Rule Book 2025

Bloemfontein, Qwaqwa and South Campuses

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VISION 130
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UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS
NATURAL AND AGRICULTURAL SCIENCES

FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

RULE BOOK 2025

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA
UFS

Content

1. USING THE RULE BOOK

The Rule Book contains information that will enable students to plan their undergraduate as well as postgraduate studies in the Faculty of Natural and Agricultural Sciences, University of the Free State (UFS). The information can be divided into three sections, namely general administrative information, academic learning programmes and module content.

In the first section students will find:

- Contact details of the academic administration officials in the Dean's office and at the student administration in the George du Toit Administration Building.
- Contact details of the different programme directors where students can get academic advice and assistance when choosing an appropriate learning programme.
- Qualification types, the structure and the constitution of the qualifications.
- Core competencies for graduates.

The second section consists of:

- Faculty rules.
- Qualifications offered by the Faculty.
- Learning programmes for different qualifications.
- Transitional Rules.

The third section contains module content information:

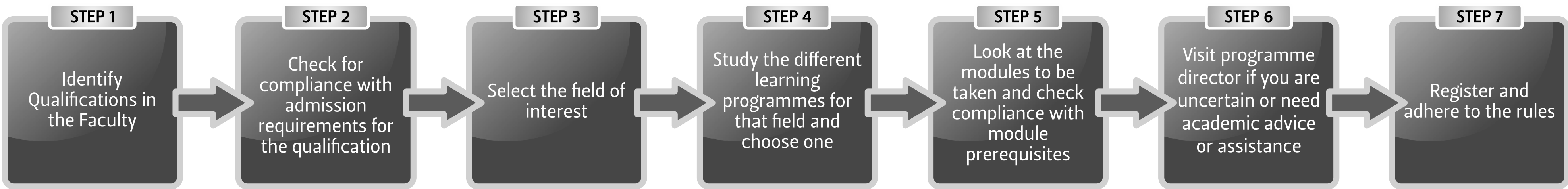
- Department in which modules are offered.
- Module code, NQF Level, number of credits and Classification of Educational Subject Matter (CESM) categories.
- Prerequisites, module name and contact sessions.
- Content of the module and the method of assessment.

The Rule Book describes students' rights and obligations. The academic programmes must be regarded as part of the agreement between the Faculty and the students. Students registering for a programme in the Faculty must adhere to the GENERAL ACADEMIC RULES AND REGULATIONS (General Academic Rules) as well as the Rules of the Faculty of Natural and Agricultural Sciences. Students will only be allowed if space is available to register if they comply with all the admission requirements.

It is important to note that even though the outcomes of academic programmes

will remain unchanged from the first time of registration, changes to learning programmes, modules and module content may occur so that the Faculty of Natural and Agricultural Sciences can ensure the relevance of the degrees. Students must therefore consult the new Rule Book every academic year before registration to ensure alignment with updated curricula, as the Faculty updates the Rule Book to keep abreast of the latest scientific developments as well as national directives. It is the student's **responsibility** to be fully conversant with these rules.

Students need to follow these steps when determining the modules for which they have to register:



2. ACADEMIC MANAGEMENT

2.1 OFFICE OF THE DEAN

DEAN

Prof P.J. Oberholster

Office of the Dean:
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T: +27 51 401 2482

E: OberholsterPJ@ufs.ac.za

VICE-DEAN:
RESEARCH AND POSTGRADUATE STUDIES

Prof S.A. Adelabu

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VICE-DEAN:
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Prof J.A. van Niekerk

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VICE-DEAN:
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Prof L. Herselman

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FACULTY MANAGER

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2.2 ACADEMIC HEADS OF DEPARTMENTS

AGRICULTURAL ECONOMICS
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Prof H. Jordaan

ANIMAL SCIENCE
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Prof F.W.C. Neser

ARCHITECTURE
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Prof J. Noble

CENTRE FOR ENVIRONMENTAL MANAGEMENT
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Prof O.O. Ololade (Acting)

CHEMISTRY
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Prof H.G. Visser

COMPUTER SCIENCE AND INFORMATICS
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Prof J.E. Kotzé

DIMTEC
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Prof A.A. Ogundeji

ENGINEERING SCIENCES
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L.F. Lagrange

GENETICS
+27 51 401 9680
Prof J.P. Grobler

GEOGRAPHY
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Prof S. Adelabu

GEOLOGY
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Prof B. Yibas

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F.F. Koning

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Dr C. Venter

MICROBIOLOGY AND BIOCHEMISTRY
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Prof J.Albertyn

PHYSICS
+27 51 401 2321
Prof J.J. Terblans

PLANT SCIENCES +27 51 401 9100
Prof A. Minnaar-Ontong

QUANTITY SURVEYING AND CONSTRUCTION MANAGEMENT
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Dr C Amoah (Acting)

SOIL, CROP AND CLIMATE SCIENCES
+27 51 401 2212
Prof A.C. Franke

SUSTAINABLE FOOD SYSTEMS AND DEVELOPMENT
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Prof J.A. van Niekerk

URBAN AND REGIONAL PLANNING
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Dr K.S. Mocwagae

ZOOLOGY AND ENTOMOLOGY
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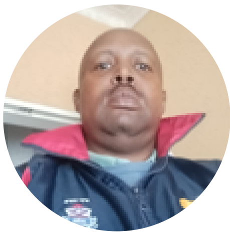
Prof L.L. van As

2.3 QWAQWA SUBJECT HEADS



CHEMISTRY
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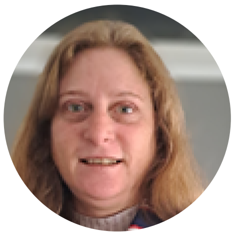
M.B. Mase



GEOGRAPHY
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MATHEMATICS AND APPLIED MATHEMATICS
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Prof S.L. Steenhuisen

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Vacant

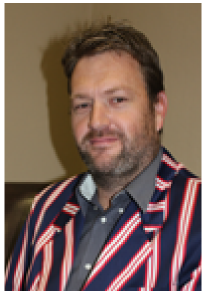
2.4 ACADEMIC ADMINISTRATION – BLOEMFONTEIN CAMPUS

POSITION	MARKETING MANAGER	PERSONAL ASSISTANT TO THE FACULTY MANAGER	PERSONAL ASSISTANT TO THE LEARNING & TEACHING MANAGER	BUSINESS ANALYST ADMISSIONS	ACADEMIC ADMINISTRATION COORDINATOR
Name	E. van den Berg 	H.J. White 	R. Visagie 	T. Kototsi 	M. Barnard 
Buildiing	Room 9A, Biology Building	Room 9A, Biology Building	Room 9A, Biology Building	Room 6, Biology Building	Room 8B, Biology Building
Telephone Number	+27 51 401 2531	+27 51 401 3236	+27 51 401 3855	+27 51 401 3365	+27 51 401 9726
E-mail	vdberge@ufs.ac.za	WhiteHJ@ufs.ac.za	VisagieR@ufs.ac.za	KototsiT@ufs.ac.za	BarnardM2@ufs.ac.za

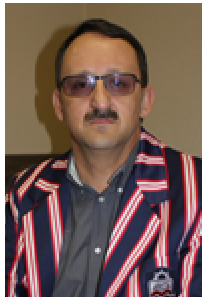
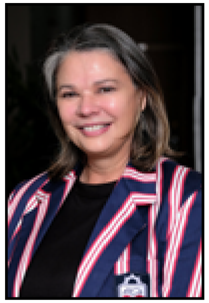
3. PROGRAMME DIRECTORS

3.1 PROGRAMME DIRECTORS – BLOEMFONTEIN CAMPUS

PROGRAMME	AGRICULTURAL SCIENCES: AGRICULTURAL ECONOMICS	ANIMAL SCIENCE	SOIL CROP AND CLIMATE SCIENCES	EXTENDED AND AGRICULTURAL SCIENCES	DISASTER MANAGEMENT	ARCHITECTURE
Name	Dr W.A. Lombard 	Dr H.A. O'Neill 	Dr E Van der Watt 	E.S. Jacobs 	Prof A. Ncube 	J.L. du Preez 
Building	Room 1.129. , Agriculture Building	Room 10A, Agriculture Building	LG1.230, Agriculture Building	Room G19.1, Agriculture Building	Room LG3.105, Agriculture Building	Room 26 ARG105, Architecture Building
Telephone Nr	+27 51 401 3109	+27 51 401 2827	+27 51 401 2388	+27 51 401 3726	+27 51 401 9701	+27 51 401 2332
E-mail	ageconpd@ufs.ac.za	ONeillHA@ufs.ac.za	PDSCCS@ufs.ac.za	jacobses@ufs.ac.za	NcubeA@ufs.ac.za	dPreezJL@ufs.ac.za

PROGRAMME	BOTANY, PLANT BREEDING, PLANT HEALTH ECOLOGY, PLANT PATHOLOGY	COMPUTER SCIENCE & INFORMATICS	SUSTAINABLE FOOD SYSTEMS AND DEVELOPMENT	ENVIRONMENTAL MANAGEMENT	FORENSIC SCIENCE	GENETICS AND BEHAVIORAL GENETICS
Name	Dr A. van Biljon 	J. Marais 	Dr I. van der Merwe 	Dr M.F. Avenant 	Dr K. Ehlers 	Dr G. Marx 
Building	Room LG4.108 Agriculture Building	Room 212, Mathematical Sciences Building	Room LG 1G 19.8, Agriculture Building	Room LG10.103, Agriculture Building	Room BL.169, Biology Building	Room BL.169, Biology Building
Telephone Nr	+27 51 401 9568	+27 51 401 2929	+27 51 401 2598	+27 51 401 2863	+27 51 401 3978	+27 51 401 3974
E-mail	PlantPD@ufs.ac.za	CSI@ufs.ac.za	IvdMerwe@ufs.ac.za	AvenantMF@ufs.ac.za	EhlersK@ufs.ac.za	geneticsPD@ufs.ac.za

PROGRAMME	BIOCHEMISTRY AND MICROBIOLOGY	GEOHYDROLOGY	MATHEMATICAL SCIENCES	MATHEMATICAL STATISTICS AND ACTUARIAL SCIENCE	GEOGRAPHY	GEOLOGY
Name	Dr F.H. O'Neill 	Dr P.J.H. Lourens 	Dr. E. Ngounda 	J. Blomerus 	Dr A. van der Walt 	Dr J. Keet 
Building	Room A7, Microbiology and Biochemistry Building	Room 21, Institute for Groundwater studies (IGS)	Room WWG116, Mathematical Sciences Building	Room W4, Mathematical Sciences West Block	Office no: 2.11 Geography Building	Office no: GG305 Geology Building
Telephone Nr	+27 51 401 7553	+27 51 401 2840	+27 51 401 2329	+27 51 401 9610	+27 51 401 9653	+27 51 401 2373
E-mail	oneillFH@ufs.ac.za	lourenspjh@ufs.ac.z	mathsinfo@ufs.ac.za	StatsAct@ufs.ac.za.	GeographyBFNPD@ufs.ac.za	BeukesJ@ufs.ac.za

PROGRAMME	PHYSICS, CHEMISTRY	QUANTITY SURVEYING AND CONSTRUCTION MANAGEMENT	URBAN AND REGIONAL PLANNING	EXTENDED NATURAL SCIENCES	EXTENDED NATURAL SCIENCES	EXTENDED NATURAL SCIENCES	ZOOLOGY AND ENTOMOLOGY
Name	Dr R.F. Shago 	H.B. du Plessis 	Prof Y. Mashalaba 	P.J. Bothma 	Dr R. Meintjes 	Dr J. Venter 	Dr C. Jansen van Rensburg 
Building	Room ?, Chemistry Building	Room 7, Quantity Surveying and Construction Management	Room 79, Urban and Regional Planning	Dean's Office: Natural and Agricultural Sciences	Room 208 Chemistry Building	Room CEM101 Chemistry Building	Room D119A, Biology Building
Telephone Nr	+27 51 401 2348	+27 51 401 9624	+27 51 401 2795	+27 83 542 9995	+27 51 401 2783	+27 51401 3336	+27 51 401 9357
E-mail	ShagoRF@ufs.ac.za	duPlessisHB@ufs.ac.za	MashalabaY@ufs.ac.za	BothmaPJ@ufs.ac.za	MeintjR@ufs.ac.za	VenterJA@ufs.ac.za	JvRensC@ufs.ac.za

3.2 ACADEMIC ADMINISTRATION AND PROGRAMME DIRECTORS – QWAQWA CAMPUS

PROGRAMME	ASSISTANT DEAN QWAQWA	FACULTY OFFICER: QWAQWA	EXTENDED NATURAL SCIENCES	GEOGRAPHY AND BIOLOGICAL SCIENCES	MATHEMATICS AND COMPUTER SCIENCE AND INFORMATICS	PHYSICS, CHEMISTRY
Name	Prof A. le Roux 	D.M. Mohono 	N.W. Nyoka 	Dr. P.S. Mahasa 	H.C. Faber 	Vacant
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4. ACADEMIC STAFF

	AGRICULTURAL ECONOMICS (+27 51 401 2824)	ANIMAL SCIENCE (+27 51 401 2211)	SOIL, CROP AND CLIMATE SCIENCES (+27 51 401 2212)
Professor	Prof Y.T. Batha	***Prof F.W.C. Neser**, Prof A. Hugo	***Prof A.C. Franke**
Senior Professor			
Professors Extraordinary		Prof M.M. Scholtz	
Associate Professor	Prof B. Grové, ***Prof H. Jordaan,** Prof N. Matthews	Prof E.D. Cason, Prof F. Deacon	Prof J.J. Van Tol, Prof T. Weldeslassie , Prof G.M. Ceronio, Prof E. Kotzé
Affiliated Professor		Prof V.P Ducrocq, Prof J.P.C Greyling, Prof M.L. Makgahlela, Prof M.M. Scholtz	Prof S. Walker, Prof M. Savage, Prof C.C. du Preez, Prof C.W. van Huysteen
Affiliated Associate Professor		Prof M.D MacNiel, Prof N. Maiwashi, Prof T.L. Nedambale	Prof R. van Antwerpen
Senior Lecturer	Dr J.I.F. Henning, Dr W.A. Lombard, Dr H.N. van Niekerk	Dr M.D. Fair, Dr H.A. O'Neill, Dr O.B. Einkamerer, Dr J. Myburgh, Dr A Maqhashu	Dr J.H. Barnard, Dr G.M. Coetzer, Dr E.van der Watt, Dr W.A Tesfuhuney
Lecturers	P. Mokhatla, P. Pilane, Dr L. von Maltitz, B.D. Jammer, M.A. Monteiro	Dr A. Hattingh, Dr P.J. Malan, L. Kruger, Dr B.B. Janecke, G.C. Josling, Dr L.C. Mhlongo	L. de Wet, Dr A.S. Steyn, Dr P.C. Tharaga, Dr V.N. Mathinya, Dr L. Banda, C.C. McLean, S. Erasmus, Dr. P.F. Loke
Junior Lecturer	Z. Coka	G. Janse van Rensburg, J. Paulse-Ross	
Researcher	Dr P. Madende		
Research Associate	Dr B. Riddout, Prof A.K. Chapagain	Prof H.O. de Waal, Dr W.J. Olivier, Prof H.A. Snyman, Prof J.B. van Wyk	Dr H Fouche, Prof C.W. van Huyssteen, Prof A. Singels
Senior Researcher			
Affiliated Researcher	P. Oosthuizen, Dr F.A. Maré		

	ARCHITECTURE (+27 51 401 2332)	QUANTITY SURVEYING AND CONSTRUCTION MANAGEMENT (+27 51 401 3322)	URBAN AND REGIONAL PLANNING (+27 51 401 2486)	ENGINEERING SCIENCES (+27 51 401 3780)
Professor	***Prof J. Noble**		Emeritus Prof V.J. Nel	
Associate Professor	Prof G. Bosman, Dr T. Hardman (Adjunct), Dr J. Smith (Adjunct)	Prof K. Kajimo-Shakantu	Emeritus Prof M.M. Campbell, ***Prof. Y. Mashalaba**, Prof. A. Matamanda	
Affiliated Professor		***Prof C. Amoah**		
Senior Lecturers	Dr H. Auret, M. Bitzer, J. L. du Preez	Dr O. Akinradewo	Dr K.S. Mocwagae, Dr T. Mphambukeli, T. Stewart,	***Dr J.M. Maritz,** Dr A. Naghizadeh, L.F. Lagrange
Lecturers	M. Meyer, J. H. Nel, H. Raubenheimer, D.P.G. van der Merwe, N. Harper	P.M. Oosthuizen, M. Els, T. Bremer, H.B. du Plessis, B. du Toit, L. le Roux, C. Robbertse	A. Mgwele, .S. Rammile	S. Dladla, Z. Xelelo
Junior Lecturers	J.I. Olivier			
Research Fellow	Prof W. Peters	Prof A. Opawole, Prof T. Haupt, Prof F. Muleya	Prof I. Chirisa, Prof JJ Steyn, Dr S.Denoon-Stevens	

	CHEMISTRY (+27 51 401 9212)	COMPUTER SCIENCE AND INFORMATICS (+27 51 401 2754)	GENETICS (+27 51 401 9680)	GEOGRAPHY (+27 51 401 2255)	GEOLOGY (+27 51 401 2515)	MATHEMATICS AND APPLIED MATHEMATICS (+27 51 401 2691)	MATHEMATICAL STATISTICS AND ACTUARIAL SCIENCE (+27 51 401 2311)
Senior Professor						Prof J.H. Meyer (Emeritus Professor)	Prof M.S. Finkelstein
Research Fellow	Prof B.C.B. Bezuidenhoudt, Dr A.A. Adeniyi Prof A. Roodt Prof JC Swarts Prof J Conradie Dr R Mogale Dr A Malloum Dr KG Akpomie	Dr L. Bergh, Dr O. Oriola, Dr B.A. Senekal, Dr C. van Staden	Prof A. Kotzé	Dr R. Massey Dr A. Ramoelo Dr S. Roffe Dr R. Rapolaki ProfJ. Boardman Prof K. Chatiza	Dr H. Praekelt, Dr P.G. Meintjes, Prof W.A. van der Westhuizen, Prof W.P. Colliston, Dr W. Archer, Prof L. Jacobson, Dr M. Sadeghi Dr V.R.K. Vadapalli		Prof A. van der Merwe, Prof A. Ring
Professor	***Prof H.G. Visser** Prof V. Azov	Prof P.J. Blignaut	***Prof J.P. Grobler**		***Prof B. Yibas** Prof J. Carranza	Prof T. Vetrik	
Associate Professor	Prof K. von Eschwege, Prof L. Moskaleva, Prof E. Erasmus, Prof A. Brink, Prof J.A. Venter, Prof A. Wilhelm, Prof M. Schutte-Smith	***Prof J.E. Kotzé** Prof L. Nel, Prof T. Stott	Prof R. Rebello	***Prof S. Adelabu** Prof J.J. le Roux,	Prof F. Roelofse	Prof J. Brink	Prof A. Verster, Prof D. Chikobvu, Prof F. Correa, Prof K. Essel-Mensah, Prof M.J. von Maltitz
Affiliated Professor	Prof K.J. Swart		Prof F.E. Zachos		Prof D.E. Miller, Prof G.Germs		Prof R. Schall
Affiliated Associate Professor	Prof C.R. Dennis				Prof CDK Gauert		Prof D.A. Burger
Senior Lecturer	Dr S.L. Bonnet, Dr E.H.G. Langner, Dr C. Marais Dr E Müller Dr DV Kama		Dr K. Ehlers, Dr G.M. Marx, Dr M. Gryzenhout	Dr A.J. van der Walt, Dr L. Rudolph,	Dr H. Minnaar, Dr R. Hansen, Dr R. Muir, Dr M. Clark	Dr C.J. Budde	F.F. Koning, Dr M. Diko, ***Dr S. van der Merwe,** J. Blomerus, Dr N. Chakraborty, J.L. Voges
Researcher	Dr A Noreljaleel						
Senior Lecturer – Units	Dr D.V. Kama	J.A.S. Vieira					Dr A Neethling
Lecturer	Dr R. Shago, Dr L. Nkabiti Dr M.R. Swart	Dr B.S. Botha, Dr R.C. Fouché, W.S.J. Marais, T. Nkalai	Dr M.F. Maleka, Dr J.A. Viljoen, S. Schneider, Z. Murray, L. Wessels, T.C. Motolo	E. Kruger, Dr M. Stander, S. Sikhosana	J. Keet M.E. Moitsi, M.E. Dimmick-Touw, R. Makhadi, W.J. Nel, J. Magson	A.F. Kleynhans, ***Dr C. Venter**, Dr A. Kriel, Dr E. Ngounda, Dr E. Maritz, Dr R. Jansen, E. Swartz	E. Girmay, W. Oosthuizen, Z. Ludick, Dr M. Sjölander, Dr L. Da Silva, S. Shongwe

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Affiliated Lecturer					E. Bergh, T. Diale, K. van der Merwe, P. Viljoen, M.C.C. van der Merwe, M. Du Toit, B.F. Steenkamp, M.J. Burnet		
Junior Lecturer		C.A. Cilliers, M. Thakaso			T. Mapholi		L. Groenewald
Junior Lecturer – Units		G.D. le Roux, R.P. Phuthi					
Subject Coordinator	Dr R. Meintjes						
Academic Facilitator	Dr M. du Plessis, B. van Tonder, C. de Klerk, L. Siegert						

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			Division of Plant Pathology	Division of Botany	Division of Plant Breeding	
Senior Professor		Prof H.C. Swart, Prof P.J. Meintjes				
Professor	***Prof J.Albertyn,** Prof B.C. Viljoen, Prof C.H. Pohl-Albertyn, Prof H.G. O'Neill, Prof G.Osthoff, Prof C.J. Hugo, Prof D. Opperman, Prof O.M. Sebolai	***Prof J.J. Terblans,** Prof R.E. Kroon, Prof D.E. Motaung			Prof M.T. Labuschagne, Prof L. Herselman	***Prof L.L. van As**, Prof D. Codron
Associate Professor	Prof W.J. Goosen	Prof M.J.H. Hoffman, Prof E. Coetsee-Hugo, Prof B. van Soelen, Prof R.A. Harris	Prof W.H.P. Boshoff	Prof B. Visser	***Prof A. Minnaar-Ontong**, Prof R. van der Merwe	Prof C.R. Haddad,
Affiliated Professor	Prof F. Hollmann, Prof. J.R. Hiscock, Prof A.A. van Dijk					
Emeritus Professor	Prof R.R. Bragg, Prof M.S. Smit					
Affiliated Associate Professor	Prof A. Valverde Portal, Dr S. Bareetseng	Prof K.T. Hillie, Prof G. Mhlongo				
Senior Lecturer	Dr F.H. O'Neill, Dr C. Tolmie		Dr G.J. Marais, Dr N. Muzhinji, Dr L.A. Rothmann	Dr J. Moloi, Dr L. Mohase, Dr L. Joubert, Dr M.S. Mafa, Dr A.C. van Aardt	Dr A. van Biljon	Dr V.R. Swart, Dr N. Dube, Dr E. Netherlands, Dr C. Jansen van Rensburg, Dr L. van der Mescht

	MICROBIOLOGY AND BIOCHEMISTRY (+27 51 401 2396)	PHYSICS (+27 51 401 2321)	PLANT SCIENCES (+27 51 401 2514)			ZOOLOGY AND ENTOMOLOGY (+27 51 401 2427)
			Division of Plant Pathology	Division of Botany	Division of Plant Breeding	
Affiliated Senior Lecturer	Dr. M. Labuschagne					
Lecturer	L. Steyn, P.K. Letebele Dr W.F. van Zyl, Dr L-A. Caine-Sigeje	Dr S. Cronjé, H. Szegedi, I.P. van der Westhuizen		Dr M. Jackson, Dr D.A.Veldkornet	Dr C Steyn	Dr H.J.B. Butler, L. Heyns
Junior Lecturer						D Fourie
Research Associate	Dr C.E. Boucher		Prof Z.A. Pretorius, Prof W.J. Swart	Dr L Rossouw, Dr M Toffolo	Dr S. Ramburan, Dr N.W. Mbuma	Dr L.M. Barkhuizen, Dr L.Hugo-Coetzee, Dr Y. Marusik, Dr M.F. Bates, Dr. C. Stobie; Dr J. Botha; Dr F. Chidawanyika; Prof N. Heideman; Dr O. Uyi
Senior Researcher	Dr G. Kemp, Dr J.C. Castillo Hernandez			Prof L Scott (Mentor)		Dr Z. Khumalo, Dr. B Mans, Dr R. Pienaar, Prof L. Basson
Researcher		Dr M. Duvenhage				
Junior Researcher		L.J.B. Erasmus				

	DiMTEC (+27 51 401 2721)	SUSTAINABLE FOOD SYSTEMS AND DEVELOPMENT (+27 51 401 2572)	CENTRE FOR ENVIRONMENTAL MANAGEMENT (+27 51 401 2863)	INSTITUTE FOR GROUNDWATER STUDIES (+27 51 401 2175)
Director	***Prof A.A. Ogundeji**	***Prof J.A. van Niekerk**	***Prof O.O. Ololade (Acting)**	***Dr E. Lukas**
Professor	Prof R. Bragg	Prof C. Witthuhn		Prof A. Atangana
Associate Professor	Prof J Belle, Prof B. Grové	Prof M. de Wit, Prof J.W. Swanepoel	Prof O.O. Ololade	Prof F.D. Fourie, Prof M. Gomo
Affiliated Professors	Prof J. Szarzynski		Prof A. Turton	
Affiliated Associate Professors	Prof A. Ozuno			Prof K.T. Witthüser
Affiliated Researchers				
Senior Lecturer / Senior Researcher	Dr H. Booysen, Prof A. Ncube, Dr M Khangale	Dr C. Bothma, Dr I. van der Merwe, Dr A. du Toit	Dr S. Esterhuyse, Dr M.F. Avenant, Dr B. Nkhata	Dr S.S. De Lange
Lecturers	Dr O. Kunguma, W.F Ellis, M Serekoane, G Du Toit, Dr T.D. Raphela, V.Z. Poto, M. Joubert	Dr J.F. Vermaas, Dr N. Cronje, Dr N. Tinta, Dr A. Makamane, L Mdiya K. Green, A. Zulu, H. van der Merwe		Dr P.J.H. Lourens
Junior Lecturers	L. Nogabe, D Banyane, E. Mokhua			
Research Associates		Prof W. Oldewage-Theron, Prof S. Venter	Dr N.L. Avenant; Dr A.T. Grundling; Dr P-L. Grundling; Dr J.R. Henschel; Dr D. Jungmann; Dr T.W.D. Pinceel; Dr N.A. Rivers-Moore; Prof M.H. Solomon; Dr D.F. Thwala; Dr D.F. Toerien; Prof B.J. Van Schoenwinkel; Dr P.C. Zietsman.	

QWAQWA-CAMPUS

	CHEMISTRY (+27 58 718 5130)	COMPUTER SCIENCE AND INFORMATICS (+27 58 718 5216)	GEOGRAPHY (+27 58 718 5476)	MATHEMATICS AND APPLIED MATHEMATICS (+27 58 718 5204)
Professor				
Associate Professor		Prof T.W. Okello		
Senior Lecturer	Dr J.P. Mofokeng	Dr R.D. Wario		Dr K. Afassinou
Lecturer	T.A. Tsotetsi, Dr M.A. Malimabe, Dr M. Mngomezulu, Dr M.A. Sibeko, Dr S.J. Mkhize	A.G. Musa, ***Dr M.B. Mase**, G.J. Dollman, Dr A.A. Akinyelu	***Dr M.M. Hansen**, Dr P.S. Mahasa, N.M. Sekhele, Z. Solomon	S.P. Mbambo, ***Dr N.R. Loufouma Makala**, H.C. Faber
Affiliated Researcher			Dr V.R. Clark	
Research Fellows			Prof S. Kudo, Dr S. Schneiderbauer Dr M. Tongwane, Prof G. Mukwada	
Junior Lecturer	***R.G. Moji**	B. Sebastian, T. Lesesa		
Academic Facilitator	Ms.M. Mbongo			

	PHYSICS (+27 58 718 5302)	PLANT SCIENCES (+27 58 718 5332)	ZOOLOGY AND ENTOMOLOGY (+27 58 7185324)
Professor		Prof A.O.T. Ashafa	Prof P.J. Taylor, Prof A. le Roux
Associate Professor	Prof L.F. Koao, Prof R.O. Ocaya	***Prof S.L. Steenhuisen**,	Prof A. le Roux
Senior Lecturer	***Dr K.G. Tshabalala**	Dr R. Ngara, Dr A. Gokul	***Dr P. Voua Otomo**, Dr E. Bredenhand
Lecturer	Dr S.J. Motloung	T.R. Pitso, Dr P.J. Mojau	Dr J. van As, Dr M. van As, Dr N. Nyembe, Dr M. Ramoejane
Research Associate		Prof R.O. Moffett, Dr R.J. McKenzie, Dr K. Canavan, Dr G.D. Martin	
Academic Facilitator		S.J. Moloi	

*** Academic Departmental Head**

5. REVISED QUALIFICATION TYPES AND DEGREE CODES

Higher Education Qualifications Sub-Framework (HEQSF) contains eleven qualification types mapped on to the six levels of the National Qualifications Framework (NQF) offered by higher education institutions. Some levels have more than one qualification type. The following qualification types are presented at the Faculty of Natural and Agricultural Sciences, UFS:

UNDERGRADUATE QUALIFICATIONS				POSTGRADUATE QUALIFICATIONS			
Type of qualification	**Exit level**	**Minimum total credits**	**Credits and level**	**Type of qualification**	**Exit Level**	**Minimum total credits**	**Credits and level**
Advanced Diploma	7	120	Minimum 120 credits at Level 7	Postgraduate Diploma	8	120	Minimum 120 credits at Level 8
Bachelor's Degree	7	360	Minimum 120 credits at Level 7	Bachelor Honours Degree	8	120	Minimum 120 credits at Level 8
Professional Bachelor's Degree	8	480	Minimum 120 credits at Level 8	Master's Degree	9	180	Minimum 180 credits at Level 9
				Doctoral Degree	10	360	Minimum 360 credits at Level 10

Each of these qualifications are registered with South African Qualifications Authority (SAQA) and Department of Higher Education and Training (DHET) and are linked to a unique degree code on the Programme and Qualification Mix (PQM) of the University of the Free State.

Table 1: Degree Codes

First	Second				Third				Fourth
Faculty	**Exit level qualifier**				**Faculty specific**				
4 - Natural Sciences 5 – Agriculture Sciences	1-4 Undergraduate		5-9 Postgraduate		**Natural Sciences**				Degrees with designator 0 = old and 1 = reviewed.
	*Certificates (Higher/ Advanced)	1	*Honours degree	6	Biological Sciences	1	Computer Science and Informatics	6	
	*Diplomas (360-credits/240-credits/ Advanced)	2	*Master's degree (Course work/ Professional)	7	Mathematical Sciences	2	Consumer Science	7	
	*B-degree (360-credit)	3	*Master's degree (Dissertation)	8	Chemical and Physical Sciences	3	Agricultural Sciences	8	
	*B-degree (480-credit)	4	*Doctorate (Research)	9	Geosciences	4	Building Sciences	9	
	*Postgraduate Diploma	5	*Doctorate (Professional)	0	Agricultural Economics	5	Other	0	

6. CONSTITUTION OF QUALIFICATIONS AND PROGRAMME CODES

The majority of the Bachelor's Degrees on offer at the Faculty of Natural and Agricultural Sciences consists of three years of study. The first year of study provides stu- dents with the opportunity to develop a broad scientific foundation and students are normally required to complete eight modules (at least 120 credits per year, four mod- ules per semester). These modules serve as the foundation for specialisation in the subsequent years. In the second year of study, majors are selected (at NQF Level 6), supplemented with modules from supportive disciplines. Learning programmes provide students with the opportunity to select modules from related supportive disciplines to ensure purposeful qualifications. In the third year of study, students must specialise in two major fields of study, for example Physics and Chemistry, or Microbiology and Biochemistry, or Genetics and Botany (at NQF Exit Level 7), with a total of at least 60 credits completed for each major. Furthermore, students may also be required to complete other modules to ensure that they have the necessary knowledge and literacy required to function in a demanding academic environment. The diagram below indicates how degrees are constituted and how one qualification provides entry into a qualification at the next NQF Level.

The Bachelor's Degree (B) makes provision for four fields of study, namely:	The Bachelor of Science (BSc) and the Bachelor of Science Honours Degree make provision for seven fields of study, namely:		The Bachelor of Science in Agricultural BSc (Agriculture) Degree makes provision for four fields of study, namely:
• Architecture • Agricultural Sciences • Consumer Sciences • Computer Information Systems	• Biological Sciences • Building Sciences • Chemical and Physical Sciences	• Geosciences • Computer Science and Informatics • Mathematical Sciences	• Animal, Grassland and Wildlife Sciences • Plant Breeding and Plant Pathology • Soil, Crop and Climate Sciences

In each field of study different modules can be combined as majors. The different combinations of majors, minors and supportive modules are referred to as learning programmes. The combination of modules are known as the curriculum for the specific learning programme and must comply with the minimum credits as indicated under the heading *5. Revised Qualification Types and Degree Codes.* Each learning programme has a unique Programme Code, which refers to a qualification on the UFS PQM, accredited by the CHE, and registered with SAQA and DHET and link to a specific Degree Code.

Table 2: Programme codes

First Digit	Second Digit	Third Digit					
Campus	**Faculty**	**Exit level qualifier**					
B – Bloemfontein Q – Qwaqwa	4 – Natural Sciences 5 – Agricultural Sciences	**1-4 Undergraduate 5-9 Postgraduate**					
		Certificates (Higher/ Advanced)	1	Postgraduate Diploma	5	Master's Degree (Dissertation)	8
		Diplomas (360-credits/240-credits/ Advanced)	2	Honours Degree	6	Doctorate (Research)	9
		B-degree (360-credit)	3	Master's Degree (Course work/ Professional)	7	Doctorate (Professional)	0
		B-degree (480-credit)	4				

Fourth Digit								Fifth Digit	
Natural Sciences fields of study				**Agriculture fields of study**				**Detail qualifiers**	
Biological Sciences	1	Computer Science and Informatics	6	Animal, Grassland and Wildlife Sciences	1	Agricultural Economics	5	All degrees except the ones listed below are zero (0)	0
Mathematical Sciences	2	Consumer Science	7	Food Science	2	Agricultural Management	6		
Chemical and Physical Sciences	3	Agricultural Sciences	8	Plant Breeding and Plant Pathology	3	Agricultural Extension	7	Selection programmes with different admission requirements	1
Geosciences	4	Building Sciences	9	Soil, Crop and Climate Sciences	4				
Agricultural Economics	5	Other	0						

7. ACADEMIC PLAN CODES

The coding system links to another level, the Academic Plan Code. This code consists of eight digits. The first four digits respond directly with the first four digits of the Degree Code. The last digits link to the different degrees as follows:

(xx and yy represent the TWO different majors)

Advanced Diploma	BC4200xx	Bachelor of Science	BC54xxyy	Master's by dissertation	BC4802xx	Doctor	BC4902xx
Advanced Diploma Agric.	BC5200xx	AgricultureBachelor Honours	BC4600xx	Master's by course work	BC4703xx	Doctor of Philosophy	BC4900xx
Bachelor	BC4301xx	Bachelor of Science Honours	BC5600xx	Master of Science by dissertation	BC4800xx	Doctor of Science	BC4901xx
Bachelor of Science	BC43xxyy	Postgraduate Diploma	BC4500xx	Master of Science by course work	BC4701xx		
		Postgraduate Diploma Agric.	BC5500xx	Master of Agricultural Sciences	BC5800xx		
				Master of Agricultural Sciences Structured	BC5702xx		

Bachelor of Science Extended Degrees				**Bachelor of Science Agricultural Extended Degree**	**Bachelor of Agriculture Extended Degree**
Mathematics and Chemistry	BC4300E1	Mathematics Sciences	BC4320E2	Agricultural Sciences BC5480E1	Agriculture BC5300E1
Mathematics and Finances	BC4300E2	Actuarial Sciences	BC4324E2		
Biological Sciences	BC4310E1	Agricultural Economic	BC4350E2		
Chemical and Physical Sciences	BC4330E1	Sustainable Food Systems	BC4371E2*		
Geology	BC4340E2	Building Science	BC4390E2		
Geography	BC4341E2	Computer Information Systems	BC4365E2		
Computer Science	BC4360E1				

**If available on Programme Qualification Mix.*

The first digits that indicate the degree can include one of the two digits representing a major. The subsequent digits represent either the selected two majors, or the major and minor in the case of the Bachelor of Science Agriculture degrees, or a single speciality area in the case of Bachelor Honours, Master's and Doctoral degrees. Each subject is identified by a two-digit code as provided in the table below.

Table 3: Identification codes of different disciplines

Actuarial Science	10	Behavioural Genetics	18	Engineering Science	26	Geohydrology	34	Plant Pathology	42
Agricultural Economics	11	Biochemistry	19	Entomology	27	Geology	35	Quantity Surveying	43
Agrometeorology	12	Botany	20	Environmental Geology	28	Grassland Science	36	Soil Science	44
Agronomy	13	Chemistry	21	Food Science	29	Mathematical Statistics	37	Spatial Planning	45
Architecture	14	Computer Science and Informatics	22	Forensic Science	30	Mathematics	38	Statistics	46
Animal Science	15	Consumer Science	23	Genetics	31	Microbiology	39	Sustainable Agriculture	47
Applied Mathematics	16	Construction Management	24	Geochemistry	32	Physics	40	Urban and Regional Planning	48
Astrophysics / Astronomy	17	Disaster Management	25	Geography	33	Plant Breeding	41	Zoology	49

Table 4: Identification codes of specialisation fields

Alternative combination	00	Economics	58	Forensic Sciences Interdiciplinary	68	Mineral Resource Management	78	Risk analysis	87
Program without two majors	1-9	Environmental Geography	59	Geographical Informatics	69	Nano Sciences	79	Soil Science Interdisciplinary	88
Agricultural Engineering	51	Environmental Management	60	Human Settlements	71	Physiology	80	Wildlife	89
Agrometeorology Interdisciplinary	53	Environmental Science	62	Irrigation Management	72	Plant Breeding Interdisciplinary	81	Wildlife Management	90
Agronomy Interdisciplinary	54	Facilities Management	63	Irrigation Sciences	73	Plant Health Ecology	82	Integrated Water Management	91
Business Management	55	Finance	64	Land and Property Development Management	74	Plant Pathology Interdisciplinary	83	Tourism	92
Computer Information Systems	56	Forensic Chemistry	65	Life Sciences	75	Polymer Sciences	84	Conservation Biology	94
Ecology	57	Forensic Entomology	66	Limnology	76	Property Sciences	85	Data Science	95
Economics	58	Forensic Genetics	67	Microbiotechnology	77	Psychology	86	Horticulture	99

The curricula for the different learning programmes usually consist of three types of modules, namely compulsory, elective and required modules. Compulsory modules must be taken by all the students in the learning programme; elective modules provide students with the opportunity to select modules of interest; and required modules must be followed when a student does not comply with certain requirements. The curricula for the different learning programmes are set out from number 12.

8. STRUCTURE OF QUALIFICATIONS

COMPOSITION OF THREE AND FOUR YEAR DEGREES

The different blocks represent different modules. If the blocks have the same colour they represent the same discipline.

The different blocks represent different modules; if the blocks have the same colour they represent the same discipline.

Three year Bachelor's Degree **Exit Level 7**		**Four year Bachelor's Professional Degree** **Exit Level 8**	
YEAR		**YEAR**	
1		1	
2		2	
3		3	
4	**One year Bachelor Honours Degree** **Exit Level 8**	4	
One or Two year Master's Degree **Exit Level 9**			
Research project culminating in a dissertation		Course work and a research project culminating in a mini-dissertation	
Two year Doctoral Degree **Exit Level 10** Research project cumulating in a thesis			

MODULE CODES

Undergraduate and postgraduate modules may be presented as semester or year modules. The credits awarded to every module give an indication of the teaching and learning time and volume of work. One module credit equals 10 notional hours which include hours spent in the lecture room and on independent work and study.

A module is indicated with the code **ABCDwxyz** and this code represents the following:

ABCD Indicates the discipline

- **w**: A numeral stating the study year, for example first year = 1
- **x**: Indicate NQF Level
- **y**: An odd number indicates the first semester and an even number indicates the second semester. The numerals 0 indicates a year module
- **z**: The number multiplied by four indicate the number of credits

For example, CROP3754 indicates that it is an Agronomy module (CROP), presented during the third academic year at NQF Exit Level 7 (3), that the module is presented during the first semester (odd number 5), and represents 4x4 = 16 teaching credits (4). The numerical code for Bachelor Honours, Master's and Doctorate modules will start with a 6, 7 for structured or 8 research and 9. If the last number is 0 it indicates that the modules have either more than 36 credits or the credits are not a multiple of four.

9. CORE COMPETENCIES FOR GRADUATES

A Bachelor's or Bachelor of Science Graduate is:

Academically excellent

- Attains a strong sense of academic integrity and scholarship.
- Becomes self-motivated and self-regulated, with an ability to continuously direct his/her own learning.
- Adapts to a changing environment and becomes committed to lifelong learning.
- Accepts critical thinking and decision-making as part of the learning process.
- Attains an appropriate level of achievement in language proficiency, reading and writing, problem solving, communication and broad research activities.
- Becomes competent in information and communication technologies.
- Develops cognitive and analytical skills that are flexible and transferable through various learning experiences.

Adjusted to cultural diversity

- Acquires an understanding of the social and cultural diversity in our country.
- Learns to value and respect different cultures

An active global citizen

- Acquires an appreciation of the global perspective on his/her chosen discipline(s).
- Learns to accept social responsibilities.
- Works effectively both as a team leader and a team member.
- Takes cognissance of existing social, economic, political and environmental issues.
- Encourages the improvement and sustainability of the environment.
- Respects human rights, attaches importance to equity and values, ethics and ethical standards.

A Bachelor's or Bachelor of Science Graduate has:

Knowledge

- Integrated, comprehensive knowledge of the main areas within the two major disciplines of choice. This includes an understanding of, and an ability to apply and evaluate, the key terms, concepts, facts, principles, rules and their theories.
- Detailed knowledge of at least one area of specialisation nd how that knowledge relates to other fields, disciplines or practices.
- An understanding of contested knowledge and an ability to evaluate types of knowledge and explanations typical of the discipline.

Skills

- An understanding of a range of enquiry methods in a field, discipline or practice, and their suitability to specific investigations.
- An ability to apply a range of methods to resolve problems or introduce change within a practice.
- An ability to identify, analyse, critically reflect on and address complex problems, applying evidence-based solutions and theory-driven arguments.
- An ability to make decisions and act ethically and professionally, and the ability to justify these decisions and actions drawing on appropriate ethical values and approaches within a supported environment.
- An ability to manage processes in unfamiliar and variable contexts, recognising that problem solving is context- and system-bound, and does not occur in isolation.

Values and attitudes

- An ability to accurately identify, evaluate and address own learning needs in a self-directed manner, and facilitate collaborative learning processes.
- An ability to take full responsibility for own work, decision making and use of resources and limited accountability for the decisions and actions of others in varied or ill-defined contexts.
- An ability to develop appropriate processes of information gathering for a given context or use.
- An ability to independently validate sources of information, and evaluate and manage it.
- An ability to develop and communicate own ideas and opinions in well-structured arguments.

10. FACULTY RULES

The General Academic Rules and Regulations referred to as General Academic Rules can be found on the UFS website at www.ufs.ac.za. The General Rules of the UFS apply to this Faculty mutatis mutandis. These Rules of the UFS are, with the necessary adjustments, applicable to all the qualifications that are awarded by the Faculty of Natural and Agricultural Sciences. Rules of the Faculty of Natural and Agricultural Sciences (NAS), which specifically apply to the degree and other programmes presented in the Faculty, are equally important and relevant. Students must consult the new Rule Book of the Faculty every academic year before registration to ensure alignment with updated curricula, as the Faculty updates the Rule Book to keep abreast of the latest scientific developments. It is the student's responsibility to be conversant with these rules.

- From 2024 onwards, the following applies to examination opportunities:
  - Once admission to the examination has been granted, participation in the main mid-year examination (for first semester modules) and main end-of-year examination (for year modules and second semester modules) is compulsory.
  - Only students who:
    - as a result of justified extraordinary circumstances, are unable to write the main examination and are granted a supplementary examination (after following the prescribed process), or
    - qualify for a "supplementary examination" in terms of the UFS General Rules will be able to write a further examination on the date scheduled for the "supplementary examination".
  - The "supplementary examination" includes reassessments, improvement of marks, ad hoc examinations and special examinations.
  - Only two examinations (main and supplementary) are scheduled for each module, and no further examination opportunities will be provided. The supplementary examination exists specifically as the final examination opportunity.
  - Students who are unable to write the main examination for valid reasons (justified extraordinary circumstances) could be allowed to undertake the supplementary exam subject to approval by the Student Academic Services, with no subsequent examination opportunities provided.
  - Students who qualify for a "supplementary examination" in terms of the UFS General Rules will not be eligible to write a further "special examination".

NAS2 AND NAS3 – ENTRANCE AND PROGRESS REQUIREMENTS

UNDERGRADUATE PROGRAMMES

The Faculty offers various undergraduate qualifications in different categories including Advanced Diplomas and Extended Curriculum Programmes, Bachelor's Degrees and Professional Bachelor's Degrees.

BLOEMFONTEIN CAMPUS

Diplomas:

- Advanced Diploma in Sustainable Agriculture and Rural Development

Extended Curriculum Programmes:

- Bachelor of Agriculture
- Bachelor of Agricultural Sciences;
- Bachelor of Science (Mathematics and Chemistry)
- Bachelor of Science (Mathematics and Finances)
- Bachelor of Science with specialisation in Biological Sciences
- Bachelor of Science with specialisation in Chemical and Physical Sciences
- Bachelor of Science with specialisation in Geology
- Bachelor of Science with specialisation in Geography
- Bachelor of Science with specialisation in Information Technology
- Bachelor of Science with specialisation in Mathematics Sciences
- Bachelor of Science with specialisation in Actuarial Sciences
- Bachelor of Science with specialisation in Agricultural Economic
- Bachelor of Sustainable Food Systems
- Bachelor of Science with specialisation in Building Science
- Bachelor of Computer Information Systems

Bachelor's Degrees:

- Bachelor of Architecture
- Bachelor of Agriculture with specialisation in:

  Agricultural Economics, Agricultural Extension, Agricultural Management, Animal Production Management, Crop Production, Irrigation Management, Mixed Farming Management, Wildlife Management, Agricultural Economics;

- Bachelor of Computer Information Systems;
- Bachelor of Consumer Sciences.

Bachelor of Science with specialisation in:

- Actuarial Science
- Agricultural Economics
- Biological Sciences:

  Behavioural Genetics, Biochemistry and Botany, Biochemistry and Entomology, Biochemistry and Genetics, Biochemistry and Microbiology, Biochemistry and Physiology, Biochemistry and Statistics, Biochemistry and Zoology, Botany and Entomology, Botany and Genetics, Botany and Microbiology, Botany and Plant Breeding, Botany and Plant Pathology, Botany and Zoology, Entomology and Genetics, Entomology and Microbiology, Entomology and Zoology, Forensic Sciences, Genetics and Microbiology, Genetics and Physiology, Genetics and Zoology, Microbiology and Statistics, Microbiology and Zoology, Plant Health Ecology, Plant Health Management.

- Chemical and Physical Science:

  Chemistry and Biochemistry, Chemistry and Botany, Chemistry and Microbiology, Chemistry and Physics, Physics and Agrometeorology, Physics and Astrophysics, Physics and Engineering Subjects.

- Geosciences:

  Geo-Informatics, Geography and Environmental Sciences, Environmental Geology, Geochemistry, Geography Specialisation, Geology and Chemistry, Geology and Physics, Geology Specialisation.

- Mathematical Sciences:

  Mathematical Statistics and Statistical Sciences: Climate Science, Econometrics, Investment Sciences, Psychometrics, Statistics and Accounting, Statistics and Economics, Statistics and Psychology; Mathematics: Mathematics and Applied Mathematics, Mathematics and Chemistry, Mathematics and Mathematical Statistics, Mathematics and Physics.

Bachelor of Science in Construction Economics and Management (Residential)

Bachelor of Science in Construction Management (Compact Learning) (Last intake 2023)

Bachelor of Science in Quantity Surveying (Compact Learning) (Last intake 2023)

Bachelor of Science in Information Technology with specialisation in:

Computer Science and Business Management, Computer Science and Chemistry, Computer Science and Mathematical Statistics, Computer Science and Mathematics, Computer Science and Physics, Data Science

Professional Bachelor's Degrees:

- Bachelor of Science in Agriculture with specialisation in:

  Agrometeorology, Agronomy, Animal Sciences, Grassland Sciences, Plant Breeding, Plant Pathology, Soil Sciences, Wildlife Production.

QWAQWA CAMPUS

Extended Curriculum Programmes:

- Bachelor of Science with specialisation in Biological Sciences
- Bachelor of Science with specialisation in Chemical and Physical Sciences
- Bachelor of Science with specialisation in Geography
- Bachelor of Science in Information Technology with specialisation in Computer Science
- Bachelor of Sustainable Food Systems (from 2025)
- Bachelor of Agriculture (from 2025)

Bachelor's Degrees:

Bachelor of Science with specialisation in:

- Biological Sciences:
  Botany, Zoology, Life Sciences
- Chemical and Physical Sciences:
  Chemistry and Botany, Chemistry and Physics
- Geosciences:
  Environmental Geography, Geography and Life Sciences, Geography Specialisation
- Mathematical Sciences:
  Mathematics and Computer Science, Mathematics and Chemistry, Mathematics and Physics.

Bachelor of Science in Information Technology with specialisation in:
Computer Science and Management, Computer Science and Chemistry, Computer Science and Physics.

NAS 2.1 – ADMISSION REQUIREMENTS

In addition to the requirements contained in GENERAL RULES, a student has to comply with these additional Faculty requirements:

a) Students should apply for admission to the programmes listed above on the prescribed form before the closing date.

b) The following Bachelor's and Bachelor of Science Degrees require selection: Architecture, Construction Management, Forensic Sciences, Geology, Physics and Engineering Sciences and Quantity Surveying.

c) Applications to these programmes, on the prescribed form, must reach Director: Student Academic Services on or before 31 July the year before intended registration for Architecture, Quantity Surveying and Construction Management, or 30 September for the rest, the year before the intended registration. Students will be notified of preliminarily selection before the end of November, but the final selection will only be confirmed after the National Senior Certificate (NSC) or National Certificate (Vocational) (NCV) examination results are available.

d) Admission depends on Admission Point (AP) or the M Scores (MS) as well as the performance in Mathematics (M), Physical Science (PS) and Life Sciences (LS). The AP or the MS are calculated as indicated in Table 3:

e) The admission requirements in Table 4 below are a broad indication for entrance to the Faculty of Natural and Agricultural Sciences and applicable to prospective students. It is important to note that some programmes have higher requirements or the requirements are adjusted as indicated in NAS 2.2.Table 3: Values to be used for all individual or all individual NSC or NCV subjects completed to calculate AP and M Scores.

Calculation of the AP with regard to students who passed Grade 12 in 2008 onwards:

NSC or NCV Performance level for subjects	UFS Admission Point (AP)	NSC or NCV Performance level for subjects	UFS Admission Point (AP)
7 (90% – 100%)	8	4 (50% - 59%)	4
7 (80% – 89%)	7	3 (40% – 49%)	3
6 (70% – 79%)	6	2 (30% – 39%)	2
5 (60% – 69%)	5		

If the performance level in Life Orientation is 5 or above, it contributes 1 to the AP Score. If students include more than the required 7 subjects, select the best 6 to calculate the AP Score.

Calculation of the M Score with regard to students who passed Grade 12 prior to 2008:

M Scores are calculated using the symbols of the six (6) best matriculation subjects (regardless of whether they are higher or standard grade) passed in one examination.

Symbol	A	B	C	D	E	F
HG	8	7	6	5	4	3
SG	6	5	4	3	2	1

Table 4: Broad Admission requirements (These requirements must be read with Table NAS2.2)

The following is applicable to students who matriculated before or during 2007:	The following is applicable to students who completed the National Senior Certificate during or after 2008:
(i) Senior certificate with matriculation endorsement (matriculation exemption) or an equivalent qualification. (ii) A minimum MS of 32. (iii) HG = E or SG = C in an official tuition language. (iv) Mathematics HG = D or SG = B. Alternatively at least a pass mark of 60% in MATD1564 or MATD1534 or MATM1584. If STSM1614 is included in the learning programme at least a level 6 (70%) required for Mathematics. (v) Both Biology and Physical Science will be required. **Take note that not all BSc programmes require both Life and Physical Sciences. See NAS 2.2 for more detail.** (vi) Biology HG = D or SG = B and Physical Science HG = E or SG = C.	(i) NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. (ii) A minimum AP of 32, as calculated from Table 3 (iii) A performance level 4 (50%) in an official tuition language. (iv) Mathematics on level 5 (60%). Alternatively, at least a pass mark in MATD1564 or MATD1534 or MATM1584 is required. If STSM1614 is included in the learning programme a level 6 (70%) required for Mathematics. Alternatively, a pass mark of at least 80% in MATD1564 or at least 70% in MATM1584 or a pass in MATM1534 is required. (v) Both Life Science and Physical Science must be included. Take note that not all BSc programmes require both Life and Physical Sciences. See NAS 2.2 for more detail. (vi) Life Sciences level 5 (60%) and Physical Science level 5 (60%). Alternatively, at least 60% is required in the modules CHEM1552, CHEM1562, CHEM1622 and CHEM1632.

f) If students wish to transfer from other higher education institutions or another UFS Faculty's programme before they have completed their undergraduate studies they must provide evidence of their academic progress, in the form of an academic record and module content description. These records will be used to determine which modules could be recognised in the UFS prescribed curriculum and at which level the student will be placed if admission granted by the Faculty of Natural and Agricultural Sciences.

g) Students attending and passing the mathematics short courses can upgrade their mathematics marks to enable them to meet the mathematics requirements. MATD1400 to upgrade mathematical literacy, MATD1554 to upgrade mathematics level 2 and 3 and MATD1564 to upgrade mathematics level 4.

NAS 2.2 – SPECIFIC UNDERGRADUATE PROGRAMME REQUIREMENTS

Specific admission requirements:

(a) Advanced Diploma in Sustainable Agriculture and Rural Development

- A related Diploma or qualification at NQF Level 6.
- Applicants with different qualifications can be admitted if their qualifications are judged equivalent by a designated UFS panel through the Recognition of Prior Learning process. Applicants should have sound and proven experience relevant to the agricultural environment. Practical experience in agriculture and/or rural development, and appropriate prior learning are prerequisites for admission.
- This qualification is not envisaged for the individual passing directly on from the National Senior Certificate to subsequent NQF Exit Levels.

(b) BAgric extended four-year

- Requirement (i) in Table 4.
- A minimum AP of 22.
- Official tuition language with a minimum achievement level 3 (40%).
- Mathematics on performance level 2 (30%) or Mathematical Literacy at least at level 5 (60%) if the AP score is above 26.

(c) BSc extended four-year
(Bloemfontein South Campus: Biological Sciences, Chemical and Physical Sciences, Geology, Geography, Information Technology)
(Qwaqwa: Biological Sciences, Chemical and Physical Sciences, Geography)

- Requirement (i) in table 4.
- A minimum AP of 22.
- Official tuition language with a minimum achievement level 4 (50%).
- Mathematics on performance level 3 (40%).
- Life Sciences at performance level 3 (40%) or Physical Science on performance level 3 (40%).

(d) (i) BSc extended four-year
(Bloemfontein South Campus: Architecture, Mathematics Sciences, Actuarial Sciences, Agricultural Economics, Sustainable Food Systems, Building Science, Computer Information Systems)
(Qwaqwa: Information Technology with specialisation in Computer Science, Sustainable Food Systems)

- Students from this programme can only transfer to Architecture or BScQS or CM or BScMathematical Sciences if they are selected.
- Requirement (i) in table 4.
- A minimum AP of 22.
- Official tuition language with a minimum achievement level 4 (50%).
- Mathematics at performance level 3 (40%).

(ii) BSc extended four-year (Computer Science and Mathematics) (Qwaqwa only)
- Requirement (i) in table 4.
- A minimum AP of 22.
- Official tuition language with a minimum achievement level 4 (50%).
- Mathematics at performance level 3 (40%).
- If students want to major in Physics or Chemistry together with Computer Science they need to Physical Science at performance level 3 (50%)

(e) BSc (Agriculture) extended five-year

- Requirement (i) in table 4.
- A minimum AP of 24 and a performance level 4 (50%) in an official tuition language.
- Mathematics at performance level 3 (40%).
- Life Sciences or Agricultural Science at performance level 3 (40%) or Physical Science at performance level 3 (40%).

(f) BAgric (Management)

- Requirements (i), (iii) and (vii) in table 4.
- AP Score of 30.
- Mathematics at performance level 3 (40%) with TP of 30 or Mathematical Literacy at least at level 7 (80%) if the AP is 31 or above.

(g) BAgric (Agricultural Economics).

- Requirements (i)-(iii) in table 4.
- Mathematics at performance level 4 (50%).

(h) BSc with specialisation in Actuarial Science

- Requirements (i) and (iii)-(iv) in table 4.
- A minimum AP of 34.
- Mathematics at performance level 6 (70%).
- If students transfer from foundational programmes or other degree programmes they must have an average of at least 70%, and at least 65% for each individual module.

(i) BSc (Agriculture)
- Requirements (i)-(iv) in table 4.
- Two of the following three subjects: Life Sciences or Agricultural and Physical science.
- Performance level 5 (60%) for Life Sciences or Agricultural Sciences and Performance level 5 (60%) for Physical Science and Performance level 5 (60%) for Mathematics.

(j) BSc with specialisation in Agricultural Economics
- Requirements (i)-(iv) in table 4.

(k) BConSc (Consumer Sciences)
- Requirements (i)-(iii) in table 4. Mathematics at performance level 2 (at least 30%) or Mathematical Literacy at least at level 5 (80%)

(l) BArch
- A selection process takes place before admission. Applications and completed selection forms must reach the UFS before the 31 July the year before intended registration.
- A maximum number of 45 students are admitted.
- A student registered for a programme at the UFS and wishing to change to the BArch-programme, must apply online and submit completed selection forms to the department on or before 31 July the year before intended registration.
- Requirements (i)-(iii) in table 4.
- Mathematics at performance level 4 (50%).
- All information pertaining to the selection process is available on the departmental website: www.ufs.ac.za/architecture; see 'Academic Information'.
- Students will be notified of the outcome not later than the end of November of the year before intended

registration.

(m) BSc with specialisation in Biological Sciences with:

Biochemistry and Microbiology

- Students wishing to continue with MCBP2616 must take note that a maximum of 160 students will be accepted due to laboratory constraints. Students will be admitted based on academic performance.
- Students wishing to continue with BOCB2616 must take note that a maximum of 210 students will be accepted due to laboratory and equipment constraints. Students will be admitted based on academic performance.

(n) BSc with specialisation in Chemical and Physical Science

- Requirements (i)-(iv) in table 4.
- Physical Science at performance level 5 (60%) or Physical Science HG = E or SG = C.
- If Biological modules is the second major Life Sciences at performance level 5 (60%) is required.
- Please note a selection process is required for: CHEM26XX and CHEM37XX. Only 80 second year students and a maximum of 60 third year students (Bloemfontein campus) and 70 second year students and a maximum of 45 third year students for the Qwaqwa campus will be admitted owing to laboratory constraints. These students will be admitted based on academic performance. Students intending to continue with second year Chemistry should also take note that CHEM1643 do not offer that possibility.
- Students intending to register for engineering modules must take note that limited space is available.
- BSc with specialisation in Physics and Engineering Subjects:
  AP score of ≥30, Mathematics level 6 (70%) and Physical Science 5 (60%).

(o) BSc with specialisation in Forensic Sciences

- A selection process takes place before admission. A maximum number of 80 students will be admitted.
- Applications close on 30 September the year before intended registration.
- Requirements (i), (iii)-(iv) in table 4.
- A minimum AP ≥ 34 (with cumulative AP ≥ 17 for Mathematics, Life Science and Physical Science.
- No person with a criminal record will be allowed into this programme.

(p) BSc with specialisation in Geography

- Requirements (i)-(iv) in Table 4 above.
- Physical Science at performance level 5 (60%) to register for the Geo-Informatics programme.
- Life Sciences at performance level 5 (60%) is required for Environmental Sciences.

(q) BSc with specialisation in Geology *(As from 2025 this will no longer be a selection programme)*

- A selection process takes place before admission. In the first year a maximum number of 80 students will be admitted to GLGY1614 owing to laboratory constraints. In the second and third year a maximum number of 60 students will be admitted due to laboratory constraints. These students will be admitted based on academic performance.
- Students who have not passed GLGY1614; GLGY1624 and CHEM1513 will not be able to continue their studies in any of the Geology programmes.
- Applications to the BSc Geology programme, on the prescribed form, must reach the Registrar, Academic Student Services, UFS, Bloemfontein, on or before 30 September of the year before the intended registration. Students will be notified of the outcome as soon as examination results are available and no later than January.
- The selection process will be based on academic performance.
- Requirements (i)-(iv) in table 4.
- Physical Science at performance level 5 or CHEM1632+CHEM1622+CHEM1562 passed and Mathematics at performance level 5 (60%) or MATD1554 or MATD1534 passed.
- An AP of 30 or higher.

(r) BCIS

- Requirements (i)-(iii) in table 4.
- Mathematics at performance level 4 (50%).

(s) BSc (IT)

Bloemfontein

- Requirements (i)-(iii) in table 4.
- For BSc(IT) with specialisation in Data Science: Mathematics at performance level 6 (70%) and Physical Science at performance level 5 (60%) *(As from 2026 this will become a selection programme).*

- For BSc(IT) with specialisation in Computer Science and Mathematics: Mathematics at performance level 6 (70%) and Physical Science at performance level 5 (60%).
- For BSc(IT) with specialisation in Computer Science and Mathematical Statistics: Mathematics at performance level 6 (70%) and Physical Science at performance level 5 (60%).
- For BSc(IT) with specialisation in Computer Science and Chemistry: Mathematics at performance level 5 (60%) and Physical Science at performance level 5 (60%).
- For BSc(IT) with specialisation in Computer Science and Physics: Mathematics at performance level 5 (60%) and Physical Science at performance level 5 (60%).
- For BSc(IT) with specialisation in Computer Science and Business Management: Mathematics at performance level 4 (50%) and Physical Science at performance level 4 (50%) *(As from 2026 the admission requirements for this programme will increase).*

BSc (IT)

Qwaqwa

- Requirements (i)-(iii) in table 4.
- For BSc(IT) with specialisation in Computer Science and Chemistry: Mathematics at performance level 5 (60%) and Physical Science at performance level 5 (60%).
- For BSc(IT) with specialisation in Computer Science and Physics: Mathematics at performance level 5 (60%) and Physical Science at performance level 5 (60%).
- For BSc(IT) with specialisation in Computer Science and Management: Mathematics at performance level 4 (50%) and Physical Science at performance level 4 (50%) *(As from 2026 the admission requirements for this programme will increase).*

(t) BSc with specialisation in Mathematical Sciences
- Requirements (i)-(iv) in table 4.
- Mathematics at performance level 6 (70%). Alternatively, (senior students) a mark of at least 80% in MATD1564/ MATD1534 or at least 70% in MATM1584.
- If Agrometeorology or Chemistry or Physics is the second major Physical Science with a performance level of 5 (60%) is required.
- If enrolling for Applied Statistics degrees only level 5(60%) for Mathematics is required.

(u) BSc Construction Economics and Management

- Admission to the BSc (Construction Economics and Management) is subject to the Faculty of Natural and Agricultural Sciences (NAS) Rules.
- The applicants must:
  - Be in possession of a National Senior Certificate (NSC) certified with an applicable endorsement by Umalusi; or
  - Be in possession of a National Certificate (Vocational) certified with an applicable endorsement; or
  - Other than in extraordinary circumstances, take the National Benchmark Test(s).
- Attain the minimum M-score of 30 for the SC or admission point (AP) of 30 in the NSC.
- An official tuition language (English) at performance level 4 (50%).
- Mathematics at performance level 5 (60%).
- One of the following subjects: Economics; Business Studies; Accounting; or Physical Science at performance level 4 (50%).
- Admissions are subject to the available space within the programme.

(v) BSc with specialisation in Quantity Surveying and BSc with specialisation in Construction Management

- Admission to the BSc (With specialisation in Quantity Surveying or with specialisation in Construction Management) is subject to the Faculty of Natural and Agricultural Sciences (NAS) Rules.
- The applicants must:
  - Be in possession of a National Senior Certificate (NSC) certified with an applicable endorsement by Umalusi; or
  - Be in possession of a National Certificate (Vocational) certified with an applicable endorsement; or
  - An equivalent qualification.
- Attain the minimum M-score of 30 for the SC or admission point (AP) of 30 in the NSC.
- An official tuition language (English) at performance level 4 (50%).
- Mathematics at performance level 5 (60%).
- One of the following subjects: Economics; Business Studies; Accounting; or Physical Science at performance level 4 (50%) is recommended.
- Compact students must be 22 years or older and must be employed full-time in the construction sector.
- Admissions are subject to the available space within the programme.

- Under NAS 2.2 –Specific admission requirements:
- Any BSc with Mathematics as a major is missing. Add as below.

(w) BSc with specialisation in Mathematical Sciences

- Requirements (i)-(iv) in table 4.
- Mathematics at performance level 6 (70%). Alternatively, a pass mark of at least 80% in MATD1564 or at least 70% in MATM1584
- If students transfer from foundational programmes or other degree programmes, they must have an average of at least 70%, and at least 65% for each individual module.

NAS 2.3 – OTHER REQUIREMENTS:

Note to students applying for any programme in this faculty

a) Students who score in the language test, lower than the institutional set requirement (set norm), mustregister for the language module CALN1508.
b) First-time entering students with a performance level 5 in Mathematics or with a mathematics score lower than 50% will have to attend compulsory extra Mathematics tutorial classes for three hours per week.
c) First-time entering students with a performance level of 4 for Physical Science will have to attend compulsory tutorials in Chemistry and Physics if those modules are included in their curriculum.
d) Registration for extra modules has financial implications, and the extra modules do not contribute to the total number of credits required to obtain a degree.
e) Students who have registered for the extra language module and more than one additional tutorial will not be able to register for the full curriculum and will only be allowed to register for three required modules per semester as prescribed in the learning programme.

Postgraduate programmes

The Faculty offers various postgraduate qualifications including Postgraduate Diplomas, Bachelor Honours, Master's,and Doctoral Degrees.

Bloemfontein Campus

Postgraduate Diploma in:

- Disaster Management,
- Integrated Water Management,
- Sustainable Agriculture.

Bachelor Honours in:

- Architecture
- Agriculture with specialisation in:
  Agricultural Economics, Agricultural Management, Animal Production Management, Irrigation Management, Wildlife Management
- Spatial Planning, Spatial Planning (specialising in Human Settlements)
- Computer Information Systems

Bachelor of Science Honours in Agriculture with specialisation in:

Agrometeorology, Agronomy, Animal Sciences, Grassland Science, Plant Breeding, Plant Pathology, Soil Science, Wildlife.

Bachelor of Science Honours with specialisation in:

Actuarial Science, Agricultural Economics, Agrometeorology, Applied Statistics, Astrophysics, Behavioural Genetics, Biochemistry, Botany, Chemistry, Computer Science and Informatics, Data Science, Entomology, Environmental Geology, Food Science, Forensic Genetics, Genetics, Geochemistry, Geography, Geohydrology, Geoinformatics, Geology, Limnology, Mathematics and Applied Mathematics, Mathematical Statistics, Microbiology, Physics, Plant Breeding, Plant Health Ecology, Plant Pathology, Soil Science, Zoology.

Bachelor of Science Honours in Consumer Science

Bachelor of Science Honours in Construction Management

Bachelor of Science Honours in Quantity Surveying

Master's Degrees with specialisation in:

Animal Production Management, Agricultural Economics, Agricultural Management, Architecture (Research), Architecture (Professional), Architecture (Design), Disaster Management, Environmental Management, Food and Nutrition Security, Human Settlements, Irrigation Management, Land and Property Development Management, Sustainable Agriculture, Urban and Regional Planning, Urban and Regional Planning (Professional), Wildlife Management.

Master of Science with specialisation in:

Actuarial Science, Agricultural Economics, Agrometeorology, Applied Mathematics, Applied Statistics, Astrophysics, Behavioural Genetics, Biochemistry, Botany, Chemistry, Climate Change (Structured), Computer Information Systems, Computer Science and Informatics, Conservation Biology, Construction Management, Consumer Science, Data Science, Entomology, Environmental Geography, Environmental Geology, Environmental Management, Environment Sciences, Food Science, Food and Nutrition Security, Forensic Genetics, Forensic Sciences, Forensic Sciences Interdisciplinary, Genetics, Geochemistry, Geography, Geohydrology, Geo-Informatics, Geology, Grassland Science, Integrated Water Management, Limnology, Mathematics, Mathematical Statistics, Microbial Biotechnology, Microbiology, Mineral Resource Management, Nano Science, Physics, Plant Breeding, Plant Breeding Interdisciplinary, Plant Health Ecology, Plant Pathology, Plant Pathology Interdisciplinary, Polymer Science, Property Science, Quantity Surveying, Risk Analysis, Soil Science, Zoology.

Master of Science with specialisation in:

Specialising in Climate Change

Master of Science in Agriculture with specialisation in:

Agrometeorology, Agrometeorology Interdisciplinary, Agronomy, Agronomy Interdisciplinary, Animal Sciences, Food Science, Grassland Science, Plant Breeding, Plant Breeding Interdisciplinary, Plant Pathology, Plant Pathology Interdisciplinary, Soil Science, Soil Science Interdisciplinary, Wildlife.

Doctoral Degrees with specialisation in:

Actuarial Science, Animal Production Management, Architecture, Architecture with Design, Agricultural Economics, Agricultural Management, Agrometeorology, Agrometeorology Interdisciplinary, Agronomy, Agronomy Interdisciplinary, Animal Production, Animal Science, Astrophysics, Applied Mathematics, Applied Statistics, Behavioural Genetics, Biochemistry, Botany, Chemistry, Computer Information Systems, Computer Science and Informatics, Conservation Biology, Construction Management, Consumer Science, Data Science, Disaster Management, Environmental Management, Entomology, Environmental Geography, Environmental Geology, Food Science, Food and Nutrition Security, Forensic Genetics, Forensic Sciences, Forensic Science, Interdisciplinary, Forensic Sciences, Genetics, Geochemistry, Geo-Informatics, Geography, Geohydrology, Geology, Grassland Science, Human Settlements, Irrigation Management, Land and Property Development Management, Limnology, Mathematics, Mathematical Statistics, Microbiology, Microbial Biotechnology, Mineral Resource Management, Nanoscience, Physics, Plant Breeding, Plant Breeding Interdisciplinary, Plant Health Ecology, Plant Pathology, Plant Pathology Interdisciplinary, Polymer Science, Property Science, Quantity Surveying, Risk Analysis, Soil Science, Soil Science Interdisciplinary, Statistics, Sustainable Agriculture, Urban and Regional Planning, Wildlife, Wildlife Management, Zoology.

Doctor of Science Degrees with specialisation in:

Actuarial Science, Agrometeorology and Agrometeorology Interdisciplinary, Agronomy and Agronomy Interdisciplinary, Animal Sciences, Astrophysics, Applied Mathematics, Behavioural Genetics, Biochemistry, Botany, Chemistry, Computer Information Systems, Computer Science and Informatics, Construction Management, Consumer Science, Environmental Management, Entomology, Environmental Geology, Food Science, Forensic Genetics, Forensic Sciences, Forensic Sciences Interdisciplinary, Forensic Sciences, Genetics, Geochemistry, Geographical Information Systems Geography, Geography and Environmental Science, Geohydrology, Geology, Grassland Science, Limnology, Mathematics, Mathematical Statistics, Microbiology, Microbial Biotechnology, Mineral Resource Management, Nanoscience, Physics, Plant Breeding, Plant Breeding Interdisciplinary, Plant Health Ecology, Plant Pathology, Plant Pathology Interdisciplinary, Polymer Science, Quantity Surveying, Risk Analysis, Soil Science, Soil Science Interdisciplinary, Applied Statistics, Wildlife, Zoology.

Qwaqwa campus

Bachelor of Science Honours degree with specialisation in:

Botany, Computer Science and Informatics, Environmental Geography, Physics, Polymer Science, Zoology.

Master of Science with specialisation in:

Botany, Chemistry, Computer Science and Informatics, Environmental Geography, Geography, Mathematics, Physics, Polymer Science, Zoology.

Doctoral Degrees with specialisation in:

Botany, Chemistry, Computer Science and Informatics, Environmental Geography, Geography, Mathematics, Physics, Polymer Science, Zoology.

NAS 3.1 ADMISSION REQUIREMENTS FOR THE POSTGRADUATE DIPLOMA

In addition to the requirements contained in the GENERAL RULES, a student has to comply with the additional Faculty requirements:

(a) An applicant must have at least a minimum three-year qualification (at NQF Exit Level 7) from any applicable field of study.
(b) A minimum average of 60% must be obtained in the final year of study.
(c) The student must prove to the Academic Departmental Head that he/she has adequate knowledge to justify admission to the programme.
(d) Applicants who do not have the formal minimum requirements to be admitted, must apply through Recognition of Prior Learning.

1.	**Postgraduate Diploma in Disaster Management**	• An appropriate NQF Exit Level 7 qualification • Admission depends on previously acquired knowledge and experience in the disaster management field.
2.	**Postgraduate Diploma in Integrated Water Management**	• An appropriate NQF 7 qualification • Appropriate work experience will be an added advantage.
3.	**Postgraduate Diploma in Sustainable Agriculture**	• An appropriate NQF 7 qualification • Appropriate work experience will be an added advantage.

NAS 3.2 ADMISSION REQUIREMENTS FOR BACHELOR HONOURS DEGREES

In addition to the requirements contained in the GENERAL RULES, a student has to comply with the additional Faculty requirements:

(a) A Bachelor's Degree or equivalent NQF Exit Level 7 qualification including one of the following: BArch, BAgric, BConsSc, BSc (Information Technology), BSc with specialisation in Quantity Surveying or Construction Management and the following additional requirements per discipline.
(b) A deserving applicant in possession of a BSc degree with the required major modules may be permitted by the Academic Departmental Head and with the approval of the Dean to receive postgraduate training in Agriculture. Such a student registers for BScHons (Agriculture), during which prescribed honours modules as well as certain additional undergraduate Agriculture modules may be taken in consultation with the departmental chair.
(c) All Honours Degrees are selection courses and admission to these degrees is subject to approval of the departmental chair/Programme Director.
(d) Selection will take place when results are available. The honours programmes start on a date as determined by the relevant department. All modules in the learning programme must be successfully completed.

NAS 3.2.1 SPECIFIC PROGRAMME REQUIREMENTS FOR BACHELOR HONOURS DEGREES

In addition to the requirements contained in the GENERAL RULES, a student has to comply with the additional Faculty requirements:
(a) A Bachelor's Degree or equivalent NQF Exit Level 7 qualification (b) Appropriate work experience

1.	**Architecture**	• Application and completed selection forms with portfolio must reach the UFS before 31 July the year before intended registration. • A selection process takes place before admission. A maximum of 45 students will be admitted. • All information pertaining to the selection process is available on the departmental website: www.ufs.ac.za/architecture; see 'Academic Information'. • To be eligible for BArchHons selection, a student must have obtained a BArch degree or equivalent qualification from any other Architectural Learning Site with a collective average mark in his/her final year of 55% for the following modules or their equivalent, CONS3700, HTRC3706 as well as a subminimum of 60% for DESN3700 or its equivalent. Students who do not comply with the above prerequisite must either repeat (only once) selected module(s) or work on the recommendation of the Academic Departmental Head, in an architect's office for a year in order to be eligible for BArchHons selection the following year. • Students may be required to attend a personal interview, present a portfolio and provide verified academic records. The final discretion on whether the student can enroll for the programme will rest with the selection panel.
2.	**Actuarial Science**	• A student must have a BSc or BCom degree in Actuarial Science, as well as qualify for at least four exemptions in the modules of the Actuarial Society of South Africa, of which at least one exemption has to be for A211, A212 or A214.
3.	**Agricultural Economics**	**BScHons (Agricultural Economics)** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head. The following criteria are required: • -BSc degree in Agricultural Economics - An average mark of 65% for all undergraduate Agricultural Economics modules over the full period of the BSc degree. • Additional modules /modules may be required before admission to the BScHons study. **BAgricHons (Agricultural Economics)** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head. The following criteria are required: - BAgric or BCom degree in Agricultural Economics - An average mark of 65% for all undergraduate Agricultural Economics modules over the full period of the BAgric or BCom degree. • Additional modules / may be required before admission to the BAgricHons study.

4.	Agriculture	**Agricultural Management** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head. The following criteria are required: - BAgric degree in a field of Agricultural Management - An average mark of 60% for all undergraduate Agricultural Economics and Agricultural Management modules over the full period of the BAgric degree. • Additional modules may be required before admission to the BAgricHons study. **Animal Production Management** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head after evaluation by an Academic Advisory Committee. The following criteria are required: - BAgric degree in Animal Production Management with a minimum average of 60% - A minimum average of 65% for undergraduate Animal Production modules over the full period of the BAgric degree. - Additional module(s) may be required before admission to the BAgricHons study **Animal Science** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head. The following criteria are required: • B Sc Agric in Animal Science • An average mark of 65% for all undergraduate Agricultural Animal Science modules over the full period of the BSc Agric Animal Science degree. • Additional module /modules may be required before admission to the BSc Agric Animal Science Hons study. **Irrigation Management** • A minimum of 60% in Agricultural Engineering or equivalent at NQF 7 level. • Apart from the above mentioned requirements, the Academic Departmental Head may expect a student to complete certain additional modules. • **Wildlife Management** • A minimum of 60% in Agricultural Management and/or Agricultural Economics or equivalent modules at NQF 7 level.
5.	Agrometeorology	• A BSc degree featuring Agrometeorology at third-year (NQF 7) level. An average of 60% in undergraduate Agrometeorology modules.
6.	Agronomy	• A BSc degree featuring Agronomy at third-year (NQF 7) level. An average of 60% in undergraduate Agronomy modules.
7.	Applied Statistics or Risk Analysis	• Students must have passed MATM1534 OR MATR1544 + MATM1644 + MATM1622 OR a BC431000 degree as well as a minimum average mark of 65% in STSA2616 + STSA2626 + STSA3716 + STSA3726 or 50% in STSM3714 + STSM3734 + STSM3764 or equivalent NQF 7 level modules (The MATM requirement is inherent for STSM3714).
8.	Behavioural Genetics	• Admission into BScHons with specialisation in Behavioural Genetics is subject to selection. A minimum of 60% in Genetics at third-year (NQF 7) level or equivalent modules are required.
9.	Biochemistry	• At least 64 credits in Biochemistry at third-year (NQF 7) level. An average of 65% for all attempts at undergraduate Biochemistry modules. Preference will be given to students who graduated from the University of the Free State.
10.	Botany	• Students who did not receive their BSc Degree at the UFS, need to have achieved a combined average pass mark of 65% for at least 64 credits in their final year Botany modules. For UFS undergraduate students a minimum of 60% in Botany at third-year (NQF 7) level and in consultation with the Academic Departmental Head. Students may be required to take additional undergraduate modules **Qwaqwa**: A minimum of 60% in relevant modules at third-year (NQF7) level or equivalent modules is required. A selection process takes place before admission.
11.	Chemistry	• To be considered for BScHons in Chemistry, a student must have a BSc degree. Other prerequisites include MATM1534, plus MATM1644. An average mark of 60% in CHEM3713+CHEM3711/CHEM3701, CHEM3733+CHEM3731/CHEB3701, CHEM3723+CHEM3721 and CHEM3743+CHEM3741 or equivalent NQF Exit Level 7 modules. Students must apply for admission to the Head of Department before 30 September. Note also that the programme starts annually on 15 January.
12.	Computer Information Systems	• A Bachelor or Bachelor of Science degree in Information Systems or Computer Information Systems. • A minimum average of 65% for the relevant Computer Information Systems modules at third year (NQF 7) level. • An average mark of at least 60% for at least six undergraduate Business Management modules, but not less than 55% in each module; of which 64 credits need to be at NQF level 5 and/or NQF level 6 and 32 credits at NQF level 7.
13.	Computer Science and Informatics	• A Bachelor of Science degree in Computer Science, Informatics or Information Technology. • A minimum average of 65% for the relevant Computer Science modules at third year (NQF 7) level.
14.	Consumer Sciences	• Consumer Science or relevant NQF at Level 7 level with at least 65%.
15.	Construction Management	• A selection process takes place before admission. A maximum number of 60 students are admitted owing to classroom constraints. • Application must be submitted before or on 31 August, the year before intended registration to the Bachelor Honours programme. • Bachelor's/BSc degree in Construction Management from NQF Exit Level 7 from an accredited institution excluding BTech.

16. Data Science	• A Bachelor of Science degree in Data Science. • A minimum average of 65% for the relevant Computer/Data Science modules at third year (NQF 7) level. • Statistical Inference and Probability Theory, Linear Algebra, Programming, Data Structures, Databases and Foundational Data Science and Machine Learning Skills.
17. Entomology	• For undergraduate students a minimum of 60% in Entomology at third-year (NQF 7) level and in consultation with the Programme Director and Academic Departmental Head.
18. Food Science	• At least 64 credits in Food Science at third-year (NQF 7) level. An average of 65% in undergraduate Food Science modules.
19. Forensic Chemistry	• Admission into BScHons in Forensic Sciences is subject to selection. A minimum of 60% in relevant modules at third-year (NQF 7) level or equivalent modules are required.
20. Forensic Sciences	• Admission into BScHons in Forensic Sciences is subject to selection. A minimum of 60% in relevant modules at third-year (NQF 7) level or equivalent modules are required.
21. Genetics and Forensic Genetics	• Admission into BScHons with specialisation in Forensic Chemistry is subject to selection. A minimum of 60% in Genetics at third-year (NQF 7) level or equivalent modules are required.
22. Geography,and Environmental Sciences	• A student must achieve an average pass mark of 60% for all Geography modules (64 credits) at third-year (NQF 7) level to be admitted to the Bachelor Honours Degree. In exceptional cases the department may grant admission by virtue of an oral or written assessment in which the student displays relevant knowledge of the theory and principles of the subject. Depending on a student's academic background, additional modules may be prescribed by the department. Proof of computer literacy is a prerequisite. A student's skills in English will be assessed (Proficient performance in the TALPS Test) and if the required standard is not met, additional modules will be prescribed.
23. Geohydrology	• A BSc, BScAgriculture, BEng degree or BTech(Geology) degree. An average of 60% in the final year of a BSc degree calculated from the major subject, as well as Geology, Chemistry, and Mathematics or Statistics on first-year level is required for admission to the degree. A selection process takes place before admission. A maximum of 38 students can be admitted. Application close 30 September the year before intended registration. Repeaters will only be allowed if space is available.
24. Geology, Geochemistry and Environmental Geology	• For admission to the Bachelor Honours Degree in Geology, Geochemistry or Environmental Geology a student must achieve a combined average pass mark of 60% in four Geology modules (64 credits) at third-year (NQF 7) level (two modules in the first semester and two in the second semester, including GLGY3714 and GLGY3724 or equivalent modules). Students must complete all required NQF Exit Level 7 Geology modules in a maximum of two years. Students who have completed their Geology modules in the first attempt will be given preference.
25. Grassland Science	• Grassland Science at third-year (NQF 7) level.
26. Life Sciences	• A person must pass with an average of 60% for all third-year and second-year Life Science modules.
27. Limnology	• A BSc or BScAgriculture degree with at least one of the following as major: Biochemistry, Botany, Chemistry, Entomology, Mathematics, Microbiology, Physics, Soil Science, Zoology. • A mimimum of 60% in relevant modules at third year (NQF 7) level and in consultation with the Academic Departmental Head. • A selection process takes place before admission.
28. Mathematical Statistics	• Students must have a minimum average mark of 60% in STSA2616 + STSA2626 + STSM3764 OR STSM3714 + STSM3734 + STSM3764 or equivalent NQF 7 level modules (The MATM requirement is inherent for STSM3714). • The head of department in consultation with the Dean may exempt students from taking certain courses if they have completed a similar course in a different degree at the same NQF level.
29. Mathematics and Applied Mathematics	• At least four Mathematics and Applied Mathematics or equivalent modules, at third-year (NQF 7) level, completed with an average mark of 60%. In addition, all applicants will have to write and pass an admission examination to verify sufficient background and foundational mathematics knowledge. If necessary, students may be required to take additional undergraduate modules as supplementary prerequisites for certain Bachelor Honours modules. Proficient performance in the TALPS Test is also required before enrolment. The Academic Departmental Head grants admission and consults on the compilation of the curriculum. Students will do an oral presentation for their final selection.
30. Microbiology	• At least 64 credits in Microbiology at third-year (NQF 7) level. An average of 65% for all attempts at undergraduate Microbiology modules. • Preference will be given to students who graduated from the University of the Free State.
31. Physics	• An average mark of 60% in PHYS3714, PHYS3732, PHYS3752, PHYS3724, PHYS3742 and PHYS3762. For a Bachelor Honours Degree in Astrophysics the same pre- requisites apply as for the Bachelor Honours Degree in Physics, with the additional stipulation that students should have attained an average mark of 60% for PHYA3772, PHYA3782 and PHYA3709 as well. The Academic Departmental Head may grant permission for admission to the Bachelor Honours Degree in exceptional cases. The programme commences in middle January and students must apply for admission to the Academic Departmental Head before that date.
32. Plant Breeding	• For UFS undergraduate students a minimum average of 60% for all Plant Breeding modules or related subject field at third-year (NQF 7) level is required for Plant Breeding Honours and in consultation with the Academic Departmental Head. Students who did not receive their BSc Degree at the UFS may be required to take additional undergraduate modules based on their academic background. Students completing these bridging modules must have a 65% average for all plant breeding modules required for bridging. A selection process takes place before admission. .
33. Plant Health Ecology	• Plant Health or equivalent modules at third-year (NQF 7) level.

34. Plant Pathology	• An average of 60% for the third-year in a BSc or BScAgriculture Degree with the following as major: Plant Pathology or equivalent NQF Level 7 modules. Students may be required to take additional undergraduate courses based on their academic background.
35. Polymer Science	• A minimum of 60% average for all the Chemistry modules on third-year (NQF 7) level is required.
36. Soil Science	• A BSc degree featuring Soil Science at third-year (NQF 7) level. An average of 60% in undergraduate Soil Science modules.
37. Spatial Planning and BSPHons (specialising in Human Settlements)	• Closing date for applications is 30 September prior to intended year of registration. • An appropriate qualification at NQF Level 7 (SAQA certificate must accompany the qualification when requested), as approved by the academic programme director and an average of at least 60% in previous qualifications. • Applicants MUST write selection tests if they are considered suitable for selection. These tests will be conducted online at a pre-arranged time and date. • If a student does not entirely meet the admission requirements, the academic programme director and the Recognition of Prior Learning office, in consultation with the dean may, in meritorious cases, recommend that some concessions be made in respect of the requirements. The final decision shall rest with the dean. Supplementary courses, as determined by the head of the department, may be required, and these supplementary courses must be passed in order to complete the degree.
38. Quantity Surveying	• A selection process takes place before admission. A maximum number of 60 students are admitted owing to classroom constraints.. • Bachelor's/BSc degree in Quantity Surveying on NQF Exit Level 7 from an accredited institution excluding BTech.
39. Wildlife	• Grassland Science at third-year (NQF 7) level or equivalent modules and in consultation with the Academic Departmental Head.
40. Zoology	• A minimum of 60% in Zoology at third-year (NQF 7) level and in consultation with the Programme Director. • **Qwaqwa**: A minimum of 60% in relevant modules at third-year (NQF7) level or equivalent modules is required. A selection process takes place before admission.

NAS 3.3 ADMISSION REQUIREMENTS FOR MASTER'S DEGREES

In addition to the requirements contained in the GENERAL RULES, a student has to comply with the additional Faculty requirements:

(a) All Master's Degrees are selection programmes and admission to these degrees is subject to approval of the Academic Departmental Head.
(b) Applicants must apply for admission to the Master's Degree. Selection will take place throughout the year and results will be communicated. The Master's programmes start on a date as determined by the relevant department. Each module in the learning programmes must be successfully completed.
(c) Applicants must have an applicable Bachelor Honours Degree or equivalent NQF Exit Level 8 qualification and the additional requirements per discipline (see Reg. NAS3.4).
(d) If a student does not meet the admission requirements, the Dean, in exceptional circumstances, may, after consultation with the Academic Departmental Head, recommend to the Registrar (in the Registrar's sole discretion) that the granting of a concession with regard to the admission requirements be considered.
(e) Bachelor of Science Honours or relevant Honours Degree on NQF Exit Level 8 with an average of 60% in the exit year of the relevant degree may be recognized as meeting the minimum entry requirements for a Master's Degree programme.

NAS 3.3.1 SPECIFIC PROGRAMME REQUIREMENTS FOR MASTER'S DEGREES

1. Master of Architecture (for Professional registration)	• Application must reach the UFS before 31 July the year before intended registration. • A selection process takes place before admission. A maximum number of 45 students will be admitted. • All information pertaining to the selection process is available on the departmental website: www.ufs.ac.za/architecture; see 'Academic Information'. • To be eligible for MArch selection a student must have obtained a BArchHons degree or equivalent qualification from any other Architectural learning site with a joint average mark in his/her final year of 55% for the following modules or their equivalent: CONS6808, HURB6804 and RARC6808, as well as a subminimum of 60% for DESN6800 or its equivalent. • Students who do not comply with the above prerequisite must either repeat (only once) selected module(s) or work,on the recommendation of the Academic Departmental • Head, in an architect's office for a year in order to be eligible for MArch selection the following year. • Students may be required to attend an interview, present a portfolio and provide verified academic records. • Qualifying students must submit a research proposal as part of the selection process. • The final discretion whether the student is regarded as ready for the programme will rest with the selection panel.

2. Master of Architecture (Research / Research specialising in Design)	• Apart from the General Rules the following is applicable: • Students must have obtained either the postgraduate professional qualification, BArch or an equivalent thereof OR the BArchHons or its equivalent. • Students who are in possession of the BArchHons must prove that a Design Dissertation formed part of the requirements for the conferment of such degree. • Students who are in possession of the BArchHons must have obtained a minimum of 60% in THREE of the following modules or their equivalent: DESN6800, CONS6808, HURB6804 and RARC6808. • Qualifying students must submit a dissertation proposal as determined and communicated by the Academic Departmental Head. The final discretion whether the student can enrol for the programme will be the selection panel's.
3. Master of Agriculture	Apart from the General Rules, the following apply: • Students must convince the specific Academic Departmental Head that he/she has sufficient knowledge of the subject to be admitted to the programme. **Agricultural Management** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: • Bachelor Honours with specialisation in Agricultural Management, with a minimum average of 60%. • Proof of successful completion of: - AGMA6800 OR equivalent module for the above mentioned module. • Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. • Additional modules /modules may be required before admission to the MAgric study. • It may be required that some modules be successfully completed by the end of the first year of study for the M Agric degree as a prerequisite for registration of the second year of study for the MAgric degree. • It is required from the student to submit one (1) publishable scientific manuscript when submitting the final dissertation for examination. **Animal Production Management** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a relevant postgraduate selection committee. The following criteria are required: - Bachelor Honours Degree in Animal Production Management with a minimum average of 65%. - Proof of successful completion of the following modules: AGRI6808, AGRI6814, AGRI6834, AGRI6824, AGRI6844, AGRI6864 OR equivalent modules for the above mentioned modules. - Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. - Additional modules may be required before admission to the M.Agric Animal Production Management degree - It may be required that some modules be successfully completed by the end of the first year of study for the M.Agric Animal Production Management degree as a prerequisite for registration of the second year of study for the MAgric degree. - It is required from the student to submit one (1) publishable scientific manuscript when submitting the final dissertation for examination **Agricultural Economics** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: - Bachelor Honours Degree in Agricultural Economics, with a minimum average of 65%. - Proof of successful completion of: AGEC6815, AGEC6825, AGEC6835, AGEC6800, AGEC6845 OR equivalent modules for the above mentioned modules. - Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. - Additional modules may be required before admission to the M.Agric Agricultural Economics study. - It may be required that some modules be successfully completed by the end of the first year of study for the M.Agric Agricultural Economics degree as a prerequisitefor registration of the second year of study. - It is required from the student to submit one (1) publishable scientific article when submitting the final dissertation for examination. **Irrigation Management** • A student who wishes to enrol for the degree must have a 60% average in one of the following: - an appropriate Honours Degree degree plus applicable practical experience - the study is subject to the approval of a postgraduate selection committee and Academic Departmental Head. Approval will be based on a satisfactory study record and appropriate qualification or experience obtained.
4. Structured Master of Science in Climate Change	Apart from the General Rules, the following apply: Students musth have an honours degree, or a comparable degree at NQF level 8. - A specialisation in Agriculture, Agricultural Extension, Geography, Meteorology, Hydrology or a related discipline
5. Master of Disaster Management	Apart from the General Rules the following is applicable: • A student must in order to be admitted to this Master's programme have: - Appropriate NQF Exit Level 8 Qualification A student must prove to the Academic Departmental Head that he/she has: - adequate knowledge to justify admission to this study. - practical and/or preparatory experience which will be an added advantage. • Minimum admission requirement is PGDip or Honours at NQF level 8 in Disaster Management or related fields. An overall average of 60% and above for the entry qualification (NQF Level 8).

6.	**Master of Environmental Management**	• No new students will be enrolled for this structured Master of Environmental Management (M4001/ 4796) from 2020. This qualification is replaced by the Master of Science in Environmental Management
7.	**Master of Human Settlements**	Apart from the General Rules the following is applicable: • A student who wishes to enrol for the degree must have a 65% average in one of the following: - an applicable four-year degree plus applicable practical experience and/or applicable preparatory studies, OR - an appropriate Honours Honours Degree or a 4 year Bachelors degree e.g. MURP
8.	**Master of Land and Property Development Management**	In addition to the requirements contained in the GENERAL RULES, a student has to comply with the additional Faculty requirements: • Bachelor of Science Honours or relevant Bachelor Honours Degree on NQF Exit Level 8 with an average of 60% in the exit year of the relevant degree including at least 30 credits of research may be recognised as meeting the minimum entry requirements to this Master's Degree programme.
9.	**Master of Sustainable Agriculture**	Apart from the General Rules the following is applicable: • A student who wishes to enrol for the degree must have one of the following: - an applicable four-year degree plus applicable practical experience and/or applicable preparatory studies, OR - an applicable NQF-level 8 qualification and applicable studies, and/or practical experience. NB: The scope, nature and applicability of practical experience and preparatory study in Reg. NAS3.4 (a) and (b) above will be determined by the Director of the Centre for Sustainable Agriculture
10.	**Master of Urban and Regional Planning** (for extended research)	Apart from the General Rules the following is applicable: • A student who wishes to enrol for the degree, must have a 65% average in one of the following: - an applicable four-year degree plus applicable practical experience and/or applicable preparatory studies OR - an applicable Honours Degree, or a Bachelor Honours Degree and applicable studies, and/or practical experience.
11.	**Master of Urban and Regional Planning** (for Professional registration)	Apart from the General Rules the following is applicable: • A person may be admitted to the programme in Urban and Regional Planning if he/she is in possession of one of the following qualifications with an average pass mark of at least 65% and has the necessary academic background: Bachelor Honours in Urban Regional Planning, or a degree similar to a Bachelor Honours in Urban and Regional Planning (missing modules for the Bachelor Honours in Spatial Planning must be completed). Applicants may have to write selection tests if they are considered to be suitable for selection. These tests, and possible interviews, may be conducted on the Bloemfontein Campus, at a pre-arranged time and date. • If a students is required ti take supplementary courses, they must pass these courses in order to be awarded this degree. • The Head of department in consultation with the Dean may exempt students from taking certain courses if they have completed similar courses in ad different degree atthe same NQF level.
12.	**Master of Science**	Apart from the General Rules the following is applicable to the different fields of study: **Actuarial Science, Applied Statistics, Mathematical Statistics or Risk Analysis** • An appropriate Bachelor Honours Degree and mathematical background is required. Admission is subject to the approval of the Academic Departmental Head. **Agricultural Economics** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: - Bachelor Honours Degree in Agricultural Economics, with a minimum average of 65%. - Proof of successful completion of: AGEC6815, AGEC6825, AGEC6835, AGEC6800, AGEC6865 OR equivalent modules for the above mentioned modules. - Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. - Additional modules may be required before admission to the MSc study. - It may be required that some modules be successfully completed by the end of the first year of study for the MSc degree as a prerequisite for registration of the second year of study. - It is required from the student to submit one (1) publishable scientific manuscript when submitting the final dissertation for examination.

12. Master of Science	**Biochemistry** The following criteria are required: • A weighted average of 60% for Biochemistry honours • A 65% average for all attempts at 2nd and 3rd year Biochemistry modules with at least 64 NQF7 (3rd-year) credits in Biochemistry. • Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. **Botany** The following criteria are required: • A weighted average of 60% for Botany honours • A 65% average for NQF level 8 modules for candidates from other institutions. • Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. **Computer Information Systems** • An applicable Bachelor of Science Honours degree with a minimum average pass mark of 65% is required. **Computer Science and Informatics** • An applicable Bachelor of Science Honours degree with a minimum average pass mark of 65% is required. **Construction Management** In addition to the requirements contained in the GENERAL RULES, a student has to comply with the additional Faculty requirements: • Bachelor of Science Honours or relevant Bachelor Honours Degree on NQF Exit Level 8 including at least 30 credits of research, may be recognised as meeting the minimum entry requirements to the Master's Degree programme. • In addition to these requirements the General Rules, as well as the additional Natural and Agricultural Sciences Faculty requirements per discipline. • It is required from the student to submit one (1) publishable scientific manuscript when submitting the final dissertation for examination. **Data Science** • An applicable Bachelor of Science Honours degree with a minimum average pass mark of 65% is required. • Statistical Inference and Probability Theory, Linear Algebra, Programming, Data Structures, Databases and Advanced Data Science and Machine Learning Skills, otherwise candidates may be required to enroll for undergraduate/Honours modules to obtain the necessary skills. **Entomology** The following criteria are required: • A weighted average of 60% for Entomology honours • Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee **Environmental Management** Apart from the General Rules the following is applicable potential students need to satisfy the following requirements in order to be considered for the MSc with specialisation in Environmental Management and/or the MSc with specialisation in Integrated Water Management: • An applicable Bachelor of Science Honours degree with a minimum average pass mark of 65% is required. BSc degree (NQF level 7) and a BSc Honours degree (NQF level 8); • Any Bachelor degree (e.g. BA, BComm, etc.; NQF level 7) and a BSc Honours degree (NQF level 8); • A BSc degree (NQF level 7) and an Honours degree or a postgraduate diploma in Integrated Water management (e.g. BA Honours, etc.; NQF level 8). **Geohydrology** • An applicable Bachelor Honours Degree with a minimum average pass mark of 65% is required. • Additional coursework may be prescribed where students do not have the required background in Geohydrology. • Admission is subject to the discretion and approval of the postgraduate selection committee and the receiving of a research proposal. Appropriate work experience will be an added advantage. • In special cases admission may be allowed in consultation with the Director or Programme Director of Institute for Groundwater Studies. **Geology, Geochemistry and Environmental Geology** • An applicable BScHons degree with a minimum average pass mark of 60% is required **Integrated Water Management** Apart from the General Rules the following is applicable potential students need to satisfy the following requirements in order to be considered for the MSc with specialisation in Environmental Management and/or the MSc with specialisation in Integrated Water Management: A BSc degree (NQF level 7) and a BSc Honours degree (NQF level 8); • Any Bachelor degree (e.g. BA, BComm, etc.; NQF level 7) and a BSc Honours degree (NQF level 8); • A BSc degree (NQF level 7) and an Honours degree or a postgraduate diploma in Integrated Water management (e.g. BA Honours, etc.; NQF level 8).

12. Master of Science	**Mathematics or Applied Mathematics** • For admission to a Master's Degree in Mathematics or Applied Mathematics, the student needs Mathematics or Applied Mathematics, or the equivalent at Bachelor Honours level. In addition, all applicants will have to write and pass an admission examination to verify sufficient background and foundational mathematics knowledge. If necessary, students may be required to take additional undergraduate modules as supplementary prerequisites for certain Masters' modules. Proficient performance in the TALPS Test is required be- fore enrolment. **Microbial Biotechnology** • A student must be in possession of an Honours degree in Microbiology, Biochemistry, Biotechnology, or related disciplines. Students in possession of an Honours Degree in related disciplines (e.g. Botany, Zoology, Chemistry, Chemical Engineering) can be requested by the Programme Director to complete additional theoretical work, work assignments, and/ or modules before the dissertation is submitted for examination. • Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. Students will be registered for an MSc in Microbiology and after approval of a project proposal presented to the departmental academic staff their programme will be changed to an MSc in Microbial Biotechnology. **Microbiology** • The following criteria are required: • A weighted average of 60% for Microbiology honours. • A 65% average for all attempts at 2nd and 3rd year Microbiology modules with at least 64 NQF7 (3rd-year) credits in Microbiology. • Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. **Mineral Resource Management** • An applicable BScHons degree with a minimum average pass mark of 60% is required. A minimum of at least 2 years working experience within the Mining Industry. **Property Science** In addition to the requirements contained in the GENERAL RULES, a student has to comply with the additional Faculty requirements: • Bachelor of Science Honours or relevant Bachelor Honours Degree on NQF Exit Level 8 including at least 30 credits of research may be recognised as meeting the minimum entry requirements to the Master's Degree programme. • In addition to these requirements the General Rules, as well as the additional Natural and Agricultural Sciences Faculty requirements per discipline. • It is required from the student to submit one (1) publishable scientific manuscript when submitting the final dissertation for examination. **Quantity Surveying** In addition to the requirements contained in the GENERAL RULES, a student has to comply with the additional Faculty requirements: • Bachelor of Science Honours or relevant Bachelor Honours Degree on NQF Exit Level 8 including at least 30 credits of research may be recognised as meeting the minimum entry requirements to the Master's Degree programme. • In addition to these requirements the General Rules, as well as the additional Natural and Agricultural Sciences Faculty requirements per discipline. • It is required from the student to submit one (1) publishable scientific manuscript when submitting the final dissertation for examination. **Zoology** The following criteria are required: • A weighted average of 60% for Zoology honours. • Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee.

13.	**Master of Science in Agriculture**	Apart from the General Rules the following is applicable: • The students must provide evidence that he/she has adequate knowledge of the subject to justify admission to the study. • In the case of Agronomy, Agrometeorology Animal, Grassland Science and Food Science admission to the study is subject to the approval of a postgraduate selection committee and Academic Departmental Head. Approval will be based on a satisfactory study record and appropriate qualification, or experience obtained.Additional modules may be required before admission to the MScAgric study is granted. **M Sc Agric (Animal Science)** Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a relevant postgraduate selection committee. The following criteria are required: • BSc.Agric Degree in Animal Science with a minimum average of 60% in the final year. • A minimum average of 65% in discipline specific final year modules. • Additional module(s) and/or examination(s) may be required before admission to the MSc.Agric (Animal Science) degree. • It is required from the student to submit one (1) publishable scientific manuscript when submitting the final dissertation for examination **M Sc Agric (Food Science):** Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: • An average of 65% in second and third year Food Science modules and a weighted average of 60% in 4th year Food Science modules. At least 120 credits in Food Science at fourth-year level. **M Sc Agric (Agrometeorology, Agronomy, Soil Science)** Students must have a four year BSc Degree in Agronomy, Soil Science and Agrometeorology or an equivalent Honours Degree in Agronomy, Soil Science and Agrometeorology. Degrees in closely related fields may be considered. Prospective students must have obtained a minimum average of 60% in the final year, or must have obtained substantial professional experience since obtaining their BSc Honours degree. Additional modules may be required before admission to the Msc study is granted. Admission is also subject to availability of supervisory capacity and operational research funds.

NAS3.4 ADMISSION REQUIREMENTS FOR DOCTORAL DEGREES

In addition to the admission requirements contained in the GENERAL RULES, a student has to comply with the following additional Faculty requirements:

(a) All PhD degrees are selection programmes and admission to these degrees is subject to approval by the Academic Departmental Head.
(b) The PhD student must show that he/she has sufficient knowledge of the subject prior to admission. Students should apply for admittance to the Doctoral Degree on the prescribed form. These forms should be completed and submitted to the Academic Departmental Head.
(c) The PhD student must have a Master's Degree or equivalent NQF Exit Level 9 qualification. Master's Degrees include: MArch, MLPM, MSc, MAgric, MSc (Agriculture), MEM, MSA, MSc (Construction Management), MSc (Quantity Surveying), MURP, or MDM. The following additional requirements for specifics disciplines apply:

NAS3.4.1 SPECIFIC PROGRAMME REQUIREMENTS FOR DOCTORAL DEGREES:

1. Agricultural Economics	Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: • Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. • Additional modules may be required before admission to the PhD study. • It may be required that some modules be successfully completed by the end of the first year of study for the PhD degree as a prerequisite for registration of the second year of study for the PhD degree.
2. Agricultural Management	Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: • Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. • Additional modules may be required before admission to the PhD study. • It may be required that some modules be successfully completed by the end of the first year of study for the PhD degree as a prerequisite for registration of the second year of study for the PhD degree.
3. Botany	The following criteria are required: • Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee.
3. Data Science	• An applicable Master's degree with a minimum average pass mark of 65% is required. • Statistical Inference and Probability Theory, Linear Algebra, Programming, Data Structures, Databases and Advanced Data Science, Machine and Deep Learning Skills, otherwise candidates may be required to enroll for undergraduate/Honours/Masters modules to obtain the necessary skills.
4. Disaster Management	• In order to be admitted to the PhD, a student must be in possession of a relevant Master's Degree and specific/relevant modules in the Postgraduate Diploma in Disaster Management. Depending on the background and knowledge that the applicant has, some core disaster management modules may be required in order to equip the student with adequate disaster management knowledge. • The applicant must have an overall average of 65% and above in the research module. The applicant must also write a Concept Note.
5. Entomology	• Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee.
6. Environmental Management	• In order to comply with the admission requirements, a student must possess a Master's of Environmental Management Degree before registering for the PhD degree. Individuals holding another Master's Degree may be considered for admission, but could be required to register for additional modules. • Registration is only allowed after the research proposal was presented and approved by the research committee at the Center for Environmental Management.
7. Limnology	• In order to be admitted to the PhD, a student must be in possession of an MSc with specialisation in Limnology. • Registration is only allowed after the research proposal was presented and approved by the research committee at the Center for Environmental Management.
8. Microbial Biotechnology	• A student must be in possession of a Master's Degree in Microbiology, Biochemistry, Biotechnology or related disciplines. Students in possession of a Master's Degree in related disciplines (e.g. Botany, Zoology, Chemistry, Chemical Engineering) can be requested by the Programme Director to complete additional theoretical work, work assignments, and/or modules before the thesis is submitted for examination. Students will be registered for a PhD in Microbiology and after approval of a project proposal presented to the departmental academic staff their programme will be changed to a PhD in Microbial Biotechnology.
9. Geology/Geochemistry and Environmental Geology	• An applicable MSc with a pass mark of at least 60%.
10. Zoology	• Admission is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee.

NAS4 – PROGRESSION RULES

The NAS4 Progression Rules stipulate the minimum requirements students must meet to progress from one academic semester/year to the next academic semester/year. If a student does not adhere to one or more of the rules, the student may be academically excluded from the Faculty by the Faculty Examinations Board. Once a student receives notice of academic exclusion, the student can appeal the decision, with supporting evidence, by appealing to the Faculty Readmissions Appeal Committee for re-admission (explained in NAS4m).

UFS General Rule A14(a) stipulate that a student must complete his/her studies within the minimum prescribed study period (n) plus two (2) years. This is known as the residential period (n+2). Due to the fact that the NSFAS is only funding students for n+1 years the NAS faculty will from 2023 use n + 1 as the residential period. Most of the undergraduate programmes in this Faculty thus have a residential period of four years, except BSc Agriculture and BSc Extended Curriculum Programmes, which have a five-year residential period. The NAS4 (a - n) Progression Rules are Faculty specific and implemented to ensure that registered students have a fair chance of completing their qualifications within the residential period:

a) ***Mainstream students*** must **complete 32 mainstream credits per semester (64 credits per year)**. If a student was registered for less than a full load the student must pass at least half of the credits registered for.

The table below provides the accumulative number of credits per year to adhere to the general progression rules:

Three-year qualifications: ± 384 credits		Four-year qualification: ± 492 credits including extended programmes	
Y1	64	Y1	64
Y2	150	Y2	150
Y3	276	Y3	276
Y4	**Graduate**	Y4	396
		Y5	**Graduate**

b) Students **may repeat a module only once.** Should a student require no more than 4 modules for the year to obtain a qualification and has not exceeded the residential period, special permission may be granted by the Programme Director and Teaching and Learning Manager to repeat a module for a second time.

c) Students may not obtain a **final mark of less than 30% for more than one module per year.**

d) Students in the Faculty of Natural and Agricultural Sciences will only be allowed to repeat 9 modules in their three-year study programme or repeat 12 modules in their four-year study programme.

e) Students who must repeat modules **may not register for new modules that create timetable clashes with the repeated modules.**

f) Students must **pass all their required first year (NQF Level 5&6) modules and at least 48 of their second-year (NQF Level 6) credits in their first three years of study.**

g) Students must pass a minimum of 80 credits to be able to register for modules in a SUBSEQUENT study year of a learning programme.

h) Students **cannot register for third-year modules if any first year modules are outstanding.** This may only be done with special permission from the Programme Director and Teaching and Learning Manager if a student was previously registered for the wrong module or if it is the first attempt at the module.

j) Students who could not finish their degrees in residential time (n+1) but have a maximum of 4 modules outstanding may be allowed to register for one more year. The student must pass all the modules they are registered for each semester.

k) Students repeating modules can only register for a maximum of 64 credits per semester. Special permission may be granted by the Programme Director and Teaching and Learning Manager for adding one more module.

l) Students may only register for one additional module per semester, over and above the prescribed modules required in the learning programme. Approval will depend on the academic record of the student.

m) According to the UFS policies and regulations, students may appeal against the decision of academic exclusion by the Examinations Board of the faculty. After receiving an academic exclusion letter, a student may submit an appeal to the Faculty's Readmissions Appeals Committee using the prescribed form and following the procedures outlined in the academic exclusion letter. The student is responsible for monitoring his or her academic standing and his/her official UFS student email address (studentnumber@ufs4life.ac.za) to determine whether he/she is academically excluded. If you feel that you are at risk for breaking one or more of these rules, please keep to the following process:

STEP 1: Check your ufs4life e-mail address regularly for ANY UFS communication on your exclusion or appeal.

STEP 2: Ensure you read the exclusion letter thoroughly to see what is expected of you. Take special note of the date by which the appeal must be submitted.

STEP 3: Gather all relevant information and evidence. Ensure that the information and evidence are aligned with your motivation.

STEP 4: Submit the appeal application with evidence to the email address stated in the letter. This live link will take you to the correct email address.

STEP 5: Wait for the outcome.

STEP 6: Depending on your outcome, you will proceed as follows:

Approved: You may continue with your academic programme, given some conditions. Contact your programme director for assistance and provide them with the outcome letter as proof.

Denied: You may not continue with your academic programme in the faculty. You may request the URRT to review the decision. The information on how to go about submitting to the URRT will be in the letter. Please read the letter carefully.

IMPORTANT: You may only appeal if you have been academically excluded. Do not attempt the appeal process just because you feel at risk. Wait until you receive the communication on your ufs4life email. If you have been excluded and failed to submit your appeal application, or if both the RAC and the URRT denied your appeal, you will remain academically excluded. You can only reapply to UFS for admission after 12 months, but not more than 24 months. Example: If you were excluded on the results of 2023 and did not appeal or were denied, you will not be able to study in 2024. You can then reapply in 2024 to study in 2025.
No late appeals or URRT reviews are accepted. Please keep to the deadlines stated in the letters.

n) Students must obtain at least 45% for a semester mark to participate in the examination.

o) Students must complete their degrees in the prescribed residential period. If it becomes apparent that by the end of a student's second, third, fourth or fifth year of registration that they will not be able to complete their majors or their degree in the period left, students will be academically excluded. This will lead to academic exclusion without warning cards.

p) Students are not allowed to fail any non-mainstream developmental module. If a student does fail a developmental module, they will be academically excluded.

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NAS5 – MODULE REQUIREMENTS

(a) Students must comply with the requirements of the specific programme and specific modules. All prerequisites for modules presented in the learning programmes in the Faculty are provided in the study guides as well as the rule book at MODULE LIST WITH PREREQUISITES PER DEPARTMENT on page 105.

(b) Some modules require selection and students will only be allowed to register for that specific module after approval of the Programme Director.

(c) Students who passed Grade 12 Information Technology at performance level 5 or Computer Application Technology (CAT) at performance level 6 are exempted from CSIQ1531/CSIL1551/CSIL1511 and CSIQ1541/CSIL1561/CSIL1521.

(d) For some modules a minimum prerequisite applies. The requirement is a semester/year mark or an examination mark of 40% in the relevant module. It is indicated as, for example, Min. (BTNY2616), if BTNY2616 is the relevant module.

(e) If a co-requisite is required and the modules are taken for the first time, the module prescribed as co-requisite must be taken simultaneously with the relevant module. For example, to take GLGY2662 a student must have passed GLGY1614, GLGY1624 and CHEM1513 and take the co-requisite GLGY2626.

NAS6 – STUDENTS FROM OTHER FACULTIES

(a) Students from other faculties who register for modules in the Faculty of Natural and Agricultural Sciences must comply with the minimum regulation requirements, as set out in NAS2.1 and NAS2.2.

NAS7 – LEARNING PROGRAMME

Students have to:
- Select a learning programme.
- Follow the specific prescribed curriculum.
- Select one of the Biological Sciences, Mathematical Sciences, Chemical and Physical Science, Geosciences, Computer Science and Informatics and Computer Information Systems fields of study for BSc degrees; or Soil Crop and Climate, Animal Wildlife and Grassland or Agricultural Economics for one of BScAgriculture degrees; or Crop Production, or Animal Production fields of study for the BAgric degrees.
- Verify that all the selected modules are included in the **class and examination timetable**.
- Verify that the **prerequisites** prescribed for every module are met.

- Be aware that elective modules can be exchanged with each other, but all compulsory modules must be successfully completed.

NAS7.1 – THE SELECTION OF A LEARNING PROGRAMME

a) Students are only allowed to change to different fields of study or degrees within the Faculty at the end of their first year of study. If a student changes from one field of study to another, the total degree residential period must not exceed a maximum of five or six years, depending on the field of study.
b) Students can change within fields of study only up to the second year of study; this does not grant them permission to extend the duration of study beyond five years.
c) Students who change from one major within a complementary learning programme could have an extension on their study duration.

NAS7.2 – MINIMUM CREDIT ALLOCATION

A degree cannot be conferred if the minimum credit requirements are not met and the prescribed curriculum are not fully completed:

(a) All three-year Degrees:
If a student wants endorsement with **two majors,** at least 60 credits per major discipline at NQF Exit Level 7 is required. This only apply to specific qualifications that allow for two majors.

(b) BArch, BAgric, BConsSc, BCompInfoSys, BSc, BSc (Information Technology), BSc in Quantity Surveying or BSc in Construction Management:
A minimum of at least 120 credits on NQF Exit Level 7 must be obtained. At least 60 credits must be from one discipline and at NQF Exit Level 7. For BSc (Quantity Surveying) and BSc (Construction Management) the 60 credits at NQF Exit Level 7 will not be from one discipline.

(c) BSc Extended Curriculum Programme (four years):
A total of at least 464 credits of which at least 104 credits must be developmental modules and at least 120 credits at NQF Exit Level 7 must be obtained over four study years.

(d) BSc (Agriculture) (four years):
A total of at least 480 credits, with a maximum of 96 credits at NQF Level 5 and at least 120 credits at NQF Exit Level 8 for the degree must be obtained over four years. At least 60 credits must be from the minor discipline at NQF Exit Level 7.

(e) BSc (Agriculture) Extended Curriculum Programme (five years):
A total of at least 592 credits, of which at least 108 credits must be developmental modules, a maximum of 208 credits at NQF Level 5 and at least 120 credits at NQF Exit Level 8 must be obtained over five study years.

NAS8 – ASSESSMENT EXAMINATION AND PROMOTION

NAS8.1 – Examination and promotion system

In addition to the requirements contained in the GENERALACADEMIC RULES, a student has to comply with the supplementary Faculty requirements:

(a) The guidelines as set out in the study guide for assessment method and calculation of semester and final marks apply.

(b) The promotion system only applies to specific modules as indicated in the study guides. Students who obtain a semester mark of 70% or higher in a specific module can be promoted if the promotion system applies to the module. The module mark becomes the final mark for the module.

(c) The degree is awarded with distinction to a student who obtained a weighted average of 75% in the prescribed final year modules and if the programme was completed in the prescribed minimum study years.

NAS8.2 – ASSESSMENT FOR DEPARTMENTS OF ARCHITECTURE, AND URBAN AND REGIONAL PLANNING

(a) For most of the modules presented by the Department of Architecture, Urban and Regional Planning, assessment of the student's academic progress will take place on a continuous basis by means of assignments, tests and/or design tasks as specified in the module guide. The acknowledgment of a year/semester mark obtained will be subject to satisfactory attendance at lectures, studio periods and seminars. A final mark which will be taken as the student's examination mark will be compiled from the marks obtained in the assessments mentioned above.

(b) Modules presented by departments other than Architecture will be subject to the assessment procedure of those departments.

(c) Students in the Department of Architecture must meet the prescribed sub-minimum of 30% for all assignments and design tasks as specified in the module guides to pass a module.

(d) For the honours research report and master's mini-dissertation in the Department of Urban and Regional Planning, assessment occurs through internal assessment, which can include assignments and/ or oral presentations and/ or review of the final document by an internal reviewer. Internal assessment can contribute up to 50% of the final mark. The external assessment of the report or mini-dissertation occurs as per the requirements in the general rules, and must make up at least 50% of the final mark. To pass the report or mini-dissertation, it is necessary for the student to pass both internal and external assessment.

NAS8.3

In addition to the requirements contained in the GENERAL RULES a student has to comply with the additional Faculty requirements:

(a) To gain admission to the examination in a module in the Faculty of Natural and Agricultural Sciences, a module mark of at least 45% is required.

NAS9 – READMISSION RULES

Readmission in the Faculty of NAS is defined as an application for admission to a programme by an applicant or student who was previously admitted and enrolled to study at UFS in any undergraduate programme. The aim of the rules is to ensure alignment with the NAS progression rules (NAS4 par (a-t)) in order not to penalise or disadvantage students presently in the system. The main aim would be to facilitate progress within the normal residential period plus six months not counting the years of disruption in study. The following principles will guide the decisions:

- Previous academic performance,
- Improved academic performance at other academic institutions, if the applicant or student enrolled at another institution after they left the UFS,
- Proof of any form of rehabilitation or improved conditions in terms of mental, emotional and physical health
- At least one year of non-registration after academic exclusion – unsuccessful academic appeal
- Recognition of successfully employment of at least one or two years
- Improved financial situation
- Proof of an aptitude test

a) Students applying for re-admission must meet the current admission requirements for the specific programme they applied for.

b) Students who have failed, discontinued or have incomplete modules for more than 45% of ALL credits EVER REGISTERED at the UFS will NOT be readmitted to the faculty.

c) Students who have to register for more than TWO modules for the third time will not be readmitted.

d) If a student has already obtained a relevant undergraduate qualification with Mathematics, Chemistry or Biology in the first year, the marks obtained in those modules could be used to overrule the admission requirements related to the NCS for Mathematics, Physical Science and Life Science.

e) Students readmitted in the faculty must be able to complete the degree in the required residential period with a maximum extension of six months this implies that: (These rules apply for extended students as well but they have one extra residential year so the first year is split into two years):
   i. A student who was already registered four years at the UFS must have completed the total first and second year modules (Time to complete 18 months allowed to register for max of 128 credit per year)
   ii. A student who was already registered for three years at the UFS must have completed the total first year and at least the second year modules for one of the major subjects (Time to complete 30 months allowed to register for max of 128 credit per year)
   iii. A student who was already registered for two years must have completed at least 75% of their first year mainstream modules including the first year modules required as prerequisites for the major modules and all other developmental or required modules like UFS101, CALN1508, CSIL1511 and CSIL1561. (Time to complete 42 months allowed to register for max of 128 credit per year)
   iv. A student who was registered for only one year must have completed at least 50% of the first year mainstream modules and at least 32 credits of developmental or required modules like UFS101, CALN1508, CSIL1511 and CSIL1561. (Time to complete 54 months allowed to register for a maximum of 128 credit per year).

f) If the programme the student was registered before does not exist on the PQM any longer, the student will be readmitted to the new programme of choice and the student needs to comply with the present admission requirements for the programme.

g) If the student has successfully completed the mathematics, chemistry, physics and biology requirements for the first year of the programme they want to be readmitted in, although they do not meet the NSC admission requirements for that specific programme the student can, based on the performance in mathematics, chemistry, physics and biology be admitted to the programme.

h) NQF level 7 modules done in the past 3 years can be recognised. If the NQF level 7 modules were passed more than 3 years ago, the student will have to repeat those modules.

i) NQF level 6 modules done in the past 6 years can be recognised. If the NQF level 6 modules were passed more than 6 years ago, the student will have to repeat those modules.

j) First year modules will not have a shelf life except where differently indicated in the rulebook of the Faculty.

k) Students transferring from other universities who have not yet obtained a similar undergraduate degree have to be registered for at least 120 credits modules on NQF level 7 at the UFS.

l) Students who were denied access in a readmission application cannot appeal the decisions.

m) If a student passed less than 64 credits in his/her 1st year of study and the student did not take a break exceeding the previous two years of study, then the student is allowed to register for his/her 1st year modules for a second time. This includes incomplete modules and modules for which the student obtained less than 30%. After the 1st semester, if a student is unable to continue with any second semester modules due to failing his/her prerequisite 1st semester modules, the student should be de-registered for the second semester of UFS101 and/or CALN1508 and re-register for them in the following year along with the modules that they failed. This rule is not applicable to the BSc Extended Curriculum Programmes and University Access Programmes. This rule will overrule certain NAS9 rules if the applicant meets the requirements as set above.

n) For students from other faculties NAS9 par (m) will not apply, the student must comply with NAS4 par (a) to transfer to the NAS faculty.

o) The extended rule for the faculty will also apply to extended students dependant that they can complete their qualification within the residential period, which is mainstream time plus one year. The extended rule implies that if a student has passed all the first year modules in the first two years of study and in the third year of study failed all first semester modules which are prerequisites for the second semester modules. This student will be allowed back for 6 months with the requirement that they pass at least 64 credits in the first semester.

p) Students from other institutions (transferring students) must meet the current minimum admission requirements for the programme they applied for. Poor academic performance at the institution transferring from can also disqualify the student from being considered for admission even if the current minimum admission requirements are met.

q) Students who completed Grade 12 or equivalent prior to the year 2010 could be evaluated by the Committee with consideration to their age, therefore certain deviations could be applicable.

r) Students who were enrolled for an undergraduate qualification in the Faculty of Health Sciences who wish to transfer to the Faculty of Natural and Agricultural Sciences will only be considered if they were enrolled for a maximum of 5 years and can complete the proposed degree within 3 years (a maximum of 8 years for the previous and proposed qualification). These students will be admitted on a 6 months monitoring condition, which also entails that a studentmust not fail any of his or her majors based on the proposed qualification. Failure to comply with this rule will result in academic exclusion from the NAS faculty.

- Current students in the Faculty of Health Sciences who are academically excluded or cannot academically progress to the second semester of their current qualification can be considered for admission for the second semester for a qualification offered in the Faculty of Natural and Agricultural Sciences with provision that enrollment can only be done for second semester modules with no first semester prerequisites. This is subject to the support of a Programme Director.

s) Students who have a maximum of 4 modules outstanding in order to obtain the qualification previously enrolled for and have studied for a maximum of 5 years will be considered for readmission with the condition that their performance will be monitored per semester (6 months monitoring) in order to complete the qualification. Failure to pass all modules relevant in the first semester will lead to academic exclusion and second semester modules will be deregistered. If a student has to repeat modules completed beyond their shelf life, rule NAS 9 (h) and (i) are applicable, this then deems this rule not applicable to a student who needs to repeat modules due to the expiry of their shelf life in addition to the outstanding 4 modules.

t) A former student who previously enrolled for an incomplete programme 8 or more years ago will be considered for admission into the programme the student applied for without any recognition of the previously completed modules. This entails that admission will be based on meeting the minimum admission requirements of the programme (this is subject to all other UFS rules, selection processes and availability of space), and if admission is granted, the student will be required to register for all the modules relevant to the programme applied for even if it is a similar programme to the programme previously enrolled for 8 or more years ago or even if there are similar modules when comparing the programme the student applied for to the programme he/she was previously enrolled for. In addition, the student will be monitored on a 6 months basis (per semester) and could face possible academic exclusion if his or her academic performance is not satisfactory, as determined by the Learning and Teaching Manager.

NAS10 – ASSESSMENT RULES

a) Procedure: Irregularities in an examination/test venue

If students make themselves guilty of any misconduct during assessment the following procedures will be followed:

- The answer script(s) / optical reader card(s) from the student will be confiscated and the time of the irregularity on his/her answer book as well as the type of devise used will be recorded. A photo of the device will be taken.
- The student will be provided with another answer book / optical reader card (if applicable) without delay, and requested proceed with the examination, no extra time should be allocated. This new answer script will be marked as the only official assessment answers.
- Anything from the student that can prove that an irregularity has taken place, for possible use as evidence in a hearing will be confiscated
- At the instruction of the invigilator, the student must afterwards write a declaration of his side of the story. The invigilator must also write a report as an affidavit in the presence of the student. If possible, another staff member must be present.
- The ADH must investigate and give a written warning to the student.This information will be captured on the studentsrecord.

b) Annexure C: Attendance of contact assessment sessions

Attendance of all contact periods, and practical / tutorial sessions in the NAS is compulsory. Students are expected to have 80% attendance. If students choose not to do this, they will have to bear the consequences of their actions in terms of academic performances. Lecturers may not be required to repeat any classes because students did not attend. Students who do not attend at least 80% for practicals and / or tutorials and / or contact session and / or online assessments will get an incomplete for the module.

The NAS faculty will allow for unforeseen circumstances, e.g. sickness or other urgent obligations if a student submits an apology and proof before the lesson / tutorial / practical to the lecturer so that there is proof and reason why a student does not forfeit attendance and / or marks. If approved by the Department the student's marks will be calculated without that component with the provision that the student complies with the 80% rule.

For formal f2f semester test, students are allowed a third opportunity to write if they were ill or for any other valid reason approved by the ADH of the department, provided that the student makes prior arrangements and inform the lecturer before the test or assessment. This opportunity can only be use for one missed opportunity.

No Adhoc testing opportunities will be arranged for any student, regardless of the circumstances.

A student who is pregnant and needs absence to give birth, or due to other medical or mental health conditions is absent for more than two consecutive weeks or four weeks over the semester (with at least two weeks in between), should follow the same assessment procedure as above. For this, a maximum of two weeks in a row can be granted, otherwise students fall behind, and they will in any case not comply with the 80% attendance rule for tutorials as well as practicals. Students must catch up on their own on work lost during the two weeks. However, the NAS faculty recommends that student rather defer studies for the semester in which they are away for more than two weeks. No exceptions will be made for any conditions without the approval of the faculty management.

11. QUALIFICATIONS IN THE FACULTY

11.1 BACHELOR'S DEGREES AND DIPLOMAS		SAQA ID	MINIMUM PERIOD OF STUDY	NQF EXIT LEVEL	NUMBER OF LEARNING PROGRAMMES	ABBREVIATION
	DIPLOMA					
1	Advanced Diploma in Sustainable Agriculture and Rural Development	88703	18 months	7	1	AdvDip(ASARD)
	EXTENDED CURRICULUM PROGRAMMES – South Campus first year of study					
2	Bachelor of Agriculture Extended	8475	4 years	7	1	BAgric
3	Bachelor of Science in Agriculture Extended Curriculum Programme	8691	5 years	8	1	BSc (Agriculture)
4	Bachelor of Science Extended Curriculum Programme (Mathematics and Chemistry)	8691	4 years	7	1	BSc
5	Bachelor of Science Extended Curriculum Programme (Mathematics and Finances)	8691	4 years	7	1	BSc
	BACHELOR'S DEGREES					
1	Bachelor of Architecture	8757	3 years	7	1	BArch
2	Bachelor of Agriculture	8475	3 years	7	7	BAgric
3	Bachelor of Computer Information Systems	97412	3 years	7	1	BCompInfoSys
4	Bachelor of Sustainable Food Systems	119815	3 years	7	1	BSustainableFoodSystems
5	Bachelor of Science	35954	3 years	7	6 (68)	BSc
6	Bachelor of Science in Information Technology	35954/ 62018	3 years	7	5	BSc (Information Technology)
7	Bachelor of Science in Construction Economics and Management (Residential)	110791	3 years	7	2	BSc Construction Economics and Management
8	Bachelor of Science in Construction Management (Compact learning)	8683	4 years	7	1	BSc Construction Management
9	Bachelor of Science in Quantity Surveying (Compact learning)	8733	4 years	7	1	BSc in Quantity Surveying
10	Bachelor of Science in Agriculture	8469	4 years	8	4 (31)	BSc (Agriculture)

11.2 POSTGRADUATE DIPLOMAS, BACHELOR, HONOURS, MASTER'S AND DOCTORAL DEGREES		SAQA ID	MINIMUM PERIOD OF STUDY	NQF EXIT LEVEL	NUMBER OF LEARNING PROGRAMMES	ABBREVIATION
POSTGRADUATE DIPLOMA						
1	Postgraduate Diploma in Disaster Management	101126	1 year	8	1	PGDip (Disaster Management)
2	Postgraduate Diploma in Integrated Water Management	97157	1 year	8	1	PGDip(IWM)
3	Postgraduate Diploma in Sustainable Agriculture	101441	1 year	8	1	PGDip(SA)
BACHELOR HONOURS DEGREES						
1	Bachelor of Architecture Honours	112110	1 year	8	1	BArchHons
2	Bachelor of Agriculture Honours	112107	1 year	8	3	BAgricHons
3	Bachelor of Science Honours in Agricultural Economics	8699				
4	Bachelor of Science Honours in Consumer Science	110123	1 year	8	1	BScHons (Consumer Science)
5	Bachelor of Science Honours	8699	1 year	8	35	BScHons
6	Bachelor of Science Honours with specialisation in Construction Management (Residential/ Compact learning)	101130	1/ 2 year	8	1	BScHons with specialisation in Construction Management
7	Bachelor of Science Honours with specialisation in Quantity Surveying (Residential/Compact learning)	101131	1/ 2 year	8	1	BScHons with specialisation in Quantity Surveying
8	Bachelor of Spatial Planning Honours	50373	1 year	8	1	BSPHons
9	Bachelor of Spatial Planning Honours (specialising in Human Settlements)	50373	1 year	8	1	BSPHons (specialising in Human Settlements)
10	Bachelor of Computer Information Systems Honours	111150	1 year	8	1	
MASTER'S DEGREES						
1	Master of Architecture (Research or specialising in Design)	8917	2 years	9	1	MArch
2	Master of Architecture (Professional)	8917	1 year	9	1	MArch
3	Master of Agriculture	16969	1 year	9	1	MAgric
4	Master of Disaster Management	94673	1 years	9	1	MDM
6	Master of Human Settlements	50375	1 year	9	1	MHS
7	Master of Land and Property Development Management	16766	2 years	9	1	MLPM
8	Master of Sustainable Agriculture	99759	1 years	9	1	MSA
9	Master of Science full research	8907	2 years	9	37	MSc
10	Master of Science structured	8901				
11	Master of Science in Agriculture	114502	2 years	9	14	MSc (Agriculture)
12	Master of Urban and Regional Planning (Professional)	110990	1 year	9	1	MURP
13	Master of Urban and Regional Planning (Research)	110990	1 year	9	1	MURP
DOCTORAL DEGREES						
1	Doctor of Philosophy in Architecture	112106	2 years	10	2	PhD
2	Doctor of Philosophy	16941	2 years	10	57	PhD
3	Doctor of Science		2 years	10	50	DSc

11.3 LEARNING PROGRAMMES AND REQUIREMENTS

DIPLOMAS AND ADVANCE DIPLOMAS

CAREER	PROGRAMME (PROG) CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
UGRD	B5250	52501	BC520047	120	Advanced Diploma in Sustainable Agriculture and Rural Development	Dr I van der Merwe	A related diploma or qualification at NQF Level 6.

UNIVERSITY EXTENDED CURRICULUM PROGRAMMES

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
							AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B54E3	54801	BC5480E1	462	Bachelor of Science Agriculture	E Jacobs	27	50%	40%	40% or	40%
UGRD	B53E1	53001	BC5300E1	462	Bachelor of Agriculture	E Jacobs	27	50%	30% for Maths or 60% for Maths Lit if APS > 26.	N/A	N/A
UGRD	B43E1	43001	BC4310E1	462	Bachelor of Science with specialisation in Biological Sciences	Dr J Venter	27	50%	40%	40% or	40%
UGRD	B43E1	43001	BC4330E1	462	Bachelor of Science with specialisation in Chemical and Physical Sciences	Dr R Meintjes	27	50%	40%	40% or	40%
UGRD	B43E1	43001	BC4340E2	462	Bachelor of Science with specialisation in Geology	Dr R Meintjes	27	50%	50%	40% or	40%
UGRD	B43E1	43001	BC4341E2	462	Bachelor of Science with specialisation in Geography	Dr J Venter	27	50%	40%	40% or	40%
UGRD	B43E1	43601	BC4360E1	462	Bachelor of Science with specialisation in Information Technology	P Bothma	27	50%	40%	40%	N/A
UGRD	B43E2	43001	BC4320E2	462	Bachelor of Science with specialisation in Mathematical Sciences	P Bothma	27	50%	40%	N/A	N/A
UGRD	B43E2	43001	BC4324E2	462	Bachelor of Science with specialisation in Actuarial Sciences	P Bothma	27	50%	50%	N/A	N/A
UGRD	B43E2	43001	BC4350E2	462	Bachelor of Science with specialisation in Agricultural Economics	E Jacobs	27	50%	40%	40% or	40%
UGRD	B43E2	43001	BC4371E2	462	Bachelor of Sustainable Food Systems	Dr R Meintjes	27	50%	30% for Maths or 60% for Maths Lit if APS > 26	N/A	N/A
UGRD	B43E2	43001	BC4390E2	462	Bachelor of Science with specialisation in Building Science	P Bothma	27	50%	50%	40% or	40%
UGRD	B43E2	43610	BC4365E2	462	Bachelor of Computer Information Systems	P Bothma	27	50%	40%	N/A	N/A

BACHELOR DEGREE PROGRAMMES

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
							AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B4391	43911	BC430114	376	Bachelor of Architecture	K du Preez	30	50%	50%	N/A	N/A
UGRD	B5350	53501	BC530111	396	Bachelor of Agriculture with specialisation in Agricultural Economics	Dr W.A. Lombard	30	50%	50%	N/A	N/A
UGRD	B5300	53501	BC530147	376	Bachelor of Agriculture with specialisation in Agricultural Extension	Dr I van der Merwe	30	50%	40% of maths Lit 80% AP>31	N/A	N/A
UGRD	B5350	53501	BC530152	376	Bachelor of Agriculture Agricultural Management	Dr W.A. Lombard	30	50%		N/A	N/A
UGRD	B5300	53501	BC530101	392	Bachelor of Agriculture with specialisation in Animal Production Management	Dr A O'Neill	30	50%		N/A	N/A
UGRD	B5300	53501	BC530102	392	Bachelor of Agriculture with specialisation in Crop Production	Dr E vd Watt	30	50%		N/A	N/A
UGRD	B5300	53501	BC530103	384/388	Bachelor of Agriculture with specialisation in Mixed Farming Management	Dr W.A. Lombard	30	50%		N/A	N/A
UGRD	B5300	53501	BC530172	392	Bachelor of Agriculture with specialisation in Irrigation Management	Prof E Kotze	30	50%		N/A	N/A
UGRD	B5300	53501	BC530190	404/408	Bachelor of Agriculture with specialisation in Wildlife Management	Dr A. O'Neill	30	50%		N/A	N/A
UGRD	B4363	43610	BC430156	408	Bachelor of Computer Information Systems	J Marais	30	50%	50%	N/A	N/A
UGRD	B4371	43710	BC430123	376	Bachelor of Consumer Science	Dr I van der Merwe	30	50%	30% for Maths or 60% for Maths Lit	N/A	N/A
UGRD	B4371	43710	BC430223	384	Bachelor of Sustainable Food Systems	Dr I van der Merwe	30	50%		N/A	N/A
UGRD	B4350	43001	BC431100	412	Bachelor of Science with specialisation in Agricultural Economics	Dr W.A. Lombard	32	50%	60%	N/A	N/A
UGRD	B4310	43001	BC431920	396/404	Bachelor of Science with specialisation in Biochemistry and Botany	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC431927	396	Bachelor of Science with specialisation in Biochemistry and Entomology	Dr C Jansen van Rensburg	32	50%	60%	60%	60%
UGRD	B4310	43001	BC431931	396	Bachelor of Science with specialisation in Biochemistry and Genetics	Dr F O'Neill	32	50%	60%	60%	60%
UGRD	B4310	43001	BC431939	376	Bachelor of Science with specialisation in Biochemistry and Microbiology	Dr F O'Neill	32	50%	60%	60%	60%
UGRD	B4310	43001	BC431980	396	Bachelor of Science with specialisation in Biochemistry and Physiology	Dr F O'Neill	32	50%	60%	60%	60%
UGRD	B4310	43001	BC431946	396	Bachelor of Science with specialisation in Biochemistry and Statistics	Dr F O'Neill	32	50%	60%	60%	60%
UGRD	B4310	43001	BC431949	396	Bachelor of Science with specialisation in Biochemistry and Zoology	Dr C Jansen van Rensburg	32	50%	60%	60%	60%

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
							AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B4310	43001	BC432027	396	Bachelor of Science with specialisation in Botany and Entomology	Dr C Jansen van Rensburg	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432031	388	Bachelor of Science with specialisation in Botany and Genetics	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432039	428	Bachelor of Science with specialisation in Botany and Microbiology	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432041	404	Bachelor of Science with specialisation in Botany and Plant Breeding	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432042	416	Bachelor of Science with specialisation in Botany and Plant Pathology	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432049	404	Bachelor of Science with specialisation in Botany and Zoology	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432082	404	Bachelor of Science with specialisation in Plant Health Ecology	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432742	396	Bachelor of Science with specialisation in Plant Health Management	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432742	404	Bachelor of Science in Plant Health Management	Dr A van Biljon	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432731	388	Bachelor of Science with specialisation in Entomology and Genetics	Dr C Jansen van Rensburg	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432739	412	Bachelor of Science with specialisation in Entomology and Microbiology	Dr C Jansen van Rensburg	32	50%	60%	60%	60%
UGRD	B4310	43001	BC432749	388	Bachelor of Science with specialisation in Entomology and Zoology	Dr C Jansen van Rensburg	32	50%	60%	60%	60%
UGRD	B4311	43001	BC433031	380	Bachelor of Science with specialisation in Forensic Science	Dr K Ehlers	34	50%	Maths 60% and a cumulative score for Maths, Physical Science and Life Science > 17		
UGRD	B4310	43001	BC433118	400	Bachelor of Science with specialisation in Behavioural Genetics	Dr G Marx	32	50%	60%	60%	60%
UGRD	B4310	43001	BC433139	388	Bachelor of Science with specialisation in Genetics and Microbiology	Dr F O'Neill and Dr G Marx	32	50%	60%	60%	60%
UGRD	B4310	43001	BC433180	412	Bachelor of Science with specialisation in Genetics and Physiology	Dr G Marx	32	50%	60%	60%	60%
UGRD	B4310	43001	BC433149	396	Bachelor of Science with specialisation in Genetics and Zoology	Dr C Jansen van Rensburg	32	50%	60%	60%	60%
UGRD	B4310	43001	BC433946	412	Bachelor of Science with specialisation in Microbiology and Statistics	Dr F O'Neill	32	50%	60%	60%	60%
UGRD	B4310	43001	BC433949	412	Bachelor of Science with specialisation in Microbiology and Zoology	Dr C Jansen van Rensburg	32	50%	60%	60%	60%
UGRD	B4310	43001	BC433689	412	Bachelor of Science With specialisation in Rangeland and Wildlife Ecology	Dr A O'Neill	32	50%	60%	60%	60%

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
							AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B4393	43901	BC432401	392	Bachelor of Science in Construction Management (compact learning)	H Du Plessis	32	50%	60%	50% in one of Economics, Business Studies, Accounting or Physical Science	
UGRD	B4392	43901	BC432443	392	Bachelor of Science Construction Economics and Management	H du Plessis	32	50%	60%		
UGRD	B4393	43902	BC434301	392	Bachelor of Science in Quantity Surveying (compact learning)	H du Plessis	32	50%	60%		
UGRD	B4330	43001	BC432119	412	Bachelor of Science with specialisation in Chemistry and Biochemistry	Dr RF Shago	32	50%	60%	60%	60%
UGRD	B4330	43001	BC432120	412	Bachelor of Science with specialisation in Chemistry and Botany	Dr RF Shago	32	50%	60%	60%	60%
UGRD	B4330	43001	BC432139	412	Bachelor of Science with specialisation in Chemistry and Microbiology	Dr RF Shago	32	50%	60%	60%	60%
UGRD	B4330	43001	BC432140	380	Bachelor of Science with specialisation in Chemistry and Physics	Dr RF Shago	32	50%	60%	60%	N/A
UGRD	B4331	43001	BC434012	364	Bachelor of Science with specialisation in Physics and Agrometeorology	Dr RF Shago	32	50%	60%	60%	60%
UGRD	B4331	43001	BC434017	388	Bachelor of Science with specialisation in Physics and Astrophysics	Dr RF Shago	32	50%	70%	60%	N/A
UGRD	B4332	43001	BC434026	480	Bachelor of Science with specialisation in Physics and Engineering Subjects	Dr RF Shago	30	50%	70%	60%	N/A
UGRD	B4360	43601	BC432221	380	Bachelor of Science in Information Technology with specialisation in ComputerScience and Chemistry	J Marais	32	50%	60%	60%	N/A
UGRD	B4362	43601	BC432295	404	Bachelor of Science in Information Technology with specialisation in Data Science	J Marais	32	50%	70%	60%	N/A
UGRD	B4362	43601	BC432237	388	Bachelor of Science in Information Technology with specialisation in Computer Science and Mathematical Statistics	J Marais	32	50%	70%	60%	N/A
UGRD	B4361	43601	BC432238	388	Bachelor of Science in Information Technology with specialisation in Computer Science and Mathematics	J Marais	32	50%	70%	60%	N/A
UGRD	B4360	43601	BC432240	380	Bachelor of Science in Information Technology with specialisation in Computer Science and Physics	J Marais	32	50%	60%	60%	N/A
UGRD	B4364	43601	BC432255	380	Bachelor of Science in Information Technology with specialisation in Computer Science and Business Management	J Marais	32	50%	50%	50%	N/A
UGRD	B4340	43001	BC433362	392	Bachelor of Science with specialisation in Environmental Geography	Dr A van der Walt	32	50%	60 %	60%	60%
UGRD	B4340	43001	BC433333	392	Bachelor of Science with specialisation in Geography Specialisation	Dr A van der Walt	32	50%	60%	60%	60%
UGRD	B4341	43001	BC433521	416	Bachelor of Science with specialisation in Geology and Chemistry	Dr J Keet	32	50%	60%	60%	N/A
UGRD	B4341	43001	BC433528	400	Bachelor of Science with specialisation in Environmental Geology	Dr J Keet	32	50%	60%	60%	N/A
UGRD	B4341	43001	BC433532	400	Bachelor of Science with specialisation in Geochemistry	Dr J Keet	32	50%	60%	60%	N/A

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
							AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B4341	43001	BC433535	384	Bachelor of Science with specialisation in Geology Specialisation	Dr J Keet	32	50%	60%	60%	N/A
UGRD	B4341	43001	BC433540	400	Bachelor of Science with specialisation in Geology and Physics	Dr J Keet	32	50%	60%	60%	N/A
UGRD	B4341	43001	BC432742	396	Bachelor of Science with specialisation in Environmental Soil Science	Prof E Kotze	32	50%	60%	60%	N/A
UGRD	B4324	43001	BC431000	460	Bachelor of Science with specialisation in Actuarial Science	J Blomerus	34	50%	70%	N/A	N/A
UGRD	B4323	43001	BC433712	388	Bachelor of Science with specialisation in Climate Sciences	J Blomerus	32	50%	70%	60%	N/A
UGRD	B4322	43001	BC433758	388	Bachelor of Science with specialisation in Econometrics	J Blomerus	32	50%	70%	N/A	N/A
UGRD	B4322	43001	BC433786	388	Bachelor of Science with specialisation in Psychometrics	J Blomerus	32	50%	70%	N/A	N/A
UGRD	B4321	43001	BC433816	380	Bachelor of Science with specialisation in Mathematics and Applied Mathematics	Dr E Ngounda	32	50%	70%	60%	N/A
UGRD	B4321	43001	BC433821	366	Bachelor of Science with specialisation in Mathematics and Chemistry	Dr E Ngounda	32	50%	70%	60%	N/A
UGRD	B4321	43001	BC433837	380	Bachelor of Science with specialisation in Mathematics and Mathematical Statistics	Dr E Ngounda	32	50%	70%	60%	N/A
UGRD	B4321	43001	BC433840	380	Bachelor of Science with specialisation in Mathematics and Physics	Dr E Ngounda	32	50%	70%	60%	N/A
UGRD	B4325	43001	BC434658	384	Bachelor of Science with specialisation in Statistics and Economics	J Blomerus	32	50%	60%	N/A	N/A
UGRD	B4325	43001	BC434686	392	Bachelor of Science with specialisation in Statistics and Psychology	J Blomerus	32	50%	60%	N/A	N/A

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
							AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
PROFESSIONAL BACHELOR'S DEGREE PROGRAMMES											
UGRD	B5480	54801	BC540012	520	Bachelor of Science in Agriculture with specialisation in Agrometeorology	Prof E Kotze	32	50%	60%	50% for Physical Science or 60% for Life Science or 60% for Agricultural Sciences	
UGRD	B5480	54801	BC540013	520	Bachelor of Science in Agriculture with specialisation in Agronomy	Dr E vd Watt	32	50%	60%		
UGRD	B5480	54801	BC540015	520	Bachelor of Science in Agriculture with specialisation in Animal Sciences	Dr A O'Neill	32	50%	60%		
UGRD	B5480	54801	BC540041	520	Bachelor of Science in Agriculture with specialisation in Plant Breeding	Dr A van Biljon	32	50%	60%		
UGRD	B5480	54801	BC540042	520	Bachelor of Science in Agriculture with specialisation in Plant Pathology	Dr A van Biljon	32	50%	60%		
UGRD	B5480	54801	BC540044	520	Bachelor of Science in Agriculture with specialisation in Soil Science	Prof E Kotze	32	50%	60%		

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
POSTGRADUATE DIPLOMA PROGRAMMES							
PGRD	B4550	45501	BC450025	120	Postgraduate Diploma in Disaster Management	Prof A Ncube	Selection for PGDip
PGRD	B4551	45511	BC450091	120	Postgraduate Diploma in Integrated Water Management	Dr M Avenant	Selection for PGDip
PGRD	B5547	55047	BC550047	136	Postgraduate Diploma in Sustainable Agriculture	Dr I van der Merwe	Selection for PGDip
BACHELOR HONOURS PROGRAMMES							
PGRD	B5600	56001	BC560011	120	Bachelor of Agriculture Honours with specialisation in Agricultural Economics	Dr W.A. Lombard	Selection for Honours Degree
PGRD	B5600	56001	BC560052	120	Bachelor of Agriculture Honours with specialisation in Agricultural Management	Dr W.A. Lombard	Selection for Honours Degree
PGRD	B5600	56001	BC560115	132	Bachelor of Agriculture Honours with specialisation in Animal Production	Dr A O'Neill	Selection for Honours Degree
PGRD	B5600	56001	BC560072	124	Bachelor of Agriculture Honours with specialisation in Irrigation Management	Dr E Kotzé	Selection for Honours Degree
PGRD	B5600	56001	BC560090	124	Bachelor of Agriculture Honours with specialisation in Wildlife Management	Dr A O'Neill	Selection for Honours Degree
PGRD	B4691	46901	BC460114	120	Bachelor of Architecture Honours	K du Preez	Selection for Honours Degree
PGRD	B4661	46000	BC460156	120	Bachelor of Computer Information Systems Honours	J Marais	Selection for Honours Degree
PGRD	B5680	56801	BC560012	128	Bachelor of Science Honours in Agriculture with specialisation in Agrometeorology	Dr E van der Watt	Selection for Honours Degree
PGRD	B5680	56801	BC560013	128	Bachelor of Science Honours in Agriculture with specialisation in Agronomy	Dr E van der Watt	Selection for Honours Degree
PGRD	B5680	56801	BC560015	128	Bachelor of Science Honours in Agriculture with specialisation in Animal Sciences	Dr A O'Neill	Selection for Honours Degree
PGRD	B5680	56801	BC560036	148	Bachelor of Science Honours in Agriculture with specialisation in Grassland	Dr A O'Neill	Selection for Honours Degree
PGRD	B5680	56801	BC560041	120	Bachelor of Science Honours in Agriculture with specialisation in Plant Breeding	Dr A van Biljon	Selection for Honours Degree
PGRD	B5680	56801	BC560042	120	Bachelor of Science Honours in Agriculture with specialisation in Plant Pathology	Dr A van Biljon	Selection for Honours Degree
PGRD	B5680	56801	BC560044	128	Bachelor of Science Honours in Agriculture with specialisation in Soil Science	Dr E Kotzé	Selection for Honours Degree
PGRD	B5680	56801	BC560089	120	Bachelor of Science Honours in Agriculture with specialisation in Wildlife Science	Dr A O'Neill	Selection for Honours Degree
PGRD	B4690	46911	BC460024	136	Bachelor of Science Honours in Construction Management	H du Plessis	Selection for Honours Degree
PGRD	B4670	46701	BC460023	128	Bachelor of Science Honours in Consumer Science	Dr I. van der Merwe	Selection for Honours Degree
PGRD	B4690	46921	BC460043	128	Bachelor of Science Honours in Quantity Surveying	H du Plessis	Selection for Honours Degree
PGRD	B4620	46001	BC460010	128/122	Bachelor of Science Honours with specialisation in Actuarial Science	J Blomerus	Selection for Honours Degree
PGRD	B4650	46001	BC460011	120	Bachelor of Science Honours with specialisation in Agricultural Economics	Dr W.A. Lombard	Selection for Honours Degree

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B4630	46001	BC460012	128	Bachelor of Science Honours with specialisation in Agrometeorology	Dr E van der Watt	Selection for Honours Degree
PGRD	B4620	46001	BC460046	122	Bachelor of Science Honours with specialisation in Applied Statistics	J Blomerus	Selection for Honours Degree
PGRD	B4630	46001	BC460017	128	Bachelor of Science Honours with specialisation in Astrophysics	Dr RF Shago	Selection for Honours Degree
PGRD	B4610	46001	BC460018	120	Bachelor of Science Honours with specialisation in Behaviour Genetics	Dr G Marx	Selection for Honours Degree
PGRD	B4610	46001	BC460019	128	Bachelor of Science Honours with specialisation in Biochemistry	Dr F O'Neill	Selection for Honours Degree
PGRD	B4610	46001	BC460020	120	Bachelor of Science Honours with specialisation in Botany	Dr A van Biljon	Selection for Honours Degree
PGRD	B4620	46001	BC460021	128	Bachelor of Science Honours with specialisation in Chemistry	Dr RF Shago	Selection for Honours Degree
PGRD	B4660	46001	BC460022	120	Bachelor of Science Honours with specialisation in Computer Science and Informatics	J Marais	Selection for Honours Degree
PGRD	B4660	46001	BC460095	120	Bachelor of Science Honours with specialisation in Data Science	J Marais	Selection for Honours Degree
PGRD	B4610	46001	BC460027	120	Bachelor of Science Honours with specialisation in Entomology	Dr C Jansen van Rensburg	Selection for Honours Degree
PGRD	B4640	46001	BC460062	128	Bachelor of Science Honours with specialisation in Environment Sciences	Dr A van der Walt	Selection for Honours Degree
PGRD	B4640	46001	BC460028	132	Bachelor of Science Honours with specialisation in Environmental Geology	Dr J Keet	Selection for Honours Degree
PGRD	B4610	46001	BC460029	128	Bachelor of Science Honours with specialisation in Food Science	Dr I van der Merwe	Selection for Honours Degree
PGRD	B4610	46001	BC460067	120	Bachelor of Science Honours with specialisation in Forensic Genetics	Dr K Ehlers	Selection for Honours Degree
PGRD	B4610	46001	BC460065	128	Bachelor of Science Honours with specialisation in Forensic Chemistry	Dr K Ehlers	Selection for Honours Degree
PGRD	B4610	46001	BC460030	120	Bachelor of Science Honours with specialisation in Forensic Science	Dr K Ehlers	Selection for Honours Degree
PGRD	B4610	46001	BC460031	120	Bachelor of Science Honours with specialisation in Genetics	Dr G Marx	Selection for Honours Degree
PGRD	B4640	46001	BC460032	120	Bachelor of Science Honours with specialisation in Geochemistry	Dr J Keet	Selection for Honours Degree
PGRD	B4640	46001	BC460033	128	Bachelor of Science Honours with specialisation in Geography	Dr A van der Walt	Selection for Honours Degree
PGRD	B4640	46001	BC460034	252	Bachelor of Science Honours with specialisation in Geohydrology	Dr PJH Lourens	Selection for Honours Degree
PGRD	B4640	46001	BC460069	128	Bachelor of Science Honours with specialisation in Geo-informatics	Dr A van der Walt	Selection for Honours Degree
PGRD	B4640	46001	BC460035	132	Bachelor of Science Honours with specialisation in Geology	Dr J Keet	Selection for Honours Degree
PGRD	B4620	46001	BC460037	128	Bachelor of Science Honours with specialisation in Mathematical Statistics	J Blomerus	Selection for Honours Degree
PGRD	B4620	46001	BC460038	120	Bachelor of Science Honours with specialisation in Mathematics and Applied Mathematics	Dr E Ngounda	Selection for Honours Degree
PGRD	B4610	46001	BC460039	128	Bachelor of Science Honours with specialisation in Microbiology	Dr F O'Neill	Selection for Honours Degree
PGRD	B4630	46001	BC460040	160	Bachelor of Science Honours with specialisation in Physics	Dr RF Shago	Selection for Honours Degree
PGRD	B4610	46001	BC560041	120	Bachelor of Science Honours with specialisation in Plant Breeding	Dr A van Biljon	Selection for Honours Degree
PGRD	B4610	46001	BC460082	120	Bachelor of Science Honours with specialisation in Plant Health Ecology	Dr A van Biljon	Selection for Honours Degree
PGRD	B4610	46001	BC560042	120	Bachelor of Science Honours with specialisation in Plant Pathology	Dr A van Biljon	Selection for Honours Degree
PGRD	B4620	46001	BC460087	128	Bachelor of Science Honours with specialisation in Risk Analysis	J Blomerus	Selection for Honours Degree
PGRD	B4640	46001	BC460044	128	Bachelor of Science Honours with specialisation in Soil Science	Dr E Kotzé	Selection for Honours Degree
PGRD	B4610	46001	BC460089	120	Bachelor of Science Honours with specialisation in Wildlife Science	Dr A O'Neill	Selection for Honours Degree
PGRD	B4610	46001	BC460049	120	Bachelor of Science Honours with specialisation in Zoology	Dr C Jansen van Rensburg	Selection for Honours Degree
PGRD	B4693	46931	BC460171	144	Bachelor of Spatial Planning Honours (specialising in Human Settlement)	Prof Y. Mashalaba	Selection for Honours Degree
PGRD	B4693	46931	BC460145	144	Bachelor of Spatial Planning Honours	Prof Y. Mashalaba	Selection for Honours Degree
MASTER PROGRAMMES							
PGRD	B5800	58301	BC580111	180	Master of Agriculture with specialisation in Agricultural Economics	Dr W.A. Lombard	Selection for Master's Degree
PGRD	B5800	58301	BC580152	180	Master of Agriculture with specialisation in Agricultural Management	Dr W.A. Lombard	Selection for Master's Degree
PGRD	B5800	58301	BC580115	180	Master of Agriculture with specialisation in Animal Production Management	Dr A O'Neill	Selection for Master's Degree
PGRD	B5800	48001	BC580193	180	Master of Agriculture with specialisation in Food and Nutrition Security	Dr I van der Merwe	Selection for Master's Degree
PGRD	B5800	58301	BC580172	180	Master of Agriculture with specialisation in Irrigation Management	Dr E Kotzé	Selection for Master's Degree
PGRD	B5800	58301	BC580190	180	Master of Agriculture with specialisation in Wildlife Management	Dr A O'Neill	Selection for Master's Degree
PGRD	B4791	47901	BC470314	180	Master of Architecture (for professional registration)	K du Preez	Selection for Master's Degree
PGRD	B4891	48011	BC480214	180	Master of Architecture (Research)	K du Preez	Selection for Master's Degree
PGRD	B4891	48011	BC480314	180	Master of Architecture with specialisation in Design	K du Preez	Selection for Master's Degree

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B4750	47501	BC470325	180	Master of Disaster Management	Prof A Ncube	Selection for Master's Degree
PGRD	B4892	48021	BC480271	180	Master of Human Settlements	Prof Y Mashalaba	Selection for Master's Degree
PGRD	B4792	47921	BC470393	180	Master of Land and Property Development Management with specialisation in Project Management	H du Plessis	Selection for Master's Degree
PGRD	B4792	47921	BC470394	180	Master of Land and Property Development Management with specialisation in Property Studies	H du Plessis	Selection for Master's Degree
PGRD	B5880	58001	BC580012	180	Master of Science in Agriculture with specialisation in Agrometeorology	Dr E van der Watt	Selection for Master's Degree
PGRD	B5880	58001	BC580053	180	Master of Science in Agriculture with specialisation in Agrometeorology Interdisciplinary	Dr E Kotzé	Selection for Master's Degree
PGRD	B5880	58001	BC580013	180	Master of Science in Agriculture with specialisation in Agronomy	Dr E van der Watt	Selection for Master's Degree
PGRD	B5880	58001	BC580054	180	Master of Science in Agriculture with specialisation in Agronomy Interdisciplinary	Dr E Kotzé	Selection for Master's Degree
PGRD	B5880	58001	BC580015	180	Master of Science in Agriculture with specialisation in Animal Science	Dr A O'Neill	Selection for Master's Degree
PGRD	B5880	58301	BC580029	180	Master of Science in Agriculture with specialisation in Food Science	Dr I van der Merwe	Selection for Master's Degree
PGRD	B5880	58301	BC580036	180	Master of Science in Agriculture with specialisation in Grassland Science	Dr A O'Neill	Selection for Master's Degree
PGRD	B5880	58001	BC580041	180	Master of Science in Agriculture with specialisation in Plant Breeding	Dr A van Biljon	Selection for Master's Degree
PGRD	B5880	58001	BC580081	180	Master of Science in Agriculture with specialisation in Plant Breeding Interdisciplinary	Dr A van Biljon	Selection for Master's Degree
PGRD	B5880	58001	BC580042	180	Master of Science in Agriculture with specialisation in Plant Pathology	Dr A van Biljon	Selection for Master's Degree
PGRD	B5880	58001	BC580083	180	Master of Science in Agriculture with specialisation in Plant Pathology Interdisciplinary	Dr A van Biljon	Selection for Master's Degree
PGRD	B5880	58001	BC580044	180	Master of Science in Agriculture with specialisation in Soil Science	Dr E Kotzé	Selection for Master's Degree
PGRD	B5880	58001	BC580088	180	Master of Science in Agriculture with specialisation in Soil Science Interdisciplinary	Dr E Kotzé	Selection for Master's Degree
PGRD	B5880	58001	BC580089	180	Master of Science in Agriculture with specialisation in Wildlife Science	Dr A O'Neill	Selection for Master's Degree
PGRD	B4820	48001	BC480010	180	Master of Science with specialisation in Actuarial Science	J Blomerus	Selection for Master's Degree
PGRD	B4850	48001	BC480011	180	Master of Science with specialisation in Agricultural Economics	Dr W.A. Lombard	Selection for Master's Degree
PGRD	B4830	48001	BC480012	180	Master of Science with specialisation in Agrometeorology	Dr E Kotzé	Selection for Master's Degree
PGRD	B4820	48001	BC480016	180	Master of Science with specialisation in Applied Mathematics	Dr E Ngounda	Selection for Master's Degree
PGRD	B4820	48001	BC480046	180	Master of Science with specialisation in Applied Statistics	J Blomerus	Selection for Master's Degree
PGRD	B4730	47001	BC470117	180	Master of Science with specialisation in Astrophysics	Dr RF Shago	Selection for Master's Degree
PGRD	B4830	48001	BC480017	180	Master of Science with specialisation in Astrophysics	Dr RF Shago	Selection for Master's Degree
PGRD	B4810	48001	BC480018	180	Master of Science with specialisation in Behavioural Genetics	Dr G Marx	Selection for Master's Degree
PGRD	B4810	48001	BC480019	180	Master of Science with specialisation in Biochemistry	Dr F O'Neill	Selection for Master's degree
PGRD	B4810	48001	BC480020	180	Master of Science with specialisation in Botany	Dr A van Biljon	Selection for Master's Degree
PGRD	B4752	47001	BC470099	180	Master of Science with specialisation in Climate Change Structured	Dr E van der Watt	Selection for Master's Degree
PGRD	B4830	48001	BC480021	180	Master of Science with specialisation in Chemistry	Dr RF Shago	Selection for Master's Degree
PGRD	B4860	48001	BC480056	180	Master of Science with specialisation in Computer Information Systems	J Marais	Selection for Master's Degree
PGRD	B4860	48001	BC480022	180	Master of Science with specialisation in Computer Science and Informatics	J Marais	Selection for Master's Degree
PGRD	B4760	47001	BC470122	180	Master of Science with specialisation in Computer Science and Informatics	J Marais	Selection for Master's Degree
PGRD	B4890	48001	BC480024	180	Master of Science with specialisation in Construction Management	H Du Plesis	Selection for Master's Degree
PGRD	B4810	48001	BC480094	180	Master of Science with specialisation in Conservation Biology	Dr G Marx	Selection for Master's Degree
PGRD	B4870	48001	BC480023	180	Master of Science with specialisation in Consumer Science	Dr I van der Merwe	Selection for Master's Degree
PGRD	B4860	48001	BC480095	180	Master of Science with specialisation in Data Science	J Marais	Selection for Master's Degree
PGRD	B4810	48001	BC480027	180	Master of Science with specialisation in Entomology	Dr C Jansen van Rensburg	Selection for Master's Degree
PGRD	B4840	48001	BC480028	180	Master of Science with specialisation in Environmental Geology	Dr J Keet	Selection for Master's Degree
PGRD	B4751	47001	BC470160	180	Master of Sciences with specialisation in Environmental Management	Dr M Avenant	Selection for Master's Degree
PGRD	B4851	48001	BC480060	180	Master of Sciences with specialisation in Environmental Management	Dr M Avenant	Selection for Master's Degree
PGRD	B4810	48001	BC480029	180	Master of Science with specialisation in Food Science	Dr I van der Merwe	Selection for Master's Degree

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B5800	48001	BC580193	180	Master of Agriculture with specialisation in Food and Nutrition Security	Dr I van der Merwe	Selection for Master's Degree
PGRD	B4810	48001	BC480065	180	Master of Science with specialisation in Forensic Chemistry	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480027	180	Master of Science with specialisation in Forensic Entomology	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480067	180	Master of Science with specialisation in Forensic Genetics	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480068	180	Master of Science with specialisation in Forensic Interdisciplinary	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480030	180	Master of Science with specialisation in Forensic Sciences	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480031	180	Master of Science with specialisation in Genetics	Dr G Marx	Selection for Master's Degree
PGRD	B4840	48001	BC480032	180	Master of Science with specialisation in Geochemistry	Dr J Keet	Selection for Master's Degree
PGRD	B4840	48001	BC480033	180	Master of Science with specialisation in Geography	Dr A van der Walt	Selection for Master's Degree
PGRD	B4840	48001	BC480034	180	Master of Science with specialisation in Geohydrology	Dr PJH Lourens	Selection for Master's Degree
PGRD	B4840	48001	BC480069	180	Master of Science with specialisation in Geo-Informatics	Dr A van der Walt	Selection for Master's Degree
PGRD	B4840	48001	BC480035	180	Master of Science with specialisation in Geology	Dr J Keet	Selection for Master's Degree
PGRD	B4880	48001	BC480036	180	Master of Science with specialisation in Grassland Sciences	Dr A O'Neill	Selection for Master's Degree
PGRD	B4751	47001	BC470191	180	Master of Science with specialisation in Integrated Water Management	Dr M Avenant	Selection for Master's Degree
PGRD	B4851	48001	BC480060	180	Master of Science with specialisation in Integrated Water Management	Dr M Avenant	Selection for Master's Degree
PGRD	B4851	48001	BC480096	180	Master of Science with specialisation in Land Rehabilitation	E Oosthuizen	Selection for Master's Degree
PGRD	B4820	48001	BC480037	180	Master of Science with specialisation in Mathematical Statistics	J Blomerus	Selection for Master's Degree
PGRD	B4820	48001	BC480038	180	Master of Science with specialisation in Mathematics	Dr E Ngounda	Selection for Master's Degree
PGRD	B4810	48001	BC480077	180	Master of Science with specialisation in Microbial Biotechnology	Dr F O'Neill	Selection for Master's Degree
PGRD	B4810	48001	BC480039	180	Master of Science with specialisation in Microbiology	Dr F O'Neill	Selection for Master's Degree
PGRD	B4740	47001	BC470178	204	Master of Science with specialisation in Mineral Resource Management	C van der Vyver	Selection for Master's Degree
PGRD	B4840	48001	BC480078	204	Master of Science with specialisation in Mineral Resource Management	C van der Vyver	Selection for Master's Degree
PGRD	B4830	48001	BC480040	180	Master of Science with specialisation in Physics	Dr RF Shago	Selection for Master's Degree
PGRD	B4880	48001	BC480041	180	Master of Science with specialisation in Plant Breeding	Dr A van Biljon	Selection for Master's Degree
PGRD	B4880	48001	BC480081	180	Master of Science with specialisation in Plant Breeding Interdisciplinary	Dr A van Biljon	Selection for Master's Degree
PGRD	B4810	48001	BC480082	180	Master of Science with specialisation in Plant Health Ecology	Dr A van Biljon	Selection for Master's Degree
PGRD	B4880	48001	BC480042	180	Master of Science with specialisation in Plant Pathology	Dr A van Biljon	Selection for Master's Degree
PGRD	B4880	48001	BC480083	180	Master of Science with specialisation in Plant Pathology Interdisciplinary	Dr A van Biljon	Selection for Master's Degree
PGRD	B4890	48001	BC480085	180	Master of Science with specialisation in Property Science	H Du Plesis	Selection for Master's Degree
PGRD	B4890	48001	BC480043	180	Master of Science with specialisation in Quantity Surveying	H Du Plesis	Selection for Master's Degree
PGRD	B4820	48001	BC480087	180	Master of Science with specialisation in Risk Analysis	J Blomerus	Selection for Master's Degree
PGRD	B4840	48001	BC480044	180	Master of Science with specialisation in Soil Sciences	Dr E Kotzé	Selection for Master's Degree
PGRD	B4840	48001	BC580088	180	Master of Science with specialisation in Soil Sciences Interdisciplinary	Dr E Kotzé	Selection for Master's Degree
PGRD	B4850	48001	BC480089	180	Master of Science with specialisation in Wildlife	Dr A O'Neill	Selection for Master's Degree
PGRD	B4810	48001	BC480049	180	Master of Science with specialisation in Zoology	Dr C Jansen van Rensburg	Selection for Master's Degree
PGRD	B4739	47301	BC470179	180	Master of Science in Nanoscience	Dr RF Shago	Selection for Master's Degree
PGRD	B5781	57847	BC571347	180	Master of Sustainable Agriculture	Dr I van der Merwe	Selection for Master's Degree
PGRD	B4793	47901	BC470348	204	Master of Urban and Regional Planning (For professional registration)	Prof Y Mashalaba	Selection for Master's Degree
PGRD	B4893	48901	BC480348	180	Master of Urban and Regional Planning (Research)	Prof Y Mashalaba	Selection for Master's Degree
DOCTOR OF PHILOSOPHY PROGRAMMES							
PGRD	B4920	49001	BC490010	360	Doctor of Philosophy with specialisation in Actuarial Science	J Blomerus	Selection for Doctorate Degree
PGRD	B4980	49001	BC490011	360	Doctor of Philosophy with specialisation in Agricultural Economics	Dr W.A. Lombard	Selection for Doctorate Degree
PGRD	B4900	49001	BC490052	360	Doctor of Philosophy with specialisation in Agricultural Management	Dr W.A. Lombard	Selection for Doctorate Degree
PGRD	B4980	49001	BC490012	360	Doctor of Philosophy with specialisation in Agrometeorology	Dr E van der Watt	Selection for Doctorate Degree
PGRD	B4980	49001	BC490053	360	Doctor of Philosophy with specialisation in Agrometeorology Interdisciplinary	Dr E van der Watt	Selection for Doctorate Degree
PGRD	B4980	49001	BC490013	360	Doctor of Philosophy with specialisation in Agronomy	Dr E van der Watt	Selection for Doctorate Degree
PGRD	B4980	49001	BC490054	360	Doctor of Philosophy with specialisation in Agronomy Interdisciplinary	Dr E van der Watt	Selection for Doctorate Degree

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B4900	49001	BC491015	360	Doctor of Philosophy with specialisation in Animal Production Management	Dr A O'Neill	Selection for Doctorate Degree
PGRD	B4980	49001	BC490015	360	Doctor of Philosophy with specialisation in Animal Sciences	Dr A O'Neill	Selection for Doctorate Degree
PGRD	B4920	49001	BC490016	360	Doctor of Philosophy with specialisation in Applied Mathematics	Dr E Ngounda	Selection for Doctorate Degree
PGRD	B4920	49001	BC490046	360	Doctor of Philosophy with specialisation in Applied Statistics	J Blomerus	Selection for Doctorate Degree
PGRD	B4990	49091	BC490014	360	Doctor of Philosophy with specialisation in Architecture	K du Preez	Selection for Doctorate Degree
PGRD	B4990	49091	BC490114	360	Doctor of Philosophy with specialisation in Architecture with Design	K du Preez	Selection for Doctorate Degree
PGRD	B4930	49001	BC490017	360	Doctor of Philosophy with specialisation in Astrophysics	Dr RF Shago	Selection for Doctorate Degree
PGRD	B4910	49001	BC490018	360	Doctor of Philosophy with specialisation in Behavioural Genetics	Dr G Marx	Selection for Doctorate Degree
PGRD	B4910	49001	BC490019	360	Doctor of Philosophy with specialisation in Biochemistry	Dr F O'Neill	Selection for Doctorate Degree
PGRD	B4910	49001	BC490020	360	Doctor of Philosophy with specialisation in Botany	Dr A van Biljon	Selection for Doctorate Degree
PGRD	B4930	49001	BC490021	360	Doctor of Philosophy with specialisation in Chemistry	Dr RF Shago	Selection for Doctorate Degree
PGRD	B4960	49001	BC490056	360	Doctor of Philosophy with specialisation in Computer Information Systems	J Marais	Selection for Doctorate Degree
PGRD	B4960	49001	BC490022	360	Doctor of Philosophy with specialisation in Computer Science and Informatics	J Marais	Selection for Doctorate Degree
PGRD	B4910	49001	BC490094	360	Doctor of Philosophy with specialisation in Conservation Biology	Dr G Marx	Selection for Doctorate Degree
PGRD	B4990	49001	BC490024	360	Doctor of Philosophy with specialisation in Construction Management	H Du Plessis	Selection for Doctorate Degree
PGRD	B4970	49001	BC490023	360	Doctor of Philosophy with specialisation in Consumer Sciences	Dr I van der Merwe	Selection for Doctorate Degree
PGRD	B4960	49001	BC490095	360	Doctor of Philosophy with specialisation in Data Science	J Marais	Selection for Doctorate Degree
PGRD	B4950	49001	BC490025	360	Doctor of Philosophy with specialisation in Disaster Management	Prof A Ncube	Selection for Doctorate Degree
PGRD	B4910	49001	BC490027	360	Doctor of Philosophy with specialisation in Entomology	Dr C Jansen van Rensburg	Selection for Doctorate Degree
PGRD	B4940	49001	BC490028	360	Doctor of Philosophy with specialisation in Environmental Geology	Dr J Keet	Selection for Doctorate Degree
PGRD	B4950	49001	BC490060	360	Doctor of Philosophy with specialisation in Environmental Management	Dr M Avenant	Selection for Doctorate Degree
PGRD	B4980	49001	BC490029	360	Doctor of Philosophy with specialisation in Food Science	Dr I van der Merwe	Selection for Doctorate Degree
PGRD	B4980	49001	BC490093	360	Doctor of Philosophy with specialisation in Food and Nutrition Secutrity	Dr I van der Merwe	Selection for Doctorate Degree
PGRD	B4910	49001	BC490065	360	Doctor of Philosophy with specialisation in Forensic Chemistry	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490066	360	Doctor of Philosophy with specialisation in Forensic Entomology	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490067	360	Doctor of Philosophy with specialisation in Forensic Genetics	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490068	360	Doctor of Philosophy with specialisation in Forensic Interdisciplinary	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490030	360	Doctor of Philosophy with specialisation in Forensic Science	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490031	360	Doctor of Philosophy with specialisation in Genetics	Dr G Marx	Selection for Doctorate Degree
PGRD	B4940	49001	BC490032	360	Doctor of Philosophy with specialisation in Geochemistry	Dr J Keet	Selection for Doctorate Degree
PGRD	B4940	49001	BC490033	360	Doctor of Philosophy with specialisation in Geography	Dr A van der Walt	Selection for Doctorate Degree
PGRD	B4940	49001	BC490034	360	Doctor of Philosophy with specialisation in Geohydrology	Dr PJH Lourens	Selection for Doctorate Degree
PGRD	B4940	49001	BC490069	360	Doctor of Philosophy with specialisation in Geo-Informatics	Dr A van der Walt	Selection for Doctorate Degree
PGRD	B4940	49001	BC490035	360	Doctor of Philosophy with specialisation in Geology	Dr J Keet	Selection for Doctorate Degree
PGRD	B4980	49001	BC490036	360	Doctor of Philosophy with specialisation in Grassland Science	Dr A O'Neill	Selection for Doctorate Degree
PGRD	B4990	49001	BC490071	360	Doctor of Philosophy with specialisation in Human Settlements	Prof Y Mashalaba	Selection for Doctorate Degree
PGRD	B4950	49001	BC490051	360	Doctor of Philosophy with specialisation in Integrated water management	Dr M Avenant	Selection for Doctorate Degree
PGRD	B4851	49001	BC490096	180	Doctor of Philosophy with specialisation in Land Rehabilitation	E Oosthuizen	Selection for Master's Degree
PGRD	B4910	49001	BC490076	360	Doctor of Philosophy with specialisation in Limnology	Dr M Avenant	Selection for Doctorate Degree
PGRD	B4920	49001	BC490037	360	Doctor of Philosophy with specialisation in Mathematical Statistics	J Blomerus	Selection for Doctorate Degree
PGRD	B4920	49001	BC490038	360	Doctor of Philosophy with specialisation in Mathematics	Dr E Ngounda	Selection for Doctorate Degree
PGRD	B4910	49001	BC490077	360	Doctor of Philosophy with specialisation in Microbial Biotechnology	Dr F O'Neill	Selection for Doctorate Degree
PGRD	B4910	49001	BC490039	360	Doctor of Philosophy with specialisation in Microbiology	Dr F O'Neill	Selection for Doctorate Degree
PGRD	B4940	49001	BC490078	360	Doctor of Philosophy with specialisation in Mineral Resource Management	C van der Vyver	Selection for Doctorate Degree
PGRD	B4930	49001	BC490040	360	Doctor of Philosophy with specialisation in Physics	Dr RF Shago	Selection for Doctorate Degree
PGRD	B4980	49001	BC490041	360	Doctor of Philosophy with specialisation in Plant Breeding	Dr A van Biljon	Selection for Doctorate Degree

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B4980	49001	BC490081	360	Doctor of Philosophy with specialisation in Plant Breeding Interdisciplinary	Dr A van Biljon	Selection for Doctorate Degree
PGRD	B4910	49001	BC490082	360	Doctor of Philosophy with specialisation in Plant Health Ecology	Dr A van Biljon	Selection for Doctorate Degree
PGRD	B4980	49001	BC490042	360	Doctor of Philosophy with specialisation in Plant Pathology	Dr A van Biljon	Selection for Doctorate Degree
PGRD	B4980	49001	BC490083	360	Doctor of Philosophy with specialisation in Plant Pathology Interdisciplinary	Dr A van Biljon	Selection for Doctorate Degree
PGRD	B4990	49001	BC490085	360	Doctor of Philosophy with specialisation in Property Science	H Du Plessis	Selection for Doctorate Degree
PGRD	B4990	49001	BC490043	360	Doctor of Philosophy with specialisation in Quantity Surveying	H Du Plessis	Selection for Doctorate Degree
PGRD	B4920	49001	BC490087	360	Doctor of Philosophy with specialisation in Risk Analysis	J Blomerus	Selection for Doctorate Degree
PGRD	B4980	49001	BC490088	360	Doctor of Philosophy with specialisation in Soil Science Interdisciplinary	Dr E Kotzé	Selection for Doctorate Degree
PGRD	B4980	49001	BC490044	360	Doctor of Philosophy with specialisation in Soil Sciences	Dr E Kotzé	Selection for Doctorate Degree
PGRD	B4980	49001	BC490047	360	Doctor of Philosophy with specialisation in Sustainable Agriculture	Dr I van der Merwe	Selection for Doctorate Degree
PGRD	B4990	49001	BC490048	360	Doctor of Philosophy with specialisation in Urban and Regional Planning	Prof Y Mashalaba	Selection for Doctorate Degree
PGRD	B4980	49001	BC490089	360	Doctor of Philosophy with specialisation in Wildlife	Dr A O'Neill	Selection for Doctorate Degree
PGRD	B4900	49001	BC490090	360	Doctor of Philosophy with specialisation in Wildlife Management	Dr A O'Neill	Selection for Doctorate Degree
PGRD	B4910	49001	BC490049	360	Doctor of Philosophy with specialisation in Zoology	Dr C Jansen van Rensburg	Selection for Doctorate Degree

QWAQWA CAMPUS

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
							AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UNDERGRADUATE PROGRAMMES											
EXTENDED PROGRAMMES											
UGRD	Q43E1	43001	QC4310E1	462	Bachelor of Science with specialisation in Biological Sciences	N Nyoka	27	50%	40%	40% or	40%
UGRD	Q43E1	43001	QC4330E1	462	Bachelor of Science with specialisation in Chemical and Physical Sciences	N Nyoka	27	50%	40%	40% or	40%
UGRD	Q43E1	43001	QC4341E1	462	Bachelor of Science with specialisation in Geography	N Nyoka	27	50%	40%	40% or	40%
UGRD	Q43E1	43601	QC4360E1	462	Bachelor of Science in Information Technology with specialisation in Computer Science	N Nyoka	27	50%	40%	40% or	40%
UGRD	Q43E2	43001	QC4371E2	462	Bachelor of Sustainable Food Systems	N Nyoka	27	50%	"30% for Maths or 60% for Maths Lit if APS > 26."	N/A	N/A
UGRD	Q53E1	53501	QC5300E1	462	Bachelor of Agriculture	N Nyoka	27	50%		N/A	N/A
BACHELOR DEGREES											
UGRD	Q4310	43001	QC432075	392	Bachelor of Science with specialisation in Botany and Life Sciences	Dr P Mahasa	32	50%	60%	60%	60%
UGRD	Q4310	43001	QC434975	392	Bachelor of Science with specialisation in Zoology and Life Sciences	Dr P Mahasa	32	50%	60%	60%	60%
UGRD	Q4310	43001	QC437500	392	Bachelor of Science with specialisation in Life Sciences	Dr P Mahasa	32	50%	60%	60%	60%
UGRD	Q4320	43001	QC433821	392	Bachelor of Science with specialisation in Mathematics and Chemistry	Dr RF Shago	32	50%	70%	60%	60%
UGRD	Q4320	43001	QC433840	392	Bachelor of Science with specialisation in Mathematics and Physics	C Faber	32	50%	70%	60%	60%
UGRD	Q4320	43001	QC433822	392	Bachelor of Science with specialisation in Mathematics and Computer Science	C Faber	32	50%	70%	NA	NA
UGRD	Q4330	43001	QC432120	392	Bachelor of Science with specialisation in Chemistry and Botany	Dr RF Shago	32	50%	60%	60%	60%
UGRD	Q4330	43001	QC432140	392	Bachelor of Science with specialisation in Chemistry and Physics	?	32	50%	60%	60%	NA

CAREER	PROG CODE	DEGREE CODE	ACADEMIC PLAN CODE	TOTAL CREDITS	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS					
							AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	Q4340	43001	QC433359	392	Bachelor of Science with specialisation in Geography and Environmental Geography	Dr P Mahasa	32	50%	60%	60%	60%
UGRD	Q4340	43001	QC433392	392	Bachelor of Science with specialisation in Geography and Tourism	Dr P Mahasa	32	50%	60%	NA	NA
UGRD	Q4340	43001	QC433375	392	Bachelor of Science with specialisation in Geography and Life Science	Dr P Mahasa	32	50%	60%	60%	60%
UGRD	Q4360	43601	QC432221	392	Bachelor of Science in Information Technology with specialisation in Computer Science and Chemistry	C Faber	32	50%	60%	60%	
UGRD	Q4360	43601	QC432240	392	Bachelor of Science in Information Technology with specialisation in Computer Science and Physics	C Faber	32	50%	60%	60%	
UGRD	Q4364	43601	QC432202	392	Bachelor of Science in Information Technology with specialisation in Computer Science and Management	C Faber	32	50%	50%	50%	NA

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC CODE	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
POSTGRADUATE PROGRAMMES						
BACHELOR OF HONOURS DEGREES						
PGRD	Q4610	46001	QC460020	Bachelor of Science Honours with specialisation in Botany	Dr P Mahasa	Average of 60% for Botany on NQF-level 7. Selections for a BScHons programme.
PGRD	Q4610	46001	QC460049	Bachelor of Science Honours with specialisation in Zoology	Dr P Mahasa	Average of 60% for Zoology on NQF-level 7.Selections for a BScHons programme.
PGRD	Q4630	46001	QC460040	Bachelor of Science Honours with specialisation in Physics	?	Average of 60% for Physics on NQF-level 7.Selections for a BScHons programme.
PGRD	Q4630	46001	QC460084	Bachelor of Science Honours with specialisation in Polymer Science	?	Average of 60% for Chemistry on NQF-level 7.Selections for a BScHons programme.
PGRD	Q4640	46001	QC460033	Bachelor of Science Honours with specialisation in Environmental Geography	Dr P Mahasa	Average of 60% for Geograhpy on NQF-level 7.Selections for a BScHons programme.
PGRD	Q4660	46001	QC460022	Bachelor of Science Honours with specialisation in Computer Science and Informatics	C Faber	Average of 60% for Computer Science on NQF-level 7.Selections for a BScHons programme.
MASTER'S DEGREES						
PGRD	Q4810	48001	QC480020	Master of Science with specialisation in Botany	Dr P Mahasa	Selection for a Master in Science degree
PGRD	Q4810	48001	QC480049	Master of Science with specialisation in Zoology	Dr P Mahasa	Selection for a Master in Science degree
PGRD	Q4830	48001	QC480084	Master of Science with specialisation in Polymer Sciences	?	Selection for a Master in Science degree
PGRD	Q4830	48001	QC480021	Master of Science with specialisation in Chemistry	?	Selection for a Master in Science degree
PGRD	Q4830	48001	QC480040	Master of Science with specialisation in Physics	?	Selection for a Master in Science degree
PGRD	Q4840	48001	QC480059	Master of Science with specialisation in Environmental Geography	Dr P Mahasa	Selection for a Master in Science degree
PGRD	Q4840	48001	QC480033	Master of Science with specialisation in Geography	Dr P Mahasa	Selection for a Master in Science degree
PGRD	Q4860	48001	QC480022	Master of Science with specialisation in Computer Science and Informatics	C Faber	Selection for a Master in Science degree

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC CODE	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
DOCTORATE DEGREES						
PGRD	Q4910	49001	QC490020	Doctor of Philosophy with specialisation in Botany	Dr P Mahasa	Selection for PhD degree
PGRD	Q4930	49001	QC490021	Doctor of Philosophy with specialisation in Chemistry	?	Selection for PhD degree
PGRD	Q4960	49001	QC490022	Doctor of Philosophy with specialisation in Computer Science and Informatics	C Faber	Selection for PhD degree
PGRD	Q4940	49001	QC490059	Doctor of Philosophy with specialisation in Environmental Geography	Dr P Mahasa	Selection for PhD degree
PGRD	Q4940	49001	QC490033	Doctor of Philosophy with specialisation in Geography	Dr P Mahasa	Selection for PhD degree
PGRD	Q4930	49001	QC490040	Doctor of Philosophy with specialisation in Physics	?	Selection for PhD degree
PGRD	Q4930	49001	QC490084	Doctor of Philosophy with specialisation in Polymer	?	Selection for PhD degree
PGRD	Q4910	49001	QC490049	Doctor of Philosophy with specialisation in Zoology	Dr P Mahasa	Selection for PhD degree

12. LEARNING PROGRAMMES & MODULES REQUIRED FOR THE PROGRAMME QUALIFICATION MIX AT BLOEMFONTEIN AND SOUTH CAMPUS

CONVERSATIONAL MODULES AS OPTIONAL ELECTIVE TO INTERESTED STUDENTS IN THE NATURAL AND AGRICULTURAL SCIENCES FROM 2022.

Consideration must be given to the inclusion of conversational modules (foreign language) as electives in different programs and faculties because of:

- the multilingual drive of the UFS;
- the importance of social cohesion at the UFS / in SA;
- the need to deliver graduates with skills relevant for the multilingual work environment in SA as well.

Who enrol for this?

Afrikaans: Students who do not speak and who did not offer or pass Afrikaans as a school subject in Grade 12 may register for GAFR – conversational Afrikaans if offered in their programme. (Conversational Afrikaans (GAFR).

Sotho: Students who do not speak and who did not offer or pass Sesotho Setswana and Sepedi as a school subject in Grade 12 may register for SSCL – conversational Sesotho if offered in their program.
(Conversational Sesotho (SSCL)

Zulu: Students who do not speak and who did not offer or pass isiZulu as a school subject in Grade 12, may register for ZUCL – conversational isiZulu if offered in their program.
(Conversational isiZulu (ZUCL)

Sign language: Completion of conversational Sign language (SICL) does not give access to use sign language as medium of instruction at Schools for Deaf children and/or children with hearing impairments.

Optional electives for conversational language:

- Afrikaans (Bfn and QQ campus) GAFR3512(8 credits) and 3522 (8 credits)
- Sotho (Bfn campus) SSCL3512 and 3522 (8 credits each)
- Zulu (Bfn and QQ campus) ZUCL3512 and 3522 (8 credits each)
- Sign language (Bfn campus) SICL3512 and 3522 (8 credits each)
- German (BFN campus) GERB1514 - existing disciplines for foreign language students at the UFS that do not require prior knowledge of the language to enrol
- French (BFN campus) FRAN1514 - existing disciplines for foreign language students at the UFS that do not require prior knowledge of the language to enrol

Enhance your employability with Portfolio Development

EDED3712/3722 is the ePortfolio Development: Enterprising your Degree module available for final year undergraduate students and postgraduate students. This module is positioned as a capstone for graduates, and is aligned with career development and employability initiatives at the UFS. The aim of this module is to enhance your employability by teaching you to take stock of your skills and attributes that you have acquired during your studies, and articulate that in an ePortfolio that would help you market your skills, network, and apply for work. Students that register for this module will develop the digital skills to engage on LinkedIn, populate a website, and develop a future work plan to turn their skill set into a career. EDED3712/3722 is a semester long 8 credit module – you can participate in the module either in the first semester or the second semester. If you register for this module, it will be in addition to your degree credits and will not weigh towards the required number of credits for graduation. Students can register for EDED3712 in the first semester or EDED3722 in the second semester

12.1 DIPLOMAS

12.1.1 ADVANCED DIPLOMA IN SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT BC520047

LEARNING PROGRAMMES FOR AGRICULTURE AND RURAL DEVELOPMENT

The main aim of the programme is to afford students, primarily agricultural extensionists, the opportunity to acquire the necessary skills and know-how to teach, demonstrate and facilitate sustainable agriculture and rural developmental (SARD) issues and practices to the benefit of the agricultural community. The exit level outcomes reflect an integration of the specific and critical outcomes. On achieving this qualification a graduate will, within the field of SARD and agricultural extension, be able to:

(a) Manage rural structures and group dynamics.

(b) Design strategies that will create understanding of production, marketing and value adding of agricultural produce by the community.
(c) Apply sustainable plant production practices.
(d) Apply sustainable animal production practices.
(e) Conduct sound and effective communication skills and transfer of knowledge systems.

COMPULSORY YEAR 1 + 2	
SARD1716/1726	Fundamentals of Rural Development
SAAM1716/1726	Fundamentals of Agriculture Economics
SACP1716/1726	Foundational theories in Plant Production
SALP1716/1726	Foundational Theories in Animal Production
SACT1716/1726	Basic communication skills for Sustainable Agriculture

12.2 LEARNING PROGRAMMES FOR CURRICULUM PROGRAMMES WITH EXTENDED TIME PERIODS

Extended Curriculum Programmes in the Faculty of Natural and Agricultural Sciences

The NAS Faculty admission requirements are clearly stated for all programmes. In general, it could be summarised as follows. If students do not meet the minimum admission requirements the faculty offer programmes presented over an extended time period, to allow the student to graduate with the same mainstream BSc, BScAgric, or BAgric or other bachelor's degrees offered in the faculty. Students will graduate with the same SAQA accredited qualification Bachelor of Science SAQA ID 35954.

Students failing to meet the mainstream admission requirements but meet the admission requirements for the extended programmes can request to be placed in an extended programme dependent on the availability of space. The faculty can also make offers to students not qualifying for the programme they have applied for. The faculty follows the approach to expose the students for two years to developmental modules to bridge the gaps in the admission requirements and the content gaps as well as some first year's modules, referred to as mainstream modules, which are a part of most of the learning programmes presented in the degree programmes of the faculty. These developmental modules aim to prepare students for successful entrance and performance in the mainstream modules. Some of these modules are academic modules to bridge the prerequisites. Students with a lower AP and lower scores in certain school subjects do not meet these prerequisites. This include MATD1554, MATD1564, MATD1534, MATD1544 and CHEM1552. The developmental modules provide students, with lower AP scores, with specific success skills they need to maximise their chances to succeed in their studies. This include SCNS1508, CSIL1501, CALN1508 and MATD1508. If students fail the academic developmental modules or the skills developmental modules they will not be able to progress and perform well in the required mainstream modules and therefore they cannot continue with the second year of the programme.

All students failing any of these developmental modules will have to appeal to the FRAC to gain access for the next year of study. If the student meets all requirements at the end of the study year that is presently presented on the South campus, they can transfer to the Bloemfontein campus and indicate which mainstream study field curriculum they want to follow. This include passing all modules and obtaining an average of 60% for mainstream modules. They can only indicate mainstream study field curriculums they qualify for.

The faculty and the Dean reserve the right to request the student to change the preferred mainstream study choice dependent on meeting the requirements, being selected for selection courses as well as space availability. The student will remain on the original programme code they were admitted to for the rest of their study period. Only students who want to, after the first year in the extended programme was completed successfully, and who qualify and are selected to one of the following three selection programmes, Bachelor of Architecture, Bachelor of Science specialising / majoring in Forensic Science or a Bachelor of Science specialising / majoring in Physics and Engineering Sciences may change their programme code. These students need to apply online before 30 September to be admitted. These students residential period changes to n +1 so 4 years only.

If students do not qualify for the three year Bachelor of Agriculture or the Bachelor of Science or the four year Bachelor of Science in Agriculture programmes but they qualify for programmes presented over an extended period of four years or five years respectively they can request to be admitted to programmes with extended period. Admission requirements is indicated in the table below:

Mainstream Programmes	Minimum Admission Requirements	Extended Curriculum Programmes	Minimum Admission Requirements
Three-year programme: • Bachelor of Agriculture	i. NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. ii. Official tuition language with a minimum achievementlevel 4 (50%). iii. AP Score of 30. iv. Mathematics at performance level 3 (40%) with TP of 30 or Mathematical Literacy at least at level 7 (80%) if the AP is 31 or above. v. Participation in the UFS language test.	**Four-year programme:** • Bachelor of Agriculture programme	i. NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. ii. A minimum APS of 22. iii. Official tuition language with a minimum achievement level 4 (50%). iv. Mathematics on performance level 2 (30%) or Mathematical Literacy at least at level 5 (60%) if the AP score is above 26.
Three-year programme: • Bachelor of Science programme	i. NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. ii. A minimum AP of 32. iii. A performance level 4 (50%) in an official tuition language. iv. Mathematics on level 5 (60%). v. Both Life Science and Physical Science must be included. Take note that not all BSc programmes require both Life and Physical Sciences. See NAS 2.2 for more detail. Life Sciences level 5 (60%) and Physical Science level 5(60%). vi. Participation in the UFS language test.	**Four-year programmes:** • Bachelor of Science with specialisation in Biological Sciences • Bachelor of Science with specialisation in Geology • Bachelor of Science with specialisation in Geography • Bachelor of Science in Information Technology with specialisation in Computer Science • Bachelor of Science in Agriculture	i. NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. ii. A minimum APS of 22. iii. A performance level 4 (50%) in an official tuition language. iv. Mathematics on level 3 (40%). v. Life Science or Physical Science or Geography level 3 (40%)
		Four-year programmes: • Bachelor of Science with specialisation in Mathematics Sciences • Bachelor of Science with specialisation in Actuarial Sciences • Bachelor of Science with specialisation in Agricultural Economic	i. NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. ii. A minimum APS of 22. iii. A performance level 4 (50%) in an official tuition language. iv. Mathematics on level 3 (40%). v. Physical Science level 3 (40%) or Business studies or Economics or Accounting level 3
		• Bachelor of Science with specialisation in Building Science	i. NSC or NCV with an endorsement that allows entrance to degree tudies or an equivalent qualification. ii. A minimum APS of 22. iii. A performance level 4 (50%) in an official tuition language. iv. Mathematics on level 3 (40%). v. Life Science or Physical Science. level 3 (40%)
Three-year programme: • Bachelor of Computer Information Systems	• Requirements (i)-(iii) and (vii) & (viii) in table 4. • Mathematics at performance level 4 (50%).	**Four-year programme:** • Bachelor of Computer InformationSystems	i. NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. ii. A minimum APS of 22. iii. Official tuition language with a minimum achievement level 4 (50%). iv. Mathematics on performance level 3 (40%)
Four-year programme: • Bachelor of Consumer Science	• Requirements (i)-(iii) & (vii) in table 4. Mathematics at performance level 2 (at least 30%) or Mathematical Literacy at least at level 5 (80%)	**Five-year programme:** • Bachelor of Sustainable Food Systems	i. NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. ii. A minimum APS of 22. iii. Official tuition language with a minimum achievement level 4 (50%). iv. Mathematics on performance level 2 (30%) or Mathematical Literacy at least at level 5 (60%) if the AP score is above 26.

DEGREE	DESCRIPTION	PLAN	PLAN DESCRIPTION
43001	Bachelor of Science	BC4310E1	Bachelor of Science with specialisation in Biological Sciences
		BC4340E2	Bachelor of Science with specialisation in Geology
		BC4341E2	Bachelor of Science with specialisation in Geography
43601	Bachelor of Science in Information Technology	BC4360E1	Bachelor of Science with specialisation in Information Technology
43001	Bachelor of Science	BC4320E2	Bachelor of Science with specialisation in Mathematics Sciences
		BC4324E2	Bachelor of Science with specialisation in Actuarial Sciences
		BC4350E2	Bachelor of Science with specialisation in Agricultural Economic
		BC4371E2	Bachelor of Sustainable Food Systems
		BC4390E2	Bachelor of Science with specialisation in Building Science
		BC4330E1	Bachelor of Science with specialisation in Physical and Chemical Sciences
43610	Bachelor of Computer Information Systems	BC4365E2	Bachelor of Computer Information Systems
53501	Bachelor of Agriculture	BC5300E1	Bachelor of Agriculture
54801	Bachelor of Science in Agriculture	BC5480E1	Bachelor of Science in Agriculture
43001	Bachelor of Science	QC4310E1	Bachelor of Science with specialisation in Biological Sciences
		QC4330E1	Bachelor of Science with specialisation in Chemical and Physical Sciences
		QC4341E1	Bachelor of Science with specialisation in Geography
43601	Bachelor of Science in Information Technology	QC4360E1	Bachelor of Science in Information Technology with specialisation in Computer Science
43001	Bachelor of Science	QC4371E2	Bachelor of Sustainable Food Systems (not in 2025)
53501	Bachelor of Agriculture	QC5300E1	Bachelor of Agriculture (not in 2025)

Students will remain in the programme for their entire studies. As students in this extended timeframe programmes do not meet the minimum admission requirements for mainstream programmes they will complete the prescribed first year modules over a period of two years with developmental modules to provide intensive support for them to develop the skills to complete their degrees successfully. Prospective students whose final NSC or other examination bodies results are not available when applying for the mainstream programmes and applicants not meeting the requirements for mainstream programmes when their final results are released, dependent on the availability of space, could be offered admission in the extended programme degrees related to the field of the mainstream programme they have applied for. Prospective students whose final NSC or equivalent results are available can apply for these extended curriculum programmes.

Compulsory modules depend on the extended programme a student register for. Students have to consult academic advisors to determine the modules.

SOUTH CAMPUS EXTENDED PROGRAMMES CURRICULUM

12.2.1 BSC AGRICULTURE FIVE-YEAR SOUTH CAMPUS

BC5480E1 - BACHELOR OF SCIENCE IN AGRICULTURE

Year	Disciplines	Semester 1	Semester 2
1	TWO OF: Chemistry Biology Agricultural Economics	CHEM1552 + CHEM1632 CHOOSE ONE BLGY1513 AGEC1514	CHEM1622 + CHEM1562 BLGY1643 OR AGEC1624
	Mathematics Academic language course	MATD1554 OR MATD1534 CALN1508	MATD1564 OR MATD1544
	Life-long Learning – Natural Sciences	SCNS1508	
	Computer Literacy	CSIL1501	

Students will be divided into specific groups on the south campus. For this programme students will be in the Cheetah group if they have Mathematics level 3 and the Dolphin group if they have Mathematics level 4.

- Students who fail MATD1554 or MATD1534 will not be able to continue in the second semester. Students who do not pass all academic modules in the June examination could be academically excluded in June already but they will be academically excluded in December. Some second semester modules have prerequisites and need to be adhered to.
- To register for CHEM1622 and CHEM1562 students must have passed CHEM1552, CHEM1632 and MATD1554 or MATD1534.
- To register for MATD1564 students must have passed MATD1554.
- To register for AGEC1624 students must have passed AGEC1514.
- To register for MATD1544 students must have passed MATD1534.
- To register for BLGY1643 students must have passed BLGY1513 and MATD1554 or MATD1534.

After the end of the year examination students must have successfully completed ALL THE MODULES in the first year of the BSc Five-year Curriculum Programme with an average of 60% for Academic modules and 50% for all the developmental modules. Then students may proceed in the next academic year to register for remaining first year modules as set out in the Faculty's Rule Book for the main field of study as chosen by the student. This includes the following fields:

- Animal Sciences (BC540015)
- Agronomy (BC540013)
- Soil Science (BC540044)
- Plant Pathology (BC540042)
- Plant Breeding (BC540041)

Students who could not complete and pass all the first year's modules and at least 48 credits of the second year required for their programme of choice after three years of registration will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.

12.2.2 B AGRICULTURE FOUR-YEAR SOUTH CAMPUS

BC5300E1 - BACHELOR OF AGRICULTURE

Year	Disciplines	Semester 1	Semester 2
1	Agricultural Economics Biological principles in Agriculture Introduction to Animal Wildlife and Grassland Sciences	AGEC1514 AGRI1514	AGEC1624 ANIG1624
	Academic language skills course English or Afrikaans	CALN1508	
	Computer Literacy Life-long Learning – Natural Sciences	CSIL1501 SCNS1508	
	Mathematical Literacy in Agriculture	MTDA1508	

Students who do not pass all academic modules in the June examination could be academically excluded in June already, but they will be academically excluded in December. Some second semester modules have prerequisites and need to be adhered to.

- To register for AGEC1624 students must have passed AGEC1514.

After the end of the year examination students must have successfully completed ALL THE MODULES in the first year of the B Agric Four-year Curriculum Programme with an average of 60% for Academic modules and 50% for all the developmental modules. Then students may proceed in the next academic year to register for remaining first year modules as set out in the Faculty's Rule Book for the main field of study as chosen by the student. This include the following fields:

- Agricultural Economics,
- Agricultural Extension,
- Agricultural Management,
- Animal Production,
- Management,
- Crop Production Management,
- Irrigation Management,
- Mixed Farming Management,
- Agricultural Economics. (NCS Mathematics level 4 is required)

Students who could not complete and pass all the first year's modules required for their programme of choice after three years of registration will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.

Year	Semester 1 and Semester 2	Year	Semester 1 and Semester 2
2	In their second year of study students have to register for CHEM1661 and CSIL1521 as well as all the first year main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book. Students must take note of the following requirements: • The modules CHEM1552, CHEM1622, CHEM1632, CHEM1562, CHEM1501 OR CHEM1581 and CHEM1661 must be passed to get recognition for CHEM1513 + CHEM1551/ CHEM1501 and CHEM1623/CHEM1643 + CHEM1661. • CSIL1501 must be passed to get recognition for CSIL1511. • Students who pass SCNS1508 and SCLL1508 will receive recognition for UFSS1512, which is the first semester of UFSS1504 but have to register for UFS1522. UFSS1512 + UFS1522 is equivalent to UFSS1504. • BLGY1513, BLGY1643 and AGEC1514 and AGCE1624 could be recognized if it is included academic year in the students learning programme of choice from the main fields of study in the Faculty Rule Book. Over the first two years of study students must have registered and passed all the required modules as prescribed as part of the main fields of study. At least 120 first year credits are needed from the following list: • MATM1534, MATM1644, PHYS1534, SCCS1624, CSIL1521, UFSS1522, CHEM1661, BLGY1623, BLGY1663.	**2**	In their second year of study students have to register for all the first year main field of study modules in the learning programme of choice as set out in the Faculty Rule Book. Students must take note of the following requirements: • CSIL1501 must be passedto get recognition for CSIL1511 • Students who pass SCNS1508 and SCLL1508 will receive recognition for UFSS1512, which is the first semester of UFSS1504 but have to register for UFS1522. UFSS1512 + UFS1522 is equivalent to UFSS1504. • Over the first two years of study students must have registered and passed all the required modules as prescribed as part of the main fields of study. At least 120 first year credits are needed from the following list: • AGRI1534, AGRI1554, AGRI1624, AGRI1664, SCCS1624, CSIL1521. • For Agricultural Economics • AGEC1634, LMER1514, EACC1614, AGRI1624, CSIL1521, EBUS1624, LMER1624, AGEC1624.

<table>
<tr><td>3</td><td colspan="5">Students select and register for one of the major fields of study from the second year BSc Agriculture learning programme as set out in the Faculty Rule Book. Students must register and pass at least 120 second year credits from the following modules linked to the relevant majors. Prerequisites need to be checked and considered to ensure compliance to be able to register for modules in the next study year.</td><td>3</td><td colspan="4">Students select and register for one of the major fields of study from the second year B Agriculture learning programme as set out in the Faculty Rule Book. Students must pass at least 120 second year credits from the following modules linked to the relevant majors. Prerequisites need to be checked and considered to ensure compliance to register for modules in the next study year.</td></tr>
<tr><td rowspan="4"></td><td>Animal Sciences</td><td>Agronomy</td><td>Soil Science</td><td>Plant Pathology</td><td>Plant Breeding</td><td rowspan="4"></td><td>Agricultural Economics</td><td>Agricultural Extension</td><td>Agricultural Management</td><td>Animal Production Management</td></tr>
<tr><td rowspan="3">AGEX2614
ANIN2614
BOCH2614
GRAS2614
ANIF2624
ANIB2624
ANIP2624
STSA1624</td><td rowspan="3">CLIM2614
CROP2614
SOIL2674
ENTO2614 OR
PLTB2613
SCCS2624
SCCS2684
PPLG2624 OR
PLTB2623
AGEG2624</td><td rowspan="3">CLIM2614
CROP2614
SOIL2674
AGEC2614
BOCH2614
ENTO2614
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SCCS2624
SCCS2684
PPLG2624
AGEG2624</td><td rowspan="3">BTNY2616
PLTB2613
SOIL2674
CROP2614
PLTB2623
SCCS2624
SCCS2684
PPLG2624</td><td rowspan="3">BTNY2616
PLTB2613
SOIL2674
CROP2614
BTNY2626 +
BTNY2621
PLTB2623
SCCS2624
PPLG2624</td><td>AGEC1634
AGEC2614
AGEX2614
ANIG2613 + 2602
CROP2614
SOIL2674
GRAS2614
SCCS2684
SCCS2624
AGEX2624
AGEG2624
ANIG2623
WDMT2624</td><td>AGEC1634
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SCCS2684
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ANIG2623
WDMT2624</td><td>AGEC1634
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AGEX2614
ANIG2613 + ANIG2602
CROP2614
SOIL2674
SCCS2684
AGEX2624
AGEG2624
ANIG2623
WDMT2624
AGEC1624
AGEC2624</td></tr>
<tr><td>Crop Production Management</td><td>Irrigation Management</td><td>Mixed Farming Management</td><td rowspan="2"></td></tr>
<tr><td>CROP2614
SOIL2674
CLIM2614
ENTO2614
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PLPG2623
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AGEX2614
ANIG2613+2602
CROP2614
SOIL2674
CLIM2614
SCCS2684
AGEX2624
AGEG2624
WDMT2624
AGEC1624
SCCS2624</td></tr>
</table>

4	Students select and register for one of the major fields of study from the second year BSc Agriculture learning programme as set out in the Faculty Rule Book. Students must register and pass at least 120 third year credits from the following modules linked to the relevant majors. Prerequisites need to be checked and considered to ensure compliance to be able to register for modules in the next study year.					**4**	Students select and register for one of the major fields of study from the third year B Agriculture learning programme as set out in the Faculty Rule Book. Students must register and pass at least 120 third year credits from the following modules linked to the relevant majors. Prerequisites need to be checked and considered to ensure compliance to be able to register for modules in the next study year.			
	Animal Sciences	**Agronomy**	**Soil Science**	**Plant Pathology**	**Plant Breeding**		**Agricultural Economics**	**Agricultural Extension**	**Agricultural Management**	**Animal Production Management**
	ANIP3713 ANIB3713 ANIN3734 DATA3712 ANIF3714 ANIP3724 ANIB3724 ANIN3723 GRAS3763 WILD3723	CROP3714 HORT3754 SOIL3774/3754 CROP3724 SCCS3724 HORT3774 PPLG3714 PPLG3734 SOIL3724 HORT3764 PPLG3744 PLTB3724 PLTB3744 PPLG3724	CROP3714 HORT3754 SOIL3774/3754 SOIL3724 CLIM3724 SCCS3724 AGEG3724 PPLG3724 CROP3744	BTNY3754 PLTB3714 PPGL3714 PPLG3734 PPLG3724 PPLG3744 PLTB3744 CROP3714 HORT3754 HORT3734 PLTB3724 SOIL3724 HORT3764	BTNY3754 PLTB3714 PLTB3724 PLTB3744 PPLG3724 CROP3714 HORT3754 HORT3774 PPLG3714 PPLG3734 SOIL3724 HORT3774 PPLG3744		AGEC3714 AGEC3724 AGEC3734 AGEC3744 EMIC2714 EMIC2724 ANIG3754 AGMA3762	AGEX3714 AGEX3734 AGEX3754 AGEX3724 AGEX3744 AGEX3764 ANIG3713 + ANIG3702 ANIG3754 CROP3754 SOIL3774 ANIG3723 CROP3764 GRAS3763 SOIL3744 WDMT3723	AGMA3714 AGMA3734 AGMA3724 AGMA3744 AGMA3762 ANIG3713 + ANIG3702 + ANIG3723 ANIG3754 CROP3754 CROP3764 CLIM3764 HORT3714 HORT3724 HORT3734	ANIG3713 + ANIG3702 + ANIG3723 ANIG3754 GRAS3763 WDMT3723 AGMA3762 *(MUST BE TAKEN WITH AT LEAST 2 OTHER AGMA MODULES)* AGMA3714 AGMA3734 AGMA3724 AGMA3744 AGEX3714 AGEX3734 AGEX3754 AGEX3724 AGEX3744 AGEX3764

5	Students select and register for one of the major fields of study from the second year BSc Agriculture learning programme as set out in the Faculty Rule Book. Students must register and pass at least 120 fourth year credits from the following modules linked to the relevant majors. Prerequisites need to be checked and considered to ensure compliance to be able to register for modules in the next study year.					
	Animal Sciences **ANIMAL SCIENTIST:** ANIP4814 ANIB4814 ANIN4834 ANIG4808 ANIF4824 ANIF4864 ANIB4823 ANIN4864 **FOOD PRODUCTS:** ANIP4814 ASCG4826 ANIF4824 ANIF4864 ONE OF ANIN4834 WILD4814 **RANGELAND AND WILDLIFE:** GRAS4834 GRAS4808 WILD4814 WILD4856 ANIF4824 ANIF4864 GRAS4824 WILD4826 ANIB4823 ANIN4864	**Agronomy** CROP4814 CROP4834 SCCS4808 CROP4824 CROP4844 <u>ENOUGH OF</u> PTLB4814 PPLG4834 SOIL4814 SOIL4824 SOIL4834 SOIL4844	**Soil Science** SOIL4814 SOIL4824 SOIL4834 SOIL4844 SCCS4808 <u>ENOUGH OF</u> CROP4814 CROP4834 SCCS4808 CROP4824 CROP4844 CLIM4814 GRAS4834 PTLB4814 PPLG4834	**Plant Pathology** PLPG4814 PPLG4808 PPLG4816 PPLG4834 PPLG4824 PLTB4854	**Plant Breeding** PLTB4814 PLPG4814 PLTB4854 PLTB4808 PLTB4816 PLTB4824	

12.2.3 BSC FOUR-YEAR SOUTH CAMPUS

BACHELOR OF SCIENCE

All students in any of the selected extended programmes need to pass the developmental modules prescribed for these programmes. This include mainstream developmental modules MATD1554, MATD1534, MATD1564 and MATD1544. Students must also pass CHEM1552 if it is required in their programme. The skills developmental modules must be passed for students to proceed to the second year of study and these include SCNS1508, CALN1508 and CSIL1501. The rest of the required modules are included in the table below.

Mathematics **Academic Language Course** **Life-long Learning – Natural Sciences** **Computer Literacy**		MATD1554 OR MATD1534 CALN1508 SCNC1508 CSIL1501	MATD1564 OR MATD1544
Year	**Path**	**Semester 1**	**Semester 2**
1	BC4310E1 - BACHELOR OF SCIENCE WITH SPECIALISATION IN BIOLOGICAL SCIENCES	CHEM1552 + CHEM1632 BLGY1513	CHEM1622 + CHEM1562 BLGY1643
	BC4330E1 - BACHELOR OF SCIENCE WITH SPECIALISATION IN CHEMICAL AND PHYSICAL SCIENCES	CHEM1552 + CHEM1632 CHEM1501 BLGY1513	CHEM1622 + CHEM1562 CHEM1661 BLGY1643
	BC4340E2 - BACHELOR OF SCIENCE WITH SPECIALISATION IN GEOLOGY	CHEM1552 + CHEM1632 CHEM1501 GEOG1512	CHEM1622 + CHEM1562 GEOP1624
	BC4341E2 - BACHELOR OF SCIENCE WITH SPECIALISATION IN GEOGRAPHY	BLGY1513 GEOG1512	BLGY1643 GEOP1624
	BC4360E1 - BACHELOR OF SCIENCE WITH SPECIALISATION IN INFORMATION TECHNOLOGY	CHEM1552 + CHEM1632 CSIS1534	CHEM1622 + CHEM1562 CSIS1644

Students who fail MATD1554 or MATD1534 will not be able to continue in the second semester. Students who do not pass all academic modules in the June examination could be academically excluded in June already but they will be academically excluded in December. Some second semester modules have prerequisites and need to be adhered to:

- To register for CHEM1622 and CHEM1562 students must have passed CHEM1552,CHEM1632 and MATD1554 or MATD1534.
- To register for MATD1564 students must have passed MATD1554.
- To register for MATD1544 students must have passed MATD1534.
- To register for BLGY1643 students must have passed BLGY1513 and MATD1554 or MATD1534.
- To register for GEOP1624 students must have passed GEOG1512.
- To register for CSIS1534 students must have Maths level 4 or register for MATD1554 concurrently.
- To register for CSIS1664 students must have passed CSIS1534. Students who fail CSIS1534 cannot continue with BC4360E1 - BSc(IT).

After the end of the year examination students must have successfully completed ALL THE MODULES in the first year of the BSc Four-year Curriculum Programme with an average of 60% for Academic modules and 50% for all the developmental modules. Then students may proceed in the next academic year to register for remaining first year modules as required by the Faculty's Rule Book for the main field of study as chosen by the student.

Students who could not complete and pass all the first year's modules and at least 48 credits of the second year required for their programme of choice after three years of registration will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.

12.2.4 BSC FOUR-YEAR SOUTH CAMPUS

BACHELOR OF SCIENCE

Mathematics **Academic Language Course** **Life-long Learning – Natural Sciences** **Computer Literacy**		MATD1554 OR MATD1534 CALN1508 SCNC1508 CSIL1501	MATD1564 OR MATD1544
Year	**Path**	**Semester 1**	**Semester 2**
1	BC4320E2 - BACHELOR OF SCIENCE WITH SPECIALISATION IN MATHEMATICAL SCIENCES	EFBC2514 EFEC2614 EFHR1515	EFEC2624 EFBC2524
	BC4324E2 - BACHELOR OF SCIENCE WITH SPECIALISATION IN ACTUARIAL SCIENCES	EFEC2614 EFBC2514	EFEC2624 EFBC2524
	BC4350E2 - BACHELOR OF SCIENCE WITH SPECIALISATION IN AGRICULTURAL ECONOMICS	TWO OF EFEC2614 EFBC2514 AGEC1514	TWO OF EFEC2624 EFBC2524 AGEC1624
	BC4371E2 - BACHELOR OF SUSTAINABLE FOOD SYSTEMS	EFHR1515 SFIF1513	SFSF1523 EFIO1525
	BC4365E2 - BACHELOR OF COMPUTER INFORMATION SYSTEMS	CSIS1534 ONE OF EFHR1515 EFBC2514 EFEC2614	CSIS1644 ONE OF EFIO1525 EFBC2524 EFEC2624
	BC4390E2 - BACHELOR OF SCIENCE WITH SPECIALISATION IN BUILDING SCIENCES	EFEC2614 EFBC2514	EFEC2624 EFBC2524

Students who fail MATD1554 or MATD1534 will not be able to continue in the second semester. Students who do notpass all academic modules in the June examination could be academically excluded in June already, but they will be academically excluded in December. Some second semester modules have prerequisites and need to be adhered to:

- To register for AGEC1624 students must have passed AGEC1514.
- To register for EFBC2524 students must have passed EFBC2514.
- To register for EFEC2624 students must have passed EFEC2614.
- To register for MATD1564 students must have passed MATD1554.
- To register for MATD1544 students must have passed MATD1534.
- To register for CSIS1534 students must have Maths level 4 or register for MATD1554 concurrently.
- To register for CSIS1644 students must have passed CSIS1534. Students who fail CSIS1534 cannot continue with BC4365E2 - BCIS.

After the end of the year examination students must have successfully completed ALL THE MODULES in the first year of the BSc Four-year Curriculum Programme with an average of 60% for Academic modules and 50% for all the developmental modules. Then students may proceed in the next academic year to register for remaining first year modules as required by the Faculty's Rule Book for the main field of study as chosen by the student.

Students who could not complete and pass all the first year's modules and at least 48 credits of the second year required for their programme of choice after three years of registration will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.

Year	Semester 1 and Semester 2
2	In their second year of study students have to register for CHEM1661 and CSIL1521 as well as all the first-year main field of study's modules in the learning programme of choice as set out in the Faculty Rule Book. Students must take note of the following requirements: • CHEM1552 + CHEM1632 + CHEM1501/CHEM1581 must be passed to get recognition for CHEM1513 + CHEM1551/CHEM1501. • CHEM1562 + CHEM1622 + CHEM1661 must be passed to get recognition for CHEM1623/ CHEM1643 + CHEM1661. • CSIL1501 must be passed to get recognition for CSIL1511. • Students who pass SCNS1508 or SCLL1508 will receive recognition for UFSS1512, which is the first semester of UFSS1504, but have to register for UFS1522. UFSS1512 + UFS1522 is equivalent to UFSS1504. • BLGY1513, BLGY1643, AGEC1514, AGEC1624, CSIS1534 and CSIS1544 could be recognized if it is included in the student's learning programme of choice from the main field of study in the Faculty Rule Book. • CSIS1534 + CSIS1644 must be passed with an average of 70% to continue with BC4360E1 - BSc(IT). Students will then receive recognition for CSIS1614. Students who passed CSIS1534 + CSIS1644 with an average of 50% - 69% cannot continue with BC4360E1 - BSc(IT), but will have to switch to BC4365E2 - BCIS or another programme of their choice.

BIOLOGICAL SCIENCES BC4310E1	**PHYSICAL AND CHEMICAL SCIENCES** BC4330E1	**INFORMATION TECHNOLOGY** BC4360E1	**GEOLOGY** BC4340E2	**GEOGRAPHY** BC4341E2
MATM1534 PHYS1514 OR PHYS1534 BLGY1623 BLGY1663 BLGY1683 CHEM1661 MATM1644 PHYS1624 OR PHYS1644 STSA1624	MATM1534 PHYS1514 OR PHYS1534 PHYA1554 STSM1614 CHEM1661 PHYS1624 OR PHYS1644 MATM1644 MATM1622 PHYA1624 STSA1624 STSM1624 SCCS1624 GERS1624	CSIS1614 CSIS1553 MATM1534 PHYS1514 OR PHYS1534 STSM1614 CSIS1624 CSIS1664 CHEM1661 MATM1644 MATM1622 PHYS1624 OR PHYS1644 STSM1624 STSA1624	GEOH1614 GLGY1614 MATM1534 PHYS1514 OR PHYS1534 CHEM1661 GEOP1624 GERS1624 GLGY1624 MATM1644 PHYS1624 OR PHYS1644 STSA1624	GEOH1614 GEOG1512 AGEC1514 BLGY1513 MATM1534 BLGY1643 BLGY1663 SCCS1624 GEOP1624 GERS1624 STSA1624

Year	Semester 1 and Semester 2
2	In their second year of study students have to register for all the first-year main field of study modules in the learning programme of choice as set out in the Faculty Rule Book. Students must take note of the following requirements: • CSIL1501 must be passedto get recognition for CSIL1511 • UFSS1512 – Students who pass SCNS1508 and SCLL1508 will receive recognition for UFSS1512, which is the first semester of UFSS1504 but have to register for UFS1522. UFSS1512 + UFS1522 is equivalent to UFSS1504. • AGRI1514, AGEC1514, AGEC1624 and ANIG1624 could be recognized if it formed part and was passed as the first academic year in the students learning programme of choice form the main fields of study in the Faculty Rule book. • CSIS1644 must be passed to continue with BC4365E2 - BCIS, otherwise the student will have to switch to another programme of their choice.

MATHEMATICAL SCIENCES BC4320E2	**ACTUARIAL SCIENCES** BC4324E2	**AGRICULTURAL ECONOMICS** BC4350E2	**SUSTAINABLE FOOD SYSTEMS** BC4371E2	**COMPUTER INFORMATION SYSTEMS** BC4365E2	**BUILDING SCIENCE** BC4390E2
EBCS1514 MATM1534 GEOH1614 CHEM1623 + CHEM1661 OR CHEM1643 + CHEM1661 PHYS1624 OR MATM1644 GEOP1624 STSA1624 EBCS1524	MATM1534 STSM1614 ACSF1613 EECF1614 ACSG1614 MATM1644 MATM1622 STSM1624 EECF1624 ACSF1623 CSIS1683	MATM1534 EBCS1514 AGEC1514 AGEC1634 BLGY1513 AGEC1624 MATM1644 STSA1624 SCCS1624 ANIGQ1624 BLGY1643	SFFS1513 SFNH1513 SFCF1513 SFEC1513 SFFS1523 SFNH1523 SFCF1523 SFEC1523	BCIS1513 EBCS1514 EBUS1514 EHRM1514 BCIS1623 EBCS1524 EIOP1524 CSIS1683	BARR1512 BMQR1504 BBSR1504 PHYS1512 EBCS1514 EBUS1514 EACC1614 BBER1523 BPDR1522 MATM1542

3	Follow second year main field of study for the BSc learning programme of choice as set out in the Faculty Rule Book.				
	BIOLOGICAL SCIENCES BC4310E1	**PHYSICAL AND CHEMICAL SCIENCES** BC4330E1	**COMPUTER SCIENCE AND INFORMATICS** BC4360E1	**GEOLOGY** BC4340E2	**GEOGRAPHY** BC4341E2
	BOCB2616 BTNY2616 CHEM2613 + CHEM2601 CHEM2633 + CHEA2601 ENTO2616 GENE2616 MCBP2616 ZLGY2636 BOCE2626 BTNY2626+ BTNY2621 CHEM2623+ CHEM2621+ CHEM2643+ CHEM2641 ENTO2626 ZLGY2626 GENE2626 MCBP2626 ZLGY2626	BOCB2616 BTNY2616 CHEM2613 + CHEM2601 CHEM2633 + CHEA2601 MCBP2616 PHYS2614 + PHYS2632 BOCE2626 BTNY2626+ BTNY2621 CHEM2623+ CHEM2621+ CHEM2643+ CHEM2641 MCBP2626 PHYS2624+ PHYS2644	CSIS2624 CSIS2664 STSM2616 STSM2626 TWO OF:** (EECF1614 EBUS1614 STSA2616) TWO OF:** (EECF1624 EBUS1624 EBMA2624 STSA2626) CHEM2613 + CHEM2601 CHEM2633 + CHEA2601 PHYS2614 + PHYS2632 CHEM2623+ CHEM2621+ CHEM2643+ CHEM2641 PHYS2624+ PHYS2644 TWO OF: (MATM2624 MATA2664 MATM2664) CSIS2614 CSIS2634 MATM2614 ONE OF: STSM2634 MATA2754	CHEM2613 + CHEM2601 CHEM2633 + CHEA2601 PHYS2614 + PHYS2632 MATM2614 MATA2754 MATA2654 CHEM2623+ CHEM2621 CHEM2643+ CHEM2641 PHYS2624+ MATM2624 MATA2664 MATM2664 GISC2624	ZLGY2636 BTNY2616 GEOP2614 GEOH2614 ZLGY2626 BTNY2626+ BTNY2621 GEOP2624 GISC2624 GEOH2624

3	Follow second year main field of study for the BSc learning programme of choice as set out in the Faculty Rule Book.					
	MATHEMATICAL SCIENCES BC4320E2	**ACTUARIAL SCIENCES** BC4324E2	**AGRICULTURAL ECONOMICS** BC4350E2	**SUSTAINABLE FOOD SYSTEMS** BC4371E2	**COMPUTER INFORMATION SYSTEMS** BC4365E2	**BUILDING SCIENCE** BC4390E2
	CHEM2613 + CHEM2601 CHEM2633 + CHEA2601 PHYS2614 + PHYS2632 MATM2614 MATA2674 MATA2754 MATA2654 STSM2616 STSM2634 CHEM2623+ CHEM2621+ CHEM2643+ CHEM2641 PHYS2624+ PHYS2644 MATM2624 MATA2664 MATM2664 STSM2626	ACSF2716 MATM2614 STSM2616 STSA2626 EMIC2714 MATA2654 ACSF2746 ACSF2786 STSM2626 EMAC2724 MATM2664 STSA2626	AGEC2614 EECF1614 STSA2616 AGEC2624 STSA2626 EECF1624 ONE OF: CROP2614 SOIL2674 ANIG2613 + ANIG2602 GRAS2614	SFFS2613 SFPP2613 SFPV2613 SFMB2613 SFAI2613 SFSS2623 SFPT2623 SFPD2623 SFAP2623 SFCF2623	BCIS2614 CSIS2634 EBUS1614 EFMA2614 BCIS2624 CSIS2624 EBUS1624 ELRM2624	BMQR2604 BBSR2604 BCSR2612 BBER2612 BPDR2614 BWIL2602 BPDR2624 BBER2622 BCSR2622 LLBR2624 LMER1624 EECF1614 OR EECF1624

** Choose modules whose sessions on the timetable do not clash.

4	Follow third year main field of study for the BSc learning programme of choice as set out in the Faculty Rule Book. Students need to obtain at least 120 credits at NQF level 7 and have at least 60 credits in one of the major fields of specialisation				
	BIOLOGICAL SCIENCES BC4310E1	**PHYSICAL AND CHEMICAL SCIENCES** BC4330E1	**COMPUTER SCIENCE AND INFORMATICS** BC4360E1	**GEOLOGY** BC4340E2	**GEOGRAPHY** BC4341E2
	ELECTIVES BOCM3714 + BOCE3714 CHEM3713 + CHEM3701 CHEM3733 + CHEB3701 ZLGY3714 + ZLGY3734 MCBG3714 + MCBE3714 BTNY3714 + BTNY3712 BTNY3734 + BTNY3754 ENTO3714 + ENTO3734 GEOH3714 +GEOP3714 GENE3713 + GENE3733 +GENE3703 CHEM3713 + CHEM3701 CHEM3733 + CHEB3701 BOCP3724 + BOCS3724 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741 ZLGY3724 + ZLGY3744 GENE3764 + GENE3743 MCBC3724 + MCBP3724 BTNY3724 + BTNY3744 ENTO3724 + ENTO3744	**ELECTIVES** BOCM3714 + BOCE3714 BTNY3714 + BTNY3712 BTNY3734 + BTNY3754 CHEM3713 + CHEM3701 CHEM3733 + CHEB3701 CLIM3734 MCBG3714 + MCBE3714 PHYS3714 + PHYS3732 + PHYS3752 PHYA3773 + PHYA3709 BOCP3724 + BOCS3724 BTNY3724 + BTNY3744 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741 CLIM3724 MCBC3724 + MCBP3724 PHYS3724 + PHYS3742 + PHYS3762 PHYA3783	CSIS3714 CSIS3734 CSIS3724 CSIS3744 CHEM3713 + CHEM3701 CHEM3733 + CHEB3701) TWO OF: (EBUS2714 ETRM3714 EDAB2714) TWO OF: (MATM3774 MATM3734 MATA3774) PHYS3714 + PHYS3732 + PHYS3752 STSA3716 + STSA3732 STSM3714 + STSM3734 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741 TWO OF: (EBMA3725 ESBM2724 EDAB2724) TWO OF: (MATM3784 MATM3744 MATA3764) PHYS3724 + PHYS3742 + PHYS3762 STSA3726 + STSA3742 STSM3744 + STSM3764 **ELECTIVES** CSIS3754 CSIS3784	GLGY3714 GLGY3754 GLGY3724 GLGY3744 GLGY3784 **ELECTIVES** GLGY3734 GLGY3774 GLGY3764 GLGY3784 CHEM3713 + CHEM3701+ CHEM3733 + CHEB3701 CHEM3713 PHYS3714 + PHYS3732 + PHYS3752 SOIL3774 CHEM3723 + CHEM3721 + CHEM3743 + CHEM3741 PHYS3724 +PHYS3742 + PHYS3762 SOIL3724	GEOG3702 GEOG3704 GEOH3714 GEOP3714 GERS3714 GEOH3724 GEOP3724 GERS3724 **ELECTIVES** BTNY3712 + BTNY3714 OR BTNY3734 OR ZLGY3714 + ZLGY3734 EBUS2714 AGEC3724

4	Follow third year main field of study for the BSc learning programme of choice as set out in the Faculty Rule Book.					
	MATHEMATICAL SCIENCES BC4320E2	**ACTUARIAL SCIENCES** BC4324E2	**AGRICULTURAL ECONOMICS** BC4350E2	**SUSTAINABLE FOOD SYSTEMS** BC4371E2	**COMPUTER INFORMATION SYSTEMS** BC4365E2	**BUILDING SCIENCE** BC4390E2
	MATM3774 MATM3734 MATA3774 MATM3784 MATM3744 MATA3764 MATA3784	ACSS3708 ACSM3708 STSM3714 STSM3734 STSM3764 STSM3744	AGEC3714 AGEC3734 STSA3716 AGEC3724 AGEC3744 AGEC3721 STSA3726	SFRF3713 SFPD3713 SFPM3713 SFCB3713 SFMC3713 CNCD3732 SFES3723 SFIP3726 SFQA3723 SFMV3723	BCIS3714 CSIS3714 EBUS2714 EBUS2715 CSIS3724 CSIS3744 ESBM2724 EBMA3725	BMQR3706 BBSR3712 BCCR3712 BBER3712 BQPR3704 BPOR3706 BWIL3702 BCCR3722 BIRR3722 BBSR3722 BBER3722

12.3 LEARNING PROGRAMMES FOR BACHELOR'S DEGREES (NQF EXIT LEVEL 7 & 8)

12.3.1 BACHELOR OF ARCHITECTURE BC430114

The Bachelor of Architecture involves full-time education that extends over six semesters and involves lectures, projects and continuous assessment.

The purpose of this programme is to educate students who may register in the appropriate category for which they qualify with the South African Council for the Architectural Profession in terms of the provisions of the Architectural Profession Act 44 of 2000. The degree BArch provides access to the BArchHons degree.

Students are strongly advised to work in an architect's office or other approved similar institution during holidays in order to gain practical experience.

The assessments and examinations for the degree BArch are recognised by the minister concerned in terms of the provisions of the Architectural Profession Act (Act 44 of 2000). Training experience after completion of the BArch degree will be controlled by the conditions of the South African Council for the Architectural Profession. The registrar of this Council will provide information in this regard.

	BC430114		BC430114	
YEAR	**FIRST**			
SEMESTER	**FIRST**		**SECOND**	
COMPULSORY YEAR	DESN1500 CONS1506 HTRC1506 ARCR1506	Design I Construction I Histories and Theories of Architecture I Presentation Techniques Architectural Representation 1		
*If not proficient with UFS language test	UFSS1504 OR *CALN1508			
YEAR	**SECOND**			
SEMESTER	**FIRST**		**SECOND**	
	DESN2600 CONS2600 HTRC2606 ARCR2602	Design II Construction II Histories and Theories of Architecture II Architectural Representation 2		
YEAR	**THIRD**			
SEMESTER	**FIRST**		**SECOND**	
	DESN3700 CONS3700 HTRC3706 BCCR3712	Design III Construction III Histories and Theories of Architecture III Building Contracts Law	BCCR3722	Building Contracts Law

12.3.2 BACHELOR OF AGRICULTURE

12.3.2.1 BACHELOR OF AGRICULTURE BC53XXYY

LEARNING PROGRAMMES FOR BACHELOR OF AGRICULTURE GENERAL

Each student includes 120 credits per year for three years. In planning their degree they need to consider the prerequisite for the second-year and third-year modules. They can only take modules that do not clash on the official timetable. This degree makes provision for at least 120 NQF Exit Level 7 credits.

YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C1	60 CREDITS OF: AGEC1514 AGRI1514 AGRI1534 AGRI1554	60 CREDITS OF: AGEC1624 AGRI1624 AGRI1664 ANIG1624 SCCS1624	60 CREDITS OF: AGEC1634 AGEC2614 AGEX2614 ANIG2613 + 2602 CROP2614 ENTO2614 GRAS2614 SOIL2674	60 CREDITS OF: AGEC2624 AGEG2624 AGEX2624 ANIG2623 CLIM2614 PLPG2623 SCCS2624 SCCS2684 WDMT2624	60 CREDITS OF: AGEG3714 AGEX3714 AGEX3734 AGEX3754 AGMA3714 AGMA3734 ANIG3713 + ANIG3702 ANIG3754 ANIG3723 CROP3754 HORT3714 HORT3734 SOIL3774	60 CREDITS OF: AGEG3724 AGEX3724 AGEX3744 AGEX3764 AGMA3724 AGMA3744 AGMA3762 CLIM3764 CROP3764 GRAS3763 HORT3724 SOIL3744 SOIL3774 WDMT3723
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 CALN1508	CSIL1521				

12.3.2 BACHELOR OF AGRICULTURE

12.3.2.1 MANAGEMENT SPECIALISATION Fields of study BC530147, BC530152, BC530101, BC530102, BC530172, BC530103

LEARNING PROGRAMMES FOR MANAGEMENT SPECIALISATION

The objective of the degree and different learning programmes is to train students to apply agricultural knowledge practically on farm level as well as in agriculturally-related organisations. The BAgric qualification will allow persons to apply their knowledge in the fields of resource utilisation, agricultural production, processing, management and communication. Learning programmes in this Field of study offer seven options. These learning programmes will lead to one of the following qualifications: BAgric, Agricultural Extension, Agricultural Management, Animal Production, Crop Production with specialisation in either field crops or horticulture, Irrigation Management, and. The table below indicates the combinations for the different qualifications. Each student includes all the compulsory modules (row C1, C2 and C3) from the prescribed disciplines for all three study years. Students must select sufficient other modules from their own electives (E) to obtain a total of at least 120 credits for each of the first, the second and the third year of study. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	AGRICULTURAL EXTENSION	AGRICULTURAL MANAGEMENT	ANIMAL PRODUCTION MANAGEMENT	AGRICULTURAL EXTENSION	AGRICULTURAL MANAGEMENT	ANIMAL PRODUCTION MANAGEMENT
CODE	BC530147	BC530152	BC530101	BC530147	BC530152	BC530101
YEAR	**FIRST**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C2	AGEX2614 CROP2614 ANIG2613+ANIG2602 ONE OF: SOIL2674 GRAS2614	AGEC1634 AGEC2614 CROP2614 ANIG2613+ANIG2602	AGEC2614 ANIG2613+ANIG2602 GRAS2614 ONE OF: AGEX2614 CROP2614 SOIL2674	AGEX2624 ANIG2623+ANIG2602 SCCS2624 ONE OF: SCCS2684 WDMT2624	AGEC1624 AGEC2624 TWO OF: SCCS2624 AGEX2624 ANIG2623+ANIG2602	AGEC1624 WDMT2624 ANIG2623+ANIG2602 ONE OF: AGEX2624 AGEC2624
YEAR	**THIRD**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C3	AGEX3714 AGEX3734 AGEX3754 ONE OF: ANIG3713+ANIG3702 ANIG3754 CROP3754 SOIL3774	AGMA3714 AGMA3734 TWO OF: ANIG3713+ANIG3702 *ANIG3754 *CROP3754 HORT3734 HORT3714	ANIG3713+ANIG3702 ANIG3754 TWO OF: AGMA3714 AGMA3734 AGEX3714 AGEX3734 AGEX3754	AGEX3724 AGEX3744 AGEX3764 ONE OF: ANIG3723+ANIG3702 CROP3764 GRAS3763 SOIL3744 WDMT3723	AGMA3724 AGMA3744 AGMA3762 ONE OF: CROP3764 ANIG3723+ANIG3702 CLIM3764 HORT3724	ANIG3723+ANIG3702 AGMA3762 GRAS3763 WDMT3723 ONE OF: AGMA3724 AGMA3744 AGEX3724 AGEX3744 AGEX3764

HORT3734 *(Prerequisite for HORT3724)*

HORT3724 *(Only if you selected HORT3734)*

*ANIG3754 and CROP3754 cannot be taken together"

"*Where an elective module clashes with a compulsory module another elective must be taken

DISCIPLINE	IRRIGATION MANAGEMENT	MIXED FARMING	CROP PRODUCTION		IRRIGATION MANAGEMENT	MIXED FARMING	CROP PRODUCTION	
CODE	BC530172	BC530103	BC530102		BC530172	BC530103	BC530102	
YEAR	**FIRST**							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C1	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGEC1514 AGRI1514 AGRI1534 AGRI1554	AGRI1514 AGRI1534 AGRI1554 AGEC1514		AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624	
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508				CSIL1521			
YEAR	**SECOND**							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C2	CROP2614 SOIL2674 AGEC2614 CLIM2614	AGEC2614 ANIG2613+ANIG2602 CROP2614 ONE OF: SOIL2674 GRAS2614 AGEX2614 CLIM2614	SOIL2674 CROP2614 CLIM2614 ENTO2614		SCCS2624 SCCS2684 AGEC1624 AGEG2624	AGEC1624 ANIG2623+ANIG2602 SCCS2624 ONE OF: AGEX2624 SCCS2684 AGEG2624 WDMT2624	SCCS2624 SCCS2684 AGEG2624 PLPG2623	
YEAR	**THIRD**							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C3	AGMA3714 **OR** AGMA3734 SOIL3774 AGEG3714 ONE OF: HORT3734 HORT3714 CROP3754	**FOUR OF:** AT LEAST ONE OF AGMA3714 AGMA3734 AT LEAST ONE OF ANIG3713+ANIG3702 ANIG3754* AT LEAST ONE OF CROP3754* HORT3734 HORT3714	**TWO SPECIALISATIONS:** **FIELD CROPS** CROP3754 SOIL3774 TWO OF: AGMA3714 AGEG3714 HORT3714	**HORTICULTURE** HORT3714 SOIL3774 HORT3734 AGEG3714	CROP3764 **OR** HORT3724 CLIM3764 AGEG3724 AGMA3762 ONE OF: AGMA3724 AGMA3744	**FOUR OF:** AT LEAST ONE OF AGMA3724+AGMA3762 AGMA3744+AGMA3762 AT LEAST ONE OF ANIG3723+ANIG3702 AT LEAST ONE OF CROP3764 HORT3724	**TWO SPECIALISATIONS:** **FIELD CROPS** CROP3764 SOIL3744 CLIM3764 ONE OF: AGMA3724+ AGMA3762 AGMA3744+ AGMA3762 AGEG3724 HORT3724	**HORTICULTURE** AGEG3724 HORT3724 SOIL3744 ONE OF: AGMA3724+ AGMA3762 AGMA3724+ AGMA3762 CROP3764 CLIM3764
ELECTIVE *		SOIL3774				SOIL3744 CLIM3764 GRAS3763 WDMT3723		

*ANIG3754 and CROP3754 cannot be taken together

*Where an elective module clashes with a compulsory module another elective must be taken.

12.3.2.2 AGRICULTURAL ECONOMICS BC530111

LEARNING PROGRAMMES FOR AGRICULTURAL ECONOMICS

The objective of the degree is to train students to apply agricultural knowledge practically on the farm level as well as in agriculturally-related organisations. The BAgric qualifi- cation will allow persons to apply their knowledge in the fields of resource utilisation, agricultural production, processing, management and communication.

Learning programmes in this Field of study offer ONE option. Each student includes all the compulsory modules (row C1) from the prescribed disciplines for all three study years. Students must select sufficient other modules (other science subjects as supportive electives) from the compulsory row of any other discipline or from their own electives (E) to obtain a total of at least 120 credits for each year of study. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

YEAR	FIRST		SECOND		THIRD	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C1	AGEC1634 LMER1514 EACC1614 AGEC1514	AGRI1624 EBUS1624 LMER1624 AGEC1624	AGEC2614 EECF1614	AGEC2624 EECF1624	AGEC3714 AGEC3734 ANIG3754 EMIC2714	AGEC3724 AGEC3744 EMAC2724 AGMA3762
ELECTIVES		ONE OF: ANIG1624 *SCCS1624	TWO OF: CROP2614 SOIL2674 ANIG2613+ANIG2602 GRAS2614	TWO OF: AGEG2624 ANIG2623+ANIG2602 SCCS2624 WDMT2624		
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521				

*SCCS1624 Prerequisite for SOIL3754

12.3.3 BACHELOR OF COMPUTER INFORMATION SYSTEMS BC430156

LEARNING PROGRAMMES IN COMPUTER INFORMATION SYSTEMS

Students need to enrol for all the compulsory modules for all three study years.

YEAR	FIRST		SECOND		THIRD	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C1	BCIS1513 CSIS1534 EBCS1514 EBUS1514 EHRM1514	BCIS1623 CSIS1644 EBCS1524 EIOP1524	BCIS2614 CSIS2634 EBUS1614 EFMA2614	BCIS2624 CSIS2624 EBUS1624 ELRM2624	BCIS3714 CSIS3714 EBUS2714 EBUS2715	CSIS3724 CSIS3744 ESBM2724 EBMA3725
OPTIONAL		CSIS1683		CSIS2642		
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521				

12.3.4 BACHELOR OF SUSTAINABLE FOOD SYSTEMS BC430223

LEARNING PROGRAMMES FOR SUSTAINABLE FOOD SYSTEMS

Sustainable Food Systems is a study of the need of man regarding the provision of healthy and nutritious food to meet the dietary needs of the present without compromising the ability of future generations. It includes the social, environmental, and economic viability and how to provide fair and equitable access to the resources while minimizing negative impacts on the environment, conserving natural resources, and ensuring equitable benefits to all stakeholders involved in the systems. This includes local food production, food security, biodiversity, new food product development and fostering of the resilience of food producers after the completion of this programme. After completing this programme, The B Food Systems degree student will be capable of following a career as a Food Policy Analyst, Food Safety Manager, Sustainable Agriculture Specialist, Product developer, Educator and Food Systems Analyst. Students in this degree learn to be leaders and advocates for managing sustainable community food systems, using their skills in institutions, small businesses, and other organizations. The primary subjects are Food Systems, Food production, Food processing, Consumer behaviour and the Food value chain. Each student includes all the modules from the prescribed disciplines for all three study years to obtain 120 credits for each year of study.

YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C1	SFIF1513 SFFS1513 SFNH1523 SFCF1513 SFEC1513	SFSF1523 SFPP1623 SFHN1523 SFFD1623 SFFO1523	SFFS2613 SFPP2613 SFPV2613 SFMB2613 SFAI2613	SFSS2623 SFPT2623 SFPD2623 SFAP2623 SFCF2623	SFRF3713 SFPD3713 SFPM3713 SFCB3713 SFMC3713 CNCD3732	SFES3723 SFIP3726 SFQA3723 SFMV3723
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521			CNCR3704 *(optional)*	

12.3.5 BACHELOR OF CONSUMER SCIENCE BC430123

(No new intake in this programme from 2024 as only pipeline students will be dealt with. Programme is phasing out)

LEARNING PROGRAMMES FOR CONSUMER SCIENCE

Consumer science is a study of the need of man regarding housing, clothing and food and the management of resources to satisfy these needs. After completion of this programme, the B Consumer Science student will be capable of following a career as a Consumer Scientist, e.g. consumer consultant, designer, buyer, marketer, or quality control inspector of consumer products. The student should also be capable of advising consumers on the management of time, energy and other resources. The major subjects are Foods, Consumer Science and Textiles. Learning programmes in the CONSUMER SCIENCE Field of study offer two options. Each student includes all the compulsory modules (row C1) from the prescribed disciplines for all three study years and selects sufficient other modules (other science subjects as supportive electives) from the compulsory row to obtain a total of at least 120 credits for each year of study. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

YEAR		**FIRST**		**SECOND**		**THIRD**	
SEMESTER		**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY	CONSUMER BEHAVIOUR I-VI FOOD I-VI FOOD SECURITY I-IV	CNSB1614 CNSF1614 AGEC1514	CNSB1624 CNSF1624 NUTB1624	CNSB2614 CNSF2614 CNFS2613 FSCS2634	CNSB2624 CNSF2624 CNFS2623	CNSB3714 CNSF3714 CNFS3714	CNSB3724 CNSF3724 CNFS3724
ELECTIVES **Enough credits to obtain, together with the compulsory modules, 120 credits**		AGEX2614	AGEX2624	AGEX3714	AGEX3724	AGEX3734 OR AGEX3754	AGEX3744 OR AGEX3764
REQUIRED *If not proficient with UFS language test		CSIL1511 UFSS1504 *CALN1508	CSIL1521			CNCD3732 CNCR3704	

12.4 LEARNING PROGRAMMES FOR BACHELOR OF SCIENCE DEGREES (NQF EXIT LEVEL 7 & 8)

12.4.1 BACHELOR OF SCIENCE

12.4.1.1 BACHELOR OF SCIENCE BC43XXYY

LEARNING PROGRAMMES FOR BACHELOR OF SCIENCE GENERAL

Each student includes 120 credits per year for three years. In planning their degree they need to consider the prerequisite for the second-year and third-year modules. They can only take modules that do not clash on the official timetable. This degree makes provision for one major with at least 60 NQF Exit Level 7 credits in that major and a combination of different related modules for at least 60 credits also at NQF Exit Level 7.

YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C1	60 CREDITS OF: BLGY1513 CHEM1513 + CHEM1501 PHYS1514 OR PHYS1534 MATM1534 GLGY1614 GEOH1614 GEOG1512 PSIN1514	60 CREDITS OF: BLGY1623 OR BLGY1643 OR BLGY1663 OR BLGY1683 CHEM1623 + CHEM1661 OR CHEM1643 + CHEM1661 PHYS1624 OR PHYS1644 MATM1644 GLGY1624 GEOP1624 PSDE1624	60 CREDITS OF: BOCB2616 CHEM2613 + CHEM2601 CHEM2633 + CHEA2601 ZLGY2636 PHYS2614 + PHYS2632 GENE2616 MCBP2616 BTNY2616 MATM2614 MATA2754 MATA2654 ENTO2616 GEOP2614 GEOH2614 GRAS2614 PSSO2614	60 CREDITS OF: BOCE2626 CHEM2623 + CHEM2621 + CHEM2643 + CHEM2641 ZLGY2626 PHYS2624 + PHYS2644 GENE2626 MCBP2626 BTNY2626 + BTNY2621 MATM2624 MATA2664 MATM2664 ENTO2626 GEOP2624 GISC2624 GEOH2624 PSIH2724 ANIP2624	60 CREDITS OF: BOCM3714 + BOCE3714 CHEM3713 + CHEM3701 + CHEM3733 + CHEB3701 ZLGY3714 + ZLGY3734 PHYS3714 + PHYS3732 + PHYS3752 FORS3734 + GENE3733 MCBG3714 + MCBE3714 BTNY3714 + BTNY3712 BTNY3734 + BTNY3754 ENTO3714 + ENTO3734 GEOH3714 GEOP3714 GENE3713 + GENE3733 + GENE3703 DDMT3714 PSPA3714 PSRM3714	60 CREDITS OF: BOCP3724 + BOCS3724 CHEM3723 + CHEM3721 + CHEM3743 + CHEM3741 ZLGY3724 + ZLGY3744 PHYS3724 + PHYS3742 + PHYS3762 GENE3764 + GENE3743 MCBC3724 + MCBP3724 BTNY3724 + BTNY3744 ENTO3724 + ENTO3744 GEOP3724 GRAS3763 PSPE3724 PSTH3724 WILD3723
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 CALN1508	CSIL1521				

12.4.1.2 BACHELOR OF SCIENCE WITH SPECIALISATION IN ACTUARIAL SCIENCE BC431000

LEARNING PROGRAMMES IN ACTUARIAL SCIENCE

Students need to include all the compulsory modules for each year. Students in LP431000 will be evaluated after 6 and 12 months. In order to continue in LP431000, all first-year modules must be passed. If a student fails or deregisters any module, they will be moved to LP433758 (BSc Econometrics) at the earliest opportunity. Students may return to LP431000 from LP433758 if their academic performance in LP433758 is satisfactory and Faculty regulations allow such a move.

Actuarial Sciences or Econometrics (BC431000 or BC433758) students are allowed to gain exemption from the Actuarial Society of South Africa's (ASSA) prescribed subject A111 if they passed certain modules with a mark above 60% and an average of 65%.Students are allowed to improve their marks to gain exemption. These students need to apply to participate in the supplementary examinations for the following modules ACSF1613, ACSF1623, STSM1624 and STSM2626. Stream 2 can only be presented after ASSA approval.

YEAR	**FIRST**		**SECOND**				**THIRD**			
SEMESTER	**FIRST**	**SECOND**	**FIRST**		**SECOND**		**FIRST**		**SECOND**	
COMPULSORY	MATM1534 STSM1614 ACSF1613 EECF1614 ACSG1614	MATM1644 MATM1622 STSM1624 EECF1624 ACSF1623 CSIS1683	Stream 1 ACSF2716 MATM2614 STSM2616 EMIC2714 MATA2654	Stream 2 STSA2616 MATM2614 STSM2616 EMIC2714 MATA2654	Stream 1 ACSF2746 STSM2626 EMAC2724 MATM2664	Stream 2 ACSF2786 STSM2626 EMAC2724 STSA2626	Stream 1 ACSS3708 ACSM3708 STSM3714 STSM3734	Stream 2 ACSS3708 ACSM3708 ACSL3716 ACSD3716	Stream 1 STSM3764 STSM3744	Stream 2 STSM3764
ELECTIVE			STSM2634							
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521								

Stream 2: Subject to ASSA Approval

12.4.1.3 BACHELOR OF SCIENCE WITH SPECIALISATION IN AGRICULTURAL ECONOMICS BC431100

LEARNING PROGRAMMES FOR AGRICULTURAL ECONOMICS

The objective is to train scientists who, through research and practically orientated development, can promote a scientific subject in particular or agricultural science in general. After acquiring the BScAgriculture qualification, the person will have the following skills, e.g. problem identification and aim formulation, collecting and verification of data, systematisation and interpretation of data, effective communication of information and making recommendations. **Learning programmes in this Field of study offer ONE option.** Each student includes all the compulsory modules (row C1) from the prescribed disciplines for all three study years. Students must select sufficient other modules (other science subjects as supportive electives) from the compulsory row of any other discipline or from their own electives (E) to obtain at least 120 credits for each year of study.

YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY	MATM1534 EBCS1514 AGEC1514	AGEC1624 MATM1644 STSA1624	AGEC2614 EECF1614 STSA2616	AGEC2624 STSA2626 EECF1624	AGEC3714 AGEC3734 STSA3716	AGEC3724 AGEC3744 AGEC3721 STSA3726
ELECTIVE	ONE OF: BLGY1513 AGEC1634	ONE OF: SCCS1624 ANIG1624 BLGY1643	ONE OF: CROP2614 SOIL2674 ANIG2613 + ANIG2602 GRAS2614	ONE OF: SCCS2624 ANIG2623 SCCS2684	ONE OF: ANIG3713 + ANIG3702 SOIL3754	
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521				

CROP2614 (*Prerequisite for CROP3714 CROP3744)*

12.4.1.4 BACHELOR OF SCIENCE WITH SPECIALISATION IN BIOLOGICAL SCIENCES

BIOLOGICAL SCIENCES Fields of study 1

BC431920, BC431927, BC431931, BC431939, BC431949; BC432027, BC432031, BC432039, BC432049; BC432731, 39, 49; BC433139, BC433149

LEARNING PROGRAMMES BIOLOGICAL SCIENCES Fields of study 1

Learning programmes in the Biological Sciences Field of study 1 offer 15 options with a combination of any two of the six disciplines. Learning programmes consist of the combination of any two majors, e.g. Biochem- istry and Botany (BC431920), Biochemistry and Entomology(BC431927), Biochemistry and Genetics (BC431931), Biochemistry and Microbiology (BC431939), Biochemistry and Zoology(BC431949), Botany and Entomology(BC432027), Botany and Genetics(BC432031), Botany and Microbiology (BC432039), Botany and Zoology (BC432049) Entomology and Genetics(BC432731), Entomology and Microbiology(BC432739), Entomology and Zoology (BC432749), Genetics and Microbiology(BC433139) Genetics and Zoology(BC433149) Microbiology and Zoology(BC433949). Students SELECT TWO DISCIPLINES and include all the compulsory modules in row (C1, C2, and C3) of each of the selected disciplines for all three study years. Students need to SELECT enough modules per semester from the compulsory row (C1, C2, and C3) of any other discipline or from the elective row (E) for their selected disciplines to obtain at least 120 credits for each study year. Botany and Microbiology combinations (as majors) will not be allowed to register for BTNY3734, but must rather register for BTNY3712, BTNY3714 and BTNY3754. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	BIOCHEMISTRY	MICROBIOLOGY	GENETICS	BOTANY	ENTOMOLOGY	ZOOLOGY	BIOCHEMISTRY	MICROBIOLOGY	GENETICS	BOTANY	ENTOMOLOGY	ZOOLOGY
CODE	BC4319XX	BC4339XX	BC4331XX	BC4320XX	BC4327XX	BC4349XX	BC4319XX	BC4339XX	BC4331XX	BC4320XX	BC4327XX	BC4349XX
YEAR	**FIRST**											
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C1	BLGY1513 CHEM1513+ CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513+ CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513+ CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513+ CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513+ CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513+ CHEM1501 PHYS1534 MATM1534	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661 OR **CHEM1623+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFS101 *CALN1508	CSIL1511 UFS101 *CALN1508	CSIL1511 UFS101 *CALN1508	CSIL1521	CSIL1521	CSIL1521	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**											
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C2	BOCB2616	MCBP2616 BOCB2616	GENE2616	BTNY2616	ENTO2616	ZLGY2636	BOCE2626	MCBP2626 BOCE2626	GENE2626	BTNY2626 BTNY2621	ENTO2626	ZLGY2626
ELECTIVES	CHEM2613+ CHEM2601 CHEM2633+ CHEA2601 PHBG2616 STSA2616		PHBG2616				CHEM2623+ CHEM2621 CHEM2643+ CHEM2641 PHBG2626 STSA2626		PHBG2626			
YEAR	**THIRD**											
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C3	BOCM3714 BOCE3714	MCBG3714 MCBE3714	GENE3713 GENE3703 GENE3733	BTNY3712 TWO OF: BTNY3714 BTNY3734 BTNY3754	ENTO3714 ENTO3734	ZLGY3714 ZLGY3734	BOCP3724 BOCS3724	MCBC3724 MCBP3724	GENE3743 ONE OF: FORS3744 HMBG3744 GENE3764	TWO OF: BTNY3724 BTNY3744 BTNY3764	ENTO3724 ENTO3744	ZLGY3724 ZLGY3744

***CHEM1623 is a pre-requisite for 2nd year Chemistry - see NAS 2.2(n). Genetics students with specialisation in Microbiology and Genetics can not enroll for FORS3744. Botany students with specialisation in Microbiology and Botany cannot enroll for BTNY3724.*

Botany students with specialisation in Biochemistry and Botany cannot enrol for BTNY3764

BIOLOGICAL SCIENCES Fields of study 2: BC433118, BC433130, BC433180

LEARNING PROGRAMMES IN BIOLOGICAL SCIENCES Fields of study 2

Learning programmes in the Biological Sciences Fields of study 2 offer 4 options with a Behavioural Genetics (Genetics and Psychology), Human Molecular Biology, Forensics Sciences or Genetics & Physiology. Students select one of the options and include all the compulsory modules in row (C1, C2, and C3) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester from the compulsory row (C1, C2, and C3) of any other discipline or from the elective row (E) for their selected disciplines to obtain at least 120 credits for each study year. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	BEHAVIOURAL GENETICS	FORENSIC SCIENCES	GENETICS & PHYSIOLOGY	BEHAVIOURAL GENETICS	FORENSIC SCIENCES	GENETICS & PHYSIOLOGY
CODE	BC433118	BC433031	BC433180	BC433118	BC433031	BC433180
YEAR	**FIRST**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	BLGY1513 CHEM1513+CHEM1501 PSIN1514 MATM1534	BLGY1513 CHEM1513 + CHEM1501 PHYS1534 OR PHYS1514 MATM1534	BLGY1513 CHEM1513 +CHEM1501 PHYS1534 MATM1534	PSDE1624 BLGY1623 BLGY1663 BLGY1683 STSA1624 CHEM1623+CHEM1661 OR CHEM1643+CHEM1661	BLGY1623 BLGY 1663 CHEM1623 + CHEM1661 <u>32 CREDITS OF:</u> PHYS1644 OR PHYS1624 OR ANBG1524 (max 40 students) MATM1644 OR STSA1624	BLGY1623 BLGY1643 BLGY1663 BLGY1683 CHEM1643 + CHEM1661 STSA1624
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C2	GENE2616 PSSO2614	FORS2616 GENE2616	GENE2616 PHBG2616	GENE2626 PSIH2724	FORS2626 GENE2626	GENE2626 PHBG2626
ELECTIVES (E)	BOCB2616 MCBP2616 PHBG2616 ZLGY2636	CHEM2613+ CHEM2601 CHEM2633+CHEA2601 ENTO2616 ANBG2616	BOCB2616 MCBP2616 ZLGY2636	BOCE2626 MCBP2626 PHBG2626 ZLGY2626	CHEM2623+CHEM2621 CHEM2643+CHEM2641 ENTO2626 ANBG2626	BOCE2626 MCBP2626 ZLGY2626
YEAR	**THIRD**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C3	GENE3713 GENE3703 GENE3733 PSPA3714 PSRM3714	FORS3714 FORS3734	GENE3713 GENE3703 GENE3733 PHBG3716 PHBN3712	GENE3743 PSPE3724 PSTH3724 <u>ONE OF:</u> FORS3744 HMBG3744 GENE3764	FORS3724 FORS3744	GENE3743 PHBG3726 PHBE3722 <u>ONE OF:</u> GENE3764 FORS3744 HMBG3744
ELECTIVES (E)	ZLGY3714 ZLGY3734 PHBG3716 PHBN3712	GENE3713 + GENE3703 + GENE3733 CHEM3713+CHEM3701 CHEM3733+CHEB3701 ENTO3714+ENTO3734 ANBA3716+ANBT3704	ZLGY3714	ZLGY3724 ZLGY3744 PHBG3726 PHBE3722	GENE3764+GENE3743 CHEM3723+CHEM3721+ CHEM3743+CHEM3741 ENTO3724+ENTO3744 ANBE3726	

BIOLOGICAL SCIENCES Fields of study 3 BC432082, BC432041, BC432042, BC432742

LEARNING PROGRAMMES BIOLOGICAL SCIENCES Fields of study 3

Learning programmes in the Biological Sciences Fields of study 3 offer 3 options, Plant health Ecology, Botany and Plant Pathology, Botany and Plant Breeding, with Botany as a major in combination with other modules. Each student selects all the compulsory modules (rows C1, C2, C3) for each study year and chooses modules as supportive electives (E) per semester to obtain at least 120 credits for each study year. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE`	PLANT HEALTH ECOLOGY	BOTANY AND PLANT PATHOLOGY	BOTANY AND PLANT BREEDING	PLANT HEALTH MANAGEMENT	PLANT HEALTH ECOLOGY	BOTANY AND PLANT PATHOLOGY	BOTANY AND PLANT BREEDING	PLANT HEALTH MANAGEMENT
CODE	BC432082	BC432042	BC432041	BC432742	BC432082	BC432042	BC432041	BC432742
YEAR	FIRST							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C1	BLGY1513 CHEM1513 + CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513 + CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513 + CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513 + CHEM1501 PHYS1534 MATM1534	BLGY1663 BLGY1643 CHEM1643 + CHEM1661 STSA1624 SCCS1624	BLGY1623 BLGY1643 CHEM1643 + CHEM1661 STSA1624 SCCS1624	BLGY1623 BLGY1643 SCCS1624 CHEM1643 + CHEM1661 STSA1624	BLGY1663 BLGY1643 CHEM1643 + CHEM1661 BLGY1623 SCCS1624
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1521	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C2	ENTO2616 <u>AT LEAST 40 CREDITS OF:</u> BTNY2616 OR CLIM2614 GRAS2614 SOIL2674	BTNY2616 SOIL2674 DATA2614 PLTB2613	BTNY2616 DATA2614 PLTB2613	ENTO2616 BTNY2616 SOIL2674	ENTO2626 PPLG2624 BTNY2621 BTNY2626	BTNY2626 BTNY2621 PLTB2623 PPLG2624	BTNY2621 BTNY2626 DATA2624 PLTB2623 PPLG2624	ENTO2626 PPLG2624 BTNY2621 BTNY2626
YEAR	**THIRD**							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C3	ENTO3714 PPLG3714 PPLG3734 <u>ONE OF:</u> ENTO3734 BTNY3734	BTNY3712 PPLG3714 PPLG3734 <u>TWO OF:</u> BTNY3714 BTNY3734 BTNY3754	BTNY3712 BTNY3714 BTNY3734 BTNY3754 PLTB3714	ENTO3714 PPLG3714 PPLG3734 ENTO3734	ENTO3724 PPLG3724 PPLG3744 <u>ONE OF:</u> CLIM3724 BTNY3744 ENTO3744 GRAS3763 BTNY3764	PPLG3724 PPLG3744 <u>TWO OF:</u> BTNY3724 BTNY3744 BTNY3764	PLTB3724 PLTB3744 <u>TWO OF:</u> BTNY3724 BTNY3744 BTNY3764	ENTO3724 PPLG3724 PPLG3744 ENTO3744

BIOLOGICAL SCIENCES Fields of study 4 BC431980, BC431946, BC433946

LEARNING PROGRAMMES IN THE BIOLOGICAL SCIENCES Fields of study 4

Learning Programmes in the Biological Sciences Fields of study 4 offer 3 options with Statistics in combination with Biochemistry or Microbiology as well as Biochemistry in combination with Physiology. Students select one of the options and include all the compulsory modules in row (C1, C2, and C3) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester from the compulsory row (C2) or Electives row (E2). Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	BIOCHEMISTRY & PHYSIOLOGY	BIOCHEMISTRY & STATISTICS	MICROBIOLOGY & STATISTICS	BIOCHEMISTRY & PHYSIOLOGY	BIOCHEMISTRY & STATISTICS	MICROBIOLOGY & STATISTICS
CODE	BC431980	BC431946	BC433946	BC431980	BC431946	BC433946
YEAR	FIRST					
SEMESTER	FIRST			SECOND		
COMPULSORY C1	BLGY1513 CHEM1513+ CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513 + CHEM1501 PHYS1534 MATM1534	BLGY1513 CHEM1513 + CHEM1501 PHYS1534 MATM1534	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643 + CHEM1661 OR **CHEM1623 + CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643 + CHEM1661 OR **CHEM1623 + CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643 + CHEM1661
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1521	CSIL1521	CSIL1521
YEAR	SECOND					
SEMESTER	FIRST			SECOND		
COMPULSORY C2	BOCB2616 PHBG2616	BOCB2616 STSA2616	MCBP2616 STSA2616 BOCB2616	BOCE2626 PHBG2626	BOCE2626 STSA2626	MCBP2626 STSA2626 BOCE2626
ELECTIVES E2	CHEM2613+ CHEM2601 CHEM2633+CHEA2601 GENE2616	CHEM2613 + CHEM2601 CHEM2633 CHEA2601 GENE2616		CHEM2623 + CHEM2621 CHEM2643 + CHEM2641 GENE2626	CHEM2623 + CHEM2621 CHEM2643 + CHEM2641 GENE2626	
YEAR	THIRD					
SEMESTER	FIRST			SECOND		
COMPULSORY C3	BOCM3714 BOCE3714 PHBG3716 PHBN3712	BOCM3714 BOCE3714 STSA3732 STSA3716	MCBG3714 MCBE3714 STSA3732 STSA3716	BOCP3724 BOCS3724 PHBG3726 PHBE3722	BOCP3724 BOCS3724 STSA3742 STSA3726	MCBP3724 MCBC3724 STSA3742 STSA3726

***CHEM1623 is a pre-requisite for 2nd year Chemistry - see NAS 2.2(n)*

BIOLOGICAL SCIENCES Fields of study 5: BC433689

LEARNING PROGRAMMES RANGELAND AND WILDLIFE ECOLOGY

(No new intake in this programme from 2025 as only pipeline students will be dealt with. Programme is phasing out)

Rangeland- and Wildlife Ecology is the science of the relationships between Rangeland plants, animals and their environment. Rangelands across southern Africa has been studied over many years and by adding wildlife dynamics to the ecosystem will contribute towards conservation and sustainability. This science based course has a strong conservation focus with a broad background in natural resources, the environment, wildlife, zoology, genetics and botany to prepare a student for post-graduate studies and management careers. Knowing that Rangelands represent approximately almost 50% of the earth's land area and are the main provider to the multiple ecosystem services for wildlife, this is a suitable course where we will expand and diversify knowledge on ecological systems in our unique and diverse country. Rangeland and wildlife ecologists could end up as environmental consultants, environmental planners and analysts, educators or an academic, program scientists and managers, wildlife biologists and field ecologists where the knowledge can effectively be used in everyday practices being a biologist who not just understand, but also continue to study animals in their natural habitat and evaluate the effects of human impact on their environment.

Learning programmes in the Rangeland and Wildlife Science offers 2 options: Botany, Genetics and Zoology as a major in combination with other modules. Each student selects all the compulsory modules (rows C1, C2, C3) for each study year and chooses modules as supportive electives (E) per semester to obtain at least 120 credits for each study year. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
DISCIPLINE	**RANGELAND AND WILDLIFE ECOLOGY**					
CODE	BC433689					
COMPULSORY	BLGY1513 CHEM1513 + CHEM1501 PHYS1534 MATM1534	BLGY1663 BLGY1643 CHEM1643 + CHEM1661 STSA1624 ANIG1624	GRAS2614 BTNY2616 ZLGY2636 GENE2616	ANIB2624 ANIP2624 WDMT2624 AT LEAST 32 CREDITS OF: BTNY2621 + BTNY2626 ZLGY2626 GENE2626	WDMT3714 AT LEAST 44 CREDITS OF: BTNY3734 + BTNY3712 BTNY3754 ZLGY3714 ZLGY3734 GENE3713 GENE3703 GENE3733	GRAS3763 AT LEAST 48 CREDITS OF: BTNY3724 BTNY3744 BTNY3764 ZLGY3724 ZLGY3744
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521				

12.4.1.5 BACHELOR OF SCIENCE WITH SPECIALISATION IN BUILDING SCIENCES

BUILDING SCIENCES Fields of study 1: BC432401, BC432443, BC434301

A degree for the academic preparation of a student for the profession of Quantity Surveying and Construction Management. Learning programmes in the BUILDING SCIENCES Fields of study 1 offer 3 options. Each student selects all the compulsory modules (rows C1, C2, C3) for each study year and chooses modules as supportive electives (E) per semester to obtain at least 120 credits for each study year.

DISCIPLINE	BSc CONSTRUCTION ECONOMICS AND MANAGEMENT		BSc With specialisation in CONSTRUCTION MANAGEMENT (COMPACT LEARNING)		BSc With specialisation in QUANTITY SURVEYING (COMPACT LEARNING)	
CODE	BC432443		BC432401		BC434301	
	392 CREDITS		392 CREDITS		392 CREDITS	
YEAR			**FIRST**			
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C1	BARR1512 BMQR1504 BBSR1504 PHYS1512 EBCS1514 EBUS1514 EACC1614	BBER1523 BPDR1522 MATM1542	BARD1512 (BUILD) BMQD1504 (BUILD) PHYS1502 (BUILD) BBSD1504 (BUILD) EBCS1514 (EOFF) MATM1502 (BUILD)	BBED1524 (BUILD) BPDD1522 (BUILD)	BARD1512 (BUILD) BMQD1504 (BUILD) BBSD1504 (BUILD) PHYS1502 (BUILD) EBCS1514 (EOFF) MATM1502 (BUILD)	BBED1524 (BUILD) BPDD1522 (BUILD)
ELECTIVES						
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521				
YEAR			**SECOND**			
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C2	BMQR2604 BBSR2604 BCSR2612 BBER2612 BPDR2614 BWIL2602	BPDR2624 BBER2622 BCSR2622 LLBR2624 LMER1624	EBUS1514 (BUILD) BMQD2604 (BUILD) BBED2612 (BUILD) EACC1614	BBED2622 (BUILD) LLBR2624 LMER1624	BMQD2604 (BUILD) BBED2612 (BUILD) EBUS1514 (BUILD) EACC1614	BBED2622 (BUILD) LLBR2624 LMER1624
ELECTIVES	EECF1614 OR	EECF1624	EECF1614 OR	EECF1624	EECF1614 OR	EECF1624
YEAR			**THIRD**			
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C3	BMQR3706 BBSR3712 BCCR3712 BBER3712 BQPR3704 BPOR3706 BWIL3702	BCCR3722 BIRR3722 BBSR3722 BBER3722	BPDD2614 (BUILD) BBSD2604 (BUILD) BCSD2612 (BUILD) BBED3712 (BUILD) BPOD3706 (BUILD)	BCSD2622 (BUILD) BPDD2624 (BUILD) BBED3722 (BUILD)	BBSD2604 (BUILD) BPDD2614 (BUILD) BCSD2612 (BUILD) BBED3712 (BUILD) BPOD3706 (BUILD)	BCSD2622 (BUILD) BPDD2624 (BUILD) BBED3722 (BUILD)
YEAR			**FOURTH**			
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C3			BMQD3706 (BUILD) BBSD3712 (BUILD) BCCD3712 (BUILD) BQPD3704 (BUILD)	BCCD3722 (BUILD) BIRD3722 (BUILD) BBSD3722 (BUILD)	BMQD3706 (BUILD) BBSD3712 (BUILD) BCCD3712 (BUILD) BQPD3704 (BUILD)	BCCD3722 (BUILD) BIRD3722 (BUILD) BBSD3722 (BUILD)

12.4.1.6 BACHELOR OF SCIENCE With specialisation in CHEMICAL AND PHYSICAL SCIENCES

PHYSICAL AND CHEMICAL SCIENCES Fields of study BC434017, BC434012, BC434026, BC432140, BC432119, BC432139, BC432120

LEARNING PROGRAMMES PHYSICAL AND CHEMICAL SCIENCES FIELDS OF STUDY

Learning programmes in chemical and physical sciences offer eight main options with either:

Physics and Chemistry as the two majors | Physics and Astrophysics, as the two majors | Physics and Agrometeorology, as the two majors | Physics and Engineering Subjects, as the two majors
Chemistry in combination with Biological Subjects with one of the following: Biochemistry, Botany or Microbiology as the other major.

Each student choose at least one option and enrol for or all compulsory modules in compulsory rows (C1, C2, C3). If electives are available the students need to choose enough elective modules (E) per semester to obtain at least 120 credits in each study year. Physics can also be in combination with Mathematics, Geology and Computer Science. Chemistry can also be in combination with Forensic Science, Mathematics, Geology and Computer Science. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	PHYSICS & CHEMISTRY	PHYSICS & ASTROPHYSICS	PHYSICS & AGROMETEOROLOGY	PHYSICS & ENGINEERING SUBJECTS	CHEMISTRY & BIOLOGICAL SUBJECTS	PHYSICS & CHEMISTRY	PHYSICS & ASTROPHYSICS	PHYSICS & AGROMETEOROLOGY	PHYSICS & ENGINEERING SUBJECTS	CHEMISTRY & BIOLOGICAL SUBJECTS
CODE	BC432140	BC434017	BC434012	BC434026	BC432119, BC432120, BC432139	BC432140	BC434017	BC434012	BC434026	BC432119, BC432120, BC432139
YEAR	**FIRST**									
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C1	PHYS1514 CHEM1513+ CHEM1501 MATM1534	PHYS1514 PHYA1554 MATM1534 CSIS1614	PHYS1514 MATM1534	PHYS1514 MATM1534 CHEM1513+ CHEM1501 CSIE1606 QALC1513	CHEM1513+ CHEM1501 BLGY1513 PHYS1534 OR PHYS1514 MATM1534	PHYS1624 CHEM1623+ CHEM1661 MATM1644	PHYS1624 PHYA1664 MATM1644 CSIS1624	PHYS1624 MATM1644 SCCS1624	PHYS1624 MATA1684 MATM1644 MATM1622 QEDR1524 QEFO1520	CHEM1623+ CHEM1661 BLGY1683 BLGY1643 STSA1624 MATM1644
ELECTIVES E1	CSIS1614 STSM1614 PHYA1554		CSIS1614 STSM1614 PHYA1554 CHEM1513+ CHEM1501 BLGY1513			CSIS1624 STSM1624 STSA1624 SCCS1624 PHYA1664	MATM1622	CSIS1624 STSM1624 STSA1624 PHYA1664 CHEM1623+ CHEM1661		PHYS1644 OR PHYS1624
REQUIRED *If not proficient with UFS language test	CSIL1511 & UFSS1504 *CALN1508	CSIL1511 & UFSS1504 *CALN1508	CSIL1511 & UFSS1504 *CALN1508	CSIL1511 & UFSS1504 *CALN1508	CSIL1511 & UFSS1504 *CALN1508	CSIL1521	CSIL1521	CSIL1521		CSIL1521
YEAR	**SECOND**									
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C2	PHYS2614 PHYS2632 CHEM2613+ CHEM2601 CHEM2633+ CHEA2601	PHYS2614 PHYS2632 PHYA2614	PHYS2614 PHYS2632 CLIM2614	PHYS2614 PHYS2632 MATA2674 MATM2614 MATA2654 <u>ONE OF:</u> QMSC2613 CSIS2614 QMAT2613	CHEM2613 + CHEM2601 CHEM2633 + CHEA2601 <u>AT LEAST ONE OF:</u> BOCB2616 BTNY2616 MCBP2616 + BOCB2616	PHYS2624 PHYS2644 CHEM2623+ CHEM2621 CHEM2643+ CHEM2641	PHYS2624 PHYS2644 PHYA2624	PHYS2624 SCCS2624 PHYS2644	PHYS2624 PHYS2644 MATA2684 MATM2664 QELT2723 QSTR2624 QWOR2520	CHEM2623+ CHEM2621 CHEM2643+ CHEM2641 <u>AT LEAST ONE OF:</u> BOCE2626 BTNY2626 + BTNY2621 MCBP2626+ BOCE2626

DISCIPLINE	PHYSICS & CHEMISTRY	PHYSICS & ASTROPHYSICS	PHYSICS & AGROMETEOROLOGY	PHYSICS & ENGINEERING SUBJECTS	CHEMISTRY & BIOLOGICAL SUBJECTS	PHYSICS & CHEMISTRY	PHYSICS & ASTROPHYSICS	PHYSICS & AGROMETEOROLOGY	PHYSICS & ENGINEERING SUBJECTS	CHEMISTRY & BIOLOGICAL SUBJECTS
ELECTIVES E2	MATM2614 STSM2616 MATA2754 MATA2654	STSM2616 CHEM2633+ CHEA2601 CHEM2613+ CHEM2601 MATM2614 DATA2614 CSIS2614 MATA2754 MATA2654	STSM2616 MATM2614 CHEM2633+ CHEA2601 CHEM2613 CHEM2601 MATM2654 DATA2614 MATA2754 MATA2654		DATA2614	MATA2664 MATM2624 MATM2664 STSM2626	MATM2624 MATA2664 MATM2664 STSM2626 DATA2624 CSIS2664	AGEG2624 DATA2624 MATA2664 MATM2624 MATM2664 STSM2626		DATA2624
YEAR	**THIRD**									
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C3	PHYS3714 PHYS3732 PHYS3752 CHEM3713 + CHEM3701 CHEM3733 + CHEB3701	PHYS3714 PHYS3732 PHYS3752 PHYA3773 PHYA3709	PHYS3714 PHYS3732 PHYS3752 CLIM3734	PHYS3714 PHYS3732 PHYS3752 MATA2754 ONE OF: QSTR3714 + QFLO3714 OR QCLO3714 + QSIG3714	CHEM3713 + CHEM3701 CHEM3733 + CHEB3701 ONE OF: BOCM3714 + BOCE3714 MCBG3714 + MCBE3714 BTNY3714 + BTNY3712 + BTNY3734 OR BTNY3754	PHYS3724 PHYS3742 PHYS3762 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741	PHYS3724 PHYS3742 PHYS3762 PHYA3783	PHYS3724 PHYS3742 PHYS3762 CLIM3724 SCCS3724	**CHOOSE ONE OF STREAM A OR B** ***STREAM A*** (ENG) QVAC3520 QENV3724 ONE OF: QSTR3724 + GLGY2641/43 + QGEO3624 + QCIV3624 OR QMAD3623 + QSTR3724 + QTHE3724 OR QMPR3724 + QPOW3724 ***STREAM B*** (PHYS) PHYS3724 + PHYS3742 + PHYS3762 TWO OF MATA3784 MATM3744 CSIS3744	CHEM3723 + CHEM3721 CHEM3743 + CHEM3741 ONE OF: BOCP3724 + BOCS3724 MCBC3724 + MCBP3724 BTNY3724 + BTNY3744 OR BTNY3764
ELECTIVES E3	CLNS3702 DATA3712	CLNS3702 GLGY3754 DATA3712 QFLO3714	CLNS3702 MATM3714 MATM3734 MATA3774 DATA3712 AGEG3714		CLNS3702 DATA3712		MATA3784 STSA3726 QTHE3724	MATM3724 MATM3744 MATA3764 MATA3784 AGEG3724 STSA3726		

12.4.1.7 BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

COMPUTER SCIENCE AND INFORMATICS FIELDS OF STUDY: BC432221, BC432237, BC432238, BC432240, BC432255

LEARNING PROGRAMMES IN COMPUTER SCIENCE AND INFORMATICS

Learning programmes in Computer Science and Informatics offer 5 main fields with either:

| Computer Science and Chemistry | Computer Science and Mathematics | Computer Science and Mathematical Statistics | Computer Science and Physics | Computer Science and Business Management

Each student selects ONE field and enrols for all the compulsory modules, in the compulsory rows (C1, C2, C3), for all three study years. Two modules at any NQF-level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. These modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	CHEMISTRY	MATHEMATICAL STATISTICS	MATHEMATICS	PHYSICS	BUSINESS MANAGEMENT		CHEMISTRY	MATHEMATICAL STATISTICS	MATHEMATICS	PHYSICS	BUSINESS MANAGEMENT	
CODE	BC432221	BC432237	BC432238	BC432240	BC432255		BC432221	BC432237	BC432238	BC432240	BC432255	
YEAR	**FIRST**											
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C1	CSIS1614 CSIS1553 CHEM1513 + CHEM1501 MATM1534	CSIS1614 CSIS1553 STSM1614 MATM1534	CSIS1614 CSIS1553 MATM1534 <u>ONE OF:</u> PHYS1534 PHYS1514 STSM1614	CSIS1614 CSIS1553 PHYS1514 MATM1534	CSIS1614 CSIS1553 BCIS1513 **Stream 1:** EBCS1514 MATM1534	**Stream 2:** <u>TWO OF:</u> EHRM1514 EBUS1514 EBCS1514	CSIS1624 CSIS1664 CHEM1623+ CHEM1661 MATM1644	CSIS1624 CSIS1664 STSM1624 MATM1644 MATM1622	CSIS1624 CSIS1664 MATM1644 MATM1622 <u>ONE OF:</u> PHYS1644 PHYS1624 STSM1624	CSIS1624 CSIS1664 PHYS1624 MATM1644 MATM1622	CSIS1624 CSIS1664 **Stream 1:** EBCS1524 MATM1644	**Stream 2:** <u>TWO OF:</u> BCIS1623 EBCS1524 EIOP1524
ELECTIVES E1							CSIS1683	CSIS1683	CSIS1683	CSIS1683	CSIS1683	
REQUIRED *If not proficient with UFS language test	CSIL1511 & UFSS1504 *CALN1508						CSIL1521					
YEAR	**SECOND**											
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C2	CSIS2614 CSIS2634 CHEM2613 + CHEM2601 CHEM2633 + CHEA2601	CSIS2614 CSIS2634 STSM2616 STSM2634	CSIS2614 CSIS2634 MATM2614 <u>ONE OF:</u> STSM2634 MATA2754	CSIS2614 CSIS2634 PHYS2614 PHYS2632	CSIS2614 CSIS2634 **Stream 1** <u>TWO OF:</u> BCIS2614 EECF1614 STSA2616	**Stream 2:** <u>TWO OF:</u> BCIS2614 EECF1614 EBUS1614	CSIS2624 CSIS2664 CHEM2623+ CHEM2621 CHEM2643+ CHEM2641	CSIS2624 CSIS2664 STSM2626	CSIS2624 CSIS2664 <u>TWO OF:</u> MATM2664 MATM2624 MATA2664	CSIS2624 CSIS2664 PHYS2624 PHYS2644	CSIS2624 CSIS2664 **Stream 1:** <u>TWO OF:</u> BCIS2624 EECF1624 STSA2626	**Stream 2:** <u>TWO OF:</u> BCIS2624 EECF1624 EBUS1624 EBMA2624
YEAR	**THIRD**											
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C3	CSIS3714 CSIS3734 CHEM3713 + CHEM3701 CHEM3733 + CHEB3701	CSIS3714 CSIS3734 STSM3714 STSM3734	CSIS3714 CSIS3734 <u>TWO OF:</u> MATM3774 MATM3734 MATA3774 CSIS3754	CSIS3714 CSIS3734 PHYS3714 PHYS3732 PHYS3752	CSIS3714 CSIS3734 **Stream 1:** STSA3716 STSA3732	**Stream 2:** <u>TWO OF:</u> EBUS2714 ETRM3714 EDAB2714	CSIS3724 CSIS3744 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741	CSIS3724 CSIS3744 STSM3744 STSM3764	CSIS3724 CSIS3744 <u>TWO OF:</u> MATM3784 MATM3744 MATA3764	CSIS3724 CSIS3744 PHYS3724 PHYS3742 PHYS3762	CSIS3724 CSIS3744 **Stream 1:** STSA3726 STSA3742	**Stream 2:** <u>TWO OF:</u> EBMA3725 ESBM2724 EDAB2724
ELECTIVES E3							CSIS3784**	CSIS3784**	CSIS3784**	CSIS3784**	CSIS3784**	CSIS3784**

***This module is a selection module. Students will be selected based on their previous years' academic performance. This module cannot be repeated.*

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY DATA SCIENCE: BC432295

LEARNING PROGRAMME IN DATA SCIENCE

Students need to enrol for all the compulsory modules for all three study years. Students must also select enough electives in their third year to obtain a combined amount of credits from the compulsory and elective modules of at least 120 credits. Students must also ensure to enroll for all the necessary prerequisites pertaining to each relevant module. Students must pass all their modules in their 1st year to continue with BSc(IT) majoring in Data Sciene, otherwise they will have to switch to a different programme in their 2nd year.

YEAR	**FIRST**		**SECOND**		**THIRD**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY	CSIS1614 CSIS1553 STSM1614 MATM1534	CSIS1624 CSIS1664 STSM1624 MATM1644 MATM1622	CSIS2614 CSIS2634 STSM2616 STSM2634	CSIS2664 STSM2626 MATM2624 MATA2664	CSIS3714 CSIS3734 CSIS3754 STSM3734	CSIS3724 CSIS3744
ELECTIVES					STSM3714	MATA3764 STSM3764 CSIS3784**
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521				

** *This module is a selection module. Students will be selected based on their previous years' academic performance. This module cannot be repeated.*

Students with this qualification will only be able to continue with an honours qualification (if they meet the admission requirements) within the Department of Computer Science and Informatics and therefore articulation to another faculty or department will not be possible.

12.4.1.8 BACHELOR OF SCIENCE WITH SPECIALISATION IN GEOSCIENCES

GEOGRAPHY FIELD OF STUDY 1: BC433362, BC433333

LEARNING PROGRAMMES IN GEOSCIENCES FIELD OF STUDY I

The learning programmes in Geography and the Environmental sciences are studies of the properties and processes in the earth and on the surface and encompass a holistic study of the human environment and accompa- nying interactions and relationships. The programme is aimed at students who are interested in various aspects of the environment and can lead to specialisation as environmentalists. Careers in these sciences are divergent because all institutions that are involved with resource utilisation are legally obliged to examine the impact of their activities on the environment. The connection of geographical information and computer technology simplifies the storage, processing, modelling and presentation of information and expedites decision making. Each student selects all the compulsory modules (rows C1, C2, C3) for all three study years and chooses modules as supportive electives (E) per semester to obtain at least 120 credits for each year of study. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	**ENVIRONMENTAL GEOGRAPHY**	**GEOGRAPHY SPECIALISATION**	**ENVIRONMENTAL GEOGRAPHY**	**GEOGRAPHY SPECIALISATION**
CODE	BC433362	BC433333	BC433362	BC433333
YEAR	**FIRST**			
SEMESTER	**FIRST**		**SECOND**	
COMPULSORY C1	GEOH1614 GEOG1512 AGEC1514 BLGY1513 MATM1534	GEOH1614 GEOG1512 EBUS1514 BLGY1513 MATM1534	GEOP1624 STSA1624 GERS1624 SCCS1624 <u>ONE OF:</u> BLGY1643 BLGY1663	GEOP1624 STSA1624 GERS1624 SCCS1624 <u>ONE OF:</u> BLGY1643 BLGY1663
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1521	CSIL1521
YEAR	**SECOND**			
SEMESTER	**FIRST**		**SECOND**	
COMPULSORY C2	GEOP2614 GEOH2614 GERS2614 <u>ONE OF:</u> BTNY2616 ZLGY2636	GEOP2614 GEOH2614 GERS2614 <u>ONE OF:</u> SOIL2674 CLIM2614	GEOP2624 GERS2624 GEOG2644 <u>ONE OF:</u> BTNY2626+BTNY2621 ZLGY2626	GEOP2624 GERS2624 GEOG2644 <u>ONE OF:</u> SCCS2684 SCCS2624
YEAR	**THIRD**			
SEMESTER	**FIRST**		**SECOND**	
COMPULSORY C3	GEOP3714 GEOH3714 GEOG3702 GEOG3704 EBUS2714 <u>ONE OF:</u> BTNY3712+BTNY3714 OR BTNY3734 ZLGY3734+ZLGY3714	GEOP3714 GEOH3714 GEOG3702 GEOG3704 GERS3714	GEOP3724 AGEC3724	GEOP3724 GERS3724 GEOH3724

12.4.1.9 BACHELOR OF SCIENCE WITH SPECIALISATION IN GEOSCIENCES

GEOLOGY FIELD OF STUDY 2: BC433535, BC433528, BC433532, BC433521, BC433540

LEARNING PROGRAMMES IN GEOSCIENCES FIELD OF STUDY 2

Learning programmes in GEOLOGY Field of study 1 offer five main options with either: Geology specialisation, Geochemistry, Environmental Geology, Geology and Chemistry as the two majors and Geology as the other majors, Geology and Physics as the two majors. Each student enrols for or all compulsory modules in compulsory rows (C1, C2, C3). If electives are available the students need to choose enough elective modules (E) per semester to obtain at least 120 credits in each study year. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree. It is the responsibility of the student to make sure that their selection of modules meets the prerequisites of the curriculum for each year of the programme.

DISCIPLINE	GEOLOGY	GEOCHEMISTRY	ENVIRONMENTAL GEOLOGY	CHEMISTRY	PHYSICS	GEOLOGY	GEOCHEMISTRY	ENVIRONMENTAL GEOLOGY	CHEMISTRY	PHYSICS
CODE	BC433535	BC433532	BC433528	BC433521	BC433540	BC433535	BC433532	BC433528	BC433521	BC433540
YEAR	**FIRST**									
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C1	GLGY1614 GEOG1512 CHEM1513+ CHEM1501	GLGY1614 CHEM1513+ CHEM1501 PHYS1514	GLGY1614 GEOG1512 CHEM1513+ CHEM1501 PHYS1514 OR PHYS1534	GLGY1614 CHEM1513+ CHEM1501	GLGY1614 CHEM1513+ CHEM1501 PHYS1514	GLGY1624 GERS1624	GLGY1624 MATM1644 <u>ONE OF:</u> CHEM1623+ CHEM1661 CHEM1643+ CHEM1661	GLGY1624 SCCS1624 GERS1624	GLGY1624 CHEM1623+ CHEM1661	GLGY1624 PHYS1624
	MATM1534	MATM1534	MATM1534	MATM1534	MATM1534	STSA1624	STSA1624	STSA1624	STSA1624 MATM1644	STSA1624 MATM1644
ELECTIVES E	<u>ONE OF:</u> PHYS1514 PHYS1534			<u>ONE OF:</u> PHYS1514 PHYS1534		<u>ONE OF:</u> CHEM1643+ CHEM1661 CHEM1623+ CHEM1661 PHYS1644 PHYS1624 MATM1644				
REQUIRED *If not proficient with UFS language test	CSIL1511, UFSS1504, *CALN1508					CSIL1521	CSIL1521	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**									
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C2	GLGY2612 GLGY2614 GLGY2632 GLGY2652 <u>ONE OF:</u> CHEM2613+ CHEM2601 PHYS2614 GERS2614	GLGY2612 GLGY2614 GLGY2632 GLGY2652 CHEM2633+ CHEA2601 CHEM2613+ CHEM2601	GLGY2612 GLGY2614 GLGY2632 GLGY2652 SOIL2674	GLGY2612 GLGY2614 GLGY2632 GLGY2652 CHEM2633+ CHEA2601 CHEM2613+ CHEM2601	GLGY2612 GLGY2614 GLGY2632 GLGY2652 PHYS2614 PHYS2632	GLGY2662 GERS2624 GLGY2626 GLGY2646	GLGY2662 CHEM2643+ CHEM2641 GLGY2626 GLGY2646	GLGY2662 SCCS2684 GERS2624 GLGY2626 GLGY2646	GLGY2662 CHEM2643+ CHEM2641 CHEM2623+ CHEM2621 GLGY2626 GLGY2646	GLGY2662 PHYS2624 PHYS2644 GLGY2626 GLGY2646
YEAR	**THIRD**									
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C3	GLGY3714 GLGY3734 GLGY3754 GLGY3774	CHEM3713+ CHEM3701 GLGY3714 GLGY3754 GLGY3774	SOIL3774 GLGY3714 GLGY3754 GLGY3774	CHEM3713+ CHEM3701 CHEM3733+ CHEB3701 GLGY3714 GLGY3754	PHYS3714 PHYS3732 PHYS3752 GLGY3714 GLGY3754	GLGY3724 GLGY3744 GLGY3764 GLGY3784	GLGY3724 GLGY3764 GLGY3784 <u>ONE OF:</u> GLGY3744 CHEM3723+ CHEM3721	SOIL3724 GLGY3724 GLGY3764 GLGY3784	CHEM3723+ CHEM3721 CHEM3743+ CHEM3741 GLGY3724 GLGY3784	PHYS3724 PHYS3742 PHYS3762 GLGY3724 <u>ONE OF:</u> GLGY3764 GLGY3784

12.4.1.10 BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES

ENVIRONMENTAL SCIENCES FIELD OF STUDY 1: BC433362, BC433528, BC434462

LEARNING PROGRAMMES IN GEOSCIENCES FIELD OF STUDY 3

The learning programmes in Environmental Sciences are studies of the properties and processes in the earth and on the surface and encompass a holistic study interactions and relationships. The programme is aimed at students who are interested in various aspects of the environment and can lead to specialisation as environmentalists. Besides agricultural applications, soil science is becoming increasingly important in the environmental sector. Changes in environmental authorisation legislation associated with development, carbon neutral projects and environmental pollution have created an increasing demand for soil scientists. This opened a gap in the employment market, which can be filled by training soil scientists with a solid background in other environmental fields such as meteorology, water resources and GIS. Each student selects all the compulsory modules (rows C1, C2, C3) for all three study years and chooses modules as supportive electives (E) per semester to obtain at least 120 credits for each year of study. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. These modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	ENVIRONMENTAL GEOGRAPHY	ENVIRONMENTAL GEOLOGY	ENVIRONMENTAL SOIL SCIENCE	ENVIRONMENTAL GEOGRAPHY	ENVIRONMENTAL GEOLOGY	ENVIRONMENTAL SOIL SCIENCE
CODE	BC433362	BC433528	BC434462	BC433362	BC433528	BC434462
YEAR	**FIRST**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	GEOH1614 GEOG1512 AGEC1514 BLGY1513 MATM1534	GLGY1614 GEOG1512 CHEM1513+ CHEM1501 PHYS1514 OR PHYS1534 MATM1534	GEOG1512 MATM1534 CHEM1513+CHEM1501 GLGY1614	GEOP1624 STSA1624 GERS1624 SCCS1624 <u>ONE OF:</u> BLGY1643 BLGY1663	GLGY1624 SCCS1624 GERS1624 STSA1624	GERS1624 SCCS1624 GEOP1624 GLGY1624 <u>ONE OF:</u> STSA1624 CHEM1643+CHEM1661 MATM1644
REQUIRED *If not proficient with UFS language test	CSIL1511, UFSS1504, *CALN1508			CSIL1521		
YEAR	**SECOND**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C2	GEOP2614 GEOH2614 GERS2614 <u>ONE OF:</u> BTNY2616 ZLGY2636	GLGY2612 GLGY2614 GLGY2632 GLGY2652 SOIL2674	SOIL2674 GEOP2614 CLIM2614 GLGY2614	GEOP2624 GERS2624 GEOG2644 <u>ONE OF:</u> BTNY2626+BTNY2621 ZLGY2626	GLGY2662 SCCS2684 GERS2624 GLGY2626 GLGY2646	SCCS2684 GEOP2624 GERS2624 GLGY2643
YEAR	**THIRD**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C3	GEOP3714 GEOH3714 GEOG3702 GEOG3704 EBUS2714 <u>ONE OF:</u> BTNY3712+BTNY3714 OR BTNY3734 ZLGY3734+ZLGY3714	SOIL3774 GLGY3714 GLGY3754 GLGY3774	SOIL3774 CLIM3734 GEOP3714 SCCS3774	GEOP3724 AGEC3724	SOIL3724 GLGY3724 GLGY3764 GLGY3784	SOIL3724 CLIM3724 GEOP3724 <u>ONE OF:</u> GERS3724 SCCS4824

12.4.1.9 BACHELOR OF SCIENCE With specialisation in MATHEMATICAL SCIENCES

MATHEMATICAL SCIENCES FIELDS OF STUDY 1: BC433816, BC433821, BC433837, BC433840

LEARNING PROGRAMMES IN MATHEMATICAL SCIENCES FIELDS OF STUDY 1

Learning programmes in Mathematics offer the following four combinations of disciplines:

Mathematics and Applied Mathematics | Mathematics and Chemistry | Mathematics and Mathematical Statistics | Mathematics and Physics

Each student selects ONE learning programme and enrols for all the compulsory modules (rows C1, C2 & C3) of all three study years. If elective modules (row E1) are available for the chosen learning programme, stu- dents need to select enough elective modules from their own learning programme, such that the total credits (including those of the compulsory modules) enrolled for is at least 120 in the first study year. To obtain the de- gree, a minimum of 360 core credits (compulsory and elective modules) must be passed, of which a minimum of 120 must be at NQF level 7. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	MATHEMATICS & APPLIED MATHEMATICS	MATHEMATICS & CHEMISTRY	MATHEMATICS & MATHEMATICAL STATISTICS	MATHEMATICS & PHYSICS	MATHEMATICS & APPLIED MATHEMATICS	MATHEMATICS & CHEMISTRY	MATHEMATICS & MATHEMATICAL STATISTICS	MATHEMATICS & PHYSICS
CODE	BC433816	BC433821	BC433837	BC433840	BC433816	BC433821	BC433837	BC433840
YEAR	**FIRST**							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C1	MATM1534	MATM1534 CHEM1513+ CHEM1501	MATM1534 STSM1614	MATM1534 PHYS1514 PHYA1554	MATM1644 MATM1622 MATA1684	MATM1644 MATM1622 CHEM1623+ CHEM1661	STSM1624 MATM1622 MATM1644	MATM1644 MATM1622 PHYS1624 PHYA1664
ELECTIVES E1	CHEM1513+ CHEM1501 PHYS1514 PHYA1554 STSM1614	PHYS1514 PHYA1554 STSM1614	CHEM1513+ CHEM1501 PHYS1514 PHYA1554	CHEM1513+ CHEM1501 STSM1614	CHEM1623+ CHEM1661 PHYS1624 PHYA1664 STSM1624	PHYS1624 PHYA1664 STSM1624	CHEM1623+ CHEM1661 PHYS1624 PHYA1664	CHEM1623+ CHEM1661 STSM1624
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508		CSIL1511 UFSS1504 *CALN1508		CSIL1521	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C2	MATM2614 MATA2674 MATA2654 MATA2754	MATM2614 CHEM2613+ CHEM2601 CHEM2633+ CHEA2601 MATA2654	MATM2614 STSM2616 MATA2654 ONE OF: MATA2754 STSM2634	MATM2614 MATA2654 PHYS2614 PHYS2632	MATM2624 MATM2664 MATA2664 MATA2684	MATM2624 MATM2664 CHEM2623+ CHEM2621 CHEM2643+ CHEM2641	MATA2664 MATM2624 MATM2664 STSM2626	MATA2664 MATM2624 MATM2664 PHYS2624 PHYS2644
YEAR	**THIRD**							
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C3	MATM3774 MATM3734 MATA3774	CHEM3713+ CHEM3701 CHEM3733+ CHEB3701 TWO OF: MATA3774 MATM3774 MATM3734	STSM3714 STSM3734 TWO OF: MATA3774 MATM3774 MATM3734	PHYS3714 PHYS3732 PHYS3752 TWO OF: MATA3774 MATM3774 MATM3734	MATM3784 MATM3744 MATA3764 MATA3784	CHEM3723+ CHEM3721 CHEM3743 + CHEM3741 TWO OF: MATA3764 MATA3784 MATM3784 MATM3744	STSM3764 STSM3744 TWO OF: MATA3764 MATA3784 MATM3784 MATM3744	PHYS3724 PHYS3742 PHYS3762 TWO OF: MATA3764 MATA3784 MATM3784 MATM3744

MATHEMATICAL SCIENCES FIELDS OF STUDY 2: BC433712, BC433758, BC433786

LEARNING PROGRAMMES IN MATHEMATICAL SCIENCES FIELDS OF STUDY 2

Learning programmes in Mathematical Statistics offer four main options with a combination of disciplines:

Mathematical Statistics and Agrometeorology (Climate Sciences) | Mathematical Statistics and Economics (Econometrics) | Mathematical Statistics and Psychology (Psychometrics)

Students SELECT Mathematical Statistics and one other discipline and include all the compulsory modules in row (C1, C2, C3) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester from the compulsory row (C1, C2, and C3) of any other discipline or from the elective row (E) for their selected disciplines obtain of at least 120 credits for each study year. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

DISCIPLINE	CLIMATE SCIENCE	ECONOMETRICS	PSYCHOMETRICS	CLIMATE SCIENCE	ECONOMETRICS	PSYCHOMETRICS
CODE	BC433712	BC433758	BC433786	BC433712	BC433758	BC433786
YEAR	**FIRST**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	STSM1614 GEOH1614 PHYS1534 MATM1534	STSM1614 EECF1614 MATM1534 ONE OF: EACC1614 AGEC1514 ACSG1614 ACSF1613	STSM1614 PSIN1514 EHRM1514 MATM1534	STSM1624 CSIS1683 SCCS1624 MATM1644 MATM1622	STSM1624 EECF1624 MATM1644 MATM1622 ONE OF: EACC1624 AGEC1624 CSIS1683 ACSF1623	STSM1624 PSDE1624 EIOP1524 MATM1644 MATM1622
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C2	STSM2616 CLIM2614 TWO OF: MATA2654 MATA2754 MATM2614 STSM2634	STSM2616 STSM2634 EMIC2714 ONE OF: MATM2614 MATA2654 EFES2714 ACSF2716	PSSO2614 STSM2616 TWO OF: MATA2654 MATA2754 MATM2614 STSM2634	STSM2626 SCCS2624 TWO OF: MATM2624 MATA2664 MATM2664	STSM2626 EMAC2724 ONE OF: EFES2724 MATM2624 MATA2664 MATM2664 ACSF2746	STSM2626 PSIH2724 ONE OF: MATA2664 MATM2624 MATM2664
YEAR	**THIRD**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C3	STSM3714 STSM3734 CLIM3734 ONE OF: MATM3774 MATM3734 MATA3774	STSM3714 STSM3734 EFET3714 EINT3715	PSPA3714 STSM3714 STSM3734 PSRM3714	STSM3764 STSM3744 CLIM3724 ONE OF: MATM3784 MATM3744 MATA3764 MATA3784	STSM3764 STSM3744 EECM3724 ONE OF: EFET3724 EMNF2724	PSPE3724 STSM3764 STSM3744 PSTH3724

MATHEMATICAL SCIENCES FIELDS OF STUDY 3: BC434658, BC434686

LEARNING PROGRAMMES IN MATHEMATICAL SCIENCES FIELDS OF STUDY 3

Learning programmes in Statistics offers 2 main options with a combination of disciplines:

Statistics and Economics | Statistics and Psychology

Students select Statistics and one other discipline and and include all the compulsory modules in row (C1, C2, C3) of each of the selected disciplines for all three study years. Students need to select enough elective modules per semester from the compulsory row (C1, C2 and C3) to obtain at least 120 credits for each study year. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree. To be considered for an honours programme with specialisation in Applied Statistics or Risk Analysis, a student needs a pass in MATM1534, MATM1644 and MATM1622.

DISCIPLINE	ECONOMICS	PSYCHOLOGY	ECONOMICS	PSYCHOLOGY
NEW CODE	BC434658	BC434686	BC434658	BC434686
YEAR	FIRST			
SEMESTER	FIRST		SECOND	
COMPULSORY **C1**	EBCS1514 OR STSM1614 MATM1534 EECF1614 <u>ONE OF:</u> EACC1614 AGEC1514 ACSG1614 ACSF1613	EBCS1514 OR STSM1614 MATM1534 PSIN1514 EHRM1514	EBCS1524 OR STSA1624 MATM1644 EECF1624 <u>ONE OF:</u> EACC1624 AGEC1624 ACSF1623 CSIS1683 MATM1622	EBCS1524 OR STSA1624 MATM1644 PSDE1624 <u>ONE OF:</u> EIOP1524 MATM1622
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1511 UFSS1504 *CALN1508	CSIL1521	CSIL1521
YEAR	SECOND			
SEMESTER	FIRST		SECOND	
COMPULSORY **C2**	STSA2616 EMIC2714 <u>ONE OF:</u> EFES2714 AGEC2614	STSA2616 PSSO2614 ECAP2614	STSA2626 EMAC2724 MATA2664 <u>ONE OF:</u> EFES2724 AGEC2624	STSA2626 ELRM2624 PSIH2724 MATA2664
YEAR	THIRD			
SEMESTER	FIRST		SECOND	
COMPULSORY **C3**	STSA3716 STSA3732 <u>TWO OF:</u> EINT3715 AGEC3714 EFET3714 AGEC3734	STSA3716 STSA3732 TWO OF: PSPA3714 PSRM3714 ETRM3714	STSA3726 STSA3742 <u>TWO OF:</u> EFET3724 EECT3725 AGEC3724 EECM3724 EMNF2724 AGEC3744	STSA3726 STSA3742 <u>TWO OF:</u> PSPE3724 PSTH3724 EPFM3724

12.4.2 BACHELOR OF SCIENCE IN AGRICULTURE

Note: Due to the complexity of the timetable, please note that the students may not register for the following modules as compulsory or elective modules simultaneously, irrespective of the fact that the modules are all available as elective.

SECOND YEAR FIRST SEMESTER	SECOND YEAR SECOND SEMESTER	THIRD YEAR FIRST SEMESTER	THIRD YEAR SECOND SEMESTER
AGEX2614 may not be registered with CLIM2614 GRAS2614 may not be registered with ENTO2614 ANIP2614 may not be registered with CLIM261	ANIB2624 may not be registered with CLIM2644 PLTB2623 may not be registered with ANIG2624	AGEX3734 may not be registered with AGMA3734 ANIP3714 may not be registered with PPLG3714 ANIN3734 may not be registered with AGMA3714 HORT3754 may not be registered with PLTB3714	ANIB3724 may not be registered with SOIL3724 ANIP3724 may not be registered with PPLG3724 PPLG3724 may not be registered with AGMA3724

The following 6 Agricultural fields of study include similar modules for the first year of study to ensure portability after the first year:

12.4.2.1 AGRICULTURAL SCIENCES FIELD OF STUDY: AGROMETEOROLOGY BC540012

BACHELOR OF SCIENCE IN AGRICULTURE IN THE AGROMETEOROLOGY FIELD OF STUDY 1

Learning programmes in the Agrometeorology as main field of study offer one major with 6 options with a minor from one of the following sub disciplines: Agricultural Economics, Agricultural Engineering, Agronomy, Grassland Science, Soil Science or Plant Pathology. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together. If a student wants to register for the Agri- cultural Economics minor, two extra modules for the first year is compulsory. This programme implementation is only for first year students 2022, the rest will phase in.

YEAR	**FIRST**		**SECOND**		**THIRD**		**FOURTH**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
DISCIPLINE	**AGROMETEOROLOGY**							
CODE	BC540012							
COMPULSORY	AGEC1514 BLGY1513 CHEM1513 + CHEM1501 MATM1534 PHYS1534	ANIG1624 BLGY1643 SCCS1624 MATM1644	CLIM2614 CROP2614 SOIL2674 <u>ONE OF:</u> MATA2754 MATA2654	SCCS2624 SCCS2684 PHYS1644	CLIM3734 <u>ONE OF:</u> CROP3714 HORT3754 HORT3774 SOIL3754	CLIM3724 SCCS3724 CROP3744 OR SOIL3724	CLIM4874 CLIM4834 SCCS4808	CLIM4844 CLIM4864 SCCS4824
ELECTIVES		AGEC1624		<u>ONE OF:</u> AGEG2624 PPLG2624	<u>TWO OF:</u> SOIL3774 CROP3714 HORT3754 HORT3774 AGEG3714 PPLG3714	<u>ONE OF:</u> AGEG3724 GRAS3763 HORT3764 PPLG3724 PPLG3744 SOIL3724	<u>ONE OF:</u> CLIM4854 CROP4814 CROP4834 PPLG4834 SOIL4814 SOIL4834	
REQUIRED *If not proficient with UFS language test	CSIL1511 UFSS1504 *CALN1508	CSIL1521			(The module not selected here can be selected under the electives as well)			

HORT3774 *(Prerequisite for HORT3764)*

12.4.2.2 AGRICULTURAL SCIENCES FIELD OF STUDY: AGRONOMY BC540013

BACHELOR OF SCIENCE IN AGRICULTURE IN THE AGRONOMY FIELD OF STUDY 2

Learning programmes in the Agronomy as main field of study offer one major with 8 options with a minor from one of the following sub disciplines Agricultural Economics, Agrometeorology, Animal Science, Entomology, Plant Breeding, Plant Pathology or Soil Sciences. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together. If a student wants to register for the Agricultural Economics minor, two extra modules for the first year is compulsory. This programme implementation is only for first and second year students 2022, the rest will phase in. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

YEAR	**FIRST**		**SECOND**		**THIRD**		**FOURTH**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
DISCIPLINE	**AGRONOMY**							
CODE	BC540013							
COMPULSORY	AGEC1514 BLGY1513 CHEM1513 + CHEM1501 MATM1534 PHYS1534	ANIG1624 BLGY1643 CHEM1643 + CHEM1661 SCCS1624	CLIM2614 CROP2614 SOIL2674 ENTO2614 OR PLTB2613	SCCS2624 SCCS2684 PPLG2624 OR PTLB2623 AGEG2624	CROP3714 HORT3754 SOIL3754	CROP3744 SOIL3724 SCCS3724	CROP4814 CROP4834 SCCS4808	CROP4824 CROP4844
ELECTIVES		AGEC1624 BLGY1663 (compulsory for Entomology minor)			<u>ONE OF:</u> HORT3774 PPLG3714 AGEG3714 CLIM3734 PLTB3714	<u>ONE OF:</u> HORT3764 PPLG3724 AGEG3724 CLIM3724 PLTB3724	<u>ONE OF:</u> PLTB4814 PPLG4834 SOIL4814 SOIL4834 CLIM4814	<u>ONE OF:</u> ENTO6884 PPLG4824 SOIL4824 SOIL4844 SCCS4824 PLTB4824
REQUIRED *If not proficient with UFS language test	CSIL1511, UFSS1504 *CALN1508	CSIL1521						

ENTO2614 *(Prerequisite for PPLG2624)*, PLTB2613 *(Prerequisite PLTB2623)*, PPLG2624 *(Prerequisite for PPLG3714)*, PLTB2623 *(Prerequisite for PLTB3714)*

HORT3774 (Prerequisite for HORT3764), PLTB3714 *(Prerequisite for PLTB 4814)*, PLTB3724 *(prerequisite for PLTB4824)*

12.4.2.3 AGRICULTURAL SCIENCES FIELD OF STUDY: SOIL SCIENCE BC540044

BACHELOR OF SCIENCE IN AGRICULTURE IN THE SOIL SCIENCE FIELD OF STUDY 3

Learning programmes in the Soil Sciences as main field of study offer one major with 6 options with a minor from one of the following sub disciplines Agricultural Economics, Agricultural Engineering, Agrometeorology, Agronomy, Grassland Science or Plant Pathology. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together. If a student wants to register for the Agricultural Economics minor, two extra modules for the first year is compulsory. This programme implementation is only for first and second year students 2022, the rest will phase in. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

YEAR	**FIRST**		**SECOND**		**THIRD**		**FOURTH**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
DISCIPLINE	**SOIL SCIENCE**							
CODE	BC540044							
COMPULSORY	AGEC1514 BLGY1513 CHEM1513 + CHEM1501 MATM1534 PHYS1534	ANIG1624 BLGY1643 CHEM1643 + CHEM1661 SCCS1624	CLIM2614 CROP2614 SOIL2674	SCCS2624 SCCS2684 PPLG2624 AGEG2624	SOIL3754 CLIM3734 CROP3714	SOIL3724 CLIM3724 SCCS3724	SOIL4814 SOIL4834 SCCS4808	SOIL4824 SOIL4844
ELECTIVES		AGEC1624	<u>ONE OF:</u> AGEC2614 BOCH2614 ENTO2614 GRAS2614		<u>ONE OF:</u> AGEG3714 AGEC3734 PPLG3714	<u>ONE OF:</u> AGEG3724 PPLG3724 CROP3744	<u>ONE OF:</u> CLIM4814 CROP4814 OR CROP4834 GRAS4834 PPLG4834	<u>ONE OF:</u> SCCS4824 CROP4824 OR CROP4844 GRAS4824 OR GRAS4844 PPLG4824
REQUIRED **If not proficient with UFS language test	CSIL1511, UFSS1504 *CALN1508	CSIL1521						

12.4.2.4 AGRICULTURAL SCIENCES FIELD OF STUDY: ANIMAL SCIENCE BC540015

BACHELOR OF SCIENCE IN AGRICULTURE IN THE ANIMAL SCIENCE FIELD OF STUDY 4

Learning programmes in the Animal Science as main field of study offer one major with 2 options with a minor from one of the following sub disciplines Agricultural Economics and Animal Science Specialisation. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, credit from the compulsory and elective modules together. This programme implementation is only for first and second year students 2022, the rest will phase in. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

YEAR	**FIRST**		**SECOND**		**THIRD**		**FOURTH**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
DISCIPLINE	**ANIMAL SCIENCE**							
CODE	BC540015							
COMPULSORY	AGEC1514 BLGY1513 CHEM1513 + CHEM1501 MATM1534 PHYS1534	ANIG1624 BLGY1623 BLGY1643 CHEM1643 + CHEM1661 SCCS1624	ANIN2614 BOCH2614 GRAS2614	ANIF2624 ANIB2624 ANIP2624 STSA1624	ANIP3713 ANIB3713 ANIN3734 DATA3712 ANIF3714	ANIP3724 ANIB3724 ANIN3723 GRAS3763 WILD3723	ONE OF THE FOLLOWING STREAMS: <u>ANIMAL SCIENTIST:</u> ANIP4814 ANIB4814 ANIN4834 ANIG4808 <u>FOOD PRODUCTS:</u> ANIP4814 ANIG4808 <u>RANGELAND AND WILDLIFE:</u> GRAS4834 GRAS4808 WILD4814 WILD4856	<u>ANIMAL SCIENTIST:</u> ANIF4824 ANIF4864 ANIB4823 ANIN4864 <u>FOOD PRODUCTS:</u> FSCG4826 ANIF4824 ANIF4864 <u>RANGELAND AND WILDLIFE:</u> GRAS4824 WILD4826
ELECTIVES			<u>ONE OF:</u> AGEC2614 SOIL2674 CROP2614 AGEX2614 MCBH2614				<u>FOOD PRODUCTS:</u> <u>ONE OF</u> ANIN4834 WILD4814	
REQUIRED *If not proficient with UFS language test	CSIL1511, UFSS1504 *CALN1508	CSIL1521						

12.4.2.5 AGRICULTURAL SCIENCES FIELD OF STUDY: PLANT BREEDING BC540041

BACHELOR OF SCIENCE IN AGRICULTURE IN THE PLANT BREEDING FIELD OF STUDY 5

Learning programmes in the Plant Breeding as main field of study offer one major with 2 options with a minor from one of the following sub disciplines Agronomy or Plant Pathology. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

YEAR	**FIRST**		**SECOND**		**THIRD**		**FOURTH**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
DISCIPLINE	**PLANT BREEDING**							
CODE	BC540041							
COMPULSORY	CHEM1513 + CHEM1501 MATM1534 PHYS1534 BLGY1513	ANIG1624 BLGY1623 BLGY1643 CHEM1643 + CHEM1661 SCCS1624	BTNY2616 PLTB2613 SOIL2674 CROP2614	BTNY2626 BTNY2621 PLTB2623	BTNY3754 PLTB3714	PLTB3724 PLTB3744 PPLG3724	PLTB4814 PLPG4814 PLTB4854 PLTB4808 PLTB4816	PLTB4824
ELECTIVES				<u>ONE OF:</u> SCCS2624 PPLG2624	<u>TWO OF:</u> CROP3714 HORT3754 HORT3774 PPLG3714 PPLG3734	<u>ONE OF:</u> SOIL3724 HORT3764 PPLG3744		
REQUIRED *If not proficient with UFS language test	CSIL1511, UFSS1504 *CALN1508	CSIL1521						

HORT3774 *(prerequisite for HORT3764)*

12.4.2.6 AGRICULTURAL SCIENCES FIELD OF STUDY: PLANT PATHOLOGY BC540042

BACHELOR OF SCIENCE IN AGRICULTURE IN THE PLANT PATHOLOGY FIELD OF STUDY 6

Learning programmes in the Plant Pathology as main field of study offer one major with 1 option of a Plant Breeding minor. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together. Two modules at any NQF level can be replaced by any approved modules in the CESM categories for the SAQA approved qualification. This modules must have the same NQF-level as well as enough credits to meet the minimum credits for the degree.

YEAR	**FIRST**		**SECOND**		**THIRD**		**FOURTH**	
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
DISCIPLINE	**PLANT PATHOLOGY**							
CODE	BC540042							
COMPULSORY	BLGY1513 CHEM1513 + CHEM1501 MATM1534 PHYS1534	ANIG1624 BLGY1623 BLGY1643 CHEM1643 + CHEM1661 SCCS1624	BTNY2616 CROP2614 PLTB2613 SOIL2674	SCCS2684 SCCS2624 PLTB2623 PPLG2624	BTNY3754 PLTB3714 PPLG3714 PPLG3734	PLTB3744 PPLG3724 PPLG3744	PPLG4808 PLPG4814 PPLG4816 PLTB4854 PPLG4834	PPLG4824
ELECTIVES					<u>ONE OF:</u> CROP3714 HORT3754 HORT3734	<u>ONE OF:</u> CROP3744 PLTB3724 HORT3774		
REQUIRED *If not proficient with UFS language test	CSIL1511, UFSS1504 *CALN1508	CSIL1521						

HORT3774 *(prerequisite for HORT3764)*

12.5 LEARNING PROGRAMMES FOR POSTGRADUATE DIPLOMAS

12.5.1 POSTGRADUATE DIPLOMA IN DISASTER MANAGEMENT BC450025

The Postgraduate Diploma in Disaster Management contains 120 credits and is presented in a minimum period of one year plus another year. The Dean may, however, give special permission that another additional year be granted to complete the qualification.

The programme consists of eight compulsory modules and a field visit in one of the modules . The programme requires written assignments to be completed by students and submitted at predetermined dates. Assignments will be marked and graded by the lecturers, who will give students feedback in a written format and also orally during contact sessions. Assignments will be part of a continual assessment process. Apart from the assignments, a formal examination assessment (written) will take place at the end of each semester, normally during June and November.

First Semester		Credits	Second Semester		Credits
DIMI5810	Introduction to disaster management	15	DIMS5825	Strategic Disaster Management	20
DIMR5800	Research Design and Methodology	15	DIMN5820	Management of Natural and Human-made Disasters	15
DIML5810	Legal and Institutional arrangements for Disaster Management	15	DIMT5820	Information Technology in Disaster Management	10
DIMM5810	Theoretical Models for disaster risk reduction	15	DIMP5820	Public Health in Disaster Management	15

12.5.2 POSTGRADUATE DIPLOMA IN INTEGRATED WATER MANAGEMENT BC450091

The Postgraduate Diploma in Integrated Water Management is tailor made for the working individual who wants to further their studies. This one-year, 120 credit qualification is interdisciplinary in nature and consists of three compulsory modules. Classes are presented in week long contact sessions by staff from the Centre for Environmental Management, different faculties and experts from Industry.

Upon completion of the qualification students will be able to:

- Apply a holistic, integrated approach to solving complex environmental problems relating to water by making use of social and ecological assessment and project management tools;
- Identify, interpret and implement the theory and applied knowledge related to water resources and processes and environmental sustainability and assessment practices;
- Critically analyse the relationships between human development and the environment and to discriminate between beneficial and detrimental environmental practices as they relate to water; and
- Make informed decisions, guided by ethical standards, scientific evidence and societal needs within the context of integrated water management.

As only a limited number of students can be accepted, an application form available from the Centre for Environmental Management (iwm@ufs.ac.za) must be submitted by the end of September of the preceding year, after which selection will take place.

First Semester		Credits	Second Semester		Credits
IWRM5810	Introduction to Integrated Water Management	48	IWRM5846	Integrated Water Resource Management and Legislation	24
			IWRM5820	Integrated Water Resources Science	48

12.5.3 POSTGRADUATE DIPLOMA IN SUSTAINABLE AGRICULTURE BC550047

LEARNING PROGRAMMES FOR POSTGRADUATE DIPLOMA IN SUSTAINABLE AGRICULTURE

The Postgraduate Diploma in Sustainable Agriculture contains 136 credits and is presented in a minimum period of one year. This degree will develop agricultural specialists that could support sustainable agricultural practice, and in return support food security and socio-economic development.

The programme consists of six compulsory modules. The programme requires assignments to be completed by students and submitted at predetermined dates. Assignments will be marked and graded by the lecturers, who will give students feedback in a written and oral format during contact sessions. Assignments will be part of a continual assessment process.

First Semester		Credits	Second Semester		Credits
SANR5806	Assessment and Management of Natural Resources	24	SARP5826	Research Methods for Sustainable Agriculture	24
SALS5806	Livestock Production for Sustainable Agriculture	24			
SAEC5806	Economics for Sustainable Agriculture	24			
SAIT5814	Introduction to Sustainable Agriculture	16			
ONE OF:					
SAEX5806	Extension for Sustainablility	24			
GEOG5806	Intermediate Geographic Information Science for Agriculture	24			

12.6 LEARNING PROGRAMMES FOR BACHELOR HONOURS DEGREES (NQF EXIT LEVEL 8)

12.6.1 BACHELOR OF ARCHITECTURE HONOURS BC460114

The Bachelor of Architecture Honours [BArchHons] is a full-time postgraduate degree by coursework and involves lectures, projects, and continuous assessment. The purpose of the qualification is to educate students who may register for the degree Master of Architecture (Professional) that will enable successful students to register as “Candidate Architect” with the South African Council for the Architectural Profession in terms of the provisions of the Architectural Profession Act 44 of 2000. The degree BArchHons provides access to the Master of Architecture (Professional) Degree.

The assessments and examinations for the degree BArchHons are recognised by the minister concerned in terms of the provisions of the Architectural Profession Act (Act 44 of 2000). Training experience after completion of the BArchHons degree will be controlled by the conditions of the South African Council for the Architectural Profession. The registrar of this Council will provide information in this regard.

FIRST YEAR		
COMPULSORY	DESN6800	Design
	CONS6808	Construction
	HURB6804	History of Urban Settlement
	RARC6808	Research in Theory of Architecture
	EOKR6804	Property economics
	DRET6804	Design and Research Methods in Architecture

12.6.2 BACHELOR OF AGRICULTURE HONOURS

BACHELOR OF AGRICULTURE HONOURS

The aims of this degree are:

(a) to give the student the opportunity to do in-depth specialisation of his/her choice to broaden his/her knowledge with respect to agriculture, rural development and agricultural management;
(b) to prepare the student for further postgraduate study;
(c) to lead the student in independent study of the main subject or field of specialisation; and
(d) to develop, through the Honours Degree in Agricultural Management, the student’s managerial skills in a variety of functional areas in agricultural enterprise management and development and the management of agricultural businesses.

A minimum of 120 credits must be obtained over the year and the department will announce the starting dates for classes.

BACHELOR OF AGRICULTURE HONOURS

DISCIPLINE	Agricultural Management	Irrigation Management	Wildlife Management	Animal Production Management
CODE	BC560052	BC560072	BC560090	BC560115
CREDITS	120 credits	124 credits	124 credits	132 credits
	AGMA6800 AGMA6815 AGMA6835 AGMA6825 AGMA6845	AGMA6835 IRRI6808 IRRI6816 IRRI6826 IRRI6846	AGMA6835 WDMT6816 WDMT6846 WDMT6806 WDMT6808	AGMA6835 AGRI6808 AGRI6834 AGRI6814 AGRI6824 AGRI6844 AGRI6864

BACHELOR OF AGRICULTURE HONOURS With specialisation in AGRICULTURAL ECONOMICS BC560011

SEMESTER	FIRST SEMESTER		SECOND SEMESTER	
COMPULSORY	AGEC6800	Applied econometrics and Research project	AGEC6825	Agribusiness management and marketing
	AGEC6815	Advanced production and natural resource economics	AGEC6845	Policy and Development
	AGEC6835	Macro economics and finance		

12.6.3BACHELOR OF SCIENCE HONOURS IN CONSUMER SCIENCE BC460023

To obtain a Bachelor Honours Degree a minimum study period of one year is required. The composition of the student’s curriculum and optional courses will be determined at the beginning of each year in consultation with the Academic Departmental Head. A minimum of 120 credits must be presented. The Academic Departmental Head determines how the modules must be distributed over the year and when the department will announce the starting dates for classes.

After completing the Honours learning programmes the graduates will possess the following skills:

- Knowledge of and engagement in an area at the forefront of a field, discipline or practice.
- An understanding of the theories, research methodologies, methods and techniques relevant to the field, discipline or practice; and an understanding of how to apply this knowledge in a particular context.
- An ability to interrogate multiple sources of knowledge in an area of specialisation, and to evaluate knowledge and processes of knowledge production.
- An understanding of the complexities and uncertainties of selecting, applying or transferring appropriate standard procedures, processes or techniques to unfamiliar problems in a specialised field, discipline or practice.
- An ability to critically review information gathering, assessment and management processes in specialised contexts inorder to develop creative responses to problems and issues.
- An ability to present and communicate academic, professional or occupational ideas and texts effectively to a range of audiences, offering creative insights, rigorous interpretations and solutions to problems and issues appropriate to the context.

A student must register for the compulsory research modules of 36 credits and do research on an approved topic in consultation with the Academic Departmental Head. More modules must be selected from the possible electives to obtain at least 120 credits.

SEMESTER	FIRST	SECOND
COMPULSORY	CNCS6809	
ELECTIVES	CNST6814 CNST6834 CNFD6808 NUTE6808 CNST6854	CNST6824 CNST6844 CNST6864 FSCG6826

12.6.4 BACHELOR OF SPATIAL PLANNING HONOURS

12.6.4.1 BACHELOR OF SPATIAL PLANNING HONOURS BC460145

After completing the programme, the graduates will possess the following skills:

- A thorough knowledge of the aims and purpose of urban and regional planning as well as planning theory, urban planning theory, regional planning theory, philosophy and ethics.
- The ability to practically apply theory in urban and regional planning projects e.g. the capacity to analyse issues from a theoretical and/or empirical perspective and to recommend suitable alternatives.
- The ability to apply and understand economics for planners, socio-cultural aspects in planning and environmental planning; and link these to the everyday tasks and activities of urban and regional planners.
- The capacity to communicate clearly and logically, write good planning and research reports and debate these with stakeholders.

A maximum of 140 credits must be attained to pass the BSPHons programme, and all modules are compulsory. To obtain the Honours in Spatial Planning a minimum study period of one year is required. Residential and Compact Learning can be conducted full-time over 12 months or 24 months part-time. Teaching in this program is primarily delivered thorough block weeks, if which a part-time student will typically attend 4 - 5 block weeks annually, and a full time student 8 - 9. Attendance at block weeks is compulsory. Students are expected to attend some classes, sessions, guest lectures, field trips, site visits, tours, tests and examinations during the block weeks. During classes, lectures, tutorials, practicals and discussions will take place. Assignments, tests and examinations may be written during the block weeks. The Academic Programme Director determines how the modules must be distributed over the years of study and in all programmes (full-time, part-time and compact learning). The modules may be spread over an additional year if a student does not have the necessary academic background.

Note: To register as a professional planner with the South African Council for Planners (SACPLAN), it is necessary to pass this degree, as well as the Masters in Urban and Regional Planning, and complete your practical training requirements.

MODULE CODE	COURSE LONG TITLE	CREDITS
URRE6813/URRE6823	Research in Economics for Planners	12
URSC6813/ URSC6823	Research in Socio-Cultural Aspects in Planning	12
UREP6813/UREP6823	Research in Environmental Planning	12
URLM6813/ URLM6823	Land Use Management	12
URHS6813/URHS6823	Human Settlements Planning	12
URUT6803	Research in Urban Development Theory	12
URBP6805	Basic Practice in Urban and Regional Planning	20
URRT6805	Research in Regional Planning Theory	20
URMD6808	Urban and Regional Planning Research Report	32

12.6.4.2 BACHELOR OF SPATIAL PLANNING HONOURS SPECIALISATION With specialisation in HUMAN SETTLEMENTS BC460171

The Specialisation in Human Settlements combines urban planning and human settlement modules to enable graduates to function effectively in planning sustainable human settlements with focus on the development and management of human settlements as well as the theory related to human settlements and housing. The same rules outlined in 12.6.4.1 are also applicable here, with the exception that the total credits for this degree are 140.

Note: This degree does not enable registration at the South African Council for Planners (SACPLAN), or to register for the Master in Urban and Regional Planning.

MODULE CODE	COURSE LONG TITLE	CREDITS
URBP6805	Basic Practice in Urban and Regional Planning	20
UREP6813/6823	Research in Environmental Planning	12
URRE6813/6823	Research in Economics for Planners	12
URUT6803	Research in Urban Development Theory	12
URDT6804	Human Settlement Development Management	16
URHA6804	Human Settlement Management and Administration	16
URHT6804	Human Settlements Theory	16
URRR6800	Research Report in Human Settlements	40

12.6.5 BACHELOR OF SCIENCE HONOURS

12.6.5.1 BACHELOR OF SCIENCE HONOURS with specialisation in AGRICULTURAL ECONOMICS BC460011

Students must register for all compulsory modules plus enough others to obtain at least 120 credits.

SEMESTER	FIRST SEMESTER		SECOND SEMESTER	
COMPULSORY	AGEC6800 AGEC6815 AGEC6835	Applied econometrics and research project Advanced production and natural resource economics Macro economics and finance	AGEC6825 AGEC6865	Agribusiness management and marketing Operational research

12.6.5.2 BACHELOR OF SCIENCE HONOURS

BC460018, BC460019, BC460020, BC460027, BC460029, BC460030, BC460065, BC460031, BC460039, BC460041, BC460082, BC460042, BC460089, BC460049, BC460067

Students must register for all compulsory modules plus enough others to obtain at least 120 credits. This degree is awarded in the following fields:

DISCIPLINE	**BEHAVIOURAL GENETICS**	**BIOCHEMISTRY**	**BOTANY**	**ENTOMOLOGY**	**FOOD SCIENCE**	**FORENSIC SCIENCES**		
						FORENSIC SCIENCES	**FORENSIC GENETICS**	**FORENSIC CHEMISTRY**
CODE	BC460018	BC460019	BC460020	BC460027	BC460029	BC460030	BC460067	BC460065
COMPULSORY	GENE6806 GENE6808 GENZ6804 GENB6824 GENE6804	BOCT6804 BOCO6822 BOCL6826 BOCR6828	PLTB6854 BTNY6816 BTNY6808	ENTO6814 ENTB6802 ENTO6862 ENTO6842 ENTO6808	ANIF4864 ANIF4824 FSCG6826 FSCP6814 FSCL6806 FSCR6808	FORS6804 FORS6806 FORS6808 FORC6804 FORC6824 FORG6804	FORG6808 FORG6806 FORX6804 FORG6804 FORZ6804 GENP6804	FORS6806 FORA6804 FORC6808 FORC6804 CHED6803 CHEH6803 FORC6824
ELECTIVES	GENP6804 GENE6834/GENE6844 GENS6824 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.	BOCM6804 BOCB6804 BOCE6844 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.	BTNA6804/BTNA6824 BTNB6804/BTNY6844 BTND6804/BTNY6864 BTNC6804/BTNY6884 BTNE6804 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.	ENTO6854 ENTO6864 ENTO6834 ENTO6884 ENTO6844 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.				

DISCIPLINE	**GENETICS**	**MICROBIOLOGY**	**PLANT BREEDING**	**PLANT HEALTH ECOLOGY**	**PLANT PATHOLOGY**	**WILDLIFE**	**ZOOLOGY**
CODE	BC460031	BC460039	BC460041	BC460082	BC460042	BC460089	BC460049
COMPULSORY	GENE6806 GENE6808 GENE6804	MCBT6804 MCBO6822 MCBL6826 MCBR6828	PLTB6814 PLTB6824 PLPG6814 PLTB6854 PLTB6816 PLTB6808	PPLG6816 PPLG6808 PLTB6854 PPLG6834 PPLG6824	PLTB6854 PPLG6816 PPLG6808 PLPG6814 PPLG6824 PPLG6834	WILD6816 WILD6826 WILD6808 WILD6856 ZLGY6864	ZLGY6814 ZLGC6802 ZLGY6862 ZLGY6842 ZLGY6808
ELECTIVES	GENE6834/GENE6844 GENM6804 GENZ6804 GENP6804 GENB6824 FORZ6804 GENS6824 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.	MCBD6824 MCBP6804 MCBM6804 One 16-credit NQF Exit Level 8 module from anyother discipline in thebiological field of interest. Subject to approval PD/ADH.		CROP6814 CROP6844 ENTO6854 ENTO6884 CLIM6814 SCCS6824 SOIL6844 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ ADH.			ZLGY6834 ZLGY6854 ZLGY6864 ZLGY6874 ZLGY6824 ZLGY6844 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.

12.6.5.3 BACHELOR OF SCIENCE HONOURS IN CONSTRUCTION MANAGEMENT BC460024, BC460043

LEARNING PROGRAMMES FOR CONSTRUCTION MANAGEMENT HONOURS

Each student select all the compulsory modules (row C1/C2) from the prescribed discipline for one study year. Students must select sufficient module credits from the electives (E) to obtain the credits for each year of study as indicated.

DISCIPLINE	**CONSTRUCTION MANAGEMENT HONOURS**			**QUANTITY SURVEYING HONOURS**		
CODE	BC460024			BC460043		
MODE	**RESIDENTIAL**	**COMPACT LEARNING**		**RESIDENTIAL**	**COMPACT LEARNING**	
YEAR	**FIRST YEAR**	**FIRST YEAR**	**SECOND YEAR**	**FIRST YEAR**	**FIRST YEAR**	**SECOND YEAR**
CREDITS	**136**	**64**	**72**	**128**	**56**	**72**
COMPULSORY SEMESTER 1	BIPR6804 BPDR6812 BPMR6804 BPPR6812 CPOR6804 COMR6804 CRPR6808	BPDD6812 BPPD6812 CPOD6804 COMD6804	BIPD6804 BPMD6804 CRPD6808	BIPR6804 BPDR6812 BPMR6804 BPPR6812 QBER6812 QDQR6804 QRPR6808	BPDD6812 QBED6812 QDQD6804 BPPD6812	BIPD6804 BPMD6804 QRPD6808
COMPULSORY SEMESTER 2	BCFR6822 BPCR6822 CTIR6822	BPCD6822 CTID6822	BCFD6822	QBER6822 BPQR6822 BCFR6822	BPQD6822 QBED6822	BCFD6822

BCCD3712 & BCCD3722 for students from other institutions who have not completed an equivalent modules.

12.6.5.4 BACHELOR OF SCIENCE HONOURS LEARNING PROGRAMMES IN PHYSICAL AND CHEMICAL SCIENCES

Students must register for all compulsory modules plus enough others to obtain at least 120 credits (For Physics 160 credits). This degree is awarded in the following fields:

DISCIPLINE	CHEMISTRY	PHYSICS		ASTROPHYSICS	AGROMETEOROLOGY	ENGINEERING SUBJECTS
YEAR	**FIRST & SECOND**	**FIRST**	**SECOND**	**FIRST & SECOND**	**FIRST & SECOND**	**FIRST & SECOND**
CODE	BC460021	BC460040		BC460017	BC460012	BC460026
COMPULSORY	CHEA6803 CHEB6803 CHEC6803 CHED6803 CHEE6803 CHEF6803 CHEH6803 CHEG6803 CHEM6808	PHYS6808 Note: It is compulsory to have eight of the elective modules.		Note that students will only be allowed to this programme if they comply with the extra admission requirements related to undergraduate astrophysics modules specified by the ADH. PHYA6808/PHYA6818 PHYA6814/PHYA6824 PHYA6854/PHYA6864 PHYA6874/PHYA6884	SCCS6808 CLIM6864 CLIM6874 SCCS6824 CLIM6834 CLIM6844	No Honours registered and students registering for the Bachelor of Science's Engineering Sciences cannot transfer directly to a Bachelor of Honours Degree; they would have to do at least three physics modules to make the migration possible.
ELECTIVES		**EIGHT OF:** (in consultation with the Academic Departmental Head) PHYS6814* PHYS6834* PHYS6854 PHYS6874* PHYR6814 PHYE6814 PHYE6834* PHYI6814 PHYI6834* PHYI6854* PHYI6874* PHYA6814 PHYA6834 PHYA6854 PHYA6874 PHYC6814 PHYC6834	PHYS6824* PHYS6844* PHYS6864 PHYS6884* PHYR6824 PHYE6824 PHYE6844* PHYI6824 PHYI6844* PHYI6864* PHYI6884* PHYA6824 PHYA6844 PHYA6864 PHYA6884 PHYC6824 PHYC6844 Note: Not all these modules are offered in a given year. This degree can be studied over more than one year.	PHYS6814/PHYS6824 PHYS6834/PHYS6844 PHYE6814/PHYE6824 PHYS6854/PHYS6864 PHYI6814/PHYI6824 PHYE6834/PHYE6844 PHYA6834/PHYA6844 PHYC6814/PHYC6824 PHYC6834/PHYC6844 PHYI6874/PHYI6884 Note: Students will only be allowed into this programme if they comply with the additional admission requirements related to undergraduate astrophysics modules specified by the ADH.	CLIM6854 OR One 16-credit NQF Exit Level 8 modules from any related discipline(s) Note: Students who wish to pursue a career as Meteorologist are advised to complete the following modules: MATM1644 MATA2654 MATA2754 OR MATA2664 PHYS1514 OR PHYS1534 PHYS1624	

* Modules not always presented

12.6.5.5 BACHELOR OF SCIENCE HONOURS IN AGRICULTURE

HONOURS LEARNING PROGRAMMES BC560012, BC560013, BC560015, BC560036, BC560041, BC560042, BC560044, BC560089

Depending on the previous qualification and in consultation with the Academic Departmental Head, the students will follow one of the following curriculums in Agrometeorology, Agronomy, Animal Science, Grassland Science, Soil Science and Irrigation Science.

The objectives of the study for this degree are:

(a) to deepen and extend the student's knowledge in modules of their choice in the context of research and extension;
(b) to prepare the student for further post-graduate study;
(c) to develop independent study capability in the student;
(d) to train the student how to collect, compile, collate, interpret and report subject literature and the effective communication thereof.

A minimum of 120 credits must be obtained over the year and the department will announce the starting dates for classes.

DISCIPLINE	AGROMETEOROLOGY	AGRONOMY	ANIMAL SCIENCE	GRASSLAND SCIENCE	PLANT BREEDING	PLANT PATHOLOGY	SOIL SCIENCE	WILDLIFE SCIENCE
CODE	BC560012	BC560013	BC560015	BC560036	BC560041	BC560042	BC560044	BC560089
COMPULSORY	SCCS6808 SCCS6824 CLIM6834 CLIM6844 CLIM6864 CLIM6874	CROP6814 CROP6824 CROP6834 CROP6844 SCCS6808	ANIG6808 ANIB6814 ANIB6824 ANIN6834 ANIN6864 ANIP6814 ANIP6824	GRAS6805 GRAS6808 GRAS6814 GRAS6824 GRAS6834 GRAS6844	PLTB6814 PLTB6824 PLPG6814 PLTB6854 PLTB6816 PLTB6808	PLTB6854 PPLG6816 PPLG6808 PPLG6824 PPLG6834 PLPG6814	SOIL6814 SOIL6824 SOIL6834 SOIL6844 SCCS6808	WILD6808 WILD6816 WILD6826 WILD6856 ZLGY6864
ELECTIVES	CLIM6854 OR One 16-credit NQF Exit Level 8 modules from any related discipline(s) Note: students who wish to pursue a career as Meteorologist are advised to complete the following modules: MATM1644 MATA2654 MATA2754 OR MATA2664 PHYS1514 OR PHYS1534 PHYS1624	Enough 16 credits NQF Exit Level 8 modules from other related disciplines		Enough 16 credits NQF Exit Level 8 modules from other related disciplines			SCCS6824 OR One 16 credits NQF Exit Level 8 modules from other related disciplines	

12.6.5.6 BACHELOR OF SCIENCE HONOURS LEARNING PROGRAMMES IN MATHEMATICAL SCIENCES BC460010, BC460038, BC460037, BC460087, BC460046

Students must register for all compulsory modules plus enough others to obtain at least 120 credits. This degree is awarded in the following fields:

DISCIPLINE	**ACTUARIAL SCIENCE**				**MATHEMATICS AND APPLIED MATHEMATICS**	**MATHEMATICAL STATISTICS**	**RISK ANALYSIS**	**APPLIED STATISTICS**
CODE	BC460010 (Option 1)	BC460010 (Option 2)	BC460010 (Option 3) *(Subject to ASSA Approval)*	BC460010 (Option 4) *(Subject to ASSA Approval)*	BC460038	BC460037	BC460087	BC460046
COMPULSORY	ACSR6808 ACSG6800 ACSL6816	ACSR6808 ACSG6890 ACSL6816	ACSR6808 ACSG6800 ACSC6813 ACSL6826	ACSR6808 ACSG6890 ACSC6813	MATM6819/MATM6829	STSR6808 STSA6816 STSB6816 STSE6813 STSP6813 STSA6823 ONE OF: STSD6823 STSD6843	STSR6808 STSA6816 STSE6813 STSF6813 STSD6823 STSF6823 **CHOOSE STREAM A OR B:** **STREAM A:** ONE OF STSS6813 STSS6833 ONE OF STSA6823 STSD6843 **STREAM B:** EDER6828	STSR6808 STSA6816 STSF6813 STSA6823 STSD6823 STSD6843 STSS6833 STSS6813
ELECTIVES	Special additional reguirements: 5 ASSA subject exemptions THREE OF: STSE6813 STSP6813 STSD6823 STSF6823	Special additional reguirements: 4 ASSA subject exemptions THREE OF: STSE6813 STSP6813 STSD6823 STSF6823	Special additional reguirements: 5 ASSA subject exemptions	Special additional reguirements: 4 ASSA subject exemptions THREE OF: STSE6813 STSP6813 STSD6823 STSF6823	MATA6814/MATA6824 MATB6814/MATB6824 MATC6814/MATC6824 MATD6814/MATD6824 MATE6814/MATE6824 MATF6814/MATF6824 MATG6814/MATG6824 MATH6814/MATH6824 MATI6814/MATI6824 MATJ6814/MATJ6824 MATK6814/MATK6824 MATL6814/MATL6824 MATM6814/MATM6824 One approved module from another discipline MATN6814/MATN6824 MATO6814/MATO6824 MATP6814/MATP6824 MATQ6814/MATQ6824 MATR6814/MATR6824 MATS6814/MATS6824 MATT6814/MATT6824 MATU6814/MATU6824 MATV6814/MATV6824 MATW6814/MATW6824 MATX6814/MATX6824 MATY6814/MATY6824 MATZ6814/MATZ6824 MATZ6834/MATZ6844 MATZ6854/MATZ6864			

12.6.5.7 HONOURS LEARNING PROGRAMMES IN GEOSCIENCES

Students must register for all compulsory modules plus enough others to obtain at least 120 credits. This degree is awarded in the following fields:

DISCIPLINE	GEOGRAPHY	GEO-INFORMATICS	ENVIRONMENTAL GEOGRAPHY	SOIL SCIENCE
CODE	BC460033	BC460069	BC460062	BC460044
SEMESTER		**FIRST**		**FIRST**
COMPULSORY	GEOF6816 GEOR6808 GEOP6816	GEOF6816 GEOR6808 GISC6816	GEOR6808 GEOF6816 ENVG6816	SOIL6814 SOIL6834 SCCS6808
ELECTIVES	GISC6816 GEOH6836 ENVG6816		GEOH6836 GEOP6816 GISC6816	One 16 credits NQF Exit Level 8 modules from other related disciplines
SEMESTER		**SECOND**		**SECOND**
COMPULSORY	BIOG6826	GISR6826	ENVG6846	SOIL6824 SOIL6844
ELECTIVES	ENVG6846 GISR6826 GEOH6826	BIOG6826 ENVG6846 GEOH6826	GISR6826 BIOG6826 GEOH6826	One 16 credits NQF Exit Level 8 modules from other related disciplines

HONOURS LEARNING PROGRAMMES IN GEOLOGY (BC460035, BC460028, BC460032) **AND GEOHYDROLOGY** (BC460034)

The study starts on the date as determined by the Department of Geology and Geohydrology respectively.

DISCIPLINE	GEOLOGY	ENVIRONMENTAL GEOLOGY	GEOCHEMISTRY	GEOHYDROLOGY *	GEOLOGY	ENVIRONMENTAL GEOLOGY	GEOCHEMISTRY	GEOHYDROLOGY*
CODE	BC460035	BC460028	BC460032	BC460034	BC460035	BC460028	BC460032	BC460034
SEMESTER		**FIRST**				**SECOND**		
COMPULSORY	GLGY6816 GLGY6853 GLGY6801 GLGY6808	GLGY6816 GLGY6836 GLGY6873 GLGY6801 GLGY6808	GLGY6816 GLGY6836 GLGY6853 GLGY6801 GLGY6808	GEHR6808 GEOH6815 GEOH6835 GEOH6855	GLGY6823 GLGY6863 GLGY6883	GLGY6823 GLGY6883	GLGY6843 GLGY6863 GLGY6883	GEOH6865 GEOH6845 GEOH6825
ELECTIVES	ONE OF: GLGY6836 GLGY6856					ONE OF: GLGY6843 GLGY6863		

**This programme is only available for students who graduated in the B.Sc. Geo-informatics programme.*

12.6.6 BACHELOR OF COMPUTER INFORMATION SYSTEMS HONOURS BC460156

Students must register for all compulsory modules plus enough others to obtain at least 120 credits.

COMPULSORY	BCIS6809 CSIE6853/CSIE6863 CSIS6813/CSIS6823 TWO OF EOCC6824 EVEN6824 EFMN6814	Computer Information Systems Research Project IT Project Management Introduction to Research Omni-Channel Commerce Venture Creation Financial Management for Managers
ELECTIVES	CSIA6833/CSIA6843 CSID6813/CSID6823 CSID6833/CSID6843 CSID6853/CSID6863 CSII6813/CSII6823 CSII6833/CSII6843 CSII6873/CSII6883 CSIN6833/CSIN6843 CSIP6853/CSIP6863	Analytical Programming Business Intelligence Advanced Databases Data Warehousing Information Security Human-Computer Interaction Digital Forensic Science Advanced Computer Networks Advanced Programming I

12.6.7 BACHELOR OF SCIENCE HONOURS LEARNING PROGRAMMES IN COMPUTER SCIENCE AND INFORMATICS AND DATA SCIENCE

Students must register for all compulsory modules plus enough others to obtain at least 120 credits. This degree is awarded in the following fields:

DISCIPLINE	**COMPUTER SCIENCE AND INFORMATICS**		**DATA SCIENCE**	
CODE	BC460022		BC460095	
CREDITS	All compulsory modules plus enough others to obtain at least 120 credits			
COMPULSORY	CSIS6809 CSIS6813/CSIS6823		CSIS6809 CSIS6813/CSIS6823 CSIA6813/CSIA6823 CSID6813/CSID6823 CSID6853/CSID6863 ONE OF: CSIA6833/CSIA6843 STSD6823	
ELECTIVES	CSIA6813/CSIA6823 CSIA6833/CSIA6843 CSIC6813/CSIC6823 CSIC6833/CSIC6843 CSIC6853/CSIC6863 CSID6813/CSID6823 CSID6833/CSID6843 CSID6853/CSID6863 CSIE6813/CSIE6823 CSIE6833/CSIE6843 CSIE6853/CSIE6863 CSIE6873/CSIE6883 Maximum of two approved modules from any other department within the faculty.	CSII6833/CSII6843 CSII6853/CSII6863 CSII6873/CSII6883 CSIM6813/CSIM6823 CSIM6833/CSIM6843 CSIN6813/CSIN6823 CSIN6833/CSIN6843 CSIP6813/CSIP6823 CSIP6833/CSIP6843 CSIP6853/CSIP6863 CSIP6873/CSIP6883 CSII6813/CSII6823	CSIC6813/CSIC6823 CSIC6833/CSIC6843 CSIC6853/CSIC6863 CSID6833/CSID6843 CSIE6813/CSIE6823 CSIE6833/CSIE6843 CSIE6853/CSIE6863 CSIE6873/CSIE6883 CSII6813/CSII6823 CSII6833/CSII3843 CSII6853/CSII6863	CSII6873/CSII6883 CSIM6813/CSIM6823 CSIM6833/CSIM6843 CSIN6813/CSIN6823 CSIN6833/CSIN6843 CSIP6813/CSIP6823 CSIP6833/CSIP6843 CSIP6853/CSIP6863 CSIP6873/CSIP6883 STSA6823

12.7 MASTER'S DEGREES (NQF EXIT LEVEL 9)

12.7.1MASTER OF ARCHITECTURE BC480214, BC470314, BC480314

MASTER OF ARCHITECTURE RESEARCH BC480214	MASTER OF ARCHITECTURE (PROFESSIONAL) BC470314	MASTER OF ARCHITECTURE SPECIALISING IN DESIGN BC480314
LEARNING PROGRAMMES FOR MASTER OF ARCHITECTURE • The minimum term of this study is one years and a total of 180 credits are allocated for this degree. A student must do research on an approved topic in consultation with the Academic Departmental Head, for at least one year in preparation for a dissertation that shall be sub- mitted as the only requirement for the degree.	**LEARNING PROGRAMMES FOR MASTER OF ARCHITECTURE (PROFESSIONAL) (For professional registration)** • The Master of Architecture (Professional) is a one year full-time Master's Degree by coursework and involves lectures, projects, and an investigated design thesis with an advanced design project. The purpose of the qualification is to educate students who may register as a candidate architect with the South African Council for the Architectural Profession in terms of the provisions of the Architectural Profession Act 44 of 2000. • The assessments and examinations for the degree MArch(Profes- sional) are recognised by the minister concerned in terms of the pro- visions of the Architectural Profession Act (Act 44 of 2000). Training experience after completion of the degree MArch(Professional) will be controlled by the conditions of the South African Council for the Architectural Profession. The registrar of this Council will provide information in this regard.	**LEARNING PROGRAMMES FOR MASTER OF ARCHITECTURE WITH SPECIALISATION IN DESIGN** • The Masters with Specialisation in Design is a dissertation by project mode with design focus. The dissertation by project mode includes original creative work, an exhibition and an exegesis as research requirements. • The minimum term of this study is one year and a total of 180 credits are allocated for this degree.
YEAR 1	YEAR 1	YEAR 1
ARCH8900	DDIS7900 CONS7908 ATRE7904 BPKR7914 PARC7904	ARCD8900

12.7.2MASTER OF AGRICULTURE BC580152, BC580111, BC580115, BC580172, BC580190, BC580193

LEARNING PROGRAMMES FOR MASTER OF AGRICULTURE

The aims of this degree study are:
(a) to present specialised postgraduate agricultural management training;
(b) to guide the student in such a way that he/she will be able to successfully integrate, communicate and apply the principles, concepts and knowledge of agricul-tural and management science; and
(c) to enhance applicable research skills in order to enable the student to qualify as a specialist in his/her field.

A student who registers for the MAgric degree and presents a dissertation (180 credits), must use one of the following codes:

RESEARCH					
BC580152	BC580111	BC580172	BC580190	BC580193	BC580115
AGRICULTURAL MANAGEMENT	**AGRICULTURAL ECON**	**IRRIGATION MANAGEMENT**	**WILDLIFE MANAGEMENT**	**FOOD AND NUTRITION SECURITY**	**ANIMAL PRODUCTION MANAGEMENT**
AGMA8900	AGEM8900	IRRI8900	WDMT8900	CFNS8900	AGRI8900

12.7.3 MASTER OF DISASTER MANAGEMENT BC470325

LEARNING PROGRAMMES FOR MASTER OF DISASTER MANAGEMENT

The main aim of the programme is to provide disaster management practitioners, or those who may have future disaster management responsibilities, training in a holistic approach towards disaster management. The programme will enable them to manage all kinds of disasters by implementing proactive disaster management strategies in terms of relevant legislation, policies and directives, and effectively co-ordinate relief and recovery programs.

The degree can be offered over a minimum period of one year (full time). Students will be allowed to take the degree over a two-year period (part time) by registering for fewer subjects per year. Prospective part-time candidates need to clarify their part-time studies with the Director of DiMTEC.Students need to obtain 180 credits.

COMPULSORY		CREDITS	ELECTIVES (Choose at least 60 credits)		
CODE	SUBJECT	CREDITS	CODE	SUBJECT	CREDITS
DIMR7900	Disaster Management Mini dissertation	120	DIMD7910	Ecosystem-Based Disaster Risk Reduction and Climate Change	60
			DIME7910	Ethnic, Cultural Conduct and Indigenous Knowlede Systems	30
			DIMG7900	Geographical Information Systems and Remote Sensing in Disaster Management	30
			DIMH7910	Crisis Intervention and Trauma Management	30
			DIMI7910	Disaster Risk and Impact Assessment	60
			DIMM7910	Management of Media Relations and Communication in Disaster Management	30
			DIMP7900	Political Strategic Planning	30

12.7.4 MASTER OF SUSTAINABLE AGRICULTURE BC571347

LEARNING PROGRAMMES FOR MASTERS DEGREE IN SUSTAINABLE AGRICULTURE

The aim of this multi- and interdisciplinary postgraduate degree in Sustainable Agriculture is to address the global need for research and professional capacity to research, and provide solutions to sustainability in the field of agriculture. Sustainability in terms of food security, national resources and energy are key factors that inform the national and global development agenda. Sustainable agriculture seeks to sustain farms, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and to the benefit of communities.

The Master's Degree in Sustainable Agriculture contains 180 credits and is presented in a minimum period of one year. This degree will develop agricultural specialists that could support sustainable agricultural practice, and in return support food security and socio-economic development.

The programme consists of five compulsory modules and submission of a research component in the form of a mini-dissertation. The programme requires assignments to be completed by students and submitted at predetermined dates. Assignments will be marked and graded by the lecturers, who will give students feedback in a written and oral format during contact sessions. Assignments will be part of a continual assessment process. The mini-dissertation, script or publishable manuscript or published article is conducted and examined under the supervision of a supervisor or supervision committee. External assessment is done by a separate appointed panel of experts.

FIRST SEMESTER		
CODE	SUBJECT	CREDITS
SARS7906	Research Methodology and Methods for Sustainable Agriculture	24
SARP7900	Mini-dissertation	60
CHOOSE 4 OF THE FOLLOWING		
SANR7906	Advanced Management of Natural Resources	24
SALS7906	Advanced Livestock Production for Sustainable Agriculture	24
SAEX7906	Sustainable Agriculture and Extension: Theory and Practice	24
SAEC7906	Advanced Economics for Sustainable Agriculture	24
GEOG7906	Advanced Geographical Information Science for Agriculture	24

12.7.5MASTER OF LAND AND PROPERTY DEVELOPMENT MANAGEMENT BC470393, BC470394

LEARNING PROGRAMMES

Learning programmes: Each student selects the field of interest, between Project Management or Valuation and include all the compulsory modules (row C1/C2) from the prescribed discipline for the study years. Students must select sufficient modules and credits as indicated at each field of study from the electives (E) to obtain at least 180 credits for the degree programme.

YEAR	FIRST		SECOND	
SUBJECT	**PROJECT MANAGEMENT**	**PROPERTY STUDIES**	**PROJECT MANAGEMENT**	**PROPERTY STUDIES**
CODE	BC470393	BC470394	BC470393	BC470394
CREDITS	**84**		**96**	
COMPULSORY	PMIR7902 PPMO7904 ANDC7904 PMCM7905 DPRP7902 LSFP7902 PVPE7902	PVIR7902 PVPO7905 ANDC7904 SOIL7904 PVPL7902 LSFP7902 PVPE7902	PMMD7900 PPMT7904 AGEC7902 IPMP7903	PVMD7900 PVPT7905 AGEC7902 URLM7902

12.7.6 MASTER OF HUMAN SETTLEMENTS BC480271

THESE LEARNING PROGRAMMES AIM TO:

(a) Provide the student with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate assessment of his/her own results and as well as that of others by production of a thesis, which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny.

(b) Develop the student, who will be able to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.

A student must do research on an approved topic in consultation with the academic programme director for at least one year, in preparation of a full dissertation that shall be submitted as the only requirementfor the degree. In certain circumstances, the academic programme director may require or allow additional subjects to be taken to fill a skills or knowledge gap. This degree does not enable registration at the South African Council for Planners (SACPLAN).

COMPULSORY MAJOR MODULES		
Module code	**Course Long Title**	**Credits**
URHS8900	Dissertation in Human Settlement	180

12.7.7 MASTER OF SCIENCE

These learning programmes aims at:

(a) Providing the student with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate assessment of his/her own results and that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny.

(b) Developing the student in order to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.

- The duration of this study is 1 year and a total of 180 credits is allocated for this degree. The student may do a research Master's programme with a full dissertation or a structured Master's programme depending on the discipline for which they want to register.
- If the full dissertation option is followed the student must do research on an approved topic for at least two semesters, in consultation with the Academic Departmental Head, in preparation for a dissertation that shall be submitted as the only requirement for the degree. Students may be required to present at least one seminar/research report in each year in accordance with departmental rules.
- If the structured Master's Degree is all prescribed modules, a compulsory research essay must be completed. The topic for the research must be determined in consultation with the Academic Departmental Head. Students may be required to present at least one seminar/research report.

STRUCTURED MASTER'S DEGREES

STRUCTURED MASTER OF SCIENCE With specialisation in CLIMATE CHANGE BC470099

After completion of the degree students will obtain a professional degree and possess the following skills:

- The capacity to combine the knowledge of the science behind climate change.
- Will have an understanding of the diverse and complex impacts of climate change on the environment.
- The ability to critically evaluate information and theories and to apply relevant concepts in innovative research.

The period of this study:

- Part time with distance learning for 24 months
- Compact learning block sessions 24 months presented as 4-5 workshop weeks per year.

Compact learning students must attend compulsory block weeks at the department for the duration of the program at times as determined by the HOD or section head. During these block weeks lectures tutorials, practicals and discussions will take place. Furthermore block weeks may also be used for tests and assignments. The programme includes courses on the science behind climate change and variability, and the impact of climate change on agro-ecological systems and possibilities for mitigation and adaptation. In the second year, students can choose between a course on the broader policy and economic aspects of climate change, or a quantitative course on climate modelling and data analysis. A central component of the programme is a mini dissertation on a relevant research topic written under the supervision of academic staff.

MODULE CODE	MODULE	YEAR	CREDITS	COMPULSORY	ELECTIVE
CCSA7910	Climate change and variability	1	40	Yes	
CLIM7908	Sustainability and climate change adaptation of agricultural systems	1	32	Yes	
CLIM7905	Research methodologies	1	20	Yes	
CLIM7900	Climate Change Mini dissertation	2	60	Yes	
TOTAL CREDITS FOR COMPULSORY MODULES			**152**		
ONE OF: *(CCSD7900: This module will only be presented in odd numbered years and CCSC7900 in even numbered years)*					
CCSD7900	Policy, educational and economic aspects of climate change	2	40		Yes
CCSC7900	Climate modelling and quantitative analysis	2	40		Yes
TOTAL CREDITS FOR DEGREE			**192**		

ASTROPHYSICS

CODE	BC470117
COMPULSORY	PHYA7970/PHYA7980
ELECTIVES	Students in the National Astrophysics and Space Science Programme (NASSP) must do an Extended research essay (PHYA7900) (100 credits) on an approved subject, in consultation with the Academic Departmental Head, after having already completed a theoretical course component (PHYA7970/PHYA7980 – Astrophysics and Space Science) (80 credits) presented by the University of Cape Town (UCT) consisting of a total of 5 UCT weight points from the NASSP Master's Degree (www.star.ac.za). An oral examination may be required which will be arranged with the student after the extended research essay has been submitted.

MASTERS OF SCIENCE With specialisation in MINERAL RESOURCE MANAGEMENT BC470178

Effective mining and mineral beneficiation is dependent on functional integrated management practices that include aspects such as geology, mining, mineral processing, financial management and mining-re- lated legislation, among others (including all MRM practices).

- Mining has traditionally consisted of various disciplines, which have been managed, in a fragmented fashion. The results of fragmented management led to task duplication and noncoordination of activities that span the whole spectrum of mining functions. These actions invariably resulted in the development of a high cost structure.
- The main objective of the Master in Mineral Resource Management is to effectively integrate the relevant fields of expertise so as to manage mining activities in the most cost effective manner possible.
- The programme will consist of four separate parts taken over a period of at least two years. In phase one, students will be exposed to basic Geology, Mining, Metallurgy and Business Principles as an introduction before being exposed to more detail in the applied modules. Phase two and three modules will contain more detail and will also address other deficiencies of the students.
- Upon the successful completion of the compulsory modules in Phase 1 and GLGD7913/7923 from Phase 2, four modules from Phase 2 and two modules from Phase 3 (a total of 12 modules) and GLGD7900 (mini dissertation) from Phase 4, the student will obtain a MSc with specialisation in Mineral Resource Management.

Some of the modules have compulsory contact time for lectures, case studies, practicals, tasks and tutorials, while others will be interactive and internet-based. The fourth phase comprises the completion of an extended research dissertation. Upon the successful completion of the compulsory modules in phase one, six modules from phase two, four modules from phase three and phase four, the student will obtain a Magister qualification.

PHASE1	PHASE2	PHASE3	PHASE4
GLGA7913/GLGA7923 GLGA7933/GLGA7943 GLGA7953/GLGA7963 GLGA7973/GLGA7983 GLGB7913/GLGB7923	GLGC7913/GLGC7923 GLGC7933/GLGC7943 GLGC7953/GLGC7963 GLGC7973/GLGC7983 GLGD7913/GLGD7923 GLGD7933/GLGD7943	GLGE7933/GLGE7943 GLGE7953/GLGE7963 GLGE7973/GLGE7983	GLGD7900

12.7.8 INTEGRATED WATER MANAGEMENT AND ENVIRONMENTAL MANAGEMENT BC470151, BC470160

MASTERS OF SCIENCES With specialisation in INTEGRATED WATER MANAGEMENT BC470151

The effect of the national drought in 2015/16 on the agricultural sector, as well as the Cape Town and Port Elizabeth water crises, highlighted the importance of ensuring adequate water supply for national security in Southern Africa. Additional pressures, including climate change, population growth and increasing water pollution, coupled with weakening institutional capacity, complicates the effective management of these challenges. There is, a pressing need for a new cohort of skilled and trained water professionals. The MSc with specialisation in Integrated Water Management focuses on the water system as a whole and integrates information from various inter-connected sub-disciplines.

The Postgraduate Diploma would serve as a feeder programme for the MSc with specialisation in Integrated Water Management with the provision that the students entering must also have the necessary scientific undergraduate backing in the form of a Bachelor of Science or relevant, equivalent qualification. Furthermore, we have also received several external enquiries from candidates from all levels of government, industry and academia. These candidates will also be considered for entrance in the MSc programme, granted they have successfully completed a relevant qualification in integrated water management at NQF.

Student will have to enrol for all the modules below and successfully complete the 180 credits to obtain the qualification over a period of two years.

FIRST YEAR OF STUDY					
FIRST SEMESTER			SECOND SEMESTER		
IWRR7905	Research methods (Year module)	20 credits	**Choose one elective:**		
IWRM7935	Water resources and environmental change	20 credits	IWRM7965	Water resources in arid environments	20 credits
			IWRM7985	Water management in an urbanizing world	20 credits
SECOND YEAR OF STUDY					
IWRM7900 (Year module)	Mini-dissertation	120 credits			

MASTERS OF SCIENCES With specialisation in ENVIRONMENTAL MANAGEMENT BC470160

This degree is important because of the national interests to continue producing highly trained graduates in environmental management. The National Development Plan 2030 emphasises the importance of sustainable economic development that reduces poverty without degrading natural resources. horeover, many international sustainability commitments (such as the Convention on Biological Diversity and the Sustainable Development Goals) stress the importance of holistic development that integrates social, environmental and economic considerations. Some of these commitments are up for mid-term review in 2020, so it is important that this qualification includes these new advances.

South Africa is uniquely positioned as a rapidly developing country as part of the BRICS nations. This means that our country is positioned mid-way along a development trajectory, which means that we aspire to reach the developed standards of Europe and North America, while simultaneously serving as a role model for less developed countries in sub-Saharan Africa. This degree will distinguish itself by being a structured and part-time programme that is specifically designed for young professionals who aim to further their studies while continuing to work.

Student will have to enrol for all the modules below and successfully complete the 180 credits to obtain the qualification over a period of two years.

FIRST YEAR OF STUDY					
FIRST SEMESTER			SECOND SEMESTER		
ENMT7905	Research methods (Year module)	20 credits	**Choose one elective:**		
ENMT7935	Introduction to Sustainability Science	20 credits	ENMT7965	Environmental Impact Assessment	20 credits
			ENMT7985	Environmental Management Systems	20 credits
SECOND YEAR OF STUDY					
ENMT7900 (Year module)	Mini-dissertation	120 credits			

12.7.9 MASTER OF SCIENCE IN NANOSCIENCE

MASTER OF SCIENCE IN NANOSCIENCE BC470179

COMPULSORY	Study code 4719: This qualification forms part of the National Nanoscience Postgraduate Teaching Platform (NNPTP) and is offered in collaboration with the University of the Western Cape, the Nelson Mandela University and the University of Johannesburg. Students are subjected to a selection process. The programme consists of a theoretical coursework component (80 Credits) and a mini-dissertation (100 Credits).	**a) Theoretical Coursework** The coursework component is presented at the University of the Western Cape (UWC). NSCC7911 and NSMN7911 are compulsory. Students register for a major field of speciali- sation (NSFC7911, NSFP7911 or NSCH7914) and the ap- plicable Experimental Techniques module. To complete the theoretical coursework component students have to enrol for the two foundation courses that are not part of the major field of specialisation. For example: Students opting for Advanced Nanophysics (NSAP7900) accordingly select Foundations of Nano-biomedical Sciences for non-biologists (NSCH7914) and Foundations of Nanochemistry for Non-chemists (NSCC7911). The coursework component incorporates the following modules: NSCC7911 – Central Concepts in Nanoscience NSMN7911 – Management for Nanoscientists NSFB7911 – Foundations of Nano-biomedical sciences for Non-biologists NSFC7911 – Foundations of Nanochemistry for Non-chemists NSFP7911 – Foundations of Nanophysics for Non-physicists NSCH7914 – Experimental Techniques in Nanochemistry NSTP7914 – Experimental Techniques in Nanophysics NSAP7900 – Advanced Nanophysics NSCH7900 – Advanced Nanochemistry NSRP7900 – Nanoscience Research Project **(b) Research Project** *Currently not available at the University of the Free State. On successful completion of the coursework component, students must do an approved mini-dissertation (NSRP7900) (100 credits) in Nanoscience (in consultation with the Academic Departmental Head) at the University of the Free State.

RESEARCH MASTER'S DEGREES

Disciplines	PLAN CODE	MODULE CODE
Actuarial Science	BC480010	ACST8900
Agricultural Economics	BC480011	AGEC8900
Applied Mathematics	BC480016	MATA8900
Agrometeorology	BC480012	CLIM8900
Agrometeorology Interdisciplinary	BC480012	CLMI8900
Astrophysics	BC480017	PHYA8900
Behavioural Genetics	BC480018	GENB8900
Biochemistry	BC480019	BOCM8900
Botany	BC480020	BTNY8900
Chemistry	BC480021	CHEM8900
Conservation Biology	BC480094	CONB8900
Computer Information Systems	BC480056	CSIS8900
Computer Science and Informatics	BC480022	CSIS8900
Consumer Science	BC480023	CNCS8900
Construction Management	BC480024	PQMR8900
Data Science	BC480095	CSIS8900
Entomology	BC480027	ENTO8900
Environmental Geology	BC480028	GLGE8900

Disciplines	PLAN CODE	MODULE CODE
Environmental Management	BC480060	ENMT8900
Food Science	BC480029	FSCI8900
Forensic Science	BC480030	FORS8900
Forensic Chemistry	BC480065	FORC8900
Forensic Entomology	BC480066	FORE8900
Genetics Interdisciplinary	BC480031	GENI8900
Forensic Genetics	BC480067	FORG8900
Forensic Interdisciplinary	BC480068	FORI8900
Genetics	BC480031	GENE8900
Geochemistry	BC480032	GECE8900
Geography	BC480033	GEOR8900
Geo-informatics	BC480069	GISC8900
Geology	BC480035	GLGY8900
Geohydrology	BC480034	GEHR8900
Grassland Sciences	BC480036	GRAS8900
Human Molecular Genetics	BC480031	GENH8900
Integrated Water Management	BC480091	IWRM8900
Land Rehabilitation	BC480096	CMLR8900
Mathematical Statistics	BC480037	STSM8900

Disciplines	PLAN CODE	MODULE CODE
Mathematics	BC480038	MATM8900
Microbiology	BC480039	MCBT8900
Microbial Biotechnology	BC480077	MBBT8900
Mineral Resource Management	BC480078	MRTM8900
Plant Health Ecology	BC480082	PHEC8900
Plant Breeding	BC480041	PLTB8900
Plant Breeding Interdisciplinary	BC480081	PLTI8900
Plant Pathology Interdisciplinary	BC480083	PPLI8900
Plant Pathology	BC480042	PPLG8900
Physics	BC480040	PHYS8900
Property Science	BC480085	PROP8900
Quantity Surveying	BC480043	DQFR8900
Risk Analysis	BC480087	RSAN8900
Soil Sciences	BC480044	SOIL8900
Soil Sciences Interdisciplinary	BC480088	SOII8900
Applied Statistics	BC480046	STSA8900
Wildlife	BC480089	WILD8900
Zoology	BC480049	ZLGY8900

12.7.10 MASTER OF SCIENCE IN AGRICULTURE BC580012, BC580013, BC580015, BC580029, BC580036, BC580041, BC580042, BC580044, BC580053, BC580054, BC580081, BC580083, BC580088, BC580089

These learning programmes aim at:

- providing the student with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate assessment of his/her own results and that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny
- developing the student in order to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature

The minimum term of this study is 1 year and a total of 180 credits are allocated for this degree. Rules: The student may do a research Master's programme with a full dissertation or a structured Master's programme depending on the discipline in which they want to register. For the full dissertation option the student must do research on an approved topic for at least two semesters, in consultation with the Academic Departmental Head, in preparation for a dissertation that shall be submitted as the only requirement for the degree. DATA2614 and DATA2624 must have been successfully completed or must be done concurrently in programmes if required by the Departmental Head.

RESEARCH								
Agrometeorology	BC580012	CLIM8900	Animal Nutrition	BC580015	ANIN8900	Plant Pathology	BC580042	PPLG8900
Agrometeorology Interdisciplinary	BC580053	CLMI8900	Animal Physiology	BC580015	ANIP8900	Plant Pathology Interdisciplinary	BC580083	PPLI8900
Agronomy	BC580013	CROP8900	Food Science	BC580029	FSCI8900	Soil Science	BC580044	SOIL8900
Agronomy Interdisciplinary	BC580054	CROI8900	Grassland Science	BC580036	GRAS8900	Soil Science Interdisciplinary	BC580088	SOII8900
Animal Breeding	BC580015	ANIB8900	Plant Breeding	BC580041	PLTB8900	Wildlife Science	BC580089	WILD8900
Animal Science	BC580015	ANIG8900	Plant Breeding Interdisciplinary	BC580081	PLTI8900			

12.7.11MASTER OF URBAN AND REGIONAL PLANNING BC480348

LEARNING PROGRAMMES FOR MASTERS DEGREE OF URBAN AND REGIONAL PLANNING (Research) (4764)

These learning programmes aim to:

(a) Provide the student with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate assessment of his/her own results and as well as that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny.

(b) Develop the student to be able to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.

A student must do research on an approved topic in consultation with the academic programme director for at least one year, in preparation of a full dissertation that shall be submitted as the only requirement for the degree. In certain circumstances, the academic programme director may require or allow additional subjects to be taken to fill a skills or knowledge gap.

This degree does not enable registration at the South African Council for Planners (SACPLAN).

COMPULSORY MAJOR MODULES		
Module code	**Course Long Title**	**Credits**
URMD8900	Dissertation	180

12.7.12MASTER OF URBAN AND REGIONAL PLANNING (MURP) BC470348

After completing the MURP Degree, the graduates will obtain a professional degree and will possess the following skills:

- The capacity to complete practical urban and regional planning projects including spatial frameworks, development plans and layouts,
- The capacity to analyse issues from a theoretical and/or empirical perspective and to recommend suitable alternatives,
- The capacity to communicate clearly and logically, write good planning and research reports, and debate these with stakeholders,
- The ability to critically evaluate information and theories and to apply relevant concepts from different disciplines in innovative approaches to planning issues.

The period of this study can be:

- Full Time 12 months,
- Part Time 24 months or
- Compact learning- block sessions 24 months presented as 4 - 5 workshop weeks per year.

Teaching in this program is primarily delivered through block weeks. The Academic Programme Director determines how the modules must be distributed over the years of study and in all degree programmes (Full time and Part time). The modules may be spread over an additional year if a student does not have the necessary academic background. Compact learning students must attend compulsory block weeks at the department for the duration of the programme at times as determined by the Academic Programme Director. During these block week lectures, tutorials, practicals and discussions will take place. Furthermore, block weeks may be used for tests and assignments.

Students that register as full time or part time may also be expected to attend some classes, sessions, guest lectures, field trips, site visits, tours, tests and examinations during the block weeks.

A minimum of 204 credits must be attained to pass the MURP (Professional) Degree programme, and all modules are compulsory.

After sufficient practical training, the graduate will be able to register as Urban and Regional Planner at the South African Council for Planners (SACPLAN), provided that they have also completed and passed the Bachelor of Spatial Planning Honours, and completed the practical training and any other requirements set by SACPLAN.

MODULE CODE	COURSE LONG TITLE	CREDITS
URGI7904	Geographic Information Systems for Planners	16
URPT7904	Research in Theory of Planning	16
URRP7906	Applied Regional Planning Project	24
URUP7906	Urban Research Project	24
URDP7912	Research proposal	8
URPP7924	Professional Practice in Urban and Regional Planning	16
URRM7914/URRM7924	Research Methodologies for Planners	16
URMD7900	Extended Research Essay	88

12.8 DOCTORAL DEGREES (NQF EXIT LEVEL 10)

12.8.1DOCTOR OF PHILOSOPHY (ARCHITECTURE) PHDARCH BC490014, BC490114

The aim of the Doctor of Philosophy in Architecture is to provide an opportunity to students to present extensive research, innovative research in design processes, techniques and tacit knowledge, and publications with a specific focus within the field of architecture. Two PhD programmes are offered by the Department of Architecture.

ARCHITECTURE	BC490014	ARCH9100	**ARCHITECTURE WITH DESIGN**	BC490114	ARCD9100
The Doctor of Philosophy (PhD (Architecture)) may be undertaken in a thesis mode, or thesis by publication mode.			The Doctor of Philosophy (PhD (Architecture with Design) is undertaken in thesis by project mode with design focus. The thesis by project mode includes original creative work, public exhibitions, and an exegesis as research requirements. The thesis by project mode is practice-based and/or design-led.		
After successfully completing the thesis, the PhD (Architecture) graduate would be able to: • do independent research on the highest international level by applying and implementing original and highly specialised knowledge of the area of architecture • produce a dissertation that place research within the broader context of the field and which will be recognised internationally as a significant contribution.			After successfully completing the thesis, the PhD (Architecture) graduate would be able to: • Do independent research on the highest international level by applying and implementing original and highly specialised knowledge of the creative processes of architectural design, and the design nature of architecture • Create o a portfolio of innovative architectural design processes, techniques and tacit knowledge demonstrating expertise, and o an exegesis on the creative processes, techniques and knowledge of architectural design.		

12.8.2. DOCTOR OF PHILOSOPHY (PHD)

This learning programme aims to:

(a) Provide the opportunity for students who have already obtain a NQF Exit Level 9 qualification and have contributed extensive publications of exceptional quality in the specific subject field or discipline over a considerable period of time.

(b) Enable the student to make an original contribution to the discipline.

The minimum term of this study is three years and a total of 360 credits is allocated for this degree. The student must do research for at least four semesters on an approved topic selected in consultation with the departmental chair in preparation to complete the thesis (360 credits). The degree study period therefore lasts three years. The student will present at least one seminar/research report in each year of study in accordance with departmental rules.

Students can register for a PhD with specialisation in one of the following areas:

DISCIPLINE	NEW CODE	MOD CODE	DISCIPLINE	NEW CODE	MOD CODE	DISCIPLINE	NEW CODE	MOD CODE
Actuarial Science	BC490010	ACST9100	Disaster Management	BC490025	DSMT9100	Limnology	BC490076	LIMG9100
Agricultural Economics	BC490011	AGEC9100	Entomology	BC490027	ENTO9100	Mathematical statistics	BC490037	STSM9100
Agricultural Management	BC490052	AGMA9100	Environmental Geology	BC490028	GLGE9100	Mathematics	BC490038	MATM9100
Agrometeorology	BC490012	CLIM9100	Environmental Management	BC490060	ENMT9100	Microbiology	BC490039	MCBT9100
Agrometeorology Interdisciplinary	BC490053	CLMI9100	Food Science	BC490029	FSCI9100	Microbial Biotechnology	BC490077	MBBT9100
Agronomy	BC490013	CROP9100	Food and Nutrition Security	BC490093	CFNS9100	Mineral Resource Management	BC490078	MRTM9100
Agronomy Interdisciplinary	BC490054	CROI9100	Forensic Chemistry	BC490065	FORC9100	Physics	BC490040	PHYS9100
Animal Science: Animal Breeding	BC490015	ANIB9100	Forensic Entomology	BC490066	FORE9100	Plant Breeding	BC490041	PLTB9100
Animal Nutrition	BC490015	ANIN9100	Forensic Genetics	BC490067	FORG9100	Plant Breeding Interdisciplinary	BC490081	PLTI9100
Animal Physiology	BC490015	ANIP9100	Forensic Interdisciplinary	BC490068	FORI9100	Plant Health Ecology	BC490082	PHEC9100
Animal Science	BC490015	ANIG9100	Forensics Sciences	BC490030	FORS9100	Plant Pathology	BC490042	PPLG9100
Animal Production Management	BC491015	ANIG9100	Genetics	BC490031	GENE9100	Plant Pathology Interdisciplinary	BC490083	PPLI9100
Applied Mathematics	BC490016	MATA9100	Genetics Interdisciplinary	BC490031	GENI9100	Polymer Science	BC490084	PLYS9100
Astrophysics	BC490017	PHYA9100	Geochemistry	BC490032	GECE9100	Property Science	BC490085	PROP9100
Behavioural Genetics	BC490018	GENB9100	Geography	BC490033	GEOR9100	Quantity Surveying	BC490043	DQFR9100
Biochemistry	BC490019	BOCD9100	Geohydrology	BC490034	GEHR9100	Risk Analysis	BC490087	RSAN9100
Botany	BC490020	BTNY9100	Geo-informatics	BC490069	GISC9100	Sustainable Agriculture	BC490047	SADR9100
Chemistry	BC490021	CHEM9100	Geology	BC490035	GLGY9100	Soil Science	BC490044	SOIL9100
Conservation Biology	BC490094	CONB9100	Grassland Science	BC490036	GRAS9100	Soil Science Interdisciplinary	BC490088	SOII9100
Computer Information Systems	BC490056	CSIS9100	Human Molecular Genetics	BC490031	GENH9100	Applied Statistics	BC490046	STSA9100
Computer Science and Informatics	BC490022	CSIS9100	Human Settlements	BC490071	URHS9100	Urban and Regional Planning	BC490048	URPD9100
Consumer Sciences	BC490023	CNCS9100	Integrated Water Management	BC490060	IWRM9100	Wildlife	BC490089	WILD9100
Construction Management	BC490024	PQMR9100	Irrigation Management	BC490072	IRRI9100	Wildlife Management	BC490090	WDMT9100
Data Science	BC490095	CSIS9100	Land Rehabilitation	BC490096	CMLR9100	Zoology	BC490049	ZLGY9100

12.8.3 DOCTOR OF SCIENCE (DSC)

These learning programmes aims to:

(a) Provide the opportunity for students who have already obtain a NQF Exit Level 10 qualification and have contributed extensive publications of exceptional quality in the specific subject field or discipline over a considerable period of time:

Students can register for a Doctoral degree with specialisation in one of the following areas:

DISCIPLINE	CODE	MOD CODE	DISCIPLINE	CODE	MOD CODE	DISCIPLINE	NEW CODE 2017	MOD CODE
Actuarial Science	BC490110	ACSG9100	Environmental Geology	BC490128	GLGE9100	Mathematical statistics	BC490137	STSM9000
Agrometeorology	BC490112	CLIM9100	Environmental Management	BC490160	ENMT9100	Mathematics	BC490138	MATM9100
Agrometeorology Interdisciplinary	BC490153	CLMI9100	Environmental Rehabilitation	BC490161	ENRH9100	Microbiology	BC490139	MCBT9100
Agronomy	BC490113	CROP9100	Food Science	BC490129	FSCI9100	Microbial Biotechnology	BC490177	MBBT9100
Agronomy Interdisciplinary	BC490154	CROI9100	Forensic Chemistry	BC490165	FORC9100	Physics	BC490140	PHYS9100
Animal Breeding	BC490115	ANIB9100	Forensic Entomology	BC490166	FORE9100	Plant Breeding	BC490141	PLTB9100
Animal Nutrition	BC490115	ANIN9100	Forensic Genetics	BC490167	FORG9100	Plant Breeding Interdisciplinary	BC490181	PLTI9100
Animal Physiology	BC490115	ANIP9100	Forensic Interdisciplinary	BC490168	FORI9100	Plant Health Ecology	BC490182	PHEC9100
Animal Science	BC490115	ANIG9100	Forensics Sciences	BC490130	FORS9100	Plant Pathology	BC490142	PPLG9100
Applied Mathematics	BC490116	MATA9100	Genetics	BC490131	GENE9100	Plant Pathology Interdisciplinary	BC490183	PPLI9100
Astrophysics	BC490117	PHYA9100	Genetics Interdisciplinary	BC490131	GENI9100	Polymer Sciences	BC490184	PLYS9100
Behavioural Genetics	BC490118	GENB9100	Geochemistry	BC490132	GECE9100	Property Science	BC490185	PROP9100
Biochemistry	BC490119	BOCD9100	Geography	BC490133	GEOH9100	Quantity Surveying	BC490143	DQFR9100
Botany	BC490120	BTNY9100	Geohydrology	BC490134	GEHR 9100	Soil Science	BC490144	SOIL9100
Chemistry	BC490121	CHEM9100	Geographical Information Systems	BC490160	GISC9100	Soil Science Interdisciplinary	BC490188	SOII9100
Computer Information Systems	BC490156	CSIS9100	Geology	BC490135	GLGY9100	Statistics	BC490146	STSA9100
Computer Science and Informatics	BC490122	CSIS9100	Grassland Science	BC490136	GRAS9100	Wildlife	BC490189	WILD9100
Consumer Sciences	BC490123	CNCS9100	Human Molecular Genetics	BC490131	GENH9100	Zoology	BC490149	ZLGY9100
Construction Management	BC490124	PQMR9100	Limnology	BC490176	LIMG9100			

13. LEARNING PROGRAMMES & MODULES REQUIRED FOR THE PROGRAMME QUALIFICATION MIX AT **QWAQWA CAMPUS**

13.1 LEARNING PROGRAMMES FOR EXTENDED PROGRAMMES

Candidates who do not comply with the Faculty of Natural and Agricultural Sciences entry requirements for main stream BSc studies can gain admission to the university through the BSc Extended programmes. The programmes provide students with an opportunity to improve their skills and competencies with aim of gaining access to mainstream studies after successful completion of the first year. These Programmes also address, through a course in Skills and Competencies in Lifelong Learning, the student's wider needs with regards to quality of personal life, study and reading skills, self-assertiveness, problem solving, and other generic competencies. These students also attend an academic language course in English to improve their reading and writing skills for higher education purposes. Students are not allow to register for UFSS1504 in the first year of study. Compulsory modules depend on the extended programme a student register for. Students have to consult academic advisors to determine the modules.

NO STUDENT WILL BE ALLOWED TO REPEAT IN THESE PROGRAMMES.

13.1.1 BSc FOUR-YEAR EXTENDED PROGRAMME | **13.1.2 BSC FOUR-YEAR QWAQWA CAMPUS**

All students in any of the selected extended programmes need to pass the developmental modules prescribed for these programmes. This include mainstream developmental modules MATD1544, MATD1534, MATD1564 and MATD1544, Students must also pass CHEM1552 if it is required in their programme. The skills developmental modules must be passed for students to proceed to the second year of study that include SCNS1508, CALN1508 and CSIQ1531. The rest of the required modules is included in the table below.

Developmental modules

13.1.1 BSc FOUR-YEAR EXTENDED PROGRAMME

Mathematics **Academic language course** **Life-long Learning – Natural Sciences** **Computer Literacy**		MATD1554 OR MATD1534 CALN1508 SCNC1508 CSIQ1531	MATD1564 OR MATD1544
Year	**Selected Extended Programme**	**Semester 1**	**Semester 2**
1	QC4310E1 - BACHELOR OF SCIENCE MAJORING IN BIOLOGICAL SCIENCES	CHEM1552 + CHEM1632 CHEM1501 BIOL1504	CHEM1622 + CHEM1562
	QC4330E1 - BACHELOR OF SCIENCE MAJORING IN CHEMICAL AND PHYSICAL SCIENCES	CHEM1552 + CHEM1632 CHEM1501 BIOL1504	CHEM1622 + CHEM1562
	QC4341E1 - BACHELOR OF SCIENCE MAJORING IN GEOGRAPHY	BIOL1504 GEOG1512	BIOL1504 GEOP1624

Students who fail MATD1554 will not be able to continue in the second semester. Students who do not pass all academic modules in the June examination could be academically excluded in June already, but they will be academically excluded in December. Some second semester modules have prerequisites and need to be adhere to:

- To register for CHEM1622 and CHEM1562 students must have passed CHEM1552, CHEM1632 and MATD1554 or MATD1534.
- To register for MATD1564 students must have passed MATD1554.
- To register for MATD1544 students must have passed MATD1534.
- To register for GEOP1624 students must have passed GEOG1512.

After the final end of the year examination students must have successfully complete ALL THE MODULES in the first year of the BSc Five-year Curriculum Programme with an average of 60 % for Academic modules and 50% for all the developmental modules, the student may proceed in the next academic year to register for remaining first year modules as required for the from Faculty's Rule Book for the main fields of study as chosen by the student. This includes the following fields:

- BIOLOGICAL SCIENCES Fields of study: QC432075; QC434975; QC437500.
- PHYSICAL AND CHEMICAL SCIENCES Fields of study: QC432140; QC432120.
- GEOSCIENCES Fields of study: QC433359; QC433333.

Students who could not complete and pass all the first year's modules required for their programme of choice after three years of registration will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.

13.1.2 BSC FOUR-YEAR QWAQWA CAMPUS

Mathematics **Academic language course** **Life-long Learning – Natural Sciences** **Computer Literacy**		MATD1554 OR MATD1534 CALN1508 SCNS1508 CSIQ1512	MATD1564 OR MATD1544
Year	**Selected Extended Programme**	**Semester 1**	**Semester 2**
1	QC4360E1 - BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY AND MANAGEMENT	CSIQ1533 CSIQ1553 EBCS1514	CSIQ1623 CSIQ1681 EBCS1524

Students who fail MATD1554 will not be able to continue in the second semester. Students who do not pass all academic modules in the June examination could be academically excluded in June already, but they will be academically excluded in December. Some second semester modules have prerequisites and need to be adhere to:

- To register for CHEM1622 and CHEM1562 students must have passed CHEM1552, CHEM1632 and MATD1554 or MATD1534.
- To register for MATD1564 students must have passed MATD1554.
- To register for MATD1544 students must have passed MATD1534.
- To register for GEOP1624 students must have passed GEOG1512.

After the final end of the year examination students must have successfully complete ALL THE MODULES in the first year of the BSc Five-year Curriculum Programme with an average of 60 % for Academic modules and 50% for all the developmental modules, the student may proceed in the next academic year to register for remaining first year modules as required for the from Faculty's Rule Book for the main fields of study as chosen by the student. This includes the following fields:

- BIOLOGICAL SCIENCES Fields of study: QC432075; QC434975; QC437500.
- PHYSICAL AND CHEMICAL SCIENCES Fields of study: QC432140; QC432120.
- GEOSCIENCES Fields of study: QC433359; QC433333.

Students who could not complete and pass all the first year's modules required for their programme of choice after three years of registration will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.

<table>
<tr><td>2</td><td colspan="3">In their second year of study students have to register for CHEM1661, CSIQ1541 and UFSS1522 as well as all the first-year main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book.
Students must take note of the following requirement:
• The modules CHEM1552 + CHEM1632 + CHEM1501 must be passed to get recognition for CHEM1513 + CHEM1501 and CHEM1622.
• CHEM1562, CHEM1501 and CHEM1661 + CHEM1622 + CHEM1562 must be passed to get recognition CHEM1623 / CHEM1643 + CHEM1661.
• To register for CHEM1661, students must have passed CHEM1501.
• UFSS1512 – Students who pass SCNS1508 or SCLL1508 will receive recognition for UFSS1512, which is the first semester of UFSS1504 but have to register for UFS1522. UFSS1512 + UFS1522 is equivalent to UFSS1504.</td><td>2</td><td>In their second year of study students have to register all the first-year main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book .
Students must take note of the following requirement:
• UFSS1512 – Students who pass SCNS1508 and SCLL1508 will receive recognition for UFSS1512, which is the first semester of UFSS1504 but have to register for UFS1522. UFSS1512 + UFS1522 is equivalent to UFSS1504.</td></tr>
<tr><td></td><td>BIOLOGICAL SCIENCES
QC4310E1</td><td>PHYSICAL AND CHEMICAL SCIENCES QC4330E1</td><td>GEOGRAPHY
QC4341E1</td><td></td><td>INFORMATION TECHNOLOGY AND COMPUTER SCIENCE
QC4360E1</td></tr>
<tr><td></td><td>BIOL1514
MATM1534
PHYS1534
GEOH1614
EBCS1514
BIOL1624
BIOL1644
CHEM1661
PHYS1644
GEOP1624
MATM1644
EBCS1524</td><td>MATM1534
BIOL1514
PHYS1514 OR PHYS1534
CSIQ1614
EBCS1514
CHEM1661
PHYS1624 OR PHYS1644
MATM1644
MATM1622
EBCS1524
CSIQ1623
CSIQ1624
BIOL1644
BIOL1624</td><td>MATM1534
GEOH1614
EBUS1514
BIOL1514
EBCS1524
GERS1624
BIOL1624
BIOL1644</td><td></td><td>MATM1534
CSIQ1614
PHYS1514 OR PHYS1534
CSIQ1624
CHEM1513 + CHEM1501
CHEM1623 + CHEM1661
CHEM1661
PHYS1624 OR PHYS1644
MATM1644
EIOP1524
EBUS1624</td></tr>
<tr><td>3</td><td colspan="3">Follow main fields of study second year BSc learning programme of choice as set out in the Faculty Rule Book.</td><td>3</td><td>Follow main fields of study second year BSc learning programme of choice as set out in the Faculty Rule Book.</td></tr>
<tr><td></td><td>BIOLOGICAL SCIENCES
QC4310E1</td><td>PHYSICAL AND CHEMICAL SCIENCES QC4330E1</td><td>GEOGRAPHY
QC4341E1</td><td></td><td>INFORMATION TECHNOLOGY AND COMPUTER SCIENCE
QC4360E1</td></tr>
<tr><td></td><td>BIOL2614
BOTA2654
BIOL2674
ZOOL2634
ZOOL2614
GERS2614</td><td>PHYS2614
PHYS2632
CHEM2613 + CHEM2601
CHEM2633 + CHEA2601
MATM2614
CSIQ2614
MATA2654
BOTA2654
BIOL2614
BIOL2674
PHYS2624
PHYS2642
CHEM2623+ CHEM2621
CHEM2643+ CHEM2641
MATM2624
MATM2664
BIOL2644
BOTA2684</td><td>GEOP2614
GEOH2614
GERS2614
BIOL2614
ZOOL2614
GEOP2624
GEOG2644
GERS2624
BIOL2644
BOTA2684
ZOOL2684</td><td></td><td>CSIQ2634
CSIQ2614
CSIQ2654
CHEM2613 + CHEM2601
CHEM2633 + CHEA2601
PHYS2614+ PHYS2632
EBUS1614
ECAP2614
EECF1614
CSIQ2644
CSIQ2624
CSIQ2642
CHEM2623+ CHEM2621
CHEM2643+ CHEM2641
PHYS2624 PHYS2642
EBMA2624
ELRM2624
EECF1624</td></tr>
</table>

4	Follow main fields of study third year BSc learning programme of choice as set out in the Faculty Rule Book. Students need to obtain at least 120 credits at NQF level 7 and have at least 60 credits in one of the major fields of specialization.			**4**	Follow main fields of study third year BSc learning programme of choice as set out in the Faculty Rule Book. Students need to obtain at least 120 credits at NQF level 7 and have at least 60 credits in one of the major fields of specialization.
	BIOLOGICAL SCIENCES QC4310E1	**PHYSICAL AND CHEMICAL SCIENCES** QC4330E1	**GEOGRAPHY** QC4341E2		**INFORMATION TECHNOLOGY AND COMPUTER SCIENCE** QC4360E1
	BIOL3714 BOTA3734 BOTA3754 ZOOL3714 ZOOL3734 BIOL3724 BOTA3724 BOTA3744 GERS3724 ZOOL3744 ZOOL3724 ZOOL3784 ZOOL3764	CHEM3713 + CHEM3701 CHEM3733 + CHEB3701 PHYS3714 PHYS3732 PHYS3752 BOTA3734 BOTA3754 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741 PHYS3724 PHYS3742 PHYS3762 BOTA3744 BOTA3724	GEOP3714 GEOH3714 GEOG3702 GEOG3704 EBUS2714 BIOL3714 BOTA3754 ZOOL3754 GERS3714 GEOP3724 BOTA3744 BOTA3724 ZOOL3724 GERS3724 GEOH3724		CSIQ3734 CSIQ3714 CHEM3713 + CHEM3701 CHEM3733 + CHEB3701 PHYS3714 PHYS3732 PHYS3752 EBUS2714 EORG3715 CSIQ3724 CSIQ3784 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741 PHYS3724 PHYS3742 PHYS3762 ESBM2724 EPFM3724

13.1.2 BACHELOR OF SUSTAINABLE FOOD SYSTEMS FOUR YEAR QWAQWA CAMPUS - QC4371E2 *(Not presented in 2024)*			
Year		**Semester 1**	**Semester 2**
1	Agricultural Economics Biological principles in Agriculture Introduction to Animal Wildlife and Grassland Sciences	AGEC1514 AGRI1514	AGEC1624 ANIG1624
	Academic language skills course English or Afrikaans	CALN1508	
	Computer Literacy Life-long Learning – Natural Sciences	CSIQ1531 SCNS1508	
	Mathematical Literacy in Agriculture	MTDA1508	
	Students who do not pass all academic modules in the June examination could be academically excluded in June already but they will be academically excluded in December. Some second semester modules have prerequisites and need to be adhere to • To register for AGEC1624 students must have passed AGEC1514. After the final end of the year examination students must have successfully complete of ALL THE MODULES in the first year of the BSc Five-year Curriculum Programme with an average of 60 % for Academic modules and 50% for all the developmental modules, the student may proceed in the next academic year to register for remaining first year modules as required from Faculty's Rule Book for the main fields of study as chosen by the student, This include the following fields • Agricultural Economics, • Agricultural Extension, • Agricultural Management, • Animal Production, • Management, Crop Production Management, • Irrigation Management, • Mixed Farming Management, • Agricultural Economics. (NCS Mathematics level 4 is required) Students who could not complete and pass all the first year's modules required for their programme of choice after three years of registration will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences		
2	In their <u>second year</u> of study students have to register all the <u>first year</u> main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book. Students must take note of the following requirement: • CSIL1501 to get recognition for CSIL1511 UFSS1512 – Students who pass SCNS1508 and SCLL1508 will receive recognition for UFSS1512, which is the first semester of UFSS1504 but have to register for UFS1522. UFSS1512 + UFS1522 is equivalent to UFSS1504.		
3	Follow main fields of study <u>second year</u> BSc Agriculture learning programme of choice as set out in the Faculty Rule Book.		
4	Follow main fields of study <u>third year</u> BSc Agriculture learning programme of choice as set out in the Faculty Rule Book.		

13.1.3 B AGRICULTURE FOUR-YEAR QWAQWA CAMPUS - QC5300E1 *(Not presented in 2024)*			
Year		**Semester 1**	**Semester 2**
1	Agricultural Economics Biological principles in Agriculture Introduction to Animal Wildlife and Grassland Sciences	AGEC1514 AGRI1514	AGEC1624 ANIG1624
	Academic language skills course English or Afrikaans	CALN1508	
	Computer Literacy Life-long Learning – Natural Sciences	CSIQ1501 SCNS1508	
	Mathematical Literacy in Agriculture	MTDA1508	
	Students who do not pass all academic modules in the June examination could be academically excluded in June already but they will be academically excluded in December. Some second semester modules have prerequisites and need to be adhere to • To register for AGEC1624 students must have passed AGEC1514. After the final end of the year examination students must have successfully complete of ALL THE MODULES in the first year of the BSc Five-year Curriculum Programme with an average of 60 % for Academic modules and 50% for all the developmental modules, the student may proceed in the next academic year to register for remaining first year modules as required from Faculty's Rule Book for the main fields of study as chosen by the student, This include the following fields • Agricultural Economics, • Agricultural Extension, • Agricultural Management, • Animal Production, • Management, Crop Production Management, • Irrigation Management, • Mixed Farming Management, • Agricultural Economics. (NCS Mathematics level 4 is required) Students who could not complete and pass all the first year's modules required for their programme of choice after three years of registration will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences		
2	In their <u>second year</u> of study students have to register all the <u>first year</u> main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book. Students must take note of the following requirement: • CSIL1501 to get recognition for CSIL1511 UFSS1512 – Students who pass SCNS1508 and SCLL1508 will receive recognition for UFSS1512, which is the first semester of UFSS1504 but have to register for UFS1522. UFSS1512 + UFS1522 is equivalent to UFSS1504.		
3	Follow main fields of study <u>second year</u> BSc Agriculture learning programme of choice as set out in the Faculty Rule Book.		
4	Follow main fields of study <u>third year</u> BSc Agriculture learning programme of choice as set out in the Faculty Rule Book.		

13.2 LEARNING PROGRAMMES FOR BACHELOR DEGREES

13.2.1 BACHELOR OF SCIENCE IN THE BIOLOGICAL SCIENCES

LEARNING PROGRAMMES BIOLOGICAL SCIENCES FIELDS OF INTEREST 1

Learning programmes in the BIOLOGICAL FIELD OF INTEREST offer FOUR OPTIONS. Learning programmes consist of the combination of modules from the following disciplines: Botany, Zoology and Life Sciences. A combination of Life Sciences and all third year modules from either Botany, Entomology or Zoology as the other major. Students include all the compulsory modules in row (C1, C2, C3) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester to obtain at least a total of 120 credits.

DISCIPLINE	**BOTANY & LIFE SCIENCES**	**ZOOLOGY & LIFE SCIENCES**	**LIFE SCIENCES**	**BOTANY & LIFE SCIENCES**	**ZOOLOGY & LIFE SCIENCES**	**LIFE SCIENCES**
	QC432075	**QC434975**	**QC437500**	**QC432075**	**QC434975**	**QC437500**
YEAR	**FIRST**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY **C1**	BIOL1514 CHEM1501 + CHEM1513 MATM1534	BIOL1514 CHEM1501 + CHEM1513 MATM1534	BIOL1514 CHEM1501 + CHEM1513 MATM1534	BIOL1624 BIOL1644 CHEM1623 + CHEM1661	BIOL1624 BIOL1644 CHEM1623 + CHEM1661	BIOL1624 BIOL1644 CHEM1623 + CHEM1661
ELECTIVES **E1**	PHYS1534 GEOH1614 EBCS1514	PHYS1534 GEOH1614 EBCS1514	PHYS1534 GEOH1614 EBCS1514	PHYS1644 GEOP1624 MATM1644 EBCS1524	PHYS1644 GEOP1624 MATM1644 EBCS1524	PHYS1644 GEOP1624 MATM1644 EBCS1524
REQUIRED ***If not proficient with UFS language test**	CSIQ1531 UFSS1504 *CALN1508	CSIQ1531 UFSS1504 *CALN1508	CSIQ1531 UFSS1504 *CALN1508	CSIQ1541	CSIQ1541	CSIQ1541
YEAR	**SECOND**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY **C2**	BIOL2614 BOTA2654 BIOL2674	BIOL2614 ZOOL2634 BIOL2674 ZOOL2614	BIOL2614 BIOL2674 GERS2614	BOTA2684 BIOL2644	BIOL2644 ZOOL2664 ZOOL2684	BIOL2644 GERS2624 BOTA2684 ZOOL2684
ELECTIVES **E2**	<u>ONE OF:</u> ZOOL2634 ZOOL2614 GERS2614		<u>ONE OF:</u> BOTA2654 ZOOL2614	<u>TWO OF:</u> GERS2624 ZOOL2664 ZOOL2684	<u>ONE OF:</u> BOTA2684 GERS2624	
YEAR	**THIRD**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY **C3**	BIOL3714 BOTA3734 BOTA3754	BIOL3714 ZOOL3714 BOTA3754 ZOOL3734	BIOL3714 ZOOL3714	BIOL3724 BOTA3724 BOTA3744	ZOOL3744 ZOOL3724 BIOL3724 ZOOL3784	BIOL3724 BOTA3744 GISS3724 ZOOL3744
ELECTIVES **E3**	<u>ONE OF:</u> ZOOL3714 ZOOL3734		<u>TWO OF:</u> BOTA3734 BOTA3754 ZOOL3734	<u>ONE OF:</u> GERS3724 ZOOL3744 ZOOL3724 ZOOL3784		

If students select BOTA2654, they need to continue with BOTA3734 and BOTA3754 in the third year. If students select ZOOL2614, they need to continue with ZOOL3734 and BOTA3754.

13.2.2 BACHELOR OF SCIENCE IN THE CHEMICAL AND PHYSICAL SCIENCES

LEARNING PROGRAMMES PHYSICAL AND CHEMICAL SCIENCES FIELDS OF INTEREST 1

Learning programmes in Chemical and Physical sciences offer TWO main options with either

- Physic and Chemistry as the two majors or
- Chemistry in combination Biological Subjects as the other majors.

Each student Includes all the compulsory modules (row C) for all three study years enough electives modules (row E) per semester to obtain at least 120 credits per year in the first year and the second year.

DISCIPLINE	PHYSICS & CHEMISTRY	CHEMISTRY & BOTANY	PHYSICS & CHEMISTRY	CHEMISTRY & BOTANY
	QC432140	QC432120	QC432140	QC432120
YEAR	FIRST			
SEMESTER	FIRST		SECOND	
COMPULSORY C1	PHYS1514/PHYS1534 CHEM1501 + CHEM1513	CHEM1501 + CHEM1513 BIOL1514	PHYS1624/PHYS1644 CHEM1623 + CHEM1661	CHEM1661 + CHEM1623 BIOL1644 BIOL1624
	MATM1534	MATM1534	MATM1644	MATM1644
ELECTIVES E1	CSIQ1614 CSIQ1553 EBCS1514	PHYS1514/PHYS1534 CSIQ1614 CSIQ1553 EBCS1514	CSIQ1623 CSIQ1624 MATM1622 EBCS1524	MATM1622 EBCS1524
REQUIRED If not proficient with UFS language test	CSIQ1531 UFSS1504, *CALN1508		CSIQ1541	
YEAR	SECOND			
SEMESTER	FIRST		SECOND	
COMPULSORY C2	PHYS2614 PHYS2632 CHEM2633 + CHEA2601 CHEM2613 + CHEM2601	CHEM2633 + CHEA2601 CHEM2613 + CHEM2601 BOTA2654	PHYS2624 PHYS2644 CHEM2643 + CHEM2641 CHEM2623 + CHEM2621	CHEM2643 + CHEM2641 CHEM2623 + CHEM2621 BIOL2644 BOTA2684
ELECTIVES E2	MATM2614 CSIQ2614 MATA2654	<u>ONE OF:</u> MATA2654 MATM2614 BIOL2614 BIOL2674	MATM2624 MATM2664	MATM2624 MATM2664
YEAR	THIRD			
SEMESTER	FIRST		SECOND	
COMPULSORY C3	PHYS3714 PHYS3732 PHYS3752 CHEM3701+ CHEM3713 CHEB3701 + CHEM3733	CHEM3701+ CHEM3713 CHEB3701 + CHEM3733 BOTA3734 + BOTA3754	PHYS3724 PHYS3742 PHYS3762 CHEM3721 + CHEM3723 CHEM3741 + CHEM3743	CHEM3721 + CHEM3723 CHEM3741 + CHEM3743 BOTA3744 + BOTA3724
ELECTIVES E3				

PLEASE NOTE: (CHEM1562 + CHEM1552 + CHEM1622 + CHEM1632 + CHEM1501 + CHEM1661) extended = (CHEM1513 + CHEM1623 + CHEM1501 + CHEM1661) mainstream.
Admission to second and third-year chemistry is subject to a selection process as only the 70 best students can be accommodated

13.2.3 LEARNING PROGRAMMES IN THE INFORMATION TECHNOLOGY STREAM QC433359, QC433333

LEARNING PROGRAMMES IN INFORMATION TECHNOLOGY BSc(IT)

Learning programmes in Information Technology offer THREE main options with either

- Information Technology and Chemistry as the majors
- Information Technology and Physics as the majors
- Information Technology and Business subjects as the majors

Students include all the compulsory modules in row C1 and C2 of each discipline for all three study years. They need to SELECT enough elective modules per semester to obtain at least 120 credits per year in the first year and the second year.

DISCIPLINE	INFORMATION TECHNOLOGY & CHEMISTRY	INFORMATION TECHNOLOGY & PHYSICS	INFORMATION TECHNOLOGY & MANAGEMENT	INFORMATION TECHNOLOGY & CHEMISTRY	INFORMATION TECHNOLOGY & PHYSICS	INFORMATION TECHNOLOGY & MANAGEMENT
EXT CODE	QC432221	QC432240	QC432202	QC432221	QC432240	QC432202
YEAR	**FIRST**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	CSIQ1614 CSIQ1553 CHEM1501 + CHEM1513 MATM1534	CSIQ1614 CSIQ1553 PHYS1514/PHYS1534 MATM1534	CSIQ1614 CSIQ1553 EBUS1514	CSIQ1623 CSIQ1624 CHEM1661 + CHEM1623 MATM1644	CSIQ1623 CSIQ1624 PHYS1624/PHYS1644 MATM1644	CSIQ1623 CSIQ1624 <u>ONE OF:</u> EIOP1524 EBUS1624
COMPULSORY C2			<u>ONE OF:</u> EBCS1514 MATM1534			<u>ONE OF:</u> EBCS1524 MATM1644
ELECTIVES	EBCS1514	EBCS1514		EBCS1524	EBCS1524	
REQUIRED *If not proficient with UFS language test	UFSS1504 CALN1508 CSIQ1512	UFSS1504 CALN1508 CSIQ1512	UFSS1504 CALN1508 CSIQ1512			
YEAR	**SECOND**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	CSIQ2634 CSIQ2614 CSIQ2654 CHEM2613 + CHEM2601 CHEM2633 + CHEA2601	CSIQ2634 CSIQ2654 CSIQ2614 PHYS2614 PHYS2632	CSIQ2634 CSIQ2654 CSIQ2614 EBUS1614	CSIQ2644 CSIQ2624 CHEM2623 + CHEM2621 CHEM2643 + CHEM2641	CSIQ2644 CSIQ2624 PHYS2624 PHYS2644	CSIQ2644 CSIQ2624 EBMA2624
C2			<u>ONE OF:</u> ECAP2614 EECF1614			<u>ONE OF:</u> ELRM2624 EECF1624
ELECTIVE				CSIQ2642	CSIQ2642	CSIQ2642
YEAR	**THIRD**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	CSIQ3734 CSIQ3714 CHEM3713 + CHEM3701 CHEM3733 + CHEB3701	CSIQ3734 CSIQ3714 PHYS3714 PHYS3732 PHYS3752	CSIQ3734 CSIQ3714 EBUS2714 EORG3715	CSIQ3724 CSIQ3784 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741	CSIQ3724 CSIQ3784 PHYS3724 PHYS3742 PHYS3762	CSIQ3724 CSIQ3784 ESBM2724 EPFM3724

13.2.4 BACHELOR OF SCIENCE IN GEOSCIENCES

The learning programmes in **GEOGRAPHICAL FIELD OF INTEREST** offer **THREE OPTIONS**, Environmental Geography, Geography and Life Science and Geography Specialisation. This programme include the studiy of the properties and processes in the earth and on the surface and encompass a holistic study of the human environment and accompanying interactions and relationships. The programme is aimed at students who are interested in various aspects of the environment and can lead to specialisation as environmentalists. Careers in these sciences are divergent because all institutions that are involved with resource utilisation are legally obliged to examine the impact of their activities on the environment. The connection of geographical information and computer technology simplifies the storage, processing, modelling and presentation of information and expedites decision making.

Each student includes all the compulsory modules (rows C) for all three study years and choose modules as supportive electives (E) per semester to obtain at least 120 credits for each year of study.

DISCIPLINE	**ENVIRONMENTAL GEOGRAPHY**	**GEOGRAPHY SPECIALISATION**	**ENVIRONMENTAL GEOGRAPHY**	**GEOGRAPHY SPECIALISATION**
CODE	**QC433359**	**QC433333**	**QC433359**	**QC433333**
YEAR	**FIRST**			
SEMESTER	**FIRST**		**SECOND**	
COMPULSORY C1	GEOH1614 GEOG1512 EBUS1514 BIOL1514 MATM1534	GEOH1614 GEOG1512 EBUS1514 BIOL1514 MATM1534	GEOP1624 EBCS1524 GERS1624 <u>ONE OF:</u> BIOL1624 BIOL1644	GEOP1624 EBCS1524 GERS1624 <u>ONE OF:</u> BIOL1624 BIOL1644
REQUIRED *If not proficient with UFS language test	CSIQ1531 UFSS1504 *CALN1508	CSIQ1531 UFSS1504 *CALN1508	CSIQ1541	CSIQ1541
YEAR	**SECOND**			
SEMESTER	**FIRST**		**SECOND**	
COMPULSORY C2	GEOP2614 GEOH2614 GERS2614 <u>ONE OF:</u> BIOL2614 ZOOL2614	GEOP2614 GEOH2614 GERS2614 <u>ONE OF:</u> BIOL2614 ZOOL2614	GEOP2624 GEOG2644 GERS2624 <u>ONE OF:</u> BIOL2644 BOTA2684 ZOOL2684	GEOP2624 GEOG2644 GERS2624 <u>ONE OF:</u> BIOL2644 BOTA2684 ZOOL2684
YEAR	**THIRD**			
SEMESTER	**FIRST**		**SECOND**	
COMPULSORY C3	GEOP3714 GEOH3714 GEOG3702 GEOG3704 EBUS2714 <u>ONE OF:</u> BIOL3714 BOTA3754 ZOOL3754	GEOP3714 GEOH3714 GEOG3702 GEOG3704 GERS3714	GEOP3724 <u>ONE OF:</u> BOTA3744 BOTA3724 ZOOL3724	GEOH3724, GEOP3724, GERS3724

13.2.5 BACHELOR OF SCIENCE IN THE MATHEMATICAL SCIENCES QC433840, QC433821, QC433822

(Students in their first of second year of study who want to transfer to this programme and have all required modules can transfer).

LEARNING PROGRAMMES MATHEMATICAL SCIENCES FIELDS OF INTEREST 1

Learning programmes in Mathematical sciences offer THREE main options with either Mathematics and Physic or Chemistry OR Computer Science as the three majors or each student Includes all the compulsory modules (row C) for all three study years enough electives modules (row E) per semester to obtain at least 120 credits per year in the first year and the second year.

DISCIPLINE	MATHEMATICS AND PHYSICS	MATHEMATICS & CHEMISTRY	MATHEMATICS & COMPUTER SCIENCE	MATHEMATICS AND PHYSICS	MATHEMATICS & CHEMISTRY	MATHEMATICS & COMPUTER SCIENCE
CODE	**QC433840**	**QC433821**	**QC433822**	**QC433840**	**QC433821**	**QC433822**
YEAR	**FIRST**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	MATM1534 PHYS1514/PHYS1534	MATM1534 CHEM1501 + CHEM1513	MATM1534 CSIQ1614 CSIQ1553	MATM1622 MATM1644 PHYS1624	MATM1622 MATM1644 CHEM1623 + CHEM1661	MATM1622 MATM1644 CSIQ1624 CSIQ1623
ELECTIVES E1	CSIQ1614 CSIQ1553 CHEM1501+CHEM1513	CSIQ1614 CSIQ1553 PHYS1514/PHYS1534	CHEM1501+CHEM1513 PHYS1514	CHEM1623 + CHEM1661 CSIQ1624 CSIQ1623	PHYS1624 CSIQ1624 CSIQ1623	PHYS1624 CHEM1623 + CHEM1661
REQUIRED *If not proficient with UFS language test	CSIQ1531 UFSS1504 *CALN1508			CSIQ1541		
YEAR	**SECOND**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C2	MATA2654 MATM2614 PHYS2614 PHYS2632	MATA2654 MATM2614 CHEM2633 + CHEM2631/CHEA2601 CHEM2613 + CHEM2601	MATA2654 MATM2614 CSIQ2634 CSIQ2654 CSIQ2614	MATM2624 MATM2664 PHYS2624 PHYS2644	MATM2624 MATM2664 CHEM2623 + CHEM2621 CHEM2643 + CHEM2641	MATM2624 MATM2664 CSIQ2644 CSIQ2624
ELECTIVES E2	CSIQ2634 CSIQ2654 CSIQ2614 CHEM2633 + CHEA2601 CHEM2613 + CHEM2601	CSIQ2634 CSIQ2654 CSIQ2614 PHYS2614 PHYS2632	CHEM2633 + CHEA2601 CHEM2613 + CHEM2601 PHYS2614 PHYS2632			
	Students who opt to take Mathematical NQF7 modules (MATM3714, MATM3724, MATM3734, MATM3744) will have to transfer to Bloemfontein campus, as these are no longer presented on Qwaqwa Campus.					
YEAR	**THIRD**					
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C3	MATM3714 MATM3734 PHYS3714 PHYS3732 PHYS3752	MATM3714 MATM3734 CHEM3713 + CHEM3701 CHEM3733 + CHEM3731/CHEB3701	MATM3714 MATM3734 CSIQ3714 CSIQ3734	MATM3724 MATM3744 PHYS3724 PHYS3742 PHYS3762	MATM3724 MATM3744 CHEM3723 + CHEM3721 CHEM3743 + CHEM3741	MATM3724 MATM3744 CSIQ3724 CSIQ3784

13.3 BACHELOR OF SCIENCE HONOURS

HONOURS LEARNING PROGRAMMES

Students register for all compulsory modules plus enough other to obtain at least 120 credits

DISCIPLINE	BOTANY	ZOOLOGY	PHYSICS	POLYMER SCIENCE	COMPUTER SCIENCE
NEW CODE	QC460020	QC460049	QC460040	QC460084	QC460022
FIRST & SECOND SEMESTER					
COMPULSORY	BOTA6808 BIOL6814 BIOL6834 BIOL6824	ZOOL6808 BIOL6814 BIOL6834 BIOL6824	PHYS6808	CMPR6808 CMPO6814 CMPP6814 CMPR6814 CMPA6814 CMPA6824 CMPB6824 CMPC6824	CSIS 6813 CSII 6833 CSIQ 6809 CSIQ 6863 CSIC 6853 CSIQ 6823 CSIQ 6843 CSIP 6833
ELECTIVES	**THREE OF:** BOTA6814 BOTA6824 BOTA6844 BOTA6864 ZOOL6804 Any other 16 credit Honours module approved by the Programme Director	**THREE OF:** ZOOL6814 ZOOL6854 ZOOL6824 ZOOL6834 ZOOL6844 Any other 16 credit Honours module approved by the Programme Director	PHYS6814 PHYS6834 PHYE6824 PHYE6844 PHYI6834 PHYI6874 PHYR6814 PHYI6864 PHYS6844		

DISCIPLINE	GEOGRAPHY	GEO-INFORMATICS	ENVIRONMENTAL GEOGRAPHY
CODE	QC460033	QC460069	QC460062 Not presented in 2025
SEMESTER	**FIRST**		
COMPULSORY	GEOF6816 GEOR6808 GEOP6816	GEOF6816 GEOR6808 GISC6816	GEOR6808 GEOF6816 ENVG6816
ELECTIVES	GISC6816 GEOH6836 ENVG6816		GEOH6836 GEOP6816 GISC6816
SEMESTER	**SECOND**		
COMPULSORY	BIOG6826	GISR6826	ENVG6846
ELECTIVES	ENVG6846 GISR6826 GEOH6826	BIOG6826 ENVG6846 GEOH6826	GISR6826 BIOG6826 GEOH6826

13.4 MASTER OF SCIENCES

These learning programmes aim at:

(a) providing the candidate with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate evaluation of his/her own results and that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny.

(b) developing the candidate in order to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.

The minimum term of this study is 2 years and a total of 180 credits are allocated for this degree. The candidate may do a research Masters programme with a full dissertation or a structured Masters programme depending on the discipline in which they want to register. In cases where an MSc degree consists only of a dissertation the programme code will start with 471 and in the case where the MSc degree consists of both course work and research the programme code will start with 472.

- If the full dissertation option is followed the candidate must do research on an approved topic for at least two semesters, in consultation with the Departmental Chairperson, in preparation for a dissertation that shall be submitted as the only requirement for the degree. Candidates may be required to present at least one seminar/research report in each year in accordance with departmental rules.
- If the structured Master programme is all prescribed modules, a compulsory research essay must be completed. The topic for the research must be determined in consultation with the Departmental Chairperson. Candidates may be required to present at least one seminar/research report.

RESEARCH MASTERS								
YEAR 1 + 2								
Botany	QC480020	BOTA8900	**Physics**	QC480040	PHYS8900	**Environmental Geography**	QC480059	GEOG8900
Chemistry	QC480021	CHEM8900	**Polymer Sciences**	QC480084	PLYS8900	**Zoology**	QC480049	ZOOL8900
Computer Science	QC480022	CSIQ8900	**Geography**	QC480033	GEOG8900	**Geo-informatics**	QC480069	GISC8900

13.5 DOCTOR OF SCIENCES DEGREES (NQF LEVEL 10)

13.5.1 DOCTOR OF PHILOSOPHY (PHD) 49119, 49140, 49149

These learning programmes aim at:

(a) providing the candidate with the opportunity to prove her/his ability to plan and do research independently and to report the results;

(b) enabling the candidate to make an original contribution to the discipline.

The minimum term of this study is 3 years and a total of 360 credits are allocated for this degree. The candidate must do research for at least four semesters on an approved topic selected in consultation with the Departmental Chairperson in preparation to complete the thesis (360 credits). The degree study therefore lasts three years. The candidate will present at least one seminar/research report in each year of study in accordance with departmental regulations.

Candidates can register for a PhD with specialisation in one of the following area:

BOTA9100	**Botany**	QC490020	PHYS9100	**Physics**	QC490040	GEOG9100	**Environmental Geography**	QC490059
CHEM9100	**Chemistry**	QC490021	PLYS9100	**Polymer Sciences**	QC490084	MATM9100	**Mathematics**	QC490038
CSIQ9100	**Computer Science**	QC490022	GEOG9100	**Geography**	QC490033	ZOOL9100	**Zoology**	QC490049
GISC9100	Geographical Information Systems	QC490069						

14. MODULE CONTENT FOR UNDERGRADUATE AND POSTGRADUATE MODULES ALPHABETICALLY PER ACADEMIC DEPARTMENT (ACAD ORG)

ABBREVIATION AND NUMBERING SYSTEM

Important information of each module that form part of the qualification presented in the faculty are presented in the following two set of tables.

14.1 TABLE 1A: **PREREQUISITE TABLE**

Year	Career	Session	Course ID	Module code	Course Title	Academic organisation	Campus	Location	Credits	Prerequisites
This indicate if the module can be registered for.	This indicate if the module is undergraduate or postgraduate.	This indicate if it is a first semester S1, second semester S2 or a year YR module.	This indicate a unique identification number for administrative purposes	First digit: the year of study in which the module is presented. Second digit: NQF level Third digit: the semester odd first even second Fourth digit multiply by 4 to indicate the credits	This indicate the name of the module	This indicate the Academic Department to which this module belongs.	This indicate if the course is link to qualification registered at Bloemfontein, QwaQwa or South campus.	Physical location of presentation	Number of credits	The requirement to register for this module

TABLE 1B: CONTENTS ORGANISED PER ACADEMIC DEPARTMENT

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
OFFICE OF THE DEAN (98)										
UGRD	S1	023969	BLGY	1513	Introduction to Biology	098	MAIN	BFN	12	BLGY1513: NSC Life Science Level 5
UGRD	YR	025479	CLNS	3702	Natural Science Education Community Service Learning	098	MAIN	BFN	8	None
UGRD	YR	025830	MATD	1400	Introduction to Mathematics	098	MAIN	BFN	48	MATD1400: Student must have passed NSC Mathematics on performance level 2 or Mathematical Literacy level 5 in order to continue with this module.
UGRD	S2	023978	MATD	1544	Introduction to University Mathematics	098	MAIN	BFN	16	MATD1544: MATD1534
UGRD	YR	022686	MTDA	1508	Mathematics Literacy in Agriculture	098	MAIN	BFN	32	None
UGRD	YR	021245	MTDE	1508	Mathematical Literacy for Business Study	098	MAIN	BFN	32	None
UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	MAIN	BFN	32	None
UGRD	YR	021247	MTDL	1508	Mathematical Literacy for Law Students	098	MAIN	BFN	32	None
UGRD	S1	026031	QALC	1513	Academic Literacy, Language and Communication	098	MAIN	BFN	12	None
UGRD	S2	023965	QCIV	3624	Civil Engineering	098	MAIN	BFN	16	None
UGRD	S1	026186	QCLO	3714	Computer Logic	098	MAIN	BFN	16	QCLO3714; Student must have passed QELT2723 in order to continue with module.
UGRD	S2	023946	QEDR	1524	Engineering Drawings	098	MAIN	BFN	16	None
UGRD	S2	023947	QEFO	1520	Engineering Forum	098	MAIN	BFN	0	none
UGRD	S2	026922	QELT	2723	Electrotechnique	098	MAIN	BFN	12	QELT2723: Co-requisite: PHYS2624 and PHYS2644 must be registered simultaneously.
UGRD	S2	023936	QENV	3724	Holistic Engineering Design	098	MAIN	BFN	16	QENV3724: Student must have passed QSTR2624 in order to continue with module.
UGRD	S2	023949	QFLO	3714	Fluid Mechanics	098	MAIN	BFN	16	QFLO3714: Student must have passed PHYS2614 in order to continue with module.
UGRD	S2	027033	QMAD	3623	Machine Design	098	MAIN	BFN	12	QMAD3623: Student must have passed QSTR2624 or must have obtained a minimum of 45% semester mark to continue with module.
UGRD	S1	023951	QMAT	2613	Engineering Materials	098	MAIN	BFN	12	None
UGRD	S2	023913	QMPR	3724	Microprocessors	098	MAIN	BFN	16	QMPR3724; Student must have passed QCLO3714 in order to continue with module.
UGRD	S1	023952	QMSC	2613	Material Science	098	MAIN	BFN	12	None
UGRD	S2	023953	QPOW	3724	Electrical Power Systems	098	MAIN	BFN	16	QPOW3724 : Student must have passed QELT2723 and QSIG3714 in order to continue with module.
UGRD	S1	023954	QSIG	3714	Signal Theory	098	MAIN	BFN	16	QSIG3714: Student must have passed QELT2723 or must have obtained a minimum of 45% semester mark in order to continue with module.
UGRD	S1	027176	QSTR	2624	Strength of Materials I	098	MAIN	BFN	16	QSTR2624: Student must have passed PHYS1514 and MATM1534 and MATA1684 (or must have obtained a minimum of 45% semester mark) in order to continue with module.
UGRD	S1	023963	QSTR	3714	Strength of Materials II	098	MAIN	BFN	16	QSTR3714: Student must have passed QSTR2624 or must have obtained a minimum of 45% semester mark to continue with module.
UGRD	S2	023964	QSTR	3724	Strength of Materials III	098	MAIN	BFN	16	QSTR3724: Student must have passed QSTR2624 in order to continue with module.
UGRD	S2	023966	QTHE	3724	Engineering Thermodynamics	098	MAIN	BFN	16	QTHE3724: Student must have passed PHYS2614 in order to continue with module.
UGRD	S2	027312	QVAC	3520	Practical Engineering Experience	098	MAIN	BFN	0	None
UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	MAIN	BFN	32	None
UGRD	YR	021245	MTDE	1508	Mathematical Literacy for Business Study	098	MAIN	OUDTSHOORN	32	None
UGRD	S1	024678	BIOL	2674	Biostatistics	098	QWA	QWAQWA	16	None
UGRD	S1	023977	MATD	1534	Introduction to University Mathematics 1	098	QWA	QWAQWA	16	MATD1534: Student must have passed NSC Mathematics on performance level 4 in order to continue with this module.

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
UGRD	S1	020151	MATD	1554	Basic Mathematics	098	QWA	QWAQWA	16	MATD1554: Student must have passed NSC Mathematics on performance level 3 in order to continue with this module.
UGRD	S2	025831	MATD	1564	Introduction to University Mathematics 1	098	QWA	QWAQWA	16	MATD1564: Student must have passed NSC Mathematics on performance level 4 in order to continue with this module.
UGRD	S2	025832	MATD	1584	Mathematics for Ems	098	QWA	QWAQWA	16	MATD1584: Student must have passed MATD1554
UGRD	YR	022686	MTDA	1508	Mathematics Literacy in Agriculture	098	QWA	QWAQWA	32	None
UGRD	YR	021245	MTDE	1508	Mathematical Literacy for Business Study	098	QWA	QWAQWA	32	None
UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	QWA	QWAQWA	32	None
UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	QWA	QWAQWA	32	None
UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	BETHLEHEM	32	None
UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	MOTHEO	16	MATD1554: Student must have passed NSC Mathematics on performance level 3 in order to continue with this module.
UGRD	S2	025832	MATD	1584	Mathematics for Ems	098	SOUTH	MOTHEO	16	MATD1584: Student must have passed MATD1554
UGRD	YR	021245	MTDE	1508	Mathematical Literacy for Business Study	098	SOUTH	MOTHEO	32	None
UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	OUDTSHOORN	16	MATD1554: Student must have passed NSC Mathematics on performance level 3 in order to continue with this module.
UGRD	S2	025832	MATD	1584	Mathematics for Ems	098	SOUTH	OUDTSHOORN	16	MATD1584: Student must have passed MATD1554
UGRD	YR	021245	MTDE	1508	Mathematical Literacy for Business Study	098	SOUTH	OUDTSHOORN	32	None
UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	PHUTHADITJ	32	None
UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	SASOLBURG	16	MATD1554: Student must have passed NSC Mathematics on performance level 3 in order to continue with this module.
UGRD	S2	025831	MATD	1564	Introduction to University Mathematics 1	098	SOUTH	SASOLBURG	16	MATD1564: Student must have passed NSC Mathematics on performance level 4 or MATD1554 in order to continue with this module.
UGRD	S2	025832	MATD	1584	Mathematics for Ems	098	SOUTH	SASOLBURG	16	MATD1584: Student must have passed MATD1554
UGRD	YR	021245	MTDE	1508	Mathematical Literacy for Business Study	098	SOUTH	SASOLBURG	32	None
UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	SASOLBURG	32	None
UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	SOUTH	SASOLBURG	32	None
UGRD	S1	023969	BLGY	1513	Introduction to Biology	098	SOUTH	SOUTH	12	BLGY1513: NSC Life Science Level 3 or Physical Science level 3
UGRD	YR	025830	MATD	1400	Introduction to Mathematics	098	SOUTH	SOUTH	48	MATD1400: Student must have passed NSC Mathematics on performance level 2 or mathematical Literacy level 5 in order to continue with this module.
UGRD	S1	023977	MATD	1534	Introduction to University Mathematics 1	098	SOUTH	SOUTH	16	MATD1564: Student must have passed NSC Mathematics on performance level 4 or MATD1554 in order to continue with this module.
UGRD	S2	023978	MATD	1544	Introduction to University Mathematics	098	SOUTH	SOUTH	16	MATD1544: MATD1534
UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	SOUTH	16	MATD1554: Student must have passed NSC Mathematics on performance level 3 in order to continue with this module.
UGRD	S2	025831	MATD	1564	Introduction to University Mathematics 1	098	SOUTH	SOUTH	16	MATD1564: Student must have passed Grade 12 Mathematics on performance level 4 (50%) or have passed MATD1554 in order to register for this module.
UGRD	S2	025832	MATD	1584	Mathematics for Ems	098	SOUTH	SOUTH	16	MATD1584: Student must have passed MATD1554
UGRD	YR	022686	MTDA	1508	Mathematics Literacy in Agriculture	098	SOUTH	SOUTH	32	None
UGRD	YR	021245	MTDE	1508	Mathematical Literacy for Business Study	098	SOUTH	SOUTH	32	None
UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	SOUTH	32	None
UGRD	YR	021247	MTDL	1508	Mathematical Literacy for Law Students	098	SOUTH	SOUTH	32	None
UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	SOUTH	SOUTH	32	None
UGRD	S2	023978	MATD	1544	Introduction to University Mathematics	098	SOUTH	WELKOM	16	
UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	WELKOM	16	MATD1554: Student must have passed NSC Mathematics on performance level 3 in order to continue with this module.

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UGRD	S2	025831	MATD	1564	Introduction to University Mathematics 1	098	SOUTH	WELKOM	16	MATD1564: Student must have passed Grade 12 Mathematics on performance level 4 (50%) or have passed MATD1554 in order to register for this module.
UGRD	S2	025832	MATD	1584	Mathematics for EMS	098	SOUTH	WELKOM	16	MATD1584: Student must have passed MATD1554
UGRD	YR	021245	MTDE	1508	Mathematical Literacy for Business Study	098	SOUTH	WELKOM	32	None
UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	WELKOM	32	none
UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	SOUTH	WELKOM	32	None
DEPARTMENT OF AGRICULTURAL ECONOMICS (99)										
UGRD	S1	008113	AGEC	1514	Introduction to Agricultural Economics	099	MAIN	BFN	16	AGEC1514: Student must have passed Mathematics on performance level 3 or Mathematical Literacy Level 6 or Maths Level 3 or Mathematical Literacy Level 6 and MTDA1508 in order to continue with this module.
UGRD	S2	008117	AGEC	1624	Agricultural Finance	099	MAIN	BFN	16	AGEC1624: Student must have passed AGEC1514 in order to continue with this module.
UGRD	S1	008118	AGEC	1634	Business Functions for Agribusiness	099	MAIN	BFN	16	AGEC1634: Student must have passed NSC Maths Level 3 or Mathematical Literacy Level 6 and MTDA1508.
UGRD	S1	008124	AGEC	2614	Farm Planning and Management	099	MAIN	BFN	16	AGEC2614: Student must have passed AGEC1514 in order to continue with this module.
UGRD	S2	008128	AGEC	2624	Introduction to Agricultural Marketing	099	MAIN	BFN	16	AGEC2624: Student must have passed AGEC1514 in order to continue with this module.
UGRD	S1	008137	AGEC	3714	Managerial Economics	099	MAIN	BFN	16	AGEC3714: Student must have passed AGEC2614 in order to continue with this module.
UGRD	S2	025408	AGEC	3721	Agricultural Economics Seminar	099	MAIN	BFN	4	None
UGRD	S2	008140	AGEC	3724	Resource Economics.	099	MAIN	BFN	16	AGEC3724: Student must have passed AGEC1514 or EBUS1514 and MATM1534 in order to continue with this module.
UGRD	S1	025062	AGEC	3734	Agribusiness Management.	099	MAIN	BFN	16	AGEC3734: Student must have passed AGEC1514 in order to continue with this module.
UGRD	S2	008146	AGEC	3744	Agricultural Policy and Development	099	MAIN	BFN	16	AGEC3744: Student must have passed AGEC1514 in order to continue with this module.
UGRD	S1	025078	AGMA	3714	Business Management and Entrepreneurship.	099	MAIN	BFN	16	AGMA3714: Student must have passed :AGEC1514 in order to continue with this module.
UGRD	S2	025763	AGMA	3724	Innovation Management.	099	MAIN	BFN	16	AGMA3724 : Student need to complete AGEC1514 in order to continue with this module.
UGRD	S1	025061	AGMA	3734	Farm Tax	099	MAIN	BFN	16	AGEC3734: Student must have passed AGEC1624 in order to continue with this module.
UGRD	S2	008068	AGMA	3744	Strategic Agricultural Management.	099	MAIN	BFN	16	AGMA3744 : Student must have passed AGEC1514 in order to continue with this module.
UGRD	S2	008069	AGMA	3762	Seminar: Integrated Agricultural Management.	099	MAIN	BFN	8	AGMA3762: Student must have passed AGEC1624 in order to continue with the module.
UGRD	S1	008113	AGEC	1514	Introduction to Agricultural Economics	099	SOUTH	SOUTH	16	AGEC1514: Student must have passed Mathematics on performance level 3 or Mathematical Literacy Level 6 or Maths Level 3 or Mathematical Literacy Level 6 and MTDA1508 in order to continue with this module
UGRD	S2	008117	AGEC	1624	Agricultural Finance	099	SOUTH	SOUTH	16	AGEC1624: Student must have passed AGEC1514 in order to continue with this module.
PGRD	YR	026025	AGEC	6800	Research Report Agricultural Economics	099	MAIN	BFN	40	Selection for BScHons with specialisation in Agricultural Economics
PGRD	YR	025195	AGEC	6808	Research Project in Agricultural Economics.	099	MAIN	BFN	32	Selection for BScHons with specialisation in Agricultural Economics
PGRD	S1	027234	AGEC	6815	Advanced Production and Natural Resource Economics	099	MAIN	BFN	20	Selection for BScHons with specialisation in Agricultural Economics
PGRD	S2	027364	AGEC	6825	Agribusiness Management and Marketing	099	MAIN	BFN	20	Selection for BScHons with specialisation in Agricultural Economics
PGRD	S1	027365	AGEC	6835	Macro Economics and Finance	099	MAIN	BFN	20	Selection for BScHons with specialisation in Agricultural Economics
PGRD	S2	027235	AGEC	6845	Agricultural Policy and Development	099	MAIN	BFN	20	Selection for BScHons with specialisation in Agricultural Economics

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PGRD	S2	027236	AGEC	6865	Operational Research	099	MAIN	BFN	20	Selection for BScHons with specialisation in Agricultural Economics
PGRD	YR	008215	AGEC	7902	Environmental Economics	099	MAIN	BFN	8	
PGRD	YR	025064	AGEC	8900	Agricultural Economics Extended Dissertation	099	MAIN	BFN	180	BSc Honors in relevant discipline, Selection MSc.
PGRD	YR	008218	AGEC	9100	Agricultural Economics Thesis	099	MAIN	BFN	360	M.Agric in relevant discipline. Selection for PhD.
PGRD	YR	026983	AGEM	8900	Dissertation Agricultural Economics	099	MAIN	BFN	180	BSc Honors in relevant discipline, Selection MSc.
PGRD	YR	020682	AGEN	7902	Land Valiation and Business Plans	099	MAIN	BFN	8	
PGRD	YR	027237	AGMA	6800	Research Report Agricultural Management	099	MAIN	BFN	40	Selection for BScHons with specialisation in Agricultural Economics
PGRD	S1	027366	AGMA	6815	Farm and Agribusiness Management	099	MAIN	BFN	20	Selection for BAgricHons with specialisation in Agricultural Management
PGRD	S2	027298	AGMA	6825	Marketing and Human Resource Management.	099	MAIN	BFN	20	Selection for BAgricHons with specialisation in Agricultural Management
PGRD	S1	027299	AGMA	6835	Macroeconomics and Financial Management	099	MAIN	BFN	20	Selection for BAgricHons with specialisation in Agricultural Management
PGRD	S2	027367	AGMA	6845	Production and Project Management	099	MAIN	BFN	20	Selection for BAgricHons with specialisation in Agricultural Management
PGRD	YR	008088	AGMA	8900	Agricultural Management Dissertation	099	MAIN	BFN	180	BSc Honors in relevant discipline, Selection MSc.
PGRD	YR	008094	AGMA	9100	Agricultural Management Thesis	099	MAIN	BFN	360	M.Agric in relevant discipline. Selection for PhD.
ANIMAL, WILDLIFE AND GRASSLAND SCIENCES (100)										
UGRD	S2	025172	AGRI	1664	Microbiological Principles in Agriculture	112	MAIN	BFN	16	None
UGRD	S1	008564	AGRI	1514	Biological Principles in Agriculture	100	MAIN	BFN	16	None
UGRD	S2	025169	AGRI	1624	Mathematical and Biometrical Principles in Agriculture	100	MAIN	BFN	16	AGRI1624: Student must have passed NCS Maths Level 3 with AP of 30, or Mathslit Level 7 with AP 32, or BAgric ext/UAP Agric first year completed.
UGRD	S2	024379	ANIB	2624	Introduction to Animal and Plant Breeding	100	MAIN	BFN	16	
UGRD	S1	025106	ANIB	3714	Theory of Animal Breeding	100	MAIN	BFN	16	
UGRD	S2	003267	ANIB	3724	Molecular Animal Breeding	100	MAIN	BFN	16	
UGRD	S1	025520	ANIB	4814/ 6814	Animal Breeding: Mixed Model Theory	100	MAIN	BFN	16	ANIB4814: Student must have passed ANIB3714 in order to continue with this module.
UGRD	S2	025524	ANIB	4824/ 6824	Animal Breeding: Practical Application	100	MAIN	BFN	16	
UGRD	S2	028635	ANIF	2624	Animal Fibre Production	100	MAIN	BFN	16	
UGRD	S2	023750	ANIG	1624	Introduction to Animal, Wildlife and Grassland Science	100	MAIN	BFN	16	
UGRD	YR	028147	ANIG	2602	Animal Production Practical	100	MAIN	BFN	16	
UGRD	S1	015936	ANIG	2613	Introductory Ruminant Production	100	MAIN	BFN	16	
UGRD	S2	015941	ANIG	2623	Introductory Monogastric Production	100	MAIN	BFN	16	
UGRD	S1	022523	ANIG	3713	Cattle Production Systems	100	MAIN	BFN	16	
UGRD	S2	025402	ANIG	3723	Sheep and Goat Production Systems	100	MAIN	BFN	16	
UGRD	S1	025403	ANIG	3733	Poultry Production Systems	100	MAIN	BFN	16	
UGRD	S2	015956	ANIG	3743	Pig Production Systems	100	MAIN	BFN	16	
UGRD	YR	025535	ANIG	4808/ 6808	Research Project Animal Sciences	100	MAIN	BFN	32	
UGRD	S1	023660	ANIN	3734	Fundamental and Experimental Animal Nutrition	100	MAIN	BFN	16	ANIN3734: Student must have passed BOCH2614 in order to continue with this module.
UGRD	S2	022524	ANIN	3744	Properties of Feeds Balancing Rations and Fodder Flow Planning	100	MAIN	BFN	16	None
UGRD	S1	025232	ANIN	4834/ 6834	Applied Monogastric Nutrition	100	MAIN	BFN	16	
UGRD	S2	025459	ANIN	4864/ 6864	Applied Ruminant Nutrition	100	MAIN	BFN	16	
UGRD	S1	027244	ANIP	2614	Anatomy and Physiology of Body Compartments	100	MAIN	BFN	16	
UGRD	S1	025066	ANIP	3714	Animal Anatomy and Physiology of Growth in Farm Animals	100	MAIN	BFN	16	ANIP3714: Student must have passed ANIP2614 in order to continue with this module.
UGRD	S2	025065	ANIP	3724	Animal Health	100	MAIN	BFN	16	

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UGRD	S1	025071	ANIP	4814/ 6814	Applied Reproduction Physiology in Farm Animals	100	MAIN	BFN	16	
UGRD	S2	025152	ANIP	4824/ 6824	Meat, Dairy and Egg Science	100	MAIN	BFN	16	
UGRD	S1	002987	DATA	2614	Agricultural Datametry	100	MAIN	BFN	16	DATA2614: Student must have passed Mathematics on performance level 3 in order to continue with this module.
UGRD	S2	025687	DATA	2624	Agricultural Datametry	100	MAIN	BFN	16	
UGRD	S1	022236	DATA	3712	Statistical Analysis	100	MAIN	BFN	8	DATA3712: Student must have passed Mathematics on performance level 3 in order to continue with this module.
UGRD	S1	024737	GRAS	2614	Grassland Ecology	100	MAIN	BFN	16	
UGRD	S2	016570	GRAS	3724	Intensive Pasture Production	100	MAIN	BFN	16	
UGRD	YR	026743	GRAS	4808	Research Project Grassland Science	100	MAIN	BFN	32	
UGRD	S1	025725	GRAS	4814	Production and Utilisation Ecology	100	MAIN	BFN	16	
UGRD	S2	016581	GRAS	4824	Advanced Veld Management	100	MAIN	BFN	16	
UGRD	S1	025549	GRAS	4834	Defoliation Phenology and Physiology	100	MAIN	BFN	16	
UGRD	S2	025334	GRAS	4844	Advanced Fodder Plant Evaluation	100	MAIN	BFN	16	
UGRD	S2	026495	WDMT	2624	Game and Natural Environment Interaction	100	MAIN	BFN	16	WDMT2624: Student must have passed ANIG1624 in order to continue with this module.
UGRD	S1	026928	WDMT	3714	Applied Game Farm Management	100	MAIN	BFN	16	
UGRD	S2	028639	WILD	3723	Wildlife Research and Monitoring	100	MAIN	BFN	16	None
UGRD	S2	018040	WILD	3764	Applied Nutrition of Wild Herbivores and Carnivores	100	MAIN	BFN	16	
UGRD	S2	027222	WILD	4826	Integrated Planning and Practical Environmental Management Practices	100	MAIN	BFN	24	
UGRD	S1	008564	AGRI	1514	Biological Principles in Agriculture	100	SOUTH	SOUTH	16	
UGRD	S2	023750	ANIG	1624	Introducing to Animal, Wildlife and Grassland Science	100	SOUTH	SOUTH	16	
UGRD	S2	028652	ANIB	4823	Animal Breeding: Practical Application	100	MAIN	BFN	12	
UGRD	S2	016506	ANIF	4824	Meat Science	100	MAIN	BFN	16	FSCM4814 Prerequisite: Students must have passed FSCA3714 in order to register for this module.
UGRD	S2	025092	ANIF	4864	Dairy Science	100	MAIN	BFN	16	FSCD4814 Prerequisite: Students must have passed FSCA3714 (VWS314) in order to register for this module.
UGRD	S1	028452	ANIG	3754	Monogastric Production Systems	100	MAIN	BFN	16	
UGRD	S1	028452	ANIG	3754	Monogastric Production Systems	100	MAIN	BFN	16	
UGRD	YR	025535	ANIG	4808	Research Project Animal Sciences	100	MAIN	BFN	32	
UGRD	S1	025232	ANIN	4834	Applied monogastric nutrition	100	MAIN	BFN	16	
UGRD	S2	025459	ANIN	4864	Applied runimant nutrition	100	MAIN	BFN	16	ANIN4864 Prerequisite: Students must have passed ANIN3734 (DVL334) in order to continue with this module.
UGRD	S1	025536	ANIP	4814	Applied Reproduction Physiology of Farm Animals	100	MAIN	BFN	16	
UGRD	S2	028935	CROP	3744	Small grain, industrial and diverse crops	100	MAIN	BFN	16	
UGRD	S2	029124	GRAS	3763	Applied rangeland and pasture management	100	MAIN	BFN	12	
UGRD	S1	025725	GRAS	4814	Production and Utilisation Ecology	100	MAIN	BFN	16	GRAS4814 Prerequisite: Students must have passed GRAS3714 (WDK314) in order to continue with this module.
UGRD	YR	026743	GRAS	4808	Research Project Grassland Sciences	100	MAIN	BFN	32	
UGRD	S2	016581	GRAS	4824	Advanced Veld Management	100	MAIN	BFN	16	GRAS4824 Prerequisite: Students must have passed GRAS3714 (WDK314) in order to continue with this module.
UGRD	S2	029017	WDMT	3723	Applied Game Farm Management	100	MAIN	BFN	12	WDMT3723 Prerequisite: Student must have passed ANIG2613+ANIG2623 in order to continue with the module.
UGRD	S1	025656	WILD	4814/ 6814	Veld and Game Ecology	100	MAIN	BFN	16	

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PGRD	S2	025459	ANIN	6864	Applied runimant nutrition	100	MAIN	BFN	16	ANIN6864 Prerequisite: Students must have passed ANIN3734 (DVL334) in order to continue with this module.
PGRD	S1	025725	GRAS	6814	Production and Utilisation Ecology	100	MAIN	BFN	16	GRAS6814 Prerequisite: Students must have passed GRAS3714 (WDK314) in order to continue with this module.
PGRD	YR	026743	GRAS	6808	Research Project Grassland Sciences	100	MAIN	BFN	32	
PGRD	S2	016581	GRAS	6824	Advanced Veld Management	100	MAIN	BFN	16	GRAS6824 Prerequisite: Students must have passed GRAS3714 (WDK314) in order to continue with this module.
PGRD	YR	027238	AGRI	6808	Research Project Animal Production	100	MAIN	BFN	32	Selection BAgricHons with specialisation in Animal Production Management
PGRD	S1	027239	AGRI	6814	Advanced Cattle Production Systems	100	MAIN	BFN	16	Selection BAgricHons with specialisation in Animal Production Management
PGRD	S2	027240	AGRI	6824	Advanced Sheep and Goat Production Systems	100	MAIN	BFN	16	Selection BAgricHons with specialisation in Animal Production Management
PGRD	S2	027300	AGRI	6844	Advanced Dairy Production Systems	100	MAIN	BFN	16	Selection BAgricHons with specialisation in Animal Production Management
PGRD	S2	027241	AGRI	6864	Advanced Pig Production Systems	100	MAIN	BFN	16	Selection BAgricHons with specialisation in Animal Production Management
PGRD	S2	027242	AGRI	6834	Advanced Poultry Production Systems	100	MAIN	BFN	16	Selection BAgricHons with specialisation in Animal Production Management
PGRD	YR	027243	AGRI	8900	Animal Production Dissertation	100	MAIN	BFN	180	AGRI8900 Prerequisite student must have passed BAgric Honors with 65% in order to continue with this course.
PGRD	YR	027243	AGRI	9100	Animal Production Thesis	100	MAIN	BFN	360	AGRI9100 Selection for PhD
PGRD	S1	026405	ANIB	6814	Animal Breeding: Mixed Model Theory	100	MAIN	BFN	16	Selection BScAgricHons
PGRD	S2	026407	ANIB	6826	Applied Animal Breeding	100	MAIN	BFN	24	Selection BScAgricHons
PGRD	S2	025310	ANIB	8900	Animal Breeding Dissertation	100	MAIN	BFN	180	Selection MScAgric
PGRD	YR	025312	ANIG	8900	Animal Science Dissertation	100	MAIN	BFN	180	Selection MScAgric in Animal Science
PGRD	YR	025203	ANIG	9100	Animal Science General Thesis	100	MAIN	BFN	360	Selection for PhD
PGRD	S1	003377	ANIN	6815	Fundamental Animal Nutrition	100	MAIN	BFN	20	Selection BScAgricHons
PGRD	S2	003378	ANIN	6835	Experimental Animal Nutrition	100	MAIN	BFN	20	Selection BScAgricHons
PGRD	S2	026269	ANIN	6844	Applied Monogastric Nutrition	100	MAIN	BFN	16	Selection BScAgricHons
PGRD	YR	025311	ANIN	8900	Animal Nutrition Dissertation	100	MAIN	BFN	180	Selection MScAgric in Animal Science
PGRD	YR	025202	ANIN	9100	Animal Nutrition Thesis	100	MAIN	BFN	360	Selection for PhD
PGRD	S1	025536	ANIP	6814	Applied Reproduction Physiology	100	MAIN	BFN	16	Selection Hons
PGRD	YR	026479	ANIP	8900	Animal Physiology Dissertation	100	MAIN	BFN	180	Selection MScAgric in Animal Science
PGRD	YR	026480	ANIP	9100	Animal Science Physiology Thesis	100	MAIN	BFN	360	Selection for PhD
PGRD	YR	027068	GRAS	6805	Intensive Pasture Production	100	MAIN	BFN	20	
PGRD	S1	025627	GRAS	6814	Production and Utilisation Ecology	100	MAIN	BFN	16	
PGRD	S2	025335	GRAS	6824	Advanced Veld Management	100	MAIN	BFN	16	
PGRD	S1	025336	GRAS	6834	Defoliation Phenology and Physiology	100	MAIN	BFN	16	
PGRD	S2	025337	GRAS	6844	Advanced Fodder Plant Evaluation	100	MAIN	BFN	16	
PGRD	YR	025548	GRAS	8900	Grassland Science Dissertation	100	MAIN	BFN	180	
PGRD	YR	025412	GRAS	9100	Grassland Science Thesis	100	MAIN	BFN	360	
PGRD	YR	025948	WDMT	6808	Research Essay Wildlife Management	100	MAIN	BFN	32	Selection for BAgricHons with specialisation in Agricultural Management
PGRD	S1	010673	WDMT	6816	Veld and Game Ecology	100	MAIN	BFN	24	Selection for BAgricHons with specialisation in Agricultural Management
PGRD	S2	010681	WDMT	6826	Applied Habitat Evaluation	100	MAIN	BFN	24	Selection for BAgricHons with specialisation in Agricultural Management
PGRD	S2	010675	WDMT	6846	Applied Wildlife Management	100	MAIN	BFN	24	Selection for BAgricHons with specialisation in Agricultural Management
PGRD	YR	025942	WDMT	8900	Wildlife Management Dissertation	100	MAIN	BFN	180	Selection for Magric with specialisation in Agricultural Management
PGRD	YR	025943	WDMT	9100	Wildlife Management Thesis	100	MAIN	BFN	360	Selection PhD with specialisation in Agricultural Management
PGRD	YR	025900	WILD	4808	Research Report Wildlife	100	MAIN	BFN	32	
PGRD	S2	026496	WILD	4826	Integrated Planning and Practical Environmental Management Practices	100	MAIN	BFN	24	

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PGRD	YR	027047	WILD	4856	Applied Habitat Evaluation and Game Nutrition	100	MAIN	BFN	24	
PGRD	YR	025944	WILD	6806	Habitat Evaluation and Monitoring	100	MAIN	BFN	24	
PGRD	YR	025744	WILD	6808	Research Report Wildlife	100	MAIN	BFN	32	
PGRD	S1	025891	WILD	6814	Veld and Game Ecology	100	MAIN	BFN	16	
PGRD	S1	025907	WILD	6816	Habitat Preferences and Diet Selection of Game	100	MAIN	BFN	24	
PGRD	S2	026496	WILD	6826	Integrated Planning and Practical Environmental Management Practices	100	MAIN	BFN	24	
PGRD	S2	010682	WILD	6846	Applied Wildlife Management	100	MAIN	BFN	24	
PGRD	S1	010680	WILD	6856	Applied Habitat Evaluation and Game Nutrition	100	MAIN	BFN	24	
PGRD	YR	025409	WILD	8900	Wildlife Dissertation	100	MAIN	BFN	180	
PGRD	YR	025935	WILD	9100	Wldlife Thesis	100	MAIN	BFN	360	
PGRD	S2	025935	WILD	9100	Wldlife Thesis	100	MAIN	BFN	360	
ARCHITECTURE (101)										
UGRD	YR	XXX	ARCR	2602	Architectural Representation 2	101	MAIN	BFN	8	ARCR2602: Student must have passed CONS1506 and DESN1500, in order to continue with this module.
UGRD	YR	001945	CONS	1506	Construction I	101	MAIN	BFN	24	None
UGRD	YR	027538	CONS	2600	Construction II	101	MAIN	BFN	40	CONS2600: Student must have passed CONS1506 and DESN1500 in order to continue with module.
UGRD	YR	027370	CONS	3700	Construction III	101	MAIN	BFN	40	CONS3700: Student must have passed CONS2600, DESN2600, in order to continue with this module.
UGRD	YR	011130	DESN	1500	Design I	101	MAIN	BFN	48	None
UGRD	YR	011132	DESN	2600	Design II	101	MAIN	BFN	48	DESN2600: Student must have passed CONS1506, DESN1500 in order to continue with this module.
UGRD	YR	011134	DESN	3700	Design III	101	MAIN	BFN	48	DESN3700: Student must have passed CONS2600, DESN2600 and HTRC2606 in order to continue with this module.
UGRD	YR	024732	HTRC	1506	Histories and Theories of Architecture I	101	MAIN	BFN	24	None
UGRD	YR	024733	HTRC	2606	Histories and Theories of Architecture II	101	MAIN	BFN	24	None
UGRD	YR	011024	HTRC	3706	Histories and Theories of Architecture III	101	MAIN	BFN	24	None
UGRD	YR	XXX	ARCR	1506	Architectural Representation I	101	MAIN	BFN	24	None
PGRD	YR	026270	ARCD	8900	Architecture Dissertation With Design	101	MAIN	BFN	180	Selection
PGRD	YR	027487	ARCD	9100	Architecture Thesis With Design	101	MAIN	BFN	360	Selection
PGRD	YR	026270	ARCH	8900	Architecture Dissertation	101	MAIN	BFN	180	Selection
PGRD	YR	026271	ARCH	9100	Architecture Thesis	101	MAIN	BFN	360	Selection
PGRD	YR	024728	ATRE	7904	Architectural Treatise	101	MAIN	BFN	16	Selection
PGRD	YR	017733	CONS	6808	Construction IV	101	MAIN	BFN	32	Selection
PGRD	YR	021330	CONS	7908	Construction V	101	MAIN	BFN	32	Selection
PGRD	YR	020660	DDIS	7900	Design Mini-Dissertation	101	MAIN	BFN	100	Selection
PGRD	YR	018785	DESN	6800	Design IV	101	MAIN	BFN	48	Selection
PGRD	S1	023665	DRET	6804	Design and Research Methods in Architecture	101	MAIN	BFN	16	Selection
PGRD	YR	025742	HURB	6804	History of Urban Settlement	101	MAIN	BFN	16	Selection
PGRD	YR	024735	PARC	7904	Professional Architect Practice	101	MAIN	BFN	16	Selection
PGRD	YR	025947	RARC	6808	Research in Theory of Architecture	101	MAIN	BFN	32	Selection

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
SUSTAINABLE FOOD SYSTEMS AND DEVELOPMENT (102)										
UGRD	S1	026218	AGEX	2614	Extension With The Agricultural Innovation System	102	MAIN	BFN	16	Selection
UGRD	S2	026219	AGEX	2624	Communication for Innovation	102	MAIN	BFN	16	None
UGRD	S1	026220	AGEX	3714	Facilitation for Development	102	MAIN	BFN	16	None
UGRD	S2	026221	AGEX	3724	Extension Programme Management	102	MAIN	BFN	16	None
UGRD	S1	026222	AGEX	3734	Community Mobilization and Local Organizational Development	102	MAIN	BFN	16	None
UGRD	S2	026984	AGEX	3744	Management of Change and Adaptation	102	MAIN	BFN	16	None
UGRD	S1	026223	AGEX	3754	Agricultural Entrepreneurship and Value Chains	102	MAIN	BFN	16	None
UGRD	S2	026224	AGEX	3764	Adult Learning, Behavioural Change & Gender	102	MAIN	BFN	16	None
PGRD	YR	025646	SADR	9100	Sustainable Agriculture Thesis	102	MAIN	BFN	360	Selection
PGRD	S2	025646	SADR	9100	Sustainable Agriculture Thesis	102	MAIN	BFN	360	Selection
PGRD	YR	027342	SAEC	5806	Economics for Sustainable Agriculture	102	MAIN	BFN	24	Selection
PGRD	YR	027344	SAEC	7906	Advanced Economics for Sustainable Agriculture	102	MAIN	BFN	24	Selection
PGRD	YR	027343	SAEX	5806	Extension for Sustainability	102	MAIN	BFN	24	Selection
PGRD	YR	027341	SAEX	7906	Sustainable Agriculture and Extension: Theory and Practice	102	MAIN	BFN	24	Selection
PGRD	S1	026007	SAEX	7916	Rural Agricultural Extension; Issues and Concepts	102	MAIN	BFN	24	Selection
PGRD	S1	027340	SAIT	5814	Introduction to Sustainable Agriculture	102	MAIN	BFN	16	Selection
PGRD	YR	027339	SALS	5806	Livestock Production for Sustainable Agriculture	102	MAIN	BFN	24	Selection
PGRD	YR	027338	SALS	7906	Advanced Livestock Production for Sustainable Agriculture	102	MAIN	BFN	24	Selection
PGRD	YR	027337	SANR	5806	Assessment and Management of Natural Resources	102	MAIN	BFN	24	Selection
PGRD	YR	027336	SANR	7906	Assessment and Management of Natural Resources	102	MAIN	BFN	24	Selection
PGRD	S2	027335	SARP	5826	Research Methods for Sustainable Agriculture	102	MAIN	BFN	24	Selection
PGRD	YR	027334	SARP	7900	Mini-Dissertation Sustainable Agriculture	102	MAIN	BFN	60	Selection
PGRD	YR	027714	SARS	7906	Research Methodology and Methods for Sustainable Agriculture	102	MAIN	BFN	0	Selection
UGRD	S1	027325	CNCC	1612	Clothing Construction I	125	MAIN	BFN	8	None
UGRD	S2	027326	CNCC	1622	Clothing Construction Ii	125	MAIN	BFN	8	None
UGRD	S1	027327	CNCC	2612	Clothing Construction Iii	125	MAIN	BFN	8	None
UGRD	S2	027521	CNCC	2622	Clothing Construction Iv	125	MAIN	BFN	8	None
UGRD	S1	027522	CNCC	3712	Clothing Construction V	125	MAIN	BFN	8	None
UGRD	S2	027523	CNCC	3722	Clothing Construction Vi	125	MAIN	BFN	8	None
UGRD	S1	027524	CNCD	3732	Community Development	125	MAIN	BFN	8	None
UGRD	S1	027328	CNSF	1614	Introductory Food I	125	MAIN	BFN	16	None
UGRD	S2	023985	CNSF	2624	Food Preparation I	125	MAIN	BFN	16	None
UGRD	S1	025143	CNSF	3724	Food Preservation	125	MAIN	BFN	12	None
UGRD	S1	027330	CNSF	2613	Food Security I	125	MAIN	BFN	12	None
UGRD	S2	027525	CNFS	2623	Food Security Ii	125	MAIN	BFN	12	CNFS2623: Student must have passed AGEC1514 in order to continue with module.
UGRD	S1	027526	CNFS	3714	Food Security Iii	125	MAIN	BFN	16	CNFS3714: Student must have passed CNFS2613 and CNFS2623 in order to continue with module.
UGRD	S2	027527	CNFS	3724	Food Security Iv	125	MAIN	BFN	16	CNFS3724: Student must have passed CNFS2613 and CNFS2623 in order to continue with module.

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
UGRD	S1	025808	CNOT	2614	Skills	125	MAIN	BFN	16	None
UGRD	S1	027528	CNSB	1614	Consumer Behaviour I	125	MAIN	BFN	16	None
UGRD	S2	027529	CNSB	1624	Consumer Behaviour II	125	MAIN	BFN	16	None
UGRD	S1	027530	CNSB	2614	Cosumer Behaviour III	125	MAIN	BFN	16	CNSB2614: Student must have passed CNSB1614 and CNSB1624 in order to continue with module.
UGRD	S2	023981	CNSB	2624	Consumer Behaviour IV	125	MAIN	BFN	16	
UGRD	S1	027531	CNSB	3714	Consumer Behaviour V	125	MAIN	BFN	16	CNSB3714: Student must have passed CNSB2614 in order to continue with module.
UGRD	S2	025087	CNSB	3724	Consumer Behaviour VI	125	MAIN	BFN	16	CNSB3724: Student must have passed CNSB3714 in order to continue with this module.
UGRD	S1	023983	CNSF	2614	Food III	125	MAIN	BFN	16	CNSF2614: Student must have passed CNSF1614 and CNSF1624 in order to continue with module.
UGRD	S1	027532	CNSF	3714	Food V	125	MAIN	BFN	16	CNSF3714: Student must have passed CNSF2614 and CNSF2624 in order to continue with module.
UGRD	S2	027533	CNSF	3724	Food VVIi	125	MAIN	BFN	16	None
UGRD	S1	027534	CNSI	1612	Interior I	125	MAIN	BFN	8	None
UGRD	S2	027535	CNSI	1622	Interior II	125	MAIN	BFN	16	None
UGRD	S1	027536	CNSI	2612	Interior III	125	MAIN	BFN	8	None
UGRD	S2	027537	CNSI	2622	Interior IV	125	MAIN	BFN	8	None
UGRD	S1	025110	CNSI	3712	Interior V	125	MAIN	BFN	8	None
UGRD	S2	025111	CNSI	3722	Interior VI	125	MAIN	BFN	8	None
PGRD	YR	025196	CNCS	6809	Research Report in Consumer Science	125	MAIN	BFN	36	None
UGRD	S 1		SFIF	1513	Introduction to Food Systems	102	MAIN	BFN	12	None
UGRD	S 1		SFFS	1513	Food Safety: Fundamental Food Compliance	102	MAIN	BFN	12	None
UGRD	S 1		SFNH	1513	Food Systems for Nutrition and Health	102	MAIN	BFN	12	None
UGRD	S 1		SFCF	1513	Introduction to the Components of Food	102	MAIN	BFN	12	None
UGRD	S 1		SFEC	1513	The Economics of Sustainable Food Systems	102	MAIN	BFN	12	None
UGRD	S 2		SFSF	1523	Sustainable Food Systems	102	MAIN	BFN	12	SFIF1513
UGRD	S 2		SFPP	1623	Sustainable Food Production: Processes and Principles I	102	MAIN	BFN	12	None
UGRD	S 2		SFHN	1523	Human Nutrition	102	MAIN	BFN	12	SFNH1513
UGRD	S 2		SFFD	1623	Food Dispersions	102	MAIN	BFN	12	SFCF1513
UGRD	S 2		SFFO	1523	Food Operations and Supply Chain Management	102	MAIN	BFN	12	None
UGRD	S 1		SFFS	2613	Food and Nutrition Security	102	MAIN	BFN	12	SFIF1513 and SFSF1523
UGRD	S 1		SFPP	2613	Sustainable Food Production: Processes and Principles II	102	MAIN	BFN	12	SFPP1623
UGRD	S 1		SFPV	2613	Food Processing I	102	MAIN	BFN	12	SFCF1513 and SFCF1513 and SFFS1513
UGRD	S 1		SFMB	2613	Food Marketing and Branding	102	MAIN	BFN	12	None
UGRD	S 1		SFAI	2613	Agricultural Innovation Systems (AIG)	102	MAIN	BFN	12	None
UGRD	S 2		SFSS	2623	Food Security and Sustainability	102	MAIN	BFN	12	SFFS2613
UGRD	S 2		SFPT	2623	Food Production Processes and Technology	102	MAIN	BFN	12	SFPP1623, SFPP2613
UGRD	S 2		SFPD	2623	Food Processing II	102	MAIN	BFN	12	SFPV2613
UGRD	S 2		SFAP	2623	Food and Agriculture Policy	102	MAIN	BFN	12	None
UGRD	S 2		SFCF	2623	Communication and Facilitation of Sustainable Development	102	MAIN	BFN	12	None
UGRD	S 1		SFRF	3713	Regenerative Food Systems	102	MAIN	BFN	12	None

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UGRD	S 1		SFPD	3713	Food Product Development, Sensory Analysis and Gastronomy	102	MAIN	BFN	12	SFFD1613, SFPT2623
UGRD	S 1		SFPM	3713	Food Processing III	102	MAIN	BFN	12	SPPD2623
UGRD	S 1		SFCB	3713	Consumer Behaviour and Food Consumption Trends	102	MAIN	BFN	12	None
UGRD	S 1		SFMC	3713	Management of Change and Adaptation	102	MAIN	BFN	12	None
UGRD	S 2		SFES	3723	Environmental Sustainability of Food Systems	102	MAIN	BFN	12	None
UGRD	S 2		SFIP	3726	Integrated Project Applied to Sustainable Food Systems: New Product Development/ New Venture Creation	102	MAIN	BFN	24	Students must pass all the modules in the first two years of study, and first semester of the third year to enrol for the module.
UGRD	S 2		SFQA	3723	Quality Assurance and the Food Value Chain	102	MAIN	BFN	12	None
UGRD	S 2		SFMV	3723	Managing the Food Value Chain: Logistics and Distribution	102	MAIN	BFN	12	None
PGRD	S1	026418	CNCS	6814	The Early History of Textiles, Clothing, Interior Or Foods	125	MAIN	BFN	16	Selection BScHons
PGRD	S2	025525	CNCS	8900	Consumer Science Dissertation	125	MAIN	BFN	180	Selection MSc
PGRD	YR	025086	CNCS	9100	Consumer Sciences Thesis	125	MAIN	BFN	360	Selection PhD
PGRD	S2	026422	CNST	6824	Quality Management in Clothing	125	MAIN	BFN	16	Selection BScHons
PGRD	S1	026423	CNST	6834	Social Aspects of Clothing	125	MAIN	BFN	16	Selection BScHons
PGRD	S2	026424	CNST	6844	Psychological Aspects of Clothing	125	MAIN	BFN	16	Selection BScHons
PGRD	S1	026425	CNST	6854	From Natural Fibre to Textile	125	MAIN	BFN	16	Selection BScHons
PGRD	S2	026426	CNST	6864	Natural Textile Fibres Finishings	125	MAIN	BFN	16	Selection BScHons
PGRD	S2	026561	FSCG	6826	Product Development and Sensory Analysis	102	MAIN	BFN	24	Selection BScHons
PGRD	S1	025720	FSCD	6814	Dairy Science	102	MAIN	BFN	16	Selection BScHons
PGRD	S2	026561	FSCG	6826	Product Development and Sensory Analysis	102	MAIN	BFN	24	Selection BScHons
PGRD	YR	025326	FSCI	8900	Food Science Dissertation	102	MAIN	BFN	180	Selection MSc
PGRD	YR	025142	FSCI	9100	Food Science Thesis	102	MAIN	BFN	360	Selection PhD
PGRD	YR	026569	FSCL	6806	Food Science Literature Study	102	MAIN	BFN	24	Selection BScHons
PGRD	S1	026455	FSCM	6814	Meat Science	102	MAIN	BFN	16	Selection BScHons
PGRD	S1	026474	FSCP	6814	Food Products From Plants	102	MAIN	BFN	16	Selection BScHons
PGRD	YR	026525	FSCR	6808	Research Project Food Science	102	MAIN	BFN	32	Selection BScHons
UGRD	S1	027826	FSCS	2634	Food systems for consumer science	102	MAIN	BFN	16	
CHEMISTRY (103)										
UGRD	S1	002354	CHEM	1513	Inorganic and Analytical Chemistry (Mainstream)	103	MAIN	BFN	12	CHEM1513: NSC Physical Sciences L4 (50%)
UGRD	S1	022800	CHEM	1501	Inorganic and Analytical Chemistry (Practical)	103	MAIN	BFN	4	CHEM1501: Co-register with CHEM1513 or after CHEM1552+CHEM1632 is passed
UGRD	S2	025182	CHEM	1623	Physical and Organic Chemistry (Mainstream)	103	MAIN	BFN	12	CHEM1623: Student must have passed CHEM1513 + CHEM1501 in order to continue with this module.
UGRD	S2	025678	CHEM	1643	Physical and Organic Chemistry	103	MAIN	BFN	12	CHEM1643: Student must have passed CHEM1513 + CHEM1501 in order to continue with this module.
UGRD	S2	026881	CHEM	1661	Physical and Organic Chemistry (Practical)	103	MAIN	BFN	4	CHEM1661: Student must have passed (CHEM1513 or CHEM1552+1632) +CHEM1501 in order to continue with module.
UGRD	S1	026990	CHEM	2601	Physical Chemistry Practicals	103	MAIN	BFN	4	CHEM2611/CHEM2601: Student must have passed [CHEM1623 or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and CHEM1661 and MATM1534 in order to register for this module.
UGRD	S1	026882	CHEM	2613	Physical Chemistry Theory	103	MAIN	BFN	12	CHEM2613: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and CHEM1661 and MATM1534 in order to register for this module.

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UGRD	S2	026991	CHEM	2621	Organic Chemistry Practicals II	103	MAIN	BFN	4	CHEM2621: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and [CHEM1661] and MATM1534 in order to register for this module.
UGRD	S2	027034	CHEM	2623	Organic Chemistry Theory II	103	MAIN	BFN	12	CHEM2623: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and [(CHEM1661] and MATM1534 in order to register for this module.
UGRD	S1	026992	CHEA	2601	Analytical Chemistry Practical II	103	MAIN	BFN	4	CHEM2631/CHEA2601: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and [(CHEM1661] and MATM1534 in order to register for this module.
UGRD	S1	026883	CHEM	2633	Analytical Chemistry Theory II	103	MAIN	BFN	12	CHEM2633: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and (CHEM1661) and MATM1534 in order to register for this module.
UGRD	S2	027035	CHEM	2641	Inorganic Chemistry Practicals II	103	MAIN	BFN	4	CHEM2641: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and (CHEM1661) and MATM1534 in order to register for this module.
UGRD	S2	026884	CHEM	2643	Inorganic Chemistry Theory II	103	MAIN	BFN	12	CHEM2643: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and (CHEM1661) and MATM1534 in order to register for this module.
UGRD	S1	026885	CHEM	3701	Analytical Chemistry Practicals III	103	MAIN	BFN	4	CHEM3711/CHEM3701: Student must have passed CHEM2633 & CHEM2631/CHEA2601, MATM1644 in order to continue with this module.
UGRD	S1	026886	CHEM	3713	Analytical Chemistry Theory III	103	MAIN	BFN	12	CHEM3713: Student must have passed CHEM2633 & CHEM2631/ CHEA2601, MATM1644 in order to continue with this module.
UGRD	S2	026993	CHEM	3721	Inorganic Chemistry Practicals III	103	MAIN	BFN	4	CHEM3721: Student must have passed CHEM2641 & CHEM2643, MATM1644 in order to continue with this module.
UGRD	S2	026887	CHEM	3723	Inorganic Chemistry Theory III	103	MAIN	BFN	12	CHEM3723: Student must have passed CHEM2641 & CHEM2643, MATM1644 in order to continue with this module.
UGRD	S1	026888	CHEB	3701	Physical Chemistry Practical	103	MAIN	BFN	4	CHEM3731/CHEB3701: Student must have passed CHEM2613 and CHEM2611/CHEM2601 and MATM1644 in order to continue with module.
UGRD	S1	026889	CHEM	3733	Physical Chemistry Theory III	103	MAIN	BFN	12	CHEM3733 : Student must have passed CHEM2613 and CHEM2611/ CHEM2601 and MATM1644 in order to continue with module.
UGRD	S2	026890	CHEM	3741	Organic Chemistry Practicals III	103	MAIN	BFN	4	CHEM3741: Student must have passed CHEM2623 and CHEM2621 in order to continue with this module.
UGRD	S2	026891	CHEM	3743	Organic Chemistry Theory III	103	MAIN	BFN	12	CHEM3743: Student must have passed CHEM2623 and CHEM2621 in order to continue with this module.
UGRD	S1	002354	CHEM	1513	Inorganic and Analytical Chemistry (Mainstream)	103	QWA	QWAQWA	12	CHEM1513: NSC Physical Sciences L4 (50%)
UGRD	S1	022487	CHEM	1562	Organic Chemistry	103	QWA	QWAQWA	8	CHEM1562: Student must have passed CHEM1552 and CHEM1632 in order to continue with this module.
UGRD	S1	022800	CHEM	1551	Inorganic and Analytical Chemistry (Practical)	103	QWA	QWAQWA	4	CHEM1551: Co-register with CHEM1513 or(CHEM1552 and CHEM1632) after CHEM1552+CHEM1642 is passed
UGRD	S1	002429	CHEM	1552	Introduction to Chemistry- Development Module	103	QWA	QWAQWA	8	CHEM1552: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
UGRD	S2	022486	CHEM	1622	Physical Chemistry	103	QWA	QWAQWA	8	CHEM1622: Student must have passed CHEM1552 + CHEM1632
UGRD	S2	025182	CHEM	1623	Physical and Organic Chemistry (Mainstream)	103	QWA	QWAQWA	12	CHEM1623: Student must have passed CHEM1513 + CHEM1501 in order to continue with this module.
UGRD	S2	022485	CHEM	1632	Inorganic and Analytical Chemistry	103	QWA	QWAQWA	8	CHEM1632: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
UGRD	S2	025678	CHEM	1643	Physical and Organic Chemistry	103	QWA	QWAQWA	12	CHEM1643: Student must have passed CHEM1513 + CHEM1501 in order to continue with this module.
UGRD	S2	026881	CHEM	1661	Physical and Organic Chemistry (Practical)	103	QWA	QWAQWA	4	CHEM1661: Student must have passed (CHEM1513 or CHEM1552+CHEM1632) + CHEM1501 in order to continue with module.
UGRD	S1	026990	CHEM	2601	Physical Chemistry Practicals	103	QWA	QWAQWA	4	CHEM2611/CHEM2601: Student must have passed [CHEM1623 or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and CHEM1661 and MATM1534 in order to register for this module.

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UGRD	S1	026882	CHEM	2613	Physical Chemistry Theory II	103	QWA	QWAQWA	12	CHEM2613: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and CHEM1661 and MATM1534 in order to register for this module.
UGRD	S2	026991	CHEM	2621	Organic Chemistry Practicals II	103	QWA	QWAQWA	4	CHEM2621: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and [CHEM1661] and MATM1534 in order to register for this module.
UGRD	S2	027034	CHEM	2623	Organic Chemistry Theory II	103	QWA	QWAQWA	12	CHEM2623: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and [(CHEM1661] and MATM1534 in order to register for this module.
UGRD	S1	026992	CHEA	2601	Analytical Chemistry Practical II	103	QWA	QWAQWA	4	CHEM2631/CHEA2601: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and [(CHEM1661] and MATM1534 in order to register for this module.
UGRD	S1	026883	CHEM	2633	Analytical Chemistry Theory II	103	QWA	QWAQWA	12	CHEM2633: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and (CHEM1661) and MATM1534 in order to register for this module.
UGRD	S2	027035	CHEM	2641	Inorganic Chemistry Practicals II	103	QWA	QWAQWA	4	CHEM2641: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and (CHEM1661) and MATM1534 in order to register for this module.
UGRD	S2	026884	CHEM	2643	Inorganic Chemistry Theory II	103	QWA	QWAQWA	12	CHEM2643: Student must have passed [(CHEM1623) or (CHEM1552 + CHEM1632 + CHEM1622 + CHEM1562)] and (CHEM1661) and MATM1534 in order to register for this module.
UGRD	S1	026885	CHEM	3701	Analytical Chemistry Practicals III	103	QWA	QWAQWA	4	CHEM3711/CHEM3701: Student must have passed CHEM2633 & CHEM2631/CHEA2601, MATM1644 in order to continue with this module.
UGRD	S1	026886	CHEM	3713	Analytical Chemistry Theory III	103	QWA	QWAQWA	12	CHEM3713: Student must have passed CHEM2633 & CHEM2631/ CHEA2601, MATM1644 in order to continue with this module.
UGRD	S2	026993	CHEM	3721	Inorganic Chemistry Practicals III	103	QWA	QWAQWA	4	CHEM3721: Student must have passed CHEM2641 & CHEM2643, MATM1644 in order to continue with this module.
UGRD	S2	026887	CHEM	3723	Inorganic Chemistry Theory III	103	QWA	QWAQWA	12	CHEM3723: Student must have passed CHEM2641 & CHEM2643, MATM1644 in order to continue with this module.
UGRD	S1	026888	CHEB	3701	Physical Chemistry Practical III	103	QWA	QWAQWA	4	CHEM3731/CHEB3701: Student must have passed CHEM2613 and CHEM2611/CHEM2601 and MATM1644 in order to continue with module.
UGRD	S1	026889	CHEM	3733	Physical Chemistry Theory III	103	QWA	QWAQWA	12	CHEM3733 rerequisite: Student must have passed CHEM2613 and CHEM2601 and MATM1644 in order to continue with module.
UGRD	S2	026890	CHEM	3741	Organic Chemistry Practicals III	103	QWA	QWAQWA	4	CHEM3741: Prerequisite Student must have passed CHEM2623 and CHEM2621 in order to continue with this module.
UGRD	S2	026891	CHEM	3743	Organic Chemistry Theory III	103	QWA	QWAQWA	12	CHEM3743: Prerequisite Student must have passed CHEM2623 and CHEM2621 in order to continue with this module.
UGRD	S2	022487	CHEM	1562	Organic Chemistry I	103	SOUTH	SOUTH	8	CHEM1632: Student must have passed CHEM1552 and CHEM1632 in order to continue with this module.
UGRD	S1	022800	CHEM	1551	Inorganic and Analytical Chemistry (Practical)	103	SOUTH	SOUTH	4	CHEM1501: Co-register with CHEM1513 or(CHEM1552 and CHEM1632) after CHEM1552+CHEM1642 is passed
UGRD	S1	002429	CHEM	1552	Introduction to Chemistry - Development Module	103	SOUTH	SOUTH	8	CHEM1552: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
UGRD	S2	022486	CHEM	1622	Physical Chemistry I	103	SOUTH	SOUTH	8	CHEM1622: Student must have passed CHEM1632 + CHEM1552
UGRD	S2	022485	CHEM	1632	Inorganic and Analytical Chemistry	103	SOUTH	SOUTH	8	CHEM1632: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
UGRD	S2	026881	CHEM	1661	Physical and Organic Chemistry (Practical)	103	SOUTH	SOUTH	4	CHEM1661: Student must have passed (CHEM1513 or CHEM1552+CHEM1632) + CHEM1501 in order to continue with module.
PGRD	YR	026893	CHEM	6808	Research Report Chemistry	103	MAIN	BFN	32	Selection for BScHons with specialisation in Chemistry
PGRD	S1	026994	CHEA	6803	Inorganic Chemistry I	103	MAIN	BFN	12	Selection for BScHons with specialisation in Chemistry
PGRD	S2	026995	CHEE	6803	Inorganic Chemistry II	103	MAIN	BFN	12	Selection for BScHons with specialisation in Chemistry
PGRD	S1	026996	CHEB	6803	Physical Chemistry I	103	MAIN	BFN	12	Selection for BScHons with specialisation in Chemistry

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PGRD	S2	026982	CHEF	6803	Physical Chemistry II	103	MAIN	BFN	12	Selection for BScHons with specialisation in Chemistry
PGRD	S1	026997	CHEC	6803	Organic Chemistry I	103	MAIN	BFN	12	Selection for BScHons with specialisation in Chemistry
PGRD	S2	026998	CHEG	6803	Organic Chemistry II	103	MAIN	BFN	12	Selection for BScHons with specialisation in Chemistry
PGRD	S1	026999	CHED	6803	Analytical Chemistry I	103	MAIN	BFN	12	Selection for BScHons with specialisation in Chemistry
PGRD	S2	027000	CHEH	6803	Analytical Chemistry II	103	MAIN	BFN	12	Selection for BScHons with specialisation in Chemistry
PGRD	YR	025316	CHEM	8900	Chemistry Dissertation	103	MAIN	BFN	180	Selection for MSc with specialisation in Chemistry
PGRD	S2	025316	CHEM	8900	Chemistry Dissertation	103	MAIN	BFN	180	Selection for MSc with specialisation in Chemistry
PGRD	YR	002411	CHEM	9100	Chemistry Thesis	103	MAIN	BFN	360	Selection for PhD with specialisation in Chemistry
PGRD	YR	027186	NSCH	7900	Advanced Nanochemistry	103	MAIN	BFN	48	Selection for MSc with specialisation in Nano-Chemistry
PGRD	S1	027206	NSCH	7914	Experimental Techniques in Nano-Chemistry	103	MAIN	BFN	16	Selection for MSc with specialisation in Nano-Chemistry
PGRD	YR	025316	CHEM	8900	Chemistry Dissertation	103	QWA	QWAQWA	180	Selection for MSc with specialisation in Chemistry
PGRD	S1	020163	CMPA	6814	Polymer Testing and Characterisation I	103	QWA	QWAQWA	16	Selection for BScHons with specialisation in Polymer Science
PGRD	S2	020164	CMPA	6824	Applied Polymer Science	103	QWA	QWAQWA	16	Selection for BScHons with specialisation in Polymer Science
PGRD	S2	020166	CMPB	6824	Polymer Blends, Composites and Nanocomposites	103	QWA	QWAQWA	16	Selection for BScHons with specialisation in Polymer Science
PGRD	S2	020165	CMPC	6824	Polymer Testing and Characterization Ii	103	QWA	QWAQWA	16	Selection for BScHons with specialisation in Polymer Science
PGRD	S1	020160	CMPO	6814	Polymers and Polymerization	103	QWA	QWAQWA	16	Selection for BScHons with specialisation in Polymer Science
PGRD	S1	020161	CMPP	6814	Physical Polymer Science	103	QWA	QWAQWA	16	Selection for BScHons with specialisation in Polymer Science
PGRD	YR	026583	CMPR	6808	Research Project	103	QWA	QWAQWA	32	Selection for BScHons with specialisation in Polymer Science
PGRD	S1	020162	CMPR	6814	Polymers and Polymer Reactions	103	QWA	QWAQWA	16	Selection for BScHons with specialisation in Polymer Science
PGRD	YR	026018	PLSC	8900	Polymer Science	103	QWA	QWAQWA	180	Selection for MSc with specialisation in Polymer Science
PGRD	YR	025639	PLYS	9100	Polymer Science Thesis	103	QWA	QWAQWA	360	Selection for PhD with specialisation in Polymer Science
COMPUTER SCIENCE AND INFORMATICS (104)										
UGRD	S1	025160	BCIS	1513	Introduction to Information Systems	104	MAIN	BFN	12	None
UGRD	S2	025049	BCIS	1623	Introduction to Software Design	104	MAIN	BFN	12	None
UGRD	S1	025116	BCIS	2614	Systems Analysis & Design	104	MAIN	BFN	16	None
UGRD	S2	025115	BCIS	2624	Systems Infrastructure & Integration	104	MAIN	BFN	16	None
UGRD	S1	025770	BCIS	3714	Information Systems in Organisations	104	MAIN	BFN	16	None
UGRD	S1	023911	CSIE	2613	Data Structures and Algorithms for Engineers	104	MAIN	BFN	12	CSIE2613: Student must have passed CSIE1606 in order to continue with this module.
UGRD	YR	023910	CSIE	1606	Object Oriented Programming for Engineers	104	MAIN	BFN	16	None
UGRD	S1	002010	CSIL	1511	Computer Literacy: Part 1	104	MAIN	BFN	4	None
UGRD	S2	002012	CSIL	1521	Computer Literacy: Part 2	104	MAIN	BFN	4	CSIL1521: Student must have passed CSIL1511, CSIL1531, CSIL1551, CSIL1561 or CSIL1501 in order to register for this module.
UGRD	S1	012684	CSIS	1534	Introduction to Programming: Part 1	104	MAIN	BFN	16	CSIS1534: Student must have passed CSIL1511, CSIL1531, CSIL1551, CSIL1561 or CSIL1501 or register for CSIL1511 simultaneously with CSIS1534.
UGRD	S1	025158	CSIS	1553	Introduction to Computer Hardware	104	MAIN	BFN	12	None.
UGRD	S1	012681	CSIS	1614	Programming and Problem Solving: Part 1	104	MAIN	BFN	16	CSIS1614: Student must have passed CSIL1511, CSIL1531, CSIL1551, CSIL1561 or CSIL1501 or register for CSIL1511 simultaneously with CSIS1614.
UGRD	S2	012683	CSIS	1624	Programming and Problem Solving: Part 2	104	MAIN	BFN	16	CSIS1624: Student must have passed CSIS1614 or CSIS1644 in order to continue with this module.
UGRD	S2	025374	CSIS	1644	Introduction to Programming: Part 2	104	MAIN	BFN	16	CSIS1644: Student must have passed CSIS1534 in order to continue with this module.
UGRD	S2	021275	CSIS	1664	Introduction to The Internet and Web Page Development	104	MAIN	BFN	16	CSIS1664: Student must have passed CSIS1614 or CSIS1644 OR obtained at least 60% for NSC IT(Grade 12) in order to register for this module.

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UGRD	S2	026272	CSIS	1683	Visual Basic for Applications (Vba) With The Focus On Excel	104	MAIN	BFN	12	CSIS1683: Student must have passed CSIL1511, CSIL1531, CSIL1551, CSIL1561 or CSIL1501 in order to register for this module.
UGRD	S1	012688	CSIS	2614	Data Structures and Advanced Programming	104	MAIN	BFN	16	CSIS2614: Student must have passed CSIS1624 or obtained at least 65% for CSIE1606 in order to register for this module.
UGRD	S2	025369	CSIS	2624	Human-Computer Interaction	104	MAIN	BFN	16	CSIS2624: Student must have passed CSIS1614 or CSIS1644 in order to register for this module.
UGRD	S1	025547	CSIS	2634	Introduction to Databases and Database Management Systems: Part 1	104	MAIN	BFN	16	CSIS2634: Student must have passed CSIS1624 or CSIS1644 in order to register for this module.
UGRD	S2	025711	CSIS	2642	Information Technology Service Learning	104	MAIN	BFN	8	CSIS2642: Student must have passed CSIL1521 in order to register for this module.
UGRD	S2	025685	CSIS	2664	Software Design	104	MAIN	BFN	16	CSIS2664: Student must have passed CSIS2614 in order to register for this module.
UGRD	S1	012697	CSIS	3714	Introduction to Databases and Database Management Systems: Part 2	104	MAIN	BFN	16	CSIS3714: Student must have passed CSIS2634 in order to register for this module.
UGRD	S2	012699	CSIS	3724	Software Engineering	104	MAIN	BFN	16	CSIS3724: Student must have passed CSIS2634 in order to register for this module.
UGRD	S1	025372	CSIS	3734	Internet Programming	104	MAIN	BFN	16	CSIS3734: Student must have passed CSIS1664 and CSIS2664 in order to register for this module.
UGRD	S2	012702	CSIS	3744	Computer Networks	104	MAIN	BFN	16	CSIS3744: Student must have passed CSIS1624 or CSIE1606 in order to register this module.
UGRD	S1	028156	CSIS	3754	Data Science	104	MAIN	BFN	16	CSIS3754: Student must have passed CSIS1624, STSM1624 and MATM1644 in order to register for this module.
UGRD	S2	029020	CSIS	3784	Computer Science and Informatics Work Integrated Learning	104	MAIN	BFN	16	CSIS3784: Selection
UGRD	S1	024706	CSIQ	1512	Computer Literacy for Computer Science	104	QWA	QWAQWA	8	CSIQ1512: Student must do the module with CSIQ1533 or CSIQ1614.
UGRD	S1	023305	CSIQ	1531	Computer Literacy: Part 1	104	QWA	QWAQWA	4	None
UGRD	S1	025681	CSIQ	1533	Introduction to Software Development Concepts	104	QWA	QWAQWA	12	CSIQ1533: Student must do the module with CSIQ1512.
UGRD	S2	023306	CSIQ	1541	Computer Literacy: Part 2	104	QWA	QWAQWA	4	CSIQ1541: Student must have passed CSIQ1531 to continue with this module.
UGRD	S1	025157	CSIQ	1553	Introduction to Computer Hardware	104	QWA	QWAQWA	12	None
UGRD	S1	026896	CSIQ	1614	Programming and Problem Solving: Part 1	104	QWA	QWAQWA	16	CSIQ1614: Student must do the module with CSIQ1512 or CSIQ1531.
UGRD	S2	025159	CSIQ	1623	Introduction to Computer Networks	104	QWA	QWAQWA	8	CSIQ1623: Student must have passed CSIQ1553 + (CSIQ1512 or CSIQ1531) in order to continue with this module.
UGRD	S2	026897	CSIQ	1624	Programming and Problem Solving: Part 2	104	QWA	QWAQWA	16	CSIQ1624: Student must have passed (CSIQ1614 or (CSIQ1533 + CSIQ1681) + (CSIQ1512 or CSIQ1531) to continue with this module.
UGRD	S2	027179	CSIQ	1681	Introduction to Software Development Part 2	104	QWA	QWAQWA	4	CSIQ1681: Student must have passed CSIQ1533 + (CSIQ1512 or CSIQ1531) in order to continue with this module.
UGRD	S1	025123	CSIQ	2614	Data Structures and Advanced Programming	104	QWA	QWAQWA	16	CSIQ2614: Student must have passed CSIQ1624 + CSIQ1623 to continue with this module.
UGRD	S2	012691	CSIQ	2624	Human-Computer Interaction	104	QWA	QWAQWA	16	CSIQ2624: Student must have passed CSIQ1624 + CSIQ1623 to continue with this module.
UGRD	S1	024381	CSIQ	2634	Introduction to Databases and Database Management Systems: Part 1	104	QWA	QWAQWA	16	CSIQ2634: Student must have passed CSIQ1624 in order to register for this module.
UGRD	S2	021284	CSIQ	2642	Information Technology Service Learning	104	QWA	QWAQWA	8	CSIQ2642: Student must have passed CSIQ1624 to continue with this module.
UGRD	S2	025122	CSIQ	2644	Mobile Development	104	QWA	QWAQWA	16	CSIQ2644: Student must have passed CSIQ2654 + CSIQ2634 to continue with this module.
UGRD	S1	012696	CSIQ	2654	Introduction to Website Development	104	QWA	QWAQWA	16	CSIQ2654: Student must have passed CSIQ1624 + CSIQ1623 to continue with this module.
UGRD	S1	027163	CSIQ	3714	Introduction to Databases and Database Management Systems: Part 2	104	QWA	QWAQWA	16	CSIQ3714: Student must have passed CSIQ2634 to continue with this module.

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UGRD	S2	027180	CSIQ	3724	Software Engineering	104	QWA	QWAQWA	16	CSIQ3724: Student must have passed CSIQ3734 + CSIQ2624 to continue with this module.
UGRD	S1	012701	CSIQ	3734	Internet Programming	104	QWA	QWAQWA	16	CSIQ3734: Student must have passed CSIQ2614 + CSIQ2654 + CSIQ2634 to continue with this module.
UGRD	S2	027064	CSIQ	3784	Software Development Project	104	QWA	QWAQWA	16	CSIQ3784: Student must have passed CSIQ3734 + CSIQ2644 + CSIQ2624 to continue with this module.
UGRD	S1/S2	002010/ 022029	CSIL	1511/ 1561	Computer Literacy: Part 1	104	SOUTH	BETHLEHEM	4	None
UGRD	S1/S2	002010/ 022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	PHUTHADITJ	4	None
UGRD	S1/S2	002010/ 022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	SASOLBURG	4	None
UGRD	YR	028416	CSIL	1501	Computer Literacy: Part 1	104	SOUTH	SOUTH	4	None
UGRD	S1/S2	002010/ 022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	WELKOM	4	None
PGRD	S1	028529	CSIA	6813	Advanced Data Science	104	MAIN	BFN	12	Selection Hons
PGRD	S2	029032	CSIA	6823	Advanced Data Science	104	MAIN	BFN	12	Selection Hons
PGRD	S1	028833	CSIA	6833	Analytic Programming	104	MAIN	BFN	12	Selection Hons
PGRD	S2	028552	CSIA	6843	Analytic Programming	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025072	CSIC	6813	Artificial Intelligence	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025073	CSIC	6823	Artificial Intelligence	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025244	CSIC	6833	Robotics	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025166	CSIC	6843	Robotics	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025773	CSIC	6853	Capita Selecta	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025746	CSIC	6863	Capita Selecta	104	MAIN	BFN	12	Selection Hons
PGRD	S1	012714	CSID	6813	Business Intelligence	104	MAIN	BFN	12	Selection Hons
PGRD	S2	012714	CSID	6823	Business Intelligence	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025490	CSID	6833	Advanced Databasis	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025344	CSID	6843	Advanced Databases	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025358	CSID	6853	Data Warehousing	104	MAIN	BFN	12	Selection Hons
PGRD	S2	012728	CSID	6863	Data Warehousing	104	MAIN	BFN	12	Selection Hons
PGRD	S1	012713	CSIE	6813	Knowledge-Based Systems	104	MAIN	BFN	12	Selection Hons
PGRD	S2	012713	CSIE	6823	Knowledge-Based Systems	104	MAIN	BFN	12	Selection Hons
PGRD	S1	012716	CSIE	6833	Management Information Systems	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025079	CSIE	6853	It Project Management	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025155	CSIE	6863	It Project Management	104	MAIN	BFN	12	Selection Hons
PGRD	S1	012718	CSIE	6873	Decision Support Systems	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025352	CSIE	6883	Decision Support Systems	104	MAIN	BFN	12	Selection Hons
PGRD	S1	012708	CSII	6813	Information Security	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025371	CSII	6823	Information Security	104	MAIN	BFN	12	Selection Hons
PGRD	S1	012719	CSII	6833	Advanced Human-Computer Interaction	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025365	CSII	6843	Advanced Human-Computer Interaction	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025748	CSII	6853	Computer Ethics	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025749	CSII	6863	Computer Ethics	104	MAIN	BFN	12	Selection Hons
PGRD	S2	027010	CSII	6883	Digital Forensic Science	104	MAIN	BFN	12	Selection Hons
PGRD	S1	012710	CSIM	6813	Theory of Algorithms	104	MAIN	BFN	12	Selection Hons

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PGRD	S2	025386	CSIM	6823	Theory of Algorithms	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025075	CSIM	6833	Automata Theory and Applications	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025076	CSIM	6843	Automata Theory and Applications	104	MAIN	BFN	12	Selection Hons
PGRD	S2	027011	CSIN	6823	Network Management	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025032	CSIN	6833	Advanced Computer Networks	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025054	CSIN	6843	Advanced Computer Networks	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025176	CSIP	6813	Object Design	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025177	CSIP	6823	Object Design	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025047	CSIP	6833	Advanced Internet Programming	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025048	CSIP	6843	Advanced Internet Programming	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025051	CSIP	6853	Advanced Programming I	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025245	CSIP	6863	Advanced Programming I	104	MAIN	BFN	12	Selection Hons
PGRD	S1	025057	CSIP	6873	Advanced Programming II	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025050	CSIP	6883	Advanced Programming II	104	MAIN	BFN	12	Selection Hons
PGRD	YR	028124	BCIS	6809	Computer Information Systems Research Project	104	MAIN	BFN	36	Selection Hons
PGRD	YR	027082	CSIS	6809	Computer Science and Informatics Research Project	104	MAIN	BFN	36	Selection Hons
PGRD	S1	012729	CSIS	6813	Introduction to Research	104	MAIN	BFN	12	Selection Hons
PGRD	S2	025246	CSIS	6823	Introduction to Research	104	MAIN	BFN	12	Selection Hons
PGRD	S1	022405	CSIS	6853	Capita Selecta	104	MAIN	BFN	12	Selection Hons
PGRD	S1	012757	CSIS	7910	Extended Research Essay	104	MAIN	BFN	120	Selection MSc
PGRD	S1	025248	CSIS	7915	Human-Computer Interaction	104	MAIN	BFN	20	Selection MSc
PGRD	S2	025360	CSIS	7920	Extended Research Essay	104	MAIN	BFN	120	Selection MSc
PGRD	S2	025154	CSIS	7925	Human-Computer Interaction	104	MAIN	BFN	20	Selection MSc
PGRD	S1	025094	CSIS	7935	Data Warehousing	104	MAIN	BFN	20	Selection MSc
PGRD	S2	025093	CSIS	7945	Data Warehousing	104	MAIN	BFN	20	Selection MSc
PGRD	S1	025100	CSIS	7955	Educational Technology	104	MAIN	BFN	20	Selection MSc
PGRD	S2	025101	CSIS	7965	Educational Technology	104	MAIN	BFN	20	Selection MSc
PGRD	S1	025137	CSIS	7975	Eye-Tracking	104	MAIN	BFN	20	Selection MSc
PGRD	S2	025138	CSIS	7985	Eye-Tracking	104	MAIN	BFN	20	Selection MSc
PGRD	YR	025686	CSIS	8900	Computer Science and Informatics Dissertation	104	MAIN	BFN	180	Selection MSc
PGRD	YR	025084	CSIS	9100	Computer Science and Informatics Thesis	104	MAIN	BFN	360	Selection PhD
PGRD	YR	026898	CSIQ	6809	Computer Information Technology Research Project	104	QWA	QWAQWA	36	Selection BScITHon
PGRD	S2	027733	CSIQ	6823	Advanced Mobile Development	104	QWA	QWAQWA	12	Selection BScITHon
PGRD	S1	027065	CSIQ	6833	Human-Computer Interaction	104	QWA	QWAQWA	12	Selection BScITHon
PGRD	S2	028650	CSIQ	6843	Mobile Security	104	QWA	QWAQWA	12	Selection BScITHon
PGRD	S1	027539	CSIQ	6853	Gamification	104	QWA	QWAQWA	12	Selection BScITHon
PGRD	S2	027540	CSIQ	6863	It Project Management	104	QWA	QWAQWA	12	Selection BScITHon
PGRD	YR	027158	CSIQ	8900	Computer Informatics Systems Dissertation	104	QWA	QWAQWA	180	Selection MSc
PGRD	YR	027159	CSIQ	9100	Computer Informatics Systems Thesis	104	QWA	QWAQWA	360	Selection PhD
CENTRE FOR ENVIRONMENTAL MANAGEMENT (106)										
PGRD	S1	027579	IWRM	5810	Introduction to Integrated Water Management	106	MAIN	BFN	48	None
PGRD	S2	027580	IWRM	5820	Integrated Water Resources Science	106	Main	BFN	48	None

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PGRD	S2	027581	IWRM	5846	Integrated Water Resource Management and Legislation	106	Main	BFN	24	None
PGRD	YR	028894	CLIM	7905	Research Methods	106	MAIN	BFN	20	None
PGRD	YR	028306	ENMT	7905	Research methods	106	MAIN	BFN	20	None
PGRD	S1	028130	ENMT	7935	Introduction to Sustainability Science (Compulsory)	106	MAIN	BFN	20	None
PGRD	S1	028191	ENMT	7965	Environmental Impact Assessment (Elective 1)	106	MAIN	BFN	20	Selection
PGRD	YR	028126	ENMT	7900	Mini-Dissertation Environmental Management	106	MAIN	BFN	120	None
PGRD	YR	025135	ENMT	8900	Environmental Management Dissertation	106	MAIN	BFN	180	None
PGRD	YR	025136	ENMT	9100	Environmental Management Thesis	106	MAIN	BFN	360	None
PGRD	YR	028132	IWRR	7905	Research Methods	106	MAIN	BFN	20	None
PGRD	S1	028193	IWRM	7935	Water Resources and Environmental Change (Compulsory)	106	MAIN	BFN	20	None
PGRD	S1	028195	IWRM	7965	Water Resources Management in Arid Environments (Elective 1)	106	MAIN	BFN	20	Selection
PGRD	YR	028131	IWRM	7900	Mini-Dissertation Integrated Water Management	106	MAIN	BFN	120	None
PGRD	YR	028166	IWRM	8900	Integrated Water Management Dissertation	106	MAIN	BFN	180	None
PGRD	YR	028197	IWRM	9100	Integrated Water Management Thesis	106	MAIN	BFN	360	None

GEOGRAPHY (107)

UGRD	S1	005333	GEOH	1614	Introduction to Human Geography	107	MAIN	BFN	16	GEOH1614: Student must co-register for GEOG1512 in order to continue with module.
UGRD	S2	029052	GERS	1624	Introduction to Geoinformatics Systems and Remote Sensing	107	MAIN	BFN	16	GERS1624: Student must co-register for GEOG1512 in order to continue with module.
UGRD	S1	018365	GEOH	2614	Urban Geography	107	MAIN	BFN	16	GEOH2614: Student must have passed GEOH1614 in order to continue with module.
UGRD	S1	005345	GEOH	3714	Applied Urban Development and Spatial Transformation	107	MAIN	BFN	16	GEOH3714: Student must have passed GEOH2614 in order to continue with module.
UGRD	S2	023870	GEOH	3724	Rural Geography	107	MAIN	BFN	16	GEOH3724: Student must have passed GEOH2614 in order to register for this module.
UGRD	S2	005332	GEOP	1624	Introduction to Physical Geography	107	MAIN	BFN	16	GEOP1624: Student must have passed GEOH1614 and GEOG1512 in order to continue with this module.
UGRD	S1	020083	GEOP	2614	Process Geomorphology	107	MAIN	BFN	16	GEOP2614: Student need to have passed GEOP1624 or GLGY1614 in order to continue with module.
UGRD	S2	020082	GEOP	2624	Environment and Climate Studies	107	MAIN	BFN	16	GEOP2624: Student must have passed GEOP1624 in order to continue with this module.
UGRD	S1	005353	GEOP	3714	Environmental Geomorphology	107	MAIN	BFN	16	GEOP3714: Student must have passed GEOP2614 in order to continue with module.
UGRD	S2	018366	GEOP	3724	Environmental Management and Analysis	107	MAIN	BFN	16	GEOP3724: Student must have passed GEOP2624 in order to continue with module.
UGRD	S1	029223	GERS	2614	Introduction to Remote Sensing Applications	107	MAIN	BFN	16	GERS2614 :Students must have passed GERS1624 in order to continue with the module.
UGRD	S2	029283	GERS	2624	Introduction to Spatial Analysis	107	MAIN	BFN	16	GERS2624: Students must have passed GERS1624 in order to continue with this module.
UGRD	YR	024729	GISC	3704	Professional Practice, Ethics and Legal Aspects of Geographical Information Science	107	MAIN	BFN	16	GISC3704: Student must have passed GERS2624 in order to continue with module.
UGRD	S1		GERS	3714	Remote Sensing and Image Processing	107	MAIN	BFN	16	GERS3714: Students must have passed GERS2614 in order to continue with this module.
UGRD	S2	020216	GERS	3724	Spatial analysis and applications	107	MAIN	BFN	16	GERS3724: Students must have passed GERS2624 in order to continue with the module.

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UGRD	S1	029116	GEOG	1512	Essential Skills For Geographers	107	MAIN	BFN	8	GEOP1512 Prerequisite: Student must have passed Math level 3 in order to continue with the module
UGRD	S2	026227	GEOG	2644	Biogeography and Climate of Southern Africa	107	BFN	BFN	16	GEOG2644: Student must have passed GEOG1512 or GEOP1624 in order to continue with this module.
UGRD	S1	029117	GEOG	1512	Essential Skills For Geographers	107	QWA	QWAQWA	8	GEOG1512: Prerequisite: Student must have passed Math level 3 in order to continue with the module
UGRD	S1	026190	GEOP	1624	Introduction to Physical Geography	107	QWA	QWAQWA	16	
UGRD	S2	026191	GEOH	1614	Introduction to Human Geography	107	QWA	QWAQWA	16	Student must have passed GEOG1514 in order to continue with this module
UGRD	S1	005333	GEOH	1614	Introduction to Human Geography	107	QWA	QWAQWA	16	GEOH1614: Student must co-register for GEOG1512 in order to continue with module.
UGRD	S2	029052	GERS	1624	Introduction to Geoinformatics Systems and Remote Sensing	107	QWA	QWAQWA	16	GERS1624: Student must co-register for GEOG1512 in order to continue with module.
UGRD	S1	018365	GEOH	2614	Urban Geography	107	QWA	QWAQWA	16	GEOH2614: Student must have passed GEOH1614 in order to continue with module.
UGRD	S1	005345	GEOH	3714	Applied Urban Development and Spatial Transformation	107	QWA	QWAQWA	16	GEOH3714: Student must have passed GEOH2614 in order to continue with module.
UGRD	S2	023870	GEOH	3724	Rural Geography	107	QWA	QWAQWA	16	GEOH3724: Student must have passed GEOH2614 in order to register for this module.
UGRD	S2	005332	GEOP	1624	Introduction to Physical Geography	107	QWA	QWAQWA	16	GEOP1624: Student must have passed GEOH1614 and GEOG1512 in order to continue with this module.
UGRD	S1	020083	GEOP	2614	Process Geomorphology	107	QWA	QWAQWA	16	GEOP2614: Student need to have passed GEOP1624 or GLGY1614 in order to continue with module.
UGRD	S2	020082	GEOP	2624	Environment and Climate Studies	107	QWA	QWAQWA	16	GEOP2624: Student must have passed GEOP1624 in order to continue with this module.
UGRD	S1	005353	GEOP	3714	Environmental Geomorphology	107	QWA	QWAQWA	16	GEOP3714: Student must have passed GEOP2614 in order to continue with module.
UGRD	S2	018366	GEOP	3724	Environmental Management and Analysis	107	QWA	QWAQWA	16	GEOP3724: Student must have passed GEOP2624 in order to continue with module.
UGRD	S1	029223	GERS	2614	Introduction to Remote Sensing Applications	107	QWA	QWAQWA	16	GERS2614 :Students must have passed GERS1624 in order to continue with the module.
UGRD	S2	029283	GERS	2624	Introduction to Spatial Analysis	107	QWA	QWAQWA	16	GERS2624: Students must have passed GERS1624 in order to continue with this module.
UGRD	S1		GERS	3714	Remote Sensing and Image Processing	107	MAIN	QWAQWA	16	GERS3714: Students must have passed GERS2614 in order to continue with this module.
UGRD	S2	020216	GERS	3724	Spatial analysis and applications	107	MAIN	QWAQWA	16	GERS3724: Students must have passed GERS2624 in order to continue with the module.
PGRD	S2	027250	BIOG	6826	Biogeography	107	MAIN	BFN	24	Selection BSc Hons
PGRD	S1	027638	ENVG	6816	Environmental Policy and Practice	107	MAIN	BFN	24	Selection BSc Hons
PGRD	S2	005566	ENVG	6846	Integrated Environmental Management	107	MAIN	BFN	24	Selection BSc Hons
PGRD	S1	005375	GEOF	6816	Theoretical Foundations of Geography	107	MAIN	BFN	24	Selection BSc Hons
PGRD	S2	005563	GEOH	6826	Urban Geography	107	MAIN	BFN	24	Selection BSc Hons
PGRD	S1	025134	GEOH	6836	Rural Geography	107	MAIN	BFN	24	Selection BSc Hons
PGRD	S1	027639	GEOP	6816	Applied Geomorphology	107	MAIN	BFN	24	Selection BSc Hons
PGRD	YR	005388	GEOR	6808	Research in Geography	107	MAIN	BFN	32	Selection BSc Hons
PGRD	YR	025331	GEOR	8900	Geography Disseration	107	MAIN	BFN	180	Selection MSc
PGRD	YR	025149	GEOR	9100	Geography Thesis	107	MAIN	BFN	360	Selection PhD
PGRD	S1	025387	GISC	6816	Spatial Analysis and Modelling	107	MAIN	BFN	24	Selection BSc Hons
PGRD	YR	027024	GISC	8900	Geographical Informatic Sience Disseration	107	MAIN	BFN	180	Selection MSc
PGRD	YR	025413	GISC	9100	Geographic Information Science Thesis	107	MAIN	BFN	360	Selection PhD
PGRD	S2	019938	GISR	6826	Remote Sensing and Image Processing	107	MAIN	BFN	24	Selection BSc Hons.

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PGRD	S1	005375	GEOF	6816	Theoretical Foundations of Geography	107	QWA	QWAQWA	24	Selection BSc Hons
PGRD	S2	005563	GEOH	6826	Urban Geography	107	QWA	QWAQWA	24	Selection BSc Hons
PGRD	S1	025134	GEOH	6836	Rural Geography	107	QWA	QWAQWA	24	Selection BSc Hons
PGRD	S1	027639	GEOP	6816	Applied Geomorphology	107	QWA	QWAQWA	24	Selection BSc Hons
PGRD	YR	005388	GEOR	6808	Research in Geography	107	QWA	QWAQWA	32	Selection BSc Hons
PGRD	YR	025331	GEOR	8900	Geography Disseration	107	QWA	QWAQWA	180	Selection MSc
PGRD	YR	025149	GEOR	9100	Geography Thesis	107	QWA	QWAQWA	360	Selection PhD
PGRD	S1	025387	GISC	6816	Spatial Analysis and Modelling	107	QWA	QWAQWA	24	Selection BSc Hons
PGRD	YR	027024	GISC	8900	Geographical Informatic Sience Disseration	107	QWA	QWAQWA	180	Selection MSc
PGRD	YR	025413	GISC	9100	Geography Thesis	107	QWA	QWAQWA	360	Selection PhD
PGRD	S2	019938	GISR	6826	Remote Sensing and Image Processing	107	QWA	QWAQWA	24	Selection BSc Hons.
PGRD	YR	026440	GEOG	8900	Geography : Disseration	107	QWA	QWAQWA	180	Selection MSc
PGRD	S2	026440	GEOG	8900	Geography : Disseration	107	QWA	QWAQWA	180	Selection MSc
PGRD	YR	026482	GEOG	9100	Geography Thesis	107	QWA	QWAQWA	360	Selection PhD
PGRD	S2	026482	GEOG	9100	Geography Thesis	107	QWA	QWAQWA	360	Selection PhD
PGRD	YR	025181	GEOG	9100	Geography Thesis	107	QWA	QWAQWA	360	Selection PhD
PGRD	YR	025331	GEOG	8900	Geography Dissertation	107	QWA	QWAQWA	180	Selection MSc
PGRD	YR		GEOG	6806	Intermediate Geographic Information Science for Agriculture	107	MAIN	BFN	24	
PGRD	YR		GEOG	7906	Advance Geographic Information Science for Agriculture	107	MAIN	BFN	24	GEOG7906: Student must have passed GEOG6806 in order to register for this module.
GEOLOGY (108)										
UGRD	S1	005846	GLGY	1614	Introduction to Geology	108	MAIN	BFN	16	GLGY1614: Student must have passed Physical Science at performance level 5 (60%) or passed CHEM1632+CHEM1622+CHEM1562 and Mathematics at performance level 5 (60%) or passed MATD1554 or MATD1534.
UGRD	S2	005848	GLGY	1624	General Geology and South African Stratigraphy	108	MAIN	BFN	16	GLGY1624: Student must have passed GLGY1614 in order to continue with this module.
UGRD	S1	005852	GLGY	2612	Practical Mineralogy	108	MAIN	BFN	8	GLGY2612: Student must have passed GLGY1614; GLGY1624 and CHEM1513 in order to register for this module.
UGRD	S1	005853	GLGY	2614	Mineralogy	108	MAIN	BFN	16	GLGY2614: Student must have passed GLGY1614; GLGY1624 and CHEM1513 in order to register for this module.
UGRD	S2	027561	GLGY	2626	Sedimentology Principles and Applications	108	MAIN	BFN	24	GLGY2626: Student must have passed GLGY1614; GLGY1624 and CHEM1513 in order to register for this module.
UGRD	S1	005860	GLGY	2632	Geological Field Techniques	108	MAIN	BFN	8	GLGY2632: Student must have passed GLGY1614; GLGY1624 and CHEM1513 in order to register for this module.
UGRD	S2	025769	GLGY	2641	Geology for Engineers (Practical)	108	MAIN	BFN	4	BSc with specialisation in Physics and Engineering subjects
UGRD	S2	025768	GLGY	2643	Environmental Geology	108	MAIN	BFN	12	GLGY2643: Student must have passed GEOP1524/1624 and GEOH1614 or BSc With specialisation in Physics and Engineering Subjects.
UGRD	S2	027437	GLGY	2646	Environmental Geology: Principles and Practical	108	MAIN	BFN	24	GLGY2646: Student must have passed GLGY1614; GLGY1624 and CHEM1513 in order to register for this module.
UGRD	S1	005863	GLGY	2652	Geological Structures and Maps	108	MAIN	BFN	8	GLGY2652: Student must have passed GLGY1614; GLGY1624 and CHEM1513 in order to register for this module.
UGRD	S2	026483	GLGY	2662	Field School	108	MAIN	BFN	8	GLGY2662: Student must have passed GLGY1614, and GLGY1624 in order to register for this module. GLGY2626 is a co-requisite in order to register for this module.
UGRD	S1	005865	GLGY	3714	Igneous Petrology	108	MAIN	BFN	16	GLGY3714: Student must have passed GLGY2614 and GLGY2612 in order to continue with module.

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UGRD	S2	005867	GLGY	3724	Economic Geology	108	MAIN	BFN	16	GLGY3724: Student must have passed GLGY3714 and GLGY2626 in order to continue with module.
UGRD	S1	005869	GLGY	3734	Structural Geology	108	MAIN	BFN	16	GLGY3734: Student must have passed GLGY2652, GLGY2626, GLGY2662 and GLGY2632 in order to continue with module.
UGRD	S2	005870	GLGY	3744	Metamorphic Petrology	108	MAIN	BFN	16	GLGY3744: Students must have passed GLGY3714 in order to register for this module.
UGRD	S1	005872	GLGY	3754	Introduction to Geochemistry	108	MAIN	BFN	16	GLGY3754: Student must have passed GLGY2614 in order to continue with this module.
UGRD	S2	005873	GLGY	3764	Exploration Geology	108	MAIN	BFN	16	GLGY3764: Student must have passed GLGY3714 in order to continue with module. GLGY3724 is a co-requisite in order to register for this modules.
UGRD	S1	005874	GLGY	3774	Analytical Geochemistry	108	MAIN	BFN	16	GLGY3774: Student must have passed GLGY2614 in order to continue with module.
UGRD	S2	005875	GLGY	3784	Environmental Geochemistry	108	MAIN	BFN	16	GLGY3784: Student must have passed GLGY2614 and GLGY2646 in order to continue with module.
PGRD	YR	027867	GLGY	6801	Skills Development and Ethics for Geoscience Professionals	108	MAIN	BFN	4	Selection for BSc Hons
PGRD	YR	025327	GECE	8900	Geochemistry Dissertation	108	MAIN	BFN	180	GECE8900: Selection MSc geochemistry
PGRD	YR	025148	GECE	9100	Geochemistry Thesis	108	MAIN	BFN	360	GECE9100: Selection PhD geochemistry
PGRD	S1	005913	GLGA	7913	Overview of Geology, Mining, Metallurgy and Business Processes	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025262	GLGA	7923	Overview of Geology, Mining, Metallurgy and Business Processes	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005914	GLGA	7933	Mineral Resource Management I (Methodology)	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025465	GLGA	7943	Mineral Resource Management I (Methodology)	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005915	GLGA	7953	Applied Geology	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025147	GLGA	7963	Applied Geology	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005916	GLGA	7973	Applied Mining	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025464	GLGA	7983	Applied Mining	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005917	GLGB	7913	Applied Metallurgy	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025724	GLGB	7923	Applied Metallurgy	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005918	GLGC	7913	MRM Implementation Practices	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025495	GLGC	7923	MRM Implementation Practices	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005919	GLGC	7933	MRM Information Practices	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025463	GLGC	7943	MRM Information Practices	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005920	GLGC	7953	MRM Organizational Change Practices	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025488	GLGC	7963	MRM Organizational Change Practices	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	025814	GLGC	7973	Virtual Mining: Simulation and Optimisation	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025478	GLGC	7983	Virtual Mining: Simulation and Optimisation	108	MAIN	BFN	12	Selection MSc MRM
PGRD	YR	005931	GLGD	7900	Mineral Resource Management Mini Dissertation	108	MAIN	BFN	60	GLGD7900: Student must have passed GLGA7913/23, GLGA7933/43, GLGA7953/63, GLGA7973/83, GLGB7913/23 in order to continue with the module. GLGD7913/7923 (co-requisite)
PGRD	S1	025263	GLGD	7913	Mineral Resource Management II (Advanced)	108	MAIN	BFN	12	GLGD7913: Student must have passed GLGA7933/GLGA7943 in order to continue with the module
PGRD	S2	025477	GLGD	7923	Mineral Resource Management II (Advanced)	108	MAIN	BFN	12	GLGD7923: Student must have passed GLGA7933/GLGA7943 in order to continue with the module
PGRD	S1	005923	GLGD	7933	Geological Modelling and Applied Geo-Statistics	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025489	GLGD	7943	Geological Modelling and Applied Geo-Statistics	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005924	GLGE	7913	Capita Selecta	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025462	GLGE	7923	Capita Selecta (Course Place Holder)	108	MAIN	BFN	12	Selection MSc MRM

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PGRD	S1	005925	GLGE	7933	Mining Throughput Accounting and Modelling	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025522	GLGE	7943	Mining Throughput Accounting and Modelling	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005926	GLGE	7953	MRM Risk Practices	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025460	GLGE	7963	MRM Risk Practices	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S1	005927	GLGE	7973	Modern Mining Supply Chain Principles	108	MAIN	BFN	12	Selection MSc MRM
PGRD	S2	025756	GLGE	7983	Modern Mining Supply Chain Principles	108	MAIN	BFN	12	Selection MSc MRM
PGRD	YR	025332	GLGE	8900	Environmental Geology Dissertation	108	MAIN	BFN	180	Selection MSc
PGRD	YR	025103	GLGE	9100	Environmental Geology Thesis	108	MAIN	BFN	360	Selection PhD
PGRD	YR	027266	GLGY	6808	Research Report	108	MAIN	BFN	32	Selection for BScHons
PGRD	S1	005886	GLGY	6816	Plate Tectonics	108	MAIN	BFN	24	Selection for BScHons
PGRD	S2	005890	GLGY	6823	Advanced Sedimentology	108	MAIN	BFN	12	Selection for BScHons
PGRD	S2	005893	GLGY	6863	Advanced Economic and Exploration Geology	108	MAIN	BFN	24	Selection for BScHons
PGRD	S1	005894	GLGY	6836	Advanced and Applied Mineralogy	108	MAIN	BFN	24	Selection for BScHons
PGRD	S2	021328	GLGY	6843	Advanced Geochemistry	108	MAIN	BFN	24	Selection for BScHons
PGRD	S1	005896	GLGY	6853	Advanced Igneous Petrology	108	MAIN	BFN	12	GLGY6853: Student must have passed GLGY3714 and GLGY3754 in order to register for this module. Selection for BScHons.
PGRD	S1	005897	GLGY	6856	Advanced Structural Geology	108	MAIN	BFN	24	GLGY6856: Student must have passed GLGY3714 and GLGY3734. in order to register for this module or Selection for BScHons.
PGRD	S1	005899	GLGY	6873	Advanced Environmental Geochemistry	108	MAIN	BFN	12	GLGY6873: Student must have passed GLGY3784 in order to continue with this module or Selection for BScHons.
PGRD	S2	005900	GLGY	6883	Capita Selecta Geology	108	MAIN	BFN	12	Selection for BScHons
PGRD	YR	025333	GLGY	8900	Geology Dissertation	108	MAIN	BFN	180	Selection MSc
PGRD	YR	025053	GLGY	9100	Geology Thesis	108	MAIN	BFN	360	Selection PhD
PGRD	YR	025873	MRTM	8900	Mineral Resource Throughput Management Dissertation	108	MAIN	BFN	180	Selection MSc
INSTITUTE FOR GROUNDWATER STUDIES (109)										
PGRD	YR	027378	GEHR	6808	Research Report Geohydrology	109	MAIN	BFN	32	Selection for Honours
PGRD	YR	026908	GEHI	8900	Geohydrology Interdisciplinary Dissertation	109	MAIN	BFN	180	Selection
PGRD	YR	027022	GEHI	9100	Thesis Geohydrology Interdisciplinary	109	MAIN	BFN	360	Selection
PGRD	YR	025328	GEHR	8900	Geohydrology Dissertation	109	MAIN	BFN	180	Selection
PGRD	YR	026475	GEHR	9100	Geohydrology Thesis	109	MAIN	BFN	360	Selection
PGRD	S1	005657	GEOH	6815	Groundwater Hydraulics	109	MAIN	BFN	20	Selection for Honours
PGRD	S2	025151	GEOH	6825	Groundwater Modelling	109	MAIN	BFN	20	Selection for Honours
PGRD	S1	005658	GEOH	6835	Hydrochemistry and Pollution	109	MAIN	BFN	20	Selection for Honours
PGRD	S2	025174	GEOH	6845	Mining Geohydrology and Hydrology	109	MAIN	BFN	20	Selection for Honours
PGRD	S1	025150	GEOH	6855	Groundwater Geophysics	109	MAIN	BFN	20	Selection for Honours
PGRD	S2	005664	GEOH	6865	Groundwater Management	109	MAIN	BFN	20	Selection for Honours
MATHEMATICS AND APPLIED MATHEMATICS (111)										
UGRD	S1	028070	MATA	1684	Engineering Statics	111	MAIN	BFN	16	MATA1684: Students must have passed Grade 12 Mathematics with Level 5 or must have passed MATD1534 or MATD1564 or MATM1584 in order to register this module
UGRD	S2	028071	MATA	2674	Engineering Dynamics	111	MAIN	BFN	16	MATA2674: Student must have passed MATA1614/1684 + (MATM1644/1544 or MATM1624) in order to register for this module.

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UGRD	S1	028072	MATA	2684	Dynamics of Rigid Bodies	111	MAIN	BFN	16	MATA2684: Student must have passed MATA2674 or MATA1624 in order to register for this module.
UGRD	S1	028074	MATA	2664	Introduction to Mathematical Modeling	111	MAIN	BFN	16	MATA2664: Student must have (60% in MATM1644/1544) or MATM1624 in order to register for this module.
UGRD	S2	028073	MATA	2654	Ordinary Differential Equations	111	MAIN	BFN	16	MATA2654: Student must have (60% in MATM1644/1544) or MATM1624 in order to register for this module.
UGRD	S1	027869	MATA	2754	Scientific Computing	111	MAIN	BFN	16	MATA2754: Student must have (60% in MATM1644/1544) or MATM1624 in order to register for this module.
UGRD	S2	016904	MATA	3764	Industrial Mathematics	111	MAIN	BFN	16	MATA3764: Student must have passed two of the following modules: MATA2754, MATA2654, MATA2634/2664 and MATM2624 order to register for this module.
UGRD	S1	016905	MATA	3774	Numerical Analysis	111	MAIN	BFN	16	MATA3774 : Student must have passed MATM2614 and MATA2754.
UGRD	S2	016906	MATA	3784	Dynamical Systems	111	MAIN	BFN	16	MATA3784: Student must have passed MATM2614 and MATA2654.
UGRD	S1	016887	MATM	1534	Calculus	111	MAIN	BFN	16	MATM1534: Student must have passed Grade 12 Maths HG E, or SG C or Performance Level 5 or WTW/WTV164 (MATD1564) or WTW184 (MATM1584) in order to register for this module.
UGRD	S2	025834	MATM	1542	Introductory Calculus and Statics	111	MAIN	BFN	8	MATM1542: Student must have passed Grade 12 Mathematics on performance Level 5 or 70% in MATD1534/1564 in order to register with this module.
UGRD	S2	027883	MATM	1644	Calculus and Algebra	111	MAIN	BFN	16	MATM1644: Student must have passed MATM1534/1614 in order to register for this module.
UGRD	S2	027883	MATM	1622	Introduction to Advanced Mathematics	111	MAIN	BFN	16	MATM1622: Student must have 60% pass in either MATM1534 or MATM1644 in order to register for this module.
UGRD	S1	025835	MATM	2614	Vector Analysis	111	MAIN	BFN	16	MATM2614: Student must have passed (MATM1544/1644 and MATM1622) or MATM1624 in order to register for this module.
UGRD	S2	025836	MATM	2624	Linear Algebra	111	MAIN	BFN	16	MATM2624: Student must have passed (MATM1544/1644 and MATM1622) or MATM1624 in order to register for this module.
UGRD	S2	025837	MATM	2664	Sequences and Series	111	MAIN	BFN	16	MATM2664: Student must have passed (MATM1544/1644 and MATM1622) or MATM1624 in order to register for this module.
UGRD	S1	016899	MATM	3784	Complex Analysis	111	MAIN	BFN	16	MATM3784: Student must have passed MATM2614 + MATM2664 in order to register for this module.
UGRD	S2	016900	MATM	3774	Real Analysis	111	MAIN	BFN	16	MATM3774: Student must have passed MATM2614 + MATM2664 in order to register for this module.
UGRD	S1	016901	MATM	3734	Discrete Mathematics	111	MAIN	BFN	16	MATM3734: Student must have passed MATM2624 + MATM2664 in order to register for this module.
UGRD	S2	016902	MATM	3744	Algebra	111	MAIN	BFN	16	MATM3744 : Student must have passed MATM2624 in order to register for this module.
UGRD	S1	025080	MATR	1534	Calculus	111	MAIN	BFN	16	MATR1534: This module is intended for students who have fail MATM1534 or fail to meet the required 60% in MATM1534 to continue with 2nd semester mathematics modules. It will be offered in the 2nd semester (starting from this 2023), . Information will be disseminated to students upon registration in MATM1534 and in class during the 1st semester by lecturers (MATM1534).
UGRD	YR	026477	MATM	1502	Introductory Calculus and Statics	111	MAIN	BUILDSC	8	MATM1502: Student must have passed Grade 12 Mathematics on performance Level 5 or 70% in MATD1534/1564 in order to register with this module.
UGRD	S1	016895	MATA	2634	Ordinary Differential Equations	111	QWA	QWAQWA	16	MATA2664: Student must have 60% pass in MATM1644 in order to register for this module.
UGRD	S1	016887	MATM	1534	Calculus	111	QWA	QWAQWA	16	MATM1534: Student must have passed Grade 12 Maths HG E, or SG C or Performance Level 5 or WTW/WTV164 (MATD1564) or WTW184 (MATD1584) in order to register for this module.
UGRD	S2	019761	MATM	1644	Calculus and Algebra	111	QWA	QWAQWA	16	MATM1644: Student must have passed MATM1534/1614 in order to register for this module.
UGRD	S1	025835	MATM	2614	Vector Analysis	111	QWA	QWAQWA	16	MATM2614: Student must have passed (MATM1544/1644 and MATM1622) or MATM1624 in order to register for this module.

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UGRD	S2	025836	MATM	2624	Linear Algebra	111	QWA	QWAQWA	16	MATM2624: Student must have passed (MATM1544/1644 and MATM1622) or MATM1624 in order to register for this module.
UGRD	S2	025837	MATM	2664	Sequences and Series	111	QWA	QWAQWA	16	MATM2664: Student must have passed (MATM1544/1644 and MATM1622) or MATM1624 in order to register for this module.
UGRD	S2	XXX	MATM	3764	Complex Analysis	111	QWA	QWAQWA	16	MATM3764 : Student must have passed MATM2614 + MATM2664 in order to register for this module.
UGRD	S1	016900	MATM	3754	Real Analysis	111	QWA	QWAQWA	16	MATM3754 : Student must have passed MATM2614 + MATM2664 in order to register for this module.
UGRD	S1	016901	MATM	3734	Discrete Mathematics	111	QWA	QWAQWA	16	MATM3734 : Student must have passed MATM2624 + MATM2664 in order to register for this module.
UGRD	S2	016902	MATM	3744	Algebra	111	QWA	QWAQWA	16	MATM3744 : Student must have passed MATM2624 in order to register for this module.
PGRD	S1	021332	MATA	6814	Algebra	111	MAIN	BFN	16	Selection for BScHons with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025343	MATA	6824	Algebra	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021931	MATA	7914	Algebra	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025346	MATA	7924	Algebra	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	YR	025339	MATA	8900	Mathematics Dissertation	111	MAIN	BFN	180	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	YR	025201	MATA	9100	Applied Mathematics Thesis	111	MAIN	BFN	360	Selection for PhD with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025629	MATB	6814	Galois Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	021125	MATB	6824	Galois Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021932	MATB	7914	Galois Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025363	MATB	7924	Galois Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025366	MATC	6814	Introduction to Topology	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	021357	MATC	6824	Introduction to Topology	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021933	MATC	7914	Introduction to Topology	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025370	MATC	7924	Introduction to Topology	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	016907	MATD	6814	Modern Topology	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025380	MATD	6824	Modern Topology	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	016937	MATD	7914	Modern Topology	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025381	MATD	7924	Modern Topology	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025259	MATE	6814	Analysis	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025260	MATE	6824	Analysis	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021934	MATE	7914	Analysis	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025347	MATE	7924	Analysis	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	016908	MATF	6814	Measure and Integration Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025376	MATF	6824	Measure and Integration Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	016938	MATF	7914	Measure and Integration Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025377	MATF	7924	Measure and Integration Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021365	MATG	6814	Codingtheory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025351	MATG	6824	Codingtheory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021937	MATG	7914	Coding Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025350	MATG	7924	Coding Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025261	MATH	6814	Discrete Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	026021	MATH	6824	Discrete Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	016939	MATH	7914	Discrete Mathematics	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics

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PGRD	S2	025356	MATH	7924	Discrete Mathematics	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021366	MATI	6814	Set Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025345	MATI	6824	Set Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021768	MATI	7914	Set Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025385	MATI	7924	Set Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025368	MATJ	6814	Group Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	022392	MATJ	6824	Group Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021938	MATJ	7914	Group Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025364	MATJ	7924	Group Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021402	MATK	6814	Ring Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025383	MATK	6824	Ring Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021939	MATK	7914	Ring Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025384	MATK	7924	Ring Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021403	MATL	6814	Category Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025362	MATL	6824	Category Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021940	MATL	7914	Category Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025428	MATL	7924	Category Theory	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021404	MATM	6814	Methods of Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025523	MATM	6818	Research Report	111	MAIN	BFN	32	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025838	MATM	6819	Research Report Mathematics	111	MAIN	BFN	36	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025378	MATM	6824	Methods of Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025264	MATM	6828	Mini Dissertation	111	MAIN	BFN	32	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025839	MATM	6829	Research Report Mathematics	111	MAIN	BFN	36	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025503	MATM	7910	Mini Dissertation	111	MAIN	BFN	60	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021941	MATM	7914	Methods of Mathematics	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	021378	MATM	7920	Mini Dissertation	111	MAIN	BFN	48	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025379	MATM	7924	Methods of Mathematics	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	026911	MATM	7930	Mini Dissertation Mathematics	111	MAIN	BFN	84	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	026912	MATM	7940	Mini Dissertation Mathematics	111	MAIN	BFN	84	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	YR	025355	MATM	8900	Mathematics Dissertation	111	MAIN	BFN	180	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	YR	025068	MATM	9100	Mathematics Thesis	111	MAIN	BFN	360	Selection for PhD with specialisation in Mathematics and Applied Mathematics
PGRD	S1	016910	MATN	6814	Digital Image Processing	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025353	MATN	6824	Digital Image Processing	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	016940	MATN	7914	Digital Image Processing	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025354	MATN	7924	Digital Image Processing	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025388	MATO	6814	Numerical Linear Algebra	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	021405	MATO	6824	Numerical Linear Algebra	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	021956	MATO	7914	Numerical Linear Algebra	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025392	MATO	7924	Numerical Linear Algebra	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	016911	MATP	6814	Numerical Solution of Differential Equations	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025382	MATP	6824	Numerical Solution of Differential Equations	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	016941	MATP	7914	Numerical Solution of Differential Equations	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025265	MATP	7924	Numerical Solution of Differential Equations	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics

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PGRD	S1	025266	MATQ	6814	Optimisation	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025267	MATQ	6824	Optimisation	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025268	MATQ	7914	Optimisation	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025269	MATQ	7924	Optimisation	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025270	MATR	6814	Cryptography	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025271	MATR	6824	Cryptography	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025272	MATR	7914	Cryptography	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025273	MATR	7924	Cryptography	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025274	MATS	6814	Partial Differential Equations	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025275	MATS	6824	Partial Differential Equations	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025276	MATS	7914	Partial Differential Equations	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025277	MATS	7924	Partial Differential Equations	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025278	MATT	6814	Fluid Mechanics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025279	MATT	6824	Fluid Mechanics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025280	MATT	7914	Fluid Mechanics	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	021959	MATT	7924	Fluid Mechanics	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025281	MATU	6814	Biological Modelling	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025282	MATU	6824	Biological Modelling	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025285	MATU	7914	Biological Modelling	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025283	MATU	7924	Biological Modelling	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021407	MATV	6814	Fractional Calculus	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025284	MATV	6824	Fractional Calculus	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025286	MATV	7914	Fractional Calculus	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025340	MATV	7924	Fractional Calculus	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021255	MATW	6814	Financial Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025287	MATW	6824	Financial Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025288	MATW	7914	Financial Mathematics	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025289	MATW	7924	Financial Mathematics	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	016913	MATX	6814	Graph Theory	111	MAIN	BFN	16	MATX6814: Student must have passed MATM3734 and obtained at least 40% in MATM3744 in order to register for this module.
PGRD	S2	025393	MATX	6824	Graph Theory	111	MAIN	BFN	16	MATX6824: Student must have passed MATM3734 and obtained at least 40% in MATM3744 in order to register for this module.
PGRD	S1	016943	MATX	7914	Graph Theory	111	MAIN	BFN	16	MATX7914: Student must have passed MATM3734 and obtained at least 40% in MATM3744 in order to register for this module.
PGRD	S2	025840	MATY	7924	Graph Theory	111	MAIN	BFN	16	MATX7924: Student must have passed MATM3734 and obtained at least 40% in MATM3744 in order to register for this module.
PGRD	S1	022393	MATY	6814	Asymptotic Methods	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025841	MATY	6824	Asymptotic Methods	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	026022	MATY	7914	Asymptotic Methods	111	MAIN	BFN	16	MATY7914: Student must have passed MATY6814 or MATY6824 in order to register for this module.
PGRD	S2	026023	MATY	7924	Asymptotic Methods	111	MAIN	BFN	16	MATX7924: Student must have passed MATY6814 or MATY6824 in order to continue with this module.
PGRD	S1	025842	MATZ	6814	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025843	MATZ	6824	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025844	MATZ	6834	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics

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PGRD	S2	025290	MATZ	6844	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	016920	MATZ	6854	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S2	025411	MATZ	6864	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
PGRD	S1	025291	MATZ	7914	Capita Selecta	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025292	MATZ	7924	Capita Selecta	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	021962	MATZ	7934	Capita Selecta	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S2	025293	MATZ	7944	Capita Selecta	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	025294	MATZ	7954	Capita Selecta	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
PGRD	S1	016950	MATZ	7964	Capita Selecta	111	MAIN	BFN	16	Selection for MSc with specialisation in Mathematics and Applied Mathematics
MICROBIOLOGY AND BIOCHEMISTRY (112)										
UGRD	S2	023974	BLGY	1683	Introductory Biochemistry and Microbiology	112	MAIN	BFN	12	BLGY1683: Student must have passed BLGY1513 in order to register for this module.
UGRD	S1	001789	BOCB	2616	Biochemistry of Biological Compounds	112	MAIN	BFN	24	BOCB2616: Student must have passed BLGY1683 AND CHEM1623 OR CHEM1643 OR [CHEM1562 AND CHEM1622] AND CHEM1661
UGRD	S2	001794	BOCE	2626	Enzymology and Introductory Metabolism	112	MAIN	BFN	24	BOCE2626: Student must have passed BOCB2616 in order to continue with this module.
UGRD	S1	025994	BOCE	3714	Advanced Enzyme Kinetics and Metabolism	112	MAIN	BFN	16	BOCE3714: Student must have passed BOCE2626 in order to continue with this module.
UGRD	S1	020204	BOCH	2614	Biochemistry for Agriculture and Health Sciences	112	MAIN	BFN	16	None
UGRD	S1	020058	BOCM	3714	Molecular Biology	112	MAIN	BFN	16	BOCM3714: Student must have passed BOCE2626 in order to continue with this module.
UGRD	S2	025190	BOCP	3724	Protein Biochemistry	112	MAIN	BFN	16	BOCP3724: Student must have passed BOCE2626 in order to continue with this module.
UGRD	S2	025081	BOCS	3724	Cell Membranes, Signal Transduction and Immunology	112	MAIN	BFN	16	BOCS3724: Student must have passed BOCE2626 in order to continue with this module.
UGRD	S2	009550	MCBC	3724	Microbial Genomics, Genetics and Biotechnology	112	MAIN	BFN	16	MCBC3724: Student must have passed MCBP2626 in order to continue with this module.
UGRD	S2	027265	MCBE	3714	Microbial Ecology and Environmental Microbiology	112	MAIN	BFN	16	MCBE3714: Student must have passed MCBP2626 in order to continue with this module.
UGRD	S1	020060	MCBG	3714	Growth, Nutrition and Death of Microoganisms	112	MAIN	BFN	16	MCBG3714: Student must have passed MCBP2626 in order to continue with module.
UGRD	S1	019676	MCBH	2614	Introduction to Microbiology for Health and Consumer Sciences	112	MAIN	BFN	16	None
UGRD	S2	019677	MCBH	2624	Introduction to Microbial Pathogenicity for Health and Consumer Sciences	112	MAIN	BFN	16	MCBH2624: Student must have passed MCBH2614 in order to register for this module.
UGRD	S1	009514	MCBP	2616	The Basic Principles of Microbiology	112	MAIN	BFN	24	MCBP2616: Student must have passed BLGY1683 in order to continue with module.
UGRD	S2	009520	MCBP	2626	Microbial Evolution and Diversity	112	MAIN	BFN	24	MCBP2626: Student must have passed MCBP2616 in order to continue with this module.
UGRD	S1	009547	MCBP	3724	Pathogens and Immunity	112	MAIN	BFN	16	MCBP3724: Student must have passed MCBP2626 in order to continue with module.
PGRD	YR	027210	BOCB	6804	Bioinformatics and Omics Sciences	112	MAIN	BFN	16	Selection BScHons
PGRD	YR	025077	BOCD	9100	Biochemistry Thesis	112	MAIN	BFN	360	Selection PhD
PGRD	S2	027211	BOCE	6844	Enzyme Structure and Catalysis	112	MAIN	BFN	16	Selection BScHons
PGRD	S2	020686	BOCL	6826	Research: Literature Study	112	MAIN	BFN	24	Selection BScHons
PGRD	YR	001842	BOCM	6804	Advanced Molecular Biology	112	MAIN	BFN	16	Selection BScHons
PGRD	YR	001848	BOCM	8900	Biochemistry Dissertation	112	MAIN	BFN	180	Selection MSc
PGRD	S2	025069	BOCO	6822	Biochemistry Oral Examination	112	MAIN	BFN	8	Selection BScHons

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PGRD	S2	025235	BOCR	6828	Research Essay	112	MAIN	BFN	32	Selection BScHons
PGRD	YR	025113	BOCT	6804	Techniques in Biochemistry	112	MAIN	BFN	16	Selection BScHons
PGRD	YR	025630	MBBT	8900	Microbial Biotechnology Dissertation	112	MAIN	BFN	180	Selection MSc
PGRD	YR	025171	MBBT	9100	Microbial Biotechnology Thesis	112	MAIN	BFN	360	Selection PhD
PGRD	YR	002154	MCBC	6804	Continuous and Batch Cultivation of Microorganisms	112	MAIN	BFN	16	Selection BScHons
PGRD	S1	025847	MCBD	6824	Microbial Diversity	112	MAIN	BFN	16	Selection BScHons
PGRD	S2	020685	MCBL	6826	Research : Literature Study	112	MAIN	BFN	24	Selection BScHons
PGRD	YR	009567	MCBM	6804	Microbial Molecular Biology	112	MAIN	BFN	16	Selection BScHons
PGRD	S2	009562	MCBO	6822	Oral Examination in Microbiology	112	MAIN	BFN	8	Selection BScHons
PGRD	S2	025848	MCBP	6814	Applied Microbial Physiology	112	MAIN	BFN	16	Selection BScHons
PGRD	S2	009569	MCBR	6828	Research Report	112	MAIN	BFN	32	Selection BScHons
PGRD	YR	009561	MCBT	6804	Techniques in Microbiology	112	MAIN	BFN	16	Selection BScHons
PGRD	YR	025341	MCBT	8900	Microbiology Dissertation	112	MAIN	BFN	180	Selection MSc
PGRD	YR	025173	MCBT	9100	Microbiology Thesis	112	MAIN	BFN	360	Selection PhD
PHYSICS (113)										
UGRD	S1	004921	PHYA	1554	Introductory Astronomy	113	MAIN	BFN	16	None
UGRD	S2	004922	PHYA	1664	Principles and Practice of Observational Astronomy	113	MAIN	BFN	16	PHYA1664: Student must have passed PHYA1554 in order to continue with this module.
UGRD	S1	027564	PHYA	2614	Astrophysics	113	MAIN	BFN	16	PHYA2614: Student must have passed PHYS1514, PHYS1624, PHYA1554 and PHYA1664 and MATM1534 and MATM1644 in order to continue with this module.
UGRD	S2	027763	PHYA	2624	Astrophysics	113	MAIN	BFN	16	PHYA2624: Student must have passed PHYA1554 and PHYA1664 and PHYA2614 in order to continue with module
UGRD	YR	027565	PHYA	3709	Astronomy Practical	113	MAIN	BFN	36	PHYA3709 :Student must have passed PHYA2614 and PHYA2624 in order to continue with this module.
UGRD	S1	025198	PHYA	3773	Radiative Processes in Astrophysics I	113	MAIN	BFN	8	PHYA3773: Student must have passed PHYS2614 and PHYS2644 and PHYA2614 in order to continue with this module.
UGRD	S2	022235	PHYA	3783	Radiative Processes in Astrophysics II	113	MAIN	BFN	8	PHYA3783: Student must have passed PHYS3714 and PHYS3732 and PHYA3773 and PHYA2614 in order to continue with this module.
UGRD	S2	027566	PHYC	2623	Introduction to Numerical Analysis and Quantitative Methods	113	MAIN	BFN	12	PHYC2623: Student must have passed PHYS1514, PHYS1624, PHYA1554 and PHYA1664 and MATM1534 and MATM1644 in order to continue with this module.
UGRD	S1	027603	PHYM	2613	Analytical Mechanics for Physicists and Engineers	113	MAIN	BFN	12	PHYM2613: Student must have passed PHYS1514, PHYS1624, PHYA1554 and PHYA1664 and MATM1534 and MATM1644 in order to continue with this module.
UGRD	S1	004913	PHYS	1512	Physics for Building Science Students	113	MAIN	BFN	8	None
UGRD	S1	004914	PHYS	1514	Mechanics, Optics and Electricity	113	MAIN	BFN	16	PHYS1514: Student must have passed MATM1534 previously or register simultaneously for MATM1534 and PHYS1514 in order to continue with this module.
UGRD	S1	004919	PHYS	1534	Mechanics, Optics, Electricity and Biological and Medical Relevant Topics	113	MAIN	BFN	16	None
UGRD	S2	023869	PHYS	1543	Physics for Physiotherapists	113	MAIN	BFN	12	PHYS1543: Student must have passed PHYS1534 in order to continue with this module.
UGRD	S2	004917	PHYS	1624	Mechanics, Thermodynamics, Electricity and Magnetism	113	MAIN	BFN	16	PHYS1624: Student must have passed (PHYS1514 or 60 % PHYS1534) and MATM1534 in order to continue with this module.
UGRD	S2	004920	PHYS	1644	Electricity, Magnetism, Biologically and Medically Relevant Topics	113	MAIN	BFN	16	None
UGRD	S1	004924	PHYS	2614	Mechanics, Waves and Optics	113	MAIN	BFN	16	PHYS2614: Student must have passed (PHYS1514 or 60% PHYS1534) and (PHYS1624 or 60% PHYS1644) and MATM1534 and MATM1644 in order to continue with this module.

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UGRD	S2	004927	PHYS	2624	Electronics	113	MAIN	BFN	16	PHYS2624: Student must have passed (PHYS1514 or 60% PHYS1534) and (PHYS1624 or 60% PHYS1644) and MATM1534 and MATM1644 in order to continue with this module.
UGRD	S1	004930	PHYS	2632	Practical Work: Physics	113	MAIN	BFN	8	PHYS2632: The student must have passed PHYS2614 previously or register simultaneously for PHYS2614 and PHYS2632 to continue with this module.
UGRD	S2	004933	PHYS	2644	Electromagnetism	113	MAIN	BFN	8	PHYS2644: The student must have passed PHYS2614 to continue with this module.
UGRD	S1	004935	PHYS	2654	Ophthalmic Optics/Visual Optics	113	MAIN	BFN	16	PHYS2654: Student must have passed (PHYS1514 or PHYS1534) and (PHYS1624 or PHYS1644) in order to register for this module. This module is only for Optometry students .
UGRD	S2	022361	PHYS	2664	Special Ophthalmic Optics	113	MAIN	BFN	16	PHYS2664: Student must have passed (PHYS1514 or PHYS1534) and PHYS2654 and (PHYS1624 or PHYS1644) in order to continue with this module. This module is only for Optometry students.
UGRD	S1	004938	PHYS	3714	Modern Physics	113	MAIN	BFN	16	PHYS3714:Student must have passed PHYS2614 in order to continue with this module.
UGRD	S2	004940	PHYS	3724	Solid State Physics	113	MAIN	BFN	16	PHYS3724: Student must have passed PHYS3714 in order to continue with this module.
UGRD	S1	004942	PHYS	3732	Statistical Physics I	113	MAIN	BFN	8	PHYS3732: Student must have passed PHYS2614 in order to continue with this module.
UGRD	S2	004944	PHYS	3742	Statistical Physics Ii	113	MAIN	BFN	8	PHYS3742: Student must have passed PHYS3732 in order to continue with this module.
UGRD	S1	004947	PHYS	3752	Practical Work: Physics	113	MAIN	BFN	8	PHYS3752: Student must have passed PHYS2632 and co-requisite: register simultaneously with PHYS3714 and PHYS3732 in order to register for this module.
UGRD	S2	004948	PHYS	3762	Practical Work: Physics	113	MAIN	BFN	8	PHYS3762: Student must have passed PHYS2632 and register simultaneously for PHYS3724 and PHYS3742 in order to register for this module.
UGRD	YR	026489	PHYS	1502	Physics for Building Science Students	113	MAIN	BUILDSC	8	None
UGRD	S1	004913	PHYS	1512	Physics for Building Science Students	113	MAIN	BUILDSC	8	None
UGRD	S1	004914	PHYS	1514	Mechanics, Optics and Electricity	113	QWA	QWAQWA	16	PHYS1514: Student must have passed MATM1534 previously or register simultaneously for MATM1534 and PHYS1514 in order to continue with this module.
UGRD	S1	004919	PHYS	1534	Mechanics, Optics, Electricity and Biological and Medical Relevant Topics	113	QWA	QWAQWA	16	None
UGRD	S2	004917	PHYS	1624	Mechanics, Thermodynamics, Electricity and Magnetism	113	QWA	QWAQWA	16	PHYS1624: Student must have passed (PHYS1514 or PHYS1534) and MATM1534 in order to continue with this module.
UGRD	S2	004920	PHYS	1644	Electricity, Magnetism, Biologically and Medically Relevant Topics	113	QWA	QWAQWA	16	None
UGRD	S1	004924	PHYS	2614	Mechanics, Waves and Optics	113	QWA	QWAQWA	16	PHYS2614: Student must have passed (PHYS1514 or 60% PHYS1534) and (PHYS1624 or 60% PHYS1644) and MATM1534 and MATM1644 in order to continue with this module.
UGRD	S2	004927	PHYS	2624	Electronics	113	QWA	QWAQWA	16	PHYS2624: Student must have passed (PHYS1514 or 60% PHYS1534) and (PHYS1624 or 60% PHYS1644) and MATM1534 and MATM1644 in order to continue with this module.
UGRD	S1	004930	PHYS	2632	Practical Work: Physics	113	QWA	QWAQWA	8	PHYS2632: The student must have passed PHYS2614 previously or register simultaneously for PHYS2614 and PHYS2632 to continue with this module.
UGRD	S2	004933	PHYS	2644	Electromagnetism	113	QWA	QWAQWA	8	PHYS2644: The student must have passed PHYS2614 to continue with this module.
UGRD	S1	004938	PHYS	3714	Modern Physics	113	QWA	QWAQWA	16	PHYS3714:Student must have passed PHYS2614 in order to continue with this module.
UGRD	S2	004940	PHYS	3724	Solid State Physics	113	QWA	QWAQWA	16	PHYS3724: Student must have passed PHYS3714 in order to continue with this module.
UGRD	S1	004942	PHYS	3732	Statistical Physics I	113	QWA	QWAQWA	8	PHYS3732: Student must have passed PHYS2614 in order to continue with this module.

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UGRD	S2	004944	PHYS	3742	Statistical Physics Ii	113	QWA	QWAQWA	8	PHYS3742: Student must have passed PHYS3732 in order to continue with this module.
UGRD	S1	004947	PHYS	3752	Practical Work: Physics	113	QWA	QWAQWA	8	PHYS3752: Student must have passed PHYS2632 and co-requisite: register simultaneously with PHYS3714 and PHYS3732 in order to register for this module.
UGRD	S2	004948	PHYS	3762	Practical Work: Physics	113	QWA	QWAQWA	8	PHYS3762: Student must have passed PHYS2632 and register simultaneously for PHYS3724 and PHYS3742 in order to register for this module.
PGRD	YR	023891	NSAP	7900	Advanced Nanophysics	113	MAIN	BFN	48	Selection MSc Nano Science
PGRD	YR	023888	NSCC	7911	Central Concepts in Nanoscience	113	MAIN	BFN	4	Selection MSc Nano Science
PGRD	YR	023887	NSFB	7911	Foundations of Nano-Biomedical Sciences for Non-Biologists	113	MAIN	BFN	4	Selection MSc Nano Science
PGRD	YR	023885	NSFC	7911	Foundations of Nanochemistry for Non-Chemists	113	MAIN	BFN	4	Selection MSc Nano Science
PGRD	S1	027185	NSFP	7911	Foundations of Nanophysics for Non-Physicists	113	MAIN	BFN	4	Selection MSc Nano Science
PGRD	YR	023886	NSMN	7911	Management for Nanoscientists	113	MAIN	BFN	4	Selection MSc Nano Science
PGRD	YR	023889	NSRP	7900	Nanoscience Research Project	113	MAIN	BFN	100	Selection MSc Nano Science
PGRD	YR	023890	NSTP	7914	Experimental Techniques in Nanophysics	113	MAIN	BFN	16	Selection MSc Nano Science
PGRD	YR	025779	PHYA	6808	Astrophysics Research Essay	113	MAIN	BFN	32	Selection BScHons
PGRD	S1	004964	PHYA	6814	Astrophysics	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025636	PHYA	6824	Astrophysics	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004966	PHYA	6834	General Relativity and Cosmology	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025761	PHYA	6844	General Relativity and Cosmology	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004965	PHYA	6854	Astrophysical Fluid Dynamics	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025774	PHYA	6864	Astrophysical Fluid Dynamics	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	025766	PHYA	6874	High Energy Astrophysics	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025758	PHYA	6884	High Energy Astrophysics	113	MAIN	BFN	16	Selection BScHons
PGRD	YR	004979	PHYA	7900	Astrophysics Mini-Dissertation	113	MAIN	BFN	100	Selection BScHons
PGRD	S1	020736	PHYA	7970	Astrophysics and Space Science	113	MAIN	BFN	80	Selection BScHons
PGRD	YR	025313	PHYA	8900	Astrophysics Dissertation	113	MAIN	BFN	180	Selection BScHons
PGRD	YR	025633	PHYA	9100	Physics Thesis	113	MAIN	BFN	360	Selection BScHons
PGRD	S1	025765	PHYC	6814	Capita Selecta I	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	025937	PHYC	6834	Capita Selecta Ii	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025922	PHYC	6844	Capita Selecta Iv	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	025936	PHYE	6814	Electrodynamics	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	004960	PHYE	6824	Electrodynamics	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	025394	PHYE	6834	Electronics	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	004963	PHYE	6844	Electronics	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004959	PHYI	6814	Statistical Physics	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025662	PHYI	6824	Statistical Physics	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004961	PHYI	6834	Material Science I	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025889	PHYI	6844	Material Science I	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004962	PHYI	6854	Material Science LI	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025890	PHYI	6864	Material Science LI	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004958	PHYI	6874	Semi-Conductors	113	MAIN	BFN	16	Selection BScHons

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PGRD	S2	025663	PHYI	6884	Semi-Conductors	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004955	PHYR	6814	Research Techniques	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025664	PHYR	6824	Research Techniques	113	MAIN	BFN	16	Selection BScHons
PGRD	YR	025893	PHYS	6808	Practicals	113	MAIN	BFN	32	Selection BScHons
PGRD	S1	004953	PHYS	6814	Quantum Mechanics	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025389	PHYS	6824	Quantum Mechanics	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004954	PHYS	6834	Solid State Physics I	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025660	PHYS	6844	Solid State Physics I	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004956	PHYS	6854	Computational Methods of Physics	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025659	PHYS	6864	Computational Methods of Physics	113	MAIN	BFN	16	Selection BScHons
PGRD	S1	004957	PHYS	6874	Solid State Physics Ii	113	MAIN	BFN	16	Selection BScHons
PGRD	S2	025658	PHYS	6884	Solid State Physics Ii	113	MAIN	BFN	16	Selection BScHons
PGRD	YR	025637	PHYS	8900	Physics Dissertation	113	MAIN	BFN	180	Selection BScHons
PGRD	S2	025637	PHYS	8900	Physics Dissertation	113	MAIN	BFN	180	Selection BScHons
PGRD	YR	025184	PHYS	9100	Physics Thesis	113	MAIN	BFN	360	Selection BScHons
PGRD	S1	025765	PHYC	6814	Capita Selecta I	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025922	PHYC	6844	Capita Selecta Iv	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	025936	PHYE	6814	Electrodynamics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	004960	PHYE	6824	Electrodynamics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	025394	PHYE	6834	Electronics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	004963	PHYE	6844	Electronics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	004959	PHYI	6814	Statistical Physics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025662	PHYI	6824	Statistical Physics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	004961	PHYI	6834	Material Science I	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025889	PHYI	6844	Material Science I	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	004958	PHYI	6874	Semi-Conductors	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025663	PHYI	6884	Semi-Conductors	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	004955	PHYR	6814	Research Techniques	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025664	PHYR	6824	Research Techniques	113	QWA	QWAQWA	16	Selection BScHons
PGRD	YR	025893	PHYS	6808	Practicals	113	QWA	QWAQWA	32	Selection BScHons
PGRD	S1	004953	PHYS	6814	Quantum Mechanics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025389	PHYS	6824	Quantum Mechanics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	004954	PHYS	6834	Solid State Physics I	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025660	PHYS	6844	Solid State Physics I	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	004956	PHYS	6854	Computational Methods of Physics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025659	PHYS	6864	Computational Methods of Physics	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	004957	PHYS	6874	Solid State Physics Ii	113	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025658	PHYS	6884	Solid State Physics Ii	113	QWA	QWAQWA	16	Selection BScHons
PGRD	YR	025637	PHYS	8900	Physics Dissertation	113	QWA	QWAQWA	180	Selection MSc
PGRD	S2	025637	PHYS	8900	Physics Dissertation	113	QWA	QWAQWA	180	Selection MSc
PGRD	YR	025184	PHYS	9100	Physics Thesis	113	QWA	QWAQWA	360	Selection MSc
PGRD	S2	025184	PHYS	9100	Physics Thesis	113	QWA	QWAQWA	360	Selection MSc

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PLANT SCIENCE (114)										
UGRD	S2	023973	BLGY	1643	The Interdependence of Plants and Life On Earth	114	MAIN	BFN	12	BLGY1643: Student must have passed BLGY1513 in order to continue with this module.
UGRD	S1	025052	BTNY	2616	Plant Adaptations for Survival On Land	114	MAIN	BFN	24	BTNY2616: Student must have passed BLGY1643 in order to continue with this module.
UGRD	S2	026182	BTNY	2621	Field Excursion 1	114	MAIN	BFN	8	BTNY2621: Student must have passed Min. BTNY2616 (45%) in order to continue with this module. Only compulsory for BSc and BSc Agric students.
UGRD	S2	025163	BTNY	2626	Introductory Plant Development and Biotechnology	114	MAIN	BFN	24	BTNY2626: Student must have passed Min. BTNY2616 (45%) in order to continue with this module. BTNY2621 must be taken in the same year.
UGRD	S1	025236	BTNY	3712	Field Excursion 2	114	MAIN	BFN	8	BTNY3712: Student must have passed BTNY2616 in order to continue with this module.
UGRD	S1	020065	BTNY	3714	Diversity and Systematics of Higher Plants	114	MAIN	BFN	16	BTNY3714: Student must have passed BTNY2616 in order to continue with this module. BTNY3712 must be taken in the same year of study.
UGRD	S2	011803	BTNY	3724	Carbon Metabolism in Plants	114	MAIN	BFN	16	BTNY3724: Student must have passed BTNY2626 in order to continue with this module.
UGRD	S1	011806	BTNY	3734	Vegetation Science and Environmental Management	114	MAIN	BFN	16	BTNY3734: Student must have passed BTNY2616 in order to continue with this module. BTNY3712 must be taken in the same year of study.
UGRD	S2	020044	BTNY	3744	Plant Defence and Biotechnology	114	MAIN	BFN	16	BTNY3744: Student must have passed BTNY2626 in order to continue with this module.
UGRD	S1	021239	BTNY	3754	Plant Molecular Biotechnology	114	MAIN	BFN	16	BTNY3754: Student must have passed BTNY2616 in order to continue with this module.
UGRD	S2	027253	BTNY	3764	Ecophysiology: Soil-Plant-Water Interactions	114	MAIN	BFN	16	BTNY3764: Student must have passed BTNY2626 in order to continue with this module.
UGRD	S1	025107	PLTB	2613	Theoretical Principles of Plant Breeding	114	MAIN	BFN	12	None
UGRD	S2	025070	PLTB	2623	Applied Principles of Plant Breeding	114	MAIN	BFN	12	PLTB2623: Student must have passed PLTB2613 in order to continue with this module.
UGRD	S1	011881	PLTB	3714	Principles of Quantitative Genetics in Plant Breeding	114	MAIN	BFN	16	PLTB3714: Student must have passed PLTB2613 and PLTB2623 in order to continue with this module.
UGRD	S2	025300	PLTB	3724	Breeding for Abiotic Stress Tolerance	114	MAIN	BFN	16	PLTB3724: Student must have passed PLTB2613 and PLTB2623 in order to continue with this module.
UGRD	S2	025996	PLTB	3744	Advanced Breeding Techniques	114	MAIN	BFN	16	PLTB3744: Student must have passed PLTB2613 and PLTB2623 in order to continue with this module.
UGRD	YR	025899	PLTB	4808	Research Project Plant Breeding	114	MAIN	BFN	32	PLTB4808: Student must have passed all PLTB modules up to 3rd year in order to continue with this module.
UGRD	S1	019703	PLTB	4814	Advanced Quantitative Genetics in Plant Breeding	114	MAIN	BFN	16	PLTB4814: Student must have passed PLTB3714 in order to continue with this module.
UGRD	S1	028203	PLTB	4816	Literature Review Plant Breeding	114	MAIN	BFN	24	PLTB4816: Student must have passed all PLTB modules up to 3rd year in order to continue with this module.
UGRD	S2	025301	PLTB	4824	Quality and Stress Tolerance Breeding	114	MAIN	BFN	16	PLTB4824: Student must have passed PLTB3724 in order to continue with this module.
UGRD	S1	019704	PLPG	4814	Molecular plant breeding and plant pathology	114	MAIN	BFN	16	PLPG4814: Students must have passed PLTB2613, PLTB2623, PLTB3744 and BTNY 3754
UGRD	S1	011894	PLTB	4854	Statistics in Plant Sciences	114	MAIN	BFN	16	PLTB4854: Student must have passed PLTB3714 in order to continue with this module.
UGRD	S2	024836	PPLG	2624	Principles of Plant Pathology	114	MAIN	BFN	16	PPLG2624: Student must have passed BLGY1643 and one of Min. BLGY1643 or Min. BLGY1683 in order to continue with this module.
UGRD	S1	012101	PPLG	3714	Mycological Plant Pathology	114	MAIN	BFN	16	PPLG3714: Student must have passed PPLG2624 in order to continue with this module.
UGRD	S2	012091	PPLG	3724	Plant Disease Management	114	MAIN	BFN	16	PPLG3724: Student must have passed PPLG2624 in order to continue with this module.

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UGRD	S1	025885	PPLG	3734	Bacterial and Viral Diseases of Plants	114	MAIN	BFN	16	PPLG3734: Student must have passed PLG2624 in order to continue with this module.
UGRD	S2	025305	PPLG	3744	Ecology of Plant Pathogens	114	MAIN	BFN	16	PPLG3744: Student must have passed PPLG2624 in order to continue with this module.
UGRD	YR	024837	PPLG	4808	Plant Pathology Research Report	114	MAIN	BFN	32	PPLG4808: Student must have passed all undergraduate PPLG modules in order to proceed.
UGRD	S1	028214	PPLG	4816	Literature Review Plant Pathology	114	MAIN	BFN	24	PPLG4816: Student must have passed all undergraduate PPLG modules in order to proceed.
UGRD	S2	025183	PPLG	4824	Plant-Pathogen Interactions	114	MAIN	BFN	16	PPLG4824: Student must have passed all undergraduate PPLG modules in order to proceed.
UGRD	S1	025886	PPLG	4834	Epidemiology and control of plant diseases	114	MAIN	BFN	16	PPLG4834: Student must have passed all undergraduate PPLG modules in order to proceed.
UGRD	S2	024594	BIOL	1624	Plant Biology	114	QWA	QWAQWA	16	BIOL1624: Student must have passed BIOL1514 in order to continue with this module.
UGRD	S2	024704	BIOL	2644	The Physical Environment: Natural Resources, Ecology and Sustainability	114	QWA	QWAQWA	16	BIOL2644: Student must have passed BIOL2614 in order to continue with this module.
UGRD	S1	024597	BOTA	2654	Introduction to Plant Anatomy and Morphology	114	QWA	QWAQWA	16	BOTA2654: Student must have passed two of BIOL1514 or BIOL1644 or BIOL1624 in order to continue with this module.
UGRD	S2	024679	BOTA	2684	Plant Physiology and Biotechnology	114	QWA	QWAQWA	16	BOTA2684: Student must have passed BIOL1514 in order to continue with this module.
UGRD	S2	024685	BOTA	3724	Plant Metabolism and The Environment	114	QWA	QWAQWA	16	BOTA3724: Student must have passed BIOL2684 in order to continue with this module.
UGRD	S1	024686	BOTA	3734	Introduction to Plant Systematics	114	QWA	QWAQWA	16	BOTA3734: Student must have passed BIOL2644 in order to continue with this module.
UGRD	S2	024687	BOTA	3744	Ethnobotany and Plant Defence	114	QWA	QWAQWA	16	BOTA3744: Student must have passed BIOL2684 in order to continue with this module.
UGRD	S1	024688	BOTA	3754	Vegetation Ecology	114	QWA	QWAQWA	16	BOTA3754: Student must have passed BIOL2684 in order to continue with this module.
UGRD	S2	023973	BLGY	1643	The Interdependence of Plants and Life On Earth	114	SOUTH	SOUTH	12	BLGY1643: Student must have passed BLGY1513 in order to continue with this module.
PGRD	YR	025805	BOTA	8900	Botany Dissertation	114	QWA	QWAQWA	180	Selection MSc
PGRD	YR	011853	BTNY	6806	Literature Review	114	MAIN	BFN	24	Selection BScHons
PGRD	YR	011855	BTNY	6808	Research Project Botany	114	MAIN	BFN	32	Selection BScHons
PGRD	S1	011830	BTNA	6804	Advanced Plant Ecology	114	MAIN	BFN	16	Selection BScHons
PGRD	S1	027358	BTNY	6816	Literature Review Botany	114	MAIN	BFN	24	Selection BScHons
PGRD	S1	027368	BTNY	6818	Botany Research Project	114	MAIN	BFN	32	Selection BScHons
PGRD	S2	029014	BTNA	6824	Conservation Biology	114	MAIN	BFN	16	Selection BScHons
PGRD	S2	027369	BTNY	6826	Literature Review Botany	114	MAIN	BFN	24	Selection BScHons
PGRD	S2	026879	BTNY	6828	Research Report Botany	114	MAIN	BFN	32	Selection BScHons
PGRD	S1	011841	BTND	6804	Plant Molecular Systematics	114	MAIN	BFN	16	Selection BScHons
PGRD	S2	011843	BTNY	6844	Plant Physiology II (Plant Defence and Applications)	114	MAIN	BFN	16	Selection BScHons
PGRD	S1	011845	BTNB	6804	Advanced Plant Taxonomy	114	MAIN	BFN	16	Selection BScHons
PGRD	S2	011846	BTNY	6864	Ecosystem Management and Restoration	114	MAIN	BFN	16	Selection BScHons
PGRD	S1	011848	BTNC	6804	Advanced Plant Molecular Biotechnology	114	MAIN	BFN	16	Selection BScHons
PGRD	S2	011850	BTNY	6884	Plant Analytical Biochemistry	114	MAIN	BFN	16	Selection BScHons
PGRD	S1	027254	BTNE	6804	Methods in Palaeo-Ecology	114	MAIN	BFN	16	Selection BScHons
PGRD	YR	025238	BTNY	8900	Botany Dissertation	114	MAIN	BFN	180	Selection MSc
PGRD	YR	011857	BTNY	9100	Botany Thesis	114	MAIN	BFN	360	Selection PhD

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	YR	025726	PHEC	8900	Plant Health Ecology Dissertation	114	MAIN	BFN	180	Selection MSc
PGRD	YR	024958	PHEC	9100	Plant Health Ecology Thesis	114	MAIN	BFN	360	Selection PhD
PGRD	YR	025923	PLTB	6806	Literature Review	114	MAIN	BFN	24	Selection BScHons
PGRD	YR	025923	PLTB	6808	Plant Breeding Research Report	114	MAIN	BFN	32	Selection BScHons
PGRD	S1	025924	PLTB	6814	Advanced Quantitative Genetics in Plant Breeding	114	MAIN	BFN	16	Selection BScHons
PGRD	S1	027567	PLTB	6816	Literature Review Plant Breeding	114	MAIN	BFN	24	Selection BScHons
PGRD	S2	025302	PLTB	6824	Quality and Stress Tolerance Breeding	114	MAIN	BFN	16	Selection BScHons
PGRD	S2	027568	PLTB	6828	Literature Review Plant Breeding	114	MAIN	BFN	24	Selection BScHons
PGRD	YR	025895	PLTB	6818	Plant Breeding Research Report	114	MAIN	BFN	32	Selection BScHons
PGRD	S2	027568	PLTB	6828	Plant Breeding Research Report	114	MAIN	BFN	32	Selection BScHons
PGRD	S1	025780	PLPG	6814	Molecular Plant Breeding and Plant Pathology	114	MAIN	BFN	16	Selection BScHons
PGRD	S1	024840	PLTB	6854	Statistics in Plant Sciences	114	MAIN	BFN	16	Selection BScHons
PGRD	S1	025060	PLTB	6874	Advanced Statistics in Plant Sciences	114	MAIN	BFN	16	Selection BScHons
PGRD	YR	025349	PLTB	8900	Dissertation Plant Breeding	114	MAIN	BFN	180	Selection MSc
PGRD	S2	025638	PLTB	9100	Plant Breeding Thesis	114	MAIN	BFN	360	Selection PhD
PGRD	YR	025303	PLTI	8900	Interdisciplinary Plant Breeding Dissertation	114	MAIN	BFN	180	Selection MSc
PGRD	YR	025304	PLTI	9100	Interdisciplinary Thesis Plant Breeding	114	MAIN	BFN	360	Selection PhD
PGRD	YR	019712	PPLG	6806	Literature Review	114	MAIN	BFN	24	Selection BScHons
PGRD	YR	019713	PPLG	6808	Plant Pathology Research Report	114	MAIN	BFN	32	Selection BScHons
PGRD	S1	027516	PPLG	6816	Literature Review Plant Pathology	114	MAIN	BFN	24	Selection BScHons
PGRD	S1	027516	PPLG	6818	Plant Pathology Research Report	114	MAIN	BFN	32	Selection BScHons
PGRD	S2	025888	PPLG	6824	Plant-Pathogen Interactions	114	MAIN	BFN	16	Selection BScHons
PGRD	S2	027515	PPLG	6826	Literature Review Plant Pathology	114	MAIN	BFN	24	Selection BScHons
PGRD	S2	027516	PPLG	6818	Plant Pathology Research Report	114	MAIN	BFN	32	Selection BScHons
PGRD	S1	025892	PPLG	6834	Epidemiology and Control of Plant Diseases	114	MAIN	BFN	16	Selection BScHons
PGRD	S2	025894	~~PPLG~~	~~6844~~	~~Molecular Plant Pathology~~	114	MAIN	BFN	16	Selection BScHons
PGRD	YR	025640	PPLG	8900	Dissertation Plant Pathology	114	MAIN	BFN	180	Selection MSc
PGRD	YR	025641	PPLG	9100	Thesis Plant Pathology	114	MAIN	BFN	360	Selection PhD
PGRD	YR	027026	PPLI	8900	Interdisciplinary Plant Pathology Dissertation	114	MAIN	BFN	180	Selection MSc
PGRD	YR	027260	PPLI	9100	Interdisciplinary Plant Pathology Thesis	114	MAIN	BFN	360	Selection PhD
PGRD	YR	026411	BOTA	6808	Botany Research Project	114	QWA	QWAQWA	32	Selection BScHons
PGRD	S1	024690	BOTA	6814	Restoration Ecology	114	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	024691	BOTA	6824	Plant Ecophysiology	114	QWA	QWAQWA	16	BOTA6824: Student must have passed BOTA3764 in order to continue with this module.
PGRD	S2	026412	BOTA	6844	Plant Biotechnology	114	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	024692	BOTA	6864	Phytomedicine	114	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025805	BOTA	8900	Botany Dissertation	114	QWA	QWAQWA	180	Selection MSc
PGRD	YR	025806	BOTA	9100	Botany Thesis (Phd)	114	QWA	QWAQWA	360	Selection PhD

CONSTRUCTION ECONOMICS AND MANAGEMENT (115)

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
UGRD	S2	026985	BARR	1512	Architecture	115	MAIN	BFN	8	None
UGRD	S2	001850	BBER	1524	Building Economics 1	115	MAIN	BFN	16	
UGRD	S1	027245	BBER	2612	Building Economics	115	MAIN	BFN	8	None
UGRD	S2	027268	BBER	2622	Building Economics	115	MAIN	BFN	8	None
UGRD	S1	027488	BBSD	2614	Building Sciences 2	115	MAIN	BFN	16	None
UGRD	S1	027489	BBSD	3712	Building Science 3	115	MAIN	BFN	8	None
UGRD	S1	027270	BBSR	2614	Building Sciences 2	115	MAIN	BFN	16	None
UGRD	S1	027271	BCSR	2612	Construction Science	115	MAIN	BFN	8	None
UGRD	S2	027302	BCSR	2622	Construction Science 2	115	MAIN	BFN	8	None
UGRD	YR	001529	BDQR	1504	Descriptive Quantification 1	115	MAIN	BFN	16	
UGRD	YR	001531	BDQR	2604	Descriptive Quantification	115	MAIN	BFN	16	None
UGRD	S2	026878	BPDR	1522	Property Development 1	115	MAIN	BFN	8	None
UGRD	S1	025298	BPDR	2614	Property Development Economics	115	MAIN	BFN	16	None
UGRD	S2	027519	BPDR	2624	Property Development	115	MAIN	BFN	16	None
UGRD	S2	025759	SURV	2622	Land Surveying	115	MAIN	BFN	8	None
UGRD	S2	027200	BARD	1522	Architecture	115	MAIN	BUILDSC	8	None
UGRD	S2	027049	BBED	1524	Building Economics I	115	MAIN	BUILDSC	16	None
UGRD	S1	026986	BBSD	1504	Building Science I	115	MAIN	BUILDSC	16	None
UGRD	S1	027247	BCCR	3712	Construction Law	115	MAIN	BFN	8	None
UGRD	S2	027248	BCCR	3722	Construction Law	115	MAIN	BFN	8	None
UGRD	YR	026987	BDQD	1504	Descriptive Quantification I	115	MAIN	BUILDSC	16	None
UGRD	S2	026989	BPDD	1522	Property Development I	115	MAIN	BUILDSC	8	None
UGRD	YR	019523	BBSD	2604	Building Science	115	MAIN	BUILDSC	16	None
UGRD	YR	003572	EGSD	1504	Engineering Science	115	MAIN	BUILDSC	16	None
PGRD	YR	026033	ANDC	7904	Advanced Property Development	115	MAIN	BFN	8	None
PGRD	S2	026981	BCFR	6822	Construction Finance	115	MAIN	BFN	8	None
PGRD	YR	026988	BIPR	6804	Integrated Project Quantity Surveying and Construction Management	115	MAIN	BFN	16	None
PGRD	YR	026034	PVPE	7902	Building Economics for Mprop	115	MAIN	BFN	8	None
PGRD	S1	025635	BPDR	6812	Property Development Iv	115	MAIN	BFN	8	None
PGRD	YR	027060	BPMR	6804	Project Management	115	MAIN	BFN	16	None
PGRD	S1	026745	BPPR	6812	Professional Practice	115	MAIN	BFN	8	None
PGRD	S2	027115	BPQR	6822	Professional Practice	115	MAIN	BFN	8	None
PGRD	YR	007632	CFNR	6804	Construction Finance	115	MAIN	BFN	16	None
PGRD	YR	003106	DPRP	7902	Dispute Resolution	115	MAIN	BFN	8	None
PGRD	YR	026428	DQFR	9100	Quantity Surveying Thesis	115	MAIN	BFN	360	None
PGRD	YR	025323	ENDR	7900	Research Essay : Property Development	115	MAIN	BFN	60	ENDR7900: Student must have passed INDR7902 in order to register for this module.
PGRD	YR	025161	INDR	7902	Introduction to Research	115	MAIN	BFN	8	None
PGRD	YR	026505	IPMP	7903	Integrated Project	115	MAIN	BFN	16	None
PGRD	YR	020719	LSFP	7902	Life Cycle Cost , Facility Evaluation and Management	115	MAIN	BFN	8	None
PGRD	YR	026037	PPYC	7901	Professional Practice	115	MAIN	BFN	4	None
PGRD	YR	025318	PQMR	8900	Construction Management Dissertation	115	MAIN	BFN	180	None

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	YR	025680	PQMR	9100	Construction Management Thesis	115	MAIN	BFN	360	None
PGRD	YR	025764	PROP	8900	Property Sciences Dissetation	115	MAIN	BFN	180	None
PGRD	YR	025644	PROP	9100	Property Development Thesis	115	MAIN	BFN	360	None
PGRD	YR	020251	PVPR	6804	Property Valuation Practice	115	MAIN	BFN	16	None
PGRD	S1	027031	QBER	6812	Building Economics	115	MAIN	BFN	8	None
PGRD	S2	027032	QBER	6822	Building Economics	115	MAIN	BFN	8	None
PGRD	YR	001536	QDQR	6804	Descriptive Quantification Iv	115	MAIN	BFN	16	None
PGRD	YR	027114	QRPR	6808	Quantity Surveying Research Report	115	MAIN	BFN	32	None
PGRD	YR	027075	BIPD	6804	Integrated Project Quantity Surveying and Construction Management	115	MAIN	BUILDSC	16	None
PGRD	S2	027195	BPCD	6822	Professional Practice	115	MAIN	BUILDSC	8	None
PGRD	S1	027050	BPDD	6812	Property Development Iv	115	MAIN	BUILDSC	8	None
PGRD	YR	027076	BPMD	6804	Project Management	115	MAIN	BUILDSC	16	None
PGRD	S1	027059	BPPD	6812	Professional Practice Iv	115	MAIN	BUILDSC	8	None
PGRD	S2	027197	BPQD	6822	Professional Practice	115	MAIN	BUILDSC	8	None
PGRD	YR	025661	INPD	6803	Integrated Project	115	MAIN	BUILDSC	12	None
PGRD	YR	020246	PVPD	6804	Property Valuation Practice	115	MAIN	BUILDSC	16	None
UGRD	YR	029118	BMQD/ BMQR	1504	Descriptive Quantification 1	115	MAIN	BFN	16	
UGRD	YR	029119	BMQD/ BMQR	2604	Descriptive Quantification 2N	115	MAIN	BFN	16	
UGRD	YR	029120	BMQD/ BMQR	3706	Descriptive Quantification 3N	115	MAIN	BFN	24	
UGRD	S1	025759	SURV	2622	Land Surveying	115	MAIN	BFN	8	
PGRD	YR	028961	PMCM	7905	Construction Management Principles and Practices	115	MAIN	BFN	20	
PGRD	YR	028960	PVPO	7905	Property Valuation 1	115	MAIN	BFN	20	
SOIL, CROP AND CLIMATE SCIENCES (116)										
UGRD	S2	025519	AGEG	2624	Engineering Principles in Agriculture Practices	099	MAIN	BFN	16	AGEG2624: students must have passed AGRI1554 or MATM1534 or AGRI1624.
UGRD	S1	008407	AGEG	3714	Hydraulics	099	MAIN	BFN	16	AGEG3714: Student must have passed AGEG2624 in order to continue with this module.
UGRD	S2	008409	AGEG	3724	Irrigation Systems and Irrigation Surveying	099	MAIN	BFN	16	AGEG3724: Student must have passed AGEG3714 in order to continue with this module.
UGRD	S1	008572	AGRI	1534	Chemical Principles in Agricultural	116	MAIN	BFN	16	AGRI1534: Student must have passed Mathematics on level 3 in order to continue with this module.
UGRD	S1	008578	AGRI	1554	Physical and Mechanised Principles in Agriculture	116	MAIN	BFN	16	AGRI1554: Student must have passed Mathematics on level 3 in order to continue with this module.
UGRD	S2	008625	CLIM	3724	Climate Change and Variability	116	MAIN	BFN	16	NONE
UGRD	S2	027820	CLIM	3764	Climate Change and Variability	116	MAIN	BFN	16	NONE
UGRD	S1	008606	CLIM	2614	Fundamentals of Agrometeorology	116	MAIN	BFN	16	CLIM2614: Students must have passed SCCS1624 or PHYS1534 or PHYS1514 or AGRI1554 in order to continue with the module.
UGRD	S1	029129	CLIM	3734	Micrometeorology	116	MAIN	BFN	16	CLIM3734: Student must have passed CLIM2614 in order to continue with this module.
UGRD	S1	028637	CLIM	4874	Advanced Instrumentation in Agrometeorology	116	MAIN	BFN	16	CLIM4874: Student must have passed CLIM3734 in order to continue with this module
UGRD	S1	028637	CLIM	6874	Advanced Instrumentation in Agrometeorology	116	MAIN	BFN	16	CLIM6874: Student must have passed CLIM3734 in order to continue with this module

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
UGRD	S1	008639	CLIM	4834	Physics and Dynamics of The Atmosphere	116	MAIN	BFN	16	CLIM4834: Student must have passed CLIM2614 in order to continue with this module.
UGRD	S2	027062	CLIM	4864	Tropical Meteorology	116	MAIN	BFN	16	CLIM4864: Student must have obtained a minimum mark for CLIM4834 in order to continue with this module
UGRD	S2	008641	CLIM	4844	Weather Analysis and Forecasting	116	MAIN	BFN	16	CLIM4844: Student must have obtained a minimum mark for CLIM4834 in order to continue with this module
UGRD	S1	024384	CROP	2614	Concepts in crop production	116	MAIN	BFN	16	CROP2614: Students must have passed SCCS1624 in order to continue with this module.
UGRD	S1	025091	CROP	4814	Crop Physiology	116	MAIN	BFN	16	CROP4814: Students must have passed SCCS2624 or HORT3724 or HORT3724 in order to continue with this module.
UGRD	S2	025089	CROP	4824	Role of Nutrition in Crop Development	116	MAIN	BFN	16	CROP4824: Students must have passed SCCS2624 and CROP3714 or CROP3724 in order to continue with this module
UGRD	S1	025117	CROP	3714/ 3754	Summer Grain, Oil and Protein-Rich Crops	116	MAIN	BFN	16	CROP3714/3754: Students must have passed CROP2614 in order to continue with this module.
UGRD	S1	029121	CROP	3754	Summer Grain, Oil and Protein-Rich Crops	116	MAIN	BFN	16	CROP3714/3754: Students must have passed CROP2614 in order to continue with this module.
UGRD	S1	025090	CROP	4834	Water Dynamics in Crop Production	116	MAIN	BFN	16	CROP4834: Students must have passed CROP3714 or CROP3724 or HORT3754 or HORT3724 in order to continue with this module.
UGRD	S2	025031	CROP	4844	Weed Control	116	MAIN	BFN	16	CROP4844: Students must have passed SCCS2624 and CROP4814 and CROP3714 or CROP3724 or HORT3754 or HORT3724 in order to continue with this module.
UGRD	S2	029122	CROP	3764	Small grain, Industrial and Diverse Crops	116	MAIN	BFN	16	CROP3764: Student must have passed CROP2614 in order to continue with this module.
UGRD	S2	028935	CROP	3744/ 3764	Small grain, Industrial and Diverse Crops	116	MAIN	BFN	16	CROP3744/3764: Students must have past CROP2614 in order to continue with this module.
UGRD	S2	028640	HORT	3764	Applied Fruit Production	116	MAIN	BFN	16	HORT3724/3764:Student must have passed CROP2614 and HORT3734/3774 in order to continue with this module.
UGRD	S1		HORT	3734	Fruit Production	116	MAIN	BFN	16	HORT3734:Student must have passed CROP2614 in order to continue with this module.
UGRD	S1	029127	HORT	3774	Fruit Production	116	MAIN	BFN	16	HORT3774:Student must have passed CROP2614 in order to continue with this module.
UGRD	S1	025118	HORT	3754	Vegetable Production	116	MAIN	BFN	16	HORT3754: Students must have passed CROP2614 in order to continue with this module.
UGRD	S1	029221	HORT	3714	Vegetable Production	116	MAIN	BFN	16	HORT3754: Students must have passed CROP2614 in order to continue with this module.
UGRD	S2	028561	SCCS	2624	Crop Development	116	MAIN	BFN	16	SCCS2624: Students must have passed SCCS1624 in order to continue with the module.
UGRD	S2	025165	SCCS	1624	Introduction to Soil, Crop and Climate Sciences	116	MAIN	BFN	16	None. Only a total number of 120 students per language group will be accommodated.
UGRD	S2	028642	SCCS	3724	Research Methodologies in Soil Crop and Climate Science	116	Main	BFN	16	None
UGRD	S2	025132	SCCS	2684	Sustainable Soil and Water Management	116	MAIN	BFN	16	SCCS2684: Students must have passed SCCS 1624 in order to register for this module.
UGRD	S2	25307	SCCS 4824	4824/ 6824	Modelling Soil, Crop and Cilmate Interactions	116	MAIN	BFN	16	None
UGRD	S2	025308	SOIL	4844/ 6844	Soil Biological Principles and Applications	116	MAIN	BFN	16	SOIL4844/6844: Student must have passed SOIL2674.
UGRD	S1	025128	SOIL	4814/ 6814	Soil Chemical Principles and Applications	116	MAIN	BFN	16	SOIL4814: Students must have passed SOIL 2674/3714 in order to register for this module.
UGRD	S1	025131	SOIL	4834/ 6834	Soil Classification Principles and Applications	116	MAIN	BFN	16	SOIL4834: Student must have passed SOIL3774 in order to register for this module.
UGRD	S1	028643	SOIL	3774	Soil Classification, Evaluation, and Land Use Planning.	116	MAIN	BFN	16	SOIL3774: Student must have passed SCCS1624.

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
UGRD	S1		SOIL	3754	Soil Classification, Evaluation, and Land Use Planning.	116	MAIN	BFN	16	SOIL3754: Student must have passed SCCS1624
UGRD	S2	025129	SOIL	3724	Soil Contaminants and Management	116	MAIN	BFN	16	SOIL3724: Student must have passed SOIL2674
UGRD	S2	028023	SOIL	3744	Soil Contaminants and Management	116	MAIN	BFN	16	SOIL3724 Prerequisite: Students must have passed SOIL3714/3734 in order to register for this module.
UGRD	S1	028959	SOIL	2674	Soil Fertility and Fertilization	116	MAIN	BFN	16	SOIL2674: Students should have passed SCCS1624
UGRD	S2	025121	SOIL	4824	Soil Physical Principles and Applications	116	MAIN	BFN	16	SOIL4824: Student must have passed SCCS2864
PGRD	S1	028551	CCSA	7910	Climate change and variability	116	MAIN	BFN	20	Selection for Master
PGRD	S2	028895	CCSC	7900	Climate modelling and quantitative analysis	116	MAIN	BFN	40	Selection for Master
PGRD	S2	028896	CCSD	7900	Policy, educational and economic aspects of climate change	116	MAIN	BFN	40	Selection for Master
PGRD	S1	029126	CLIM	4854	Agrometeorological Services for Extension	116	MAIN	BFN	16	CLIM4854: Student must have passed CLIM2614 in order to continue with this module.
PGRD	S1	027061	CLIM	6854	Agrometeorological Services for Extension	116	MAIN	BFN	16	CLIM6854: Student must have passed CLIM2614 in order to continue with this module.
PGRD	YR	025679	CLIM	8900	Agrometeorology Dissertation	116	MAIN	BFN	180	Selection
PGRD	YR	025521	CLIM	9100	Agrometeorology Thesis	116	MAIN	BFN	180	Selection
PGRD	YR	028566	CLIM	7900	Mini dissertation in Climate change	116	MAIN	BFN	120	Selection for Master
PGRD	S1	026414	CLIM	6834		116	MAIN	BFN	16	CLIM6834: Student must have passed CLIM2614 in order to continue with this module.
PGRD	S1	028894	CLIM	7905	Research methodologies	116	MAIN	BFN	20	Selection for Master
PGRD	S1	028551	CLIM	7908	Sustainability and climate change adaptation of agricultural systems	116	MAIN	BFN	20	Selection for Master
PGRD	S2	027062	CLIM	6864	Tropical Meteorology	116	MAIN	BFN	16	CLIM6864: Students must have obtained a minimum mark for CLIM6834/4834 in order to continue with this module
PGRD	S2	025242	CLIM	6844	Weather Analysis and Forecasting	116	MAIN	BFN	16	CLIM6844: Student must have obtained a minimum mark for CLIM6834 in order to continue with this module.
PGRD	YR	026415	CLMI	8900	Agrometeorology Interdisciplinary Dissertation	116	MAIN	BFN	180	Selection
PGRD	YR	026416	CLMI	9100	Agrometeorology Interdisciplinary Thesis	116	MAIN	BFN	360	Selection
PGRD	YR	022369	CROI	8900	Agronomy Interdisciplinary Dissertation	116	MAIN	BFN	180	Selection
PGRD	YR	022373	CROI	9100	Agronomy Interdisciplinary Thesis	116	MAIN	BFN	360	Selection
PGRD	YR	025543	CROP	8900	Agronomy Dissertation	116	MAIN	BFN	180	Selection
PGRD	YR	025405	CROP	9100	Agronomy Thesis	116	MAIN	BFN	360	Selection
PGRD	S1	025475	CROP	6814	Crop Physiology	116	MAIN	BFN	16	Selection
PGRD	S2	025321	CROP	6824	Role of Nutrition in Crop Development	116	MAIN	BFN	16	Selection
PGRD	S1	025474	CROP	6834	Water Dynamics in Crop Production	116	MAIN	BFN	16	Selection
PGRD	S2	026427	CROP	6844	Weed Control	116	MAIN	BFN	16	Selection
PGRD	S1	002022	IRRI	6816	Evaluation of Soil and Water for Irrigation Suitability	116	MAIN	BFN	24	Selection
PGRD	S2	002023	IRRI	6826	Evaluation of Soil Fertility and Pest Control	116	MAIN	BFN	24	Selection
PGRD	S2	002024	IRRI	6846	Irrigation Design	116	MAIN	BFN	24	Selection
PGRD	YR	026277	IRRI	8900	Irrigation Science Dissertation	116	MAIN	BFN	180	Selection
PGRD	YR	026278	IRRI	9100	Irrigation Science Thesis	116	MAIN	BFN	360	Selection
PGRD	YR	025338	IRRI	6808	Research Project in Irrigation Management	116	MAIN	BFN	32	Selection
PGRD	S2	025648	SCCS	6824	Modelling Soil, Crop and Cilmate Interactions	116	MAIN	BFN	16	None
PGRD	YR	025751	SCCS	6808	Research Project in Soil, Crop and Climate Sciences	116	MAIN	BFN	32	SCCS6808: Students should pass all assessments in order to pass the module

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	YR	027774	SCCS	4808/ 6808	Research Project in Soil, Crop and Climate Sciences	116	MAIN	BFN	32	SCCS4808: Students should pass all assessments in order to pass the module.
PGRD	YR	026491	SOII	8900	Soil Science Interdisciplinary Dissertation	116	MAIN	BFN	180	Selection
PGRD	YR	027036	SOII	9100	Soil Science Interdisciplinary Thesis	116	MAIN	BFN	360	Selection
PGRD	YR	025650	SOIL	7904	Land Evaluation	116	MAIN	BFN	16	Selection
PGRD	S2	026450	SOIL	6844	Soil Biological Principles and Applications	116	MAIN	BFN	16	SOIL6844: Students have to pass SOIL6814 in order to continue with this module.
PGRD	S1	025902	SOIL	6814	Soil Chemical Principles and Applications	116	MAIN	BFN	16	Selection
PGRD	S1	026449	SOIL	6834	Soil Classification Principles and Applications	116	MAIN	BFN	16	Selection
PGRD	S2	025903	SOIL	6824	Soil Physical Principles and Applications	116	MAIN	BFN	16	Selection
PGRD	YR	025651	SOIL	8900	Soil Science Dissertation	116	MAIN	BFN	180	Selection
PGRD	YR	025652	SOIL	9100	Soil Science Thesis	116	MAIN	BFN	360	Selection
MATHEMATICAL STATISTICS AND ACTUARIAL SCIENCE (117)										
UGRD	S1	027232	ACSF	1613	Actuarial Financial Management	117	MAIN	BFN	12	ACSF1613 Prerequisite:National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or MATD1564 OR MATD1534 OR MATM1584
UGRD	S2	027233	ACSF	1623	Actuarial Financial Reporting	117	MAIN	BFN	12	ACSF 1623 Prerequisite:National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or MATD1564 OR MATD1534 OR MATM1584
UGRD	S1	025223	ACSF	2716	Introductory Financial Mathematics	117	MAIN	BFN	24	ACSF2716: Students must have passed STSM1624 and MATM1622 and MATM1644 in order to continue with this module.
UGRD	S2	025225	ACSF	2746	Advanced Financial Mathematics	117	MAIN	BFN	24	ACSF2746: Student must have passed ACSF2716 with 60% in order to register for this module.
UGRD	YR	023662	ACSM	3708	Actuarial Mathematics II	117	MAIN	BFN	24	ACSM3708: Student must have passed MATM2614 + MATA2654 + ACSF2746 in order to register this module.
UGRD	S1	026003	ACSG	1614	Introduction to Actuarial Science	117	MAIN	BFN	16	ACSG1614: National Senior Certificate (NCS) Mathematics on performance level 5 (60%) MATD1564 OR MATD1534 OR MATM1584
UGRD	S1	025227	ACSS	3708	Actuarial Statistics II	117	MAIN	BFN	24	ACSS3708: Student must have passed ACSF2746 and STSMS2626 in order to register for this module.
UGRD	S1	023583	EBCS	1514	Business Calculations	117	MAIN	BFN	16	EBCS1514: Student must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
UGRD	S2	023596	EBCS	1524	Business Calculations	117	MAIN	BFN	16	EBCS1524: Student must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
UGRD	S2	025999	STSA	1624	Introduction to Statistics	117	MAIN	BFN	16	National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or MATD1564 OR MATD1534 OR MATM1584
UGRD	S1	014057	STSA	2616	Multiple Regression Analysis and Time Series Analysis	117	MAIN	BFN	24	STSA2616: Student must have passed STSA1624 or (EBCS1514 and EBCS1524) or (EFBCS2514 and EFBC2524) in order to continue with this module.
UGRD	S2	014061	STSA	2626	Multiple Regression: Variance and Time Series Analysis	117	MAIN	BFN	24	STSA2626 : Student must have passed STSA2616 in order to register for this module.
UGRD	S1	014068	STSA	3716	Probability I	117	MAIN	BFN	24	STSA3716 : Student must have passed STSA1624 or (EBCS1514 and EBCS1524) or (EFBCS2514 and EFBC2524) in order to continue with this module.
UGRD	S2	014071	STSA	3726	Probability II	117	MAIN	BFN	24	STSA3726: Student must have passed STSA3716 in order to continue with this module.
UGRD	S1	023851	STSA	3732	Applied Statistics I	117	MAIN	BFN	8	STSA3732: Student must have passed STSA2626 in order to continue with this module.
UGRD	S2	023852	STSA	3742	Applied Statistics II	117	MAIN	BFN	8	STSA3742: Student must have passed STSA3732 in order to continue with this module.
UGRD	S1	016783	STSM	1614	Introductory Statistics	117	MAIN	BFN	16	STSM1614: NCS Mathematics level 6 (70%) or at least 60% in MATD1564/ MATD1534 or a pass in MATM1584 or MATM1534

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
UGRD	S2	016787	STSM	1624	Introductory Probability Theory	117	MAIN	BFN	16	STSM1624: Student must have passed STSM1614+ 60% in MATM1534 in order to continue with this module.
UGRD	S1	016790	STSM	2616	Sample Distribution Theory and Inference	117	MAIN	BFN	24	STSM2616: Student must have been passed STSM1624 in order to continue with this module.
UGRD	S2	016792	STSM	2626	Inference I	117	MAIN	BFN	24	STSM2626: Student must have passed STSM2616 in order to register for this module.
UGRD	S1		STSM	2634	Statistical Programming	117	MAIN	BFN	16	STSM2634: Student must have passed STSM1624 in order to register for this module.
UGRD	S1	016795	STSM	3714	Inference	117	MAIN	BFN	16	STSM3714: Student must have passed MATM1644 and MATM1622 and STSM2626 in order to continue with this module.
UGRD	S2	016797	STSM	3764	Generalised Linear Models	117	MAIN	BFN	16	STSM3764: Student must have passed (STSM2626 and STSA2626) or (STSM3714 and STSM3734) in order to continue with this module.
UGRD	S1	026004	STSM	3734	Causal inference: ANOVA, regression, and the potential outcomes approach	117	MAIN	BFN	16	STSM3734: Student must have passed MATM1644 and MATM1622 and STSM2626 in order to continue with this module.
UGRD	S2	025653	STSM	3744	Time Series Analysis and Glms	117	MAIN	BFN	16	STSM3744: Student must have passed STSM3714 + STSM3734 in order to register for this module.
UGRD	S1	023583	EBCS	1514	Business Calculations	117	MAIN	EOFF	16	EBCS1514: Student must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
UGRD	S2	023596	EBCS	1524	Business Calculations	117	MAIN	EOFF	16	EBCS1524: Student must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
UGRD	S1	023583	EBCS	1514	Business Calculations	117	QWA	QWAQWA	16	EBCS1514: Student must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
UGRD	S2	023596	EBCS	1524	Business Calculations	117	QWA	QWAQWA	16	EBCS1524: Student must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
UGRD	S1	023592	ECPM	1514	Calculations for Public Managers	117	QWA	QWAQWA	16	ECPM1514: National Senior Certificate (NCS) Mathematics on performance level 3 (40%) for the 4-year curriculum, or performance level 4 (50%) for the 3-year curriculum in order to register for this module
UGRD	S1	023597	EFBC	2514	Business Calculations	117	QWA	QWAQWA	16	EFBC2514: National Senior Certificate (NCS) Mathematics on performance level 3 (40%) for the 4-year curriculum, or performance level 4 (50%) for the 3-year curriculum in order to register for this module
UGRD	S2	023598	EFBC	2524	Business Calculations	117	QWA	QWAQWA	16	EFBC2524: National Senior Certificate (NCS) Mathematics on performance level 3 (40%) for the 4-year curriculum, or performance level 4 (50%) for the 3-year curriculum in order to register for this module
UGRD	S2	025999	STSA	1624	Introduction to Statistics	117	QWA	QWAQWA	16	National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or MATD1564 OR MATD1534 OR MATM1584
UGRD	S1	023597	EFBC	2514	Business Calculations	117	SOUTH	SOUTH	16	EFBC2514: National Senior Certificate (NCS) Mathematics on performance level 3 (40%) for the 4-year curriculum, or performance level 4 (50%) for the 3-year curriculum in order to register for this module.
UGRD	S2	023598	EFBC	2524	Business Calculations	117	SOUTH	SOUTH	16	EFBC2524: National Senior Certificate (NCS) Mathematics on performance level 3 (40%) for the 4-year curriculum, or performance level 4 (50%) for the 3-year curriculum in order to register for this module.
PGRD	YR	025420	ACSD	7900	Dissertation	117	MAIN	BFN	120	Selection for MSc With specialisation in Actuarial Science
PGRD	YR	023669	ACSG	6800	Actuarial Asset and Liability Management	117	MAIN	BFN	60	ACSG6800: 5 exemptions from Actuarial Society of South Africa subjects
PGRD	YR	027157	ACSG	6890	Introduction to Actuarial Asset and Liability Management	117	MAIN	BFN	30	ACSG6890: 4 exemptions from Actuarial Society of South Africa subjects
PGRD	S1	001075	ACSL	6816	Actuarial Contingencies	117	MAIN	BFN	24	ACSL6816: 4 exemptions from Actuarial Society of South Africa subjects
PGRD	YR	025226	ACSR	6808	Actuarial Modelling and Literature Study	117	MAIN	BFN	32	ACSR6808: Selection for BScHons with specialisation in Actuarial Science
PGRD	YR	025396	ACST	8900	Actuarial Science Dissertation	117	MAIN	BFN	180	ACST8900: Selection for MSc with specialisation in Actuarial Science
PGRD	YR	024878	ACST	9100	Actuarial Science Thesis	117	MAIN	BFN	360	ACST9100: Selection for PhD with specialisation in Actuarial Science
PGRD	YR	025342	RSAN	8900	Risk Analysis Dissertation	117	MAIN	BFN	180	Selection for MSc with specialisation in Risk Analysis
PGRD	YR	025191	RSAN	9100	Risk Analysis Theses	117	MAIN	BFN	360	Selection for PhD with specialisation in Risk Analysis
PGRD	S1	027864	STSA	6816	Multivariate Analysis	117			24	Selection for Honors with specialisation in Statistics

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	S1	022927	STSA	6823	Multivariate Methods	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	YR	026445	STSA	8900	Statistics Dissertation	117	MAIN	BFN	180	STSA8900: Selection for MSc with specialisation in Applied Statistics
PGRD	YR	026454	STSA	9100	Statistics Thesis	117	MAIN	BFN	360	STSA9100: Selection for PhD with specialisation in Applied Statistics
PGRD	S1	027160	STSB	6816	Bayes Analysis	117	MAIN	BFN	24	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S1	027943	STSD	6823	Big Data	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S2		STSD	6843	Spatial Statistics	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S1	025896	STSE	6813	Modelling Extremal Events	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S1	022828	STSF	6813	Financial Times Series	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S2	022935	STSF	6823	Risk Analysis	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	YR	022951	STSM	8900	Mathematical Statistics Dissertation	117	MAIN	BFN	180	STSM 8900: Selection for MSc with specialisation in Applied Statistics or Mathematical Statistics or Risk Analysis.
PGRD	YR	025168	STSM	9100	Mathematical Statistics Thesis	117	MAIN	BFN	360	STSM9100: Selection for PhD Mathematical Statistics
PGRD	S1	025905	STSP	6813	Stochastic Processes	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	YR	022950	STSR	6808	Statistical Modelling and Literature Study	117	MAIN	BFN	32	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S1	027161	STSS	6813	Stochastic Simulation	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S2	024879	STSS	6833	Sampling Techniques	117	MAIN	BFN	12	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S2	025898	STSX	6825	Capita Selecta	117	MAIN	BFN	20	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).
PGRD	S1		STSX	6815	Capita Selecta	117	MAIN	BFN	20	Selection for BScHons (Actuarial Science/Applied Science/Risk Analysis/ Mathematical Statistics).

URBAN AND REGIONAL PLANNING (118)

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	YR	025906	UMRD	8900	Urban and Regional Planning Dissertation	118	MAIN	BFN	180	Selection for Hons
PGRD	YR	027389	URBP	6805	Basic Practice in Urban and Regional Planning	118	MAIN	BFN	20	Selection for Hons
PGRD	YR	024738	URBP	6806	Basic Practice in Urban and Regional Planning	118	MAIN	BFN	24	Selection for Hons
PGRD	S1	024739	URCS	6812	Capita Selecta in Planning	118	MAIN	BFN	8	Selection for Hons
PGRD	S1	024762	URCS	6814	Capita Selecta in Planning	118	MAIN	BFN	16	Selection for Hons
PGRD	S1	024757	URCS	7912	Capita Selecta in Planning	118	MAIN	BFN	8	Selection for Master
PGRD	S1	024764	URCS	7913	Capita Selecta in Planning	118	MAIN	BFN	12	Selection for Master
PGRD	S1	024741	URCS	7914	Capita Selecta in Planning	118	MAIN	BFN	16	Selection for Master
PGRD	S1	024766	URCS	7916	Capita Selecta in Planning	118	MAIN	BFN	24	Selection for Master
PGRD	S2	024758	URCS	7922	Capita Selecta in Planning	118	MAIN	BFN	8	Selection for Master
PGRD	S2	024742	URCS	7924	Capita Selecta in Planning	118	MAIN	BFN	16	Selection for Master
PGRD	S1	023867	URDP	7912	Research Proposal	118	MAIN	BFN	8	Selection for Master
PGRD	S2	024759	URDP	7922	Dissertation Proposal in Urban and Regional Planning	118	MAIN	BFN	8	Selection for Master
PGRD	S1	027388	UREP	6813	Research in Environmental Planning	118	MAIN	BFN	12	Selection for Hons
PGRD	S1	024743	UREP	6814	Research in Environmental Planning	118	MAIN	BFN	16	Selection for Hons

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	S2	027387	UREP	6823	Research in Environmental Planning	118	MAIN	BFN	12	Selection for Hons
PGRD	S1	023221	URFP	7912	Futurology for Planning	118	MAIN	BFN	8	Selection for Master
PGRD	S2	025654	URFP	7922	Futurology for Planning	118	MAIN	BFN	8	Selection for Master
PGRD	YR	024760	URGI	7904	Geographic Information Systems for Planners	118	MAIN	BFN	16	Selection for Master
PGRD	YR	026283	URHA	6804	Human Settlement Management and Administration	118	MAIN	BFN	16	Selection for Hons
PGRD	S1	027402	URHS	6813	Housing for Planners	118	MAIN	BFN	12	Selection for Hons
PGRD	S1	027297	URHS	6814	Human Settlements Planning	118	MAIN	BFN	16	Selection for Hons
PGRD	S1	024768	URHS	7913	Housing for Planners	118	MAIN	BFN	12	Selection for Master
PGRD	S2	024769	URHS	7923	Housing for Planners	118	MAIN	BFN	12	Selection for Master
PGRD	YR	023443	URHS	8900	Dissertation in Housing	118	MAIN	BFN	180	
PGRD	S2	023443	URHS	8900	Dissertation in Housing	118	MAIN	BFN	180	
PGRD	YR	025750	URHS	9100	Urban and Regional Planning Thesis	118	MAIN	BFN	360	Selection PhD
PGRD	YR	026284	URHT	6804	Human Settlements Theory	118	MAIN	BFN	16	Selection for Hons
PGRD	S1	020406	URID	7912	Integrated Development Planning	118	MAIN	BFN	8	Selection for Master
PGRD	S2	025667	URID	7922	Integrated Development Planning	118	MAIN	BFN	8	Selection for Master
PGRD	S1	027386	URLM	6813	Land Use Management	118	MAIN	BFN	12	Selection for Hons
PGRD	S1	024745	URLM	6814	Land Use Management	118	MAIN	BFN	16	Selection for Hons
PGRD	S2	024746	URLM	6824	Land Use Management	118	MAIN	BFN	16	Selection for Hons
PGRD	S1	020402	URLM	7912	Planning Management	118	MAIN	BFN	8	Selection for Master
PGRD	S2	025655	URLM	7922	Planning Management	118	MAIN	BFN	8	Selection for Master
PGRD	YR	027385	URMD	6808	Urban and Regional Planning Research Report	118	MAIN	BFN	32	Selection for Hons
PGRD	YR	024770	URMD	7900	Extended Research Essay	118	MAIN	BFN	88	Selection for Master
PGRD	YR	025666	URMD	8900	Dissertation	118	MAIN	BFN	180	
PGRD	YR	025665	URPD	9100	Urban and Regional Planning Thesis	118	MAIN	BFN	360	Selection PhD
PGRD	S2	025665	URPD	9100	Urban and Regional Planning Thesis	118	MAIN	BFN	360	Selection PhD
PGRD	S1	024771	URPP	7914	Professional Practice in Urban and Regional Planning	118	MAIN	BFN	16	Selection for Master
PGRD	S2	024772	URPP	7924	Professional Practice in Urban and Regional Planning	118	MAIN	BFN	16	Selection for Master
PGRD	YR	024747	URPT	6804	Research in Theory of Planning	118	MAIN	BFN	16	Selection for Hons
PGRD	YR	027384	URPT	7904	Research in Theory of Planning	118	MAIN	BFN	16	Selection for Master
PGRD	S1	021088	URRA	7912	Planning for Rural Areas	118	MAIN	BFN	8	Selection for Master
PGRD	S2	025668	URRA	7922	Planning for Rural Areas	118	MAIN	BFN	8	Selection for Master
PGRD	S1	027383	URRE	6813	Research in Economics for Planners	118	MAIN	BFN	12	Selection for Hons
PGRD	S1	024748	URRE	6814	Research in Economics for Planners	118	MAIN	BFN	16	Selection for Hons
PGRD	S2	027401	URRE	6823	Research in Economics for Planners	118	MAIN	BFN	12	Selection for Hons
PGRD	S2	024749	URRE	6824	Research in Economics for Planners	118	MAIN	BFN	16	Selection for Hons
PGRD	S1	024773	URRM	7914	Research Methodologies for Planners	118	MAIN	BFN	16	Selection for Master
PGRD	S2	024774	URRM	7924	Research Methodologies for Planners	118	MAIN	BFN	16	Selection for Master
PGRD	YR	007014	URRP	7902	Introductory Studies in Regional Planning	118	MAIN	BFN	8	Selection for Master
PGRD	YR	024756	URRP	7906	Applied Regional Planning Project	118	MAIN	BFN	24	Selection for Master
PGRD	YR	026494	URRR	6800	Research Essay in Human Settlements	118	MAIN	BFN	40	Selection for Hons
PGRD	YR	027382	URRT	6803	Research in Regional Planning Theory	118	MAIN	BFN	12	Selection for Hons
PGRD	YR	024750	URRT	6805	Research in Regional Planning Theory	118	MAIN	BFN	20	Selection for Hons

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PGRD	S1	027381	URSC	6813	Research in Socio-Cultural Aspects in Planning	118	MAIN	BFN	12	Selection for Hons
PGRD	S1	024751	URSC	6814	Research in Socio-Cultural Aspects in Planning	118	MAIN	BFN	16	Selection for Hons
PGRD	S2	027400	URSC	6823	Research in Socio-Cultural Aspects in Planning	118	MAIN	BFN	12	Selection for Hons
PGRD	S2	024752	URSC	6824	Research in Socio-Cultural Aspects in Planning	118	MAIN	BFN	16	Selection for Hons
PGRD	S1	020415	URTD	7912	Planning for Tourism	118	MAIN	BFN	8	Selection for Master
PGRD	S2	025669	URTD	7922	Planning for Tourism	118	MAIN	BFN	8	Selection for Master
PGRD	S1	020419	URTP	7912	Transportation Planning for Planners	118	MAIN	BFN	8	Selection for Master
PGRD	S2	025723	URTP	7922	Transportation Planning for Planners	118	MAIN	BFN	8	Selection for Master
PGRD	YR	024753	URUP	7906	Urban Research Project	118	MAIN	BFN	24	Selection for Master
PGRD	YR	027380	URUT	6803	Research in Urban Development Theory	118	MAIN	BFN	12	Selection for Hons
PGRD	YR	024754	URUT	6804	Research in Urban Development Theory	118	MAIN	BFN	16	Selection for Hons
PGRD	S1	025504	URUT	7912	Geography for Planners	118	MAIN	BFN	8	Selection for Master
PGRD	S2	020405	URUT	7922	Geography for Planners	118	MAIN	BFN	8	Selection for Master
PGRD	S2	023241	VMB	614	Urbanisation	118	MAIN	BFN	16	
ZOOLOGY AND ENTOMOLOGY (119)										
UGRD	S2	023972	BLGY	1663	Introduction to Zoology and Entomology	119	MAIN	BFN	12	BLGY1663: Student must have passed BLGY1513 in order to continue with this module.
UGRD	S1	024755	ENTO	2614	Introduction to Morphology, Anatomy and Bio-Ecology of Insects	119	MAIN	BFN	16	ENTO2614: Student must have completed the first year of BAgric or BScAgric to continue with this module..
UGRD	S1	004168	ENTO	2616	Functional Morphology and Evolutionary Biology of Insects	119	MAIN	BFN	24	ENTO2616: Student must have passed BLGY1513 and BLGY1663 (only relevant to BSc students) in order to continue with this module.
UGRD	S2	004171	ENTO	2626	Ecophysiology of Insects	119	MAIN	BFN	24	ENTO2626: Student must have passed ENTO2616 or ENTO2614 in order to continue with this module.
UGRD	S1	020061	ENTO	3714	Advanced Insect Ecology	119	MAIN	BFN	16	ENTO3714: Student must have passed ENTO2626 in order to continue with this module.
UGRD	S2	020052	ENTO	3724	Applied Insect Pest Management	119	MAIN	BFN	16	ENTO3724: Student must have passed ENTO3714 or ENTO2614 in order to continue with this module.
UGRD	S1	004185	ENTO	3734	Advanced Medical & Veterinary Entomology	119	MAIN	BFN	16	ENTO3734: Student must have passed ENTO2626 in order to continue with this module.
UGRD	S2	004187	ENTO	3744	Applied Insect Biochemistry and Pharmacology	119	MAIN	BFN	16	ENTO3744: Student must have passed ENTO3714 in order to continue with this module.
UGRD	S1	003133	ZLGY	2636	Invertebrate diversity	119	MAIN	BFN	24	ZLGY2636: Student must have passed BLGY1513 and BLGY1663 in order to continuewith this module.
UGRD	S2	003136	ZLGY	2626	Vertebrate Life and Evolution	119	MAIN	BFN	24	ZLGY2626: Student must have passed Min. ZLGY2636(45%) in order to continue with this module.
UGRD	S1	020054	ZLGY	3714	Marine and Freshwater Ecology	119	MAIN	BFN	16	ZLGY3714: Student must have passed ZLGY2626 in order to continue with this module.
UGRD	S2	020063	ZLGY	3724	Life Strategies in Arid Environment	119	MAIN	BFN	16	ZLGY3724: Student must have passed ZLGY2626 in order to continue with this module.
UGRD	S1	003151	ZLGY	3734	Conservation Ecology	119	MAIN	BFN	16	ZLGY3734 : Student must have passed ZLGY2626 in order to continue with this module.
UGRD	S2	003154	ZLGY	3744	Animal Behaviour	119	MAIN	BFN	16	ZLGY3744: Student must have passed ZLGY2626 in order to continue with this module.
UGRD	YR	027156	BIOL	1504	Lower Life and Molecular Biology	119	QWA	QWAQWA	16	
UGRD	S1	024562	BIOL	1514	Lower Life and Molecular Biology	119	QWA	QWAQWA	16	
UGRD	S2	024563	BIOL	1644	Animal Biology	119	QWA	QWAQWA	16	BIOL1644: Student must have passed BIOL1514 in order to continue with this module.

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
UGRD	S1	024595	BIOL	2614	Evolution, Genetics and Diversity	119	QWA	QWAQWA	16	BIOL2614: Student must have passed BIOL1624 and BIOL1644 in order to continue with this module.
UGRD	S1	024680	BIOL	3714	Human Ecological Footprint	119	QWA	QWAQWA	16	
UGRD	S2	024681	BIOL	3724	Macroevolution and Speciation	119	QWA	QWAQWA	16	BIOL3724: Student must have passed BIOL2614 in order to continue with this module.
UGRD	S2	024599	UNIR	2624	Insect Ecophysiology	119	QWA	QWAQWA	16	
UGRD	S2	024601	ZOOL	3784	Applied Entomology	119	QWA	QWAQWA	16	ZOOL3784: Student must have passed ZOOL2614 in order to continue with this module
UGRD	S1	024701	UNIR	3734	Medical, Veterinary and Forensic Entomology	119	QWA	QWAQWA	16	UNIR3734: Student must have passed UNIR2624 in order to continue with this module.
UGRD	S2	024702	UNIR	3744	Insect Biochemistry and Pharmacology	119	QWA	QWAQWA	16	
UGRD	S1	024700	ZOOL	2614	Basic Entomology	119	QWA	QWAQWA	16	
UGRD	S1	024596	ZOOL	2634	Invertebate Biodiversity	119	QWA	QWAQWA	16	
UGRD	S2	024598	ZOOL	2664	African Vertebrates	119	QWA	QWAQWA	16	BIOL2664: Student must have passed BIOL1514 in order to continue with this module.
UGRD	S2	024761	ZOOL	2684	Introduction to Parasitology	119	QWA	QWAQWA	16	ZOOL2684: Student must have passed BIOL2614 in order to continue with this module.
UGRD	S1	024695	ZOOL	3714	Introduction to Animal Behaviour	119	QWA	QWAQWA	16	ZOOL3764: Student must have passed BIOL2644 in order to continue with this module.
UGRD	S2	024695	ZOOL	3714	Introduction to Animal Behaviour	119	QWA	QWAQWA	16	ZOOL3764: Student must have passed BIOL2644 in order to continue with this module.
UGRD	S2	026555	ZOOL	3724	Ecotoxicology	119	QWA	QWAQWA	16	ZOOL3724: Student must hav epassed BIOL2634 in order to continue with this module.
UGRD	S1	024600	ZOOL	3734	Insect Ecophysiology	119	QWA	QWAQWA	16	ZOOL3734: Student must have passed UNIR2624 in order to continue with this module.
UGRD	S2	024693	ZOOL	3744	Molecular Parasitology	119	QWA	QWAQWA	16	ZOOL3744: Student must have passed ZOOL2684 in order to continue with this module.
UGRD	S1	024694	ZOOL	3754	Freshwater and Marine Ecology	119	QWA	QWAQWA	16	ZOOL3754: Student must have passed BIOL2644 in order to continue with this module.
PGRD	YR	020717	ENTO	6808	Research Project Entomology	119	MAIN	BFN	32	Selection BScHons
PGRD	S1	025714	ENTO	6814	Research Techniques, Scientific Methodology and Communication	119	MAIN	BFN	16	Selection BScHons
PGRD	S1		ENTO	6834	Chemical Ecology	119	MAIN	BFN	16	Selection BScHons
PGRD	S2	004204	ENTO	6842	The Environment	119	MAIN	BFN	8	Selection BScHons
PGRD	S2	027768	ENTO	6844	Capita Selecta in Entomology	119	MAIN	BFN	16	Selection BScHons
PGRD	S1	027769	ENTB	6802	Quantitative Ecology	119	MAIN	BFN	8	Selection BScHons
PGRD	S1	004205	ENTO	6854	Insect-Plant Interactions	119	MAIN	BFN	16	Selection BScHons
PGRD	S2	027765	ENTO	6862	Biodiversity, Evolution & Biogeography	119	MAIN	BFN	8	Selection BScHons
PGRD	S2	004206	ENTO	6864	Medical and Veterinary Entomology	119	MAIN	BFN	16	Selection BScHons
PGRD	S2	004208	ENTO	6884	Advanced Pest Management	119	MAIN	BFN	16	ENTO6884: Selection BScHons/ or student must have passed ENTO2614 or ENTO3724 or equivalent module to continue with this module.
PGRD	YR	025324	ENTO	8900	Entomology Dissertation	119	MAIN	BFN	180	Selection MSc.
PGRD	YR	025415	ENTO	9100	Entomology Thesis	119	MAIN	BFN	360	Selection PhD.
PGRD	YR	020641	ZLGY	6808	Zoology Research Project	119	MAIN	BFN	32	Selection BScHons
PGRD	S1	003168	ZLGY	6814	Research Techniques, Scientific Methodology and Communication	119	MAIN	BFN	16	Selection BScHons
PGRD	S1	023318	ZLGY	6834	Wetland Ecology	119	MAIN	BFN	16	Selection BScHons
PGRD	S2	003172	ZLGY	6842	The Environment	119	MAIN	BFN	8	Selection BScHons
PGRD	S2	027767	ZLGY	6844	Capita Selecta in Zoology	119	MAIN	BFN	16	Selection BScHons

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	S2	003169	ZLGC	6802	Quantitative Ecology	119	MAIN	BFN	8	Selection BScHons
PGRD	S1	003173	ZLGY	6854	Veterinary Ectoparasitology	119	MAIN	BFN	16	Selection BScHons
PGRD	S1	003171	ZLGY	6862	Biodiversity, Evolution & Biogeography	119	MAIN	BFN	8	Selection BScHons
PGRD	S2	003174	ZLGY	6864	Animal Behaviour	119	MAIN	BFN	16	Selection BScHons
PGRD	S1	003175	ZLGY	6874	Aquatic Parasitology	119	MAIN	BFN	16	Selection BScHons
PGRD	S2	003176	ZLGY	6824	Conservation Ecology	119	MAIN	BFN	16	Selection BScHons
PGRD	YR	026453	ZLGY	8900	Zoology Dissertation	119	MAIN	BFN	180	Selection MSc
PGRD	YR	026027	ZLGY	9100	Zoology Thesis	119	MAIN	BFN	360	Selection PhD
PGRD	YR	025424	ZOOL	8900	Zoology Dissertation	119	MAIN/ QWA	BFN	180	Selection MSc
PGRD	YR	024682	BIOL	6808	Research Essay	119	QWA	QWAQWA	32	Selection BScHons
PGRD	S1	026029	BIOL	6814	Scientific Methodology and Communication	119	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	024683	BIOL	6824	Current Events in Science	119	QWA	QWAQWA	16	BIOL6824: Student must have passed BIOL3714 in order to continue with this module.
PGRD	S1	024684	BIOL	6834	Advanced Biostatistics	119	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	025430	BIOL	6844	Advanced Biostatistics	119	QWA	QWAQWA	16	Selection BScHons
PGRD	YR	025439	LFSC	8900	Life Science Dissertation	119	QWA	QWAQWA	180	Selection MSc
PGRD	YR	025767	LFSC	9100	Life Sciences Thesis	119	QWA	QWAQWA	360	Selection PhD
PGRD	YR	026446	ZOOL	6808	Entomology Research Project	119	QWA	QWAQWA	32	Selection BScHons
PGRD	S1	024703	ZOOL	6814	Science Reading Course	119	QWA	QWAQWA	16	UNIR6814: Student must have passed UNIR3714 in order to continue with this module.
PGRD	YR	026447	UNIR	8900	Entomology Dissertation	119	QWA	QWAQWA	180	Selection MSc
PGRD	YR	026448	UNIR	9100	Entomology Thesis	119	QWA	QWAQWA	360	Selection PhD
PGRD	YR	026451	ZOOL	6808	Zoology Research Report	119	QWA	QWAQWA	32	Selection BScHons
PGRD	S1	024696	ZOOL	6814	Applied Behavioural Ecology	119	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	024697	ZOOL	6824	Veterinary Parasitology	119	QWA	QWAQWA	16	Selection BScHons
PGRD	S2	024698	ZOOL	6844	Biosystematics	119	QWA	QWAQWA	16	Selection BScHons
PGRD	S1	024699	ZOOL	6854	Immunology	119	QWA	QWAQWA	16	Selection BScHons
PGRD	YR	025424	ZOOL	8900	Zoology Dissertation	119	QWA	QWAQWA	180	Selection MSc
PGRD	YR	026452	ZOOL	9100	Zoology Thesis	119	QWA	QWAQWA	360	Selection PhD
DISASTER MANAGEMENT TRAINING AND EDUCATION CENTRE FOR AFRICA (123)										
PGRD	S1	027070	DIMD	7910	Ecosystem-Based Disaster Risk Reduction And Climate Change Adaptation (Eco-DRR)	123	MAIN	BFN	60	
PGRD	S1	025322	DIME	7910	Ethnic, Cultural Conduct and Indigenous Knowledge	123	MAIN	BFN	30	
PGRD	YR	025550	DIMG	7900	Information Management Disaster Management	123	MAIN	BFN	30	
PGRD	S1	027071	DIMH	7910	Crisis Intervention and Trauma Management	123	MAIN	BFN	30	
PGRD	S1	027139	DIMI	5810	Introduction to Disaster Management	123	MAIN	BFN	15	
PGRD	S1	025258	DIMI	7910	Disaster Risk and Impact Assessment	123	MAIN	BFN	60	
PGRD	S1	027080	DIML	5810	Legal and institutional arrangements for disaster managers	123	MAIN	BFN	15	
PGRD	S1	002839	DIMM	5810	Theoretical Models for Disaster Risk Reduction	123	MAIN	BFN	15	
PGRD	S1	025688	DIMM	7910	Ethnic, Cultural Conduct and Indigenous Knowledge Systems	123	MAIN	BFN	30	
PGRD	S2	002844	DIMN	5820	Management of Natural and Human-Made Disasters	123	MAIN	BFN	15	
PGRD	S2	002843	DIMP	5820	Public Health in Disaster Managament	123	MAIN	BFN	15	

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	YR	027083	DIMP	7900	Political Strategic Planning	123	MAIN	BFN	30	
PGRD	S1	027084	DIMR	5800	Research Design and Methodology	123	MAIN	BFN	15	
PGRD	YR	027066	DIMR	7900	Disaster Management Mini-Dissertation	123	MAIN	BFN	120	
PGRD	S2	027085	DIMS	5825	Strategic Disaster Management	123	MAIN	BFN	20	
PGRD	S2	027086	DIMT	5820	Information Technology in Disaster Management	123	MAIN	BFN	15	
PGRD	YR	025097	DSMT	9100	Disaster Management Thesis	123	MAIN	BFN	360	
PGRD	S2	025097	DSMT	9100	Disaster Management Thesis	123	MAIN	BFN	360	

GENETICS (124)

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
UGRD	S2	023971	BLGY	1623	Introduction to Genetics	124	MAIN	BFN	12	BLGY1623: Student must have passed BLGY1513
UGRD	S1	023975	FORS	2616	Introductory Forensic Science	124	MAIN	BFN	24	FORS2616: Student must have passed BLGY1513, BLGY1623, in order to register this module.
UGRD	S2	023976	FORS	2626	Crime Scene Management	124	MAIN	BFN	24	FORS2626: Student must have passed BLGY1513, BLGY1623, in order to register for this module.
UGRD	S1	024992	FORS	3714	Trace and Impression Evidence	124	MAIN	BFN	16	FORS3714: Student must have passed FORS2616 and FORS2626 in order to register this module.
UGRD	S1	024994	FORS	3734	Forensic Entomology	124	MAIN	BFN	16	FORS3734: Student must have passed BLGY1663 and FORS2616 in order to register this module.
UGRD	S2	024995	FORS	3744	Forensic Genetics	124	MAIN	BFN	16	FORS3744: Student must have passed FORS2616 or GENE2626 with 60% in order to continue with module.
UGRD	S1	024993	FORS	3724	Forensic Chemistry	124	MAIN	BFN	16	FORS3724: Student must have passed FORS2626 in order to register this module.
UGRD	S1	024996	GENE	2616	Human Genetics	124	MAIN	BFN	24	GENE2616: Student must have passed BLGY1513 and BLGY1623 and one of (MATM1534 or STSA1624) in order to continue with module.
UGRD	S2	022469	GENE	2626	Molecular Genetics	124	MAIN	BFN	24	GENE2626: Student must have passed GENE2616 in order to continue with module.
UGRD	S1	024959	GENE	3713	Genomics	124	MAIN	BFN	12	GENE3713: Student must have passed GENE2616 and GENE2626 in order to continue with module.
UGRD	S1	021238	GENE	3733	Behavioural Genetics	124	MAIN	BFN	12	GENE3733: Student must have passed GENE2616 and GENE2626 in order to continue with module.
UGRD	S2	005292	GENE	3743	Population and Conservation Genetics	124	MAIN	BFN	12	GENE3743: Student must have passed GENE2616 and GENE2626 in order to continue with module.
UGRD	YR		GENE	3703	Applied Genetics	124	MAIN	BFN	12	GENE3703: Student must have passed GENE2616 and GENE2626 in order to continue with this module.
UGRD	S2	026441	GENE	3764	Genetics in Practice	124	MAIN	BFN	16	GENE3764: Student must have passed GENE2616 and GENE2626 in order to continue with this module.
UGRD	S1	020443	HMBG	2614	Human Molecular Biology of Dietetics	124	MAIN	BFN	16	HMBG2614: Student must have passed BLGY1513 in order to continue with module (with Dietetics)
UGRD	S2	022509	HMBG	3744	Human Molecular Biology of Immunology and Haemostasis	124	MAIN	BFN	16	HMBG3744: Student must have passed GENE2616 and GENE2626 with an average of 60% in order to continue with module.
PGRD	YR	028467	FORA	6804	Forensic Chemistry: Literature Review	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	028303	FORC	6804	Sport Doping	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	026461	FORC	6808	Research Essay: Forensic Chemistry	124	MAIN	BFN	32	Selection BScHons
PGRD	S1	025772	FORC	6814	Advanced Forensic Techniques	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	024961	FORC	6824	Advanced Forensic Techniques	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	025423	FORC	8900	Forensic Chemistry Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	S2	025423	FORC	8900	Forensic Chemistry Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	YR	024954	FORC	9100	Forensic Chemistry Thesis	124	MAIN	BFN	360	Selection PhD

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	YR	025425	FORE	8900	Forensic Entomology Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	YR	024955	FORE	9100	Forensic Entomology Thesis	124	MAIN	BFN	360	Selection PhD
PGRD	YR	022956	FORG	6808	Forensic Genetics: Research Essay	124	MAIN	BFN	32	Selection BScHons
PGRD	S1	025716	FORG	6814/ FORX6804	Research: Literature Study	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	025716	FORG	6814	Forensic Genetics: Literature Study	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	022955	FORG	6816/ 6806	Forensic Genetics: Research Techniques	124	MAIN	BFN	24	Selection BScHons
PGRD	S2	025717	FORG	6824	Research: Literature Study	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	022958	FORG	6834	Forensic Dna Typing and Quality Assurance	124	MAIN	BFN	16	Selection BScHons
PGRD	S2	025450	FORG	6844/ FORZ6804	Forensic Dna Typing and Quality Assurance	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	025499	FORG	6854/ 6804	Crime Scene Investigation and The Juctice System	124	MAIN	BFN	16	Selection BScHons
PGRD	S2	022959	FORG	6864	Crime Scene Management and The Justice System	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	022961	FORG	6874	Capita Selecta in Forensic Genetics	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	025562	FORG	8900	Forensic Genetics Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	S1	026005	FORG	9100	Forensic Genetics Thesis	124	MAIN	BFN	360	Selection PhD
PGRD	YR	026005	FORG	9100	Forensic Genetics Thesis	124	MAIN	BFN	360	Selection PhD
PGRD	YR	025426	FORI	8900	Forensic Sciences Interdisciplinary Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	YR	025325	FORI	9100	Forensic Sciences Interdisciplinary Thesis	124	MAIN	BFN	360	Selection PhD
PGRD	YR	025461	FORS	6808	Forensics Science: Research Report	124	MAIN	BFN	32	Selection BScHons
PGRD	S1	024960	FORS	6814	Forensics Science: Literature Study	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	025718	FORS	6816/ 6806	Research Techniques Forensic Science	124	MAIN	BFN	24	Selection BScHons
PGRD	S2	025771	FORS	6824/ 6804	Research: Literature Review	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	024966	FORS	6874	Capita Selecta in Forensic Sciences	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	025719	FORS	6884	Capita Selecta in Forensic Sciences	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	024965	FORS	6893	Research: Literature Review	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	025427	FORS	8900	Forensic Sciences Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	S2	025427	FORS	8900	Forensic Sciences Dissertation	124	MAIN	BFN	180	Selection PhD
PGRD	S1	025429	FORS	9100	Forensic Science Thesis	124	MAIN	BFN	360	Selection PhD
PGRD	YR	025429	FORS	9100	Forensic Science Thesis	124	MAIN	BFN	360	Selection MSc
PGRD	S1	025468	GENB	6814	Advanced Behavioural Genetics	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	022520	GENB	8900	Behavioural Genetics Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	YR	022521	GENB	9100	Behavioural Genetics Thesis	124	MAIN	BFN	360	Selection PhD
PGRD	YR	020664	GENE	6808	Research Report Genetics	124	MAIN	BFN	32	Selection BScHons
PGRD	S1	025625	GENE	6814	Research Genetics: Literature Review	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	025776	GENE	6816	Research Techniques	124	MAIN	BFN	24	Selection BScHons
PGRD	S2	025721	GENE	6824	Research: Literature Study	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	026502	GENE	6834	Capita Selecta: Genetics	124	MAIN	BFN	16	Selection BScHons
PGRD	S2	022396	GENE	6844	Capita Selecta: Genetics	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	025777	GENE	8900	Genetics Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	YR	025552	GENE	9100	Genetics Thesis	124	MAIN	BFN	360	Selection PhD

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	S1	005627	GENH	6814	Advanced Human Genetics	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	025329	GENH	8900	Human Genetics Disseration	124	MAIN	BFN	180	Selection MSc
PGRD	YR	024956	GENH	9100	Human Molecular Genetics Thesis	124	MAIN	BFN	360	Selection PhD
PGRD	YR	025330	GENI	8900	Genetics Interdisciplinary Dissertation	124	MAIN	BFN	180	Selection MSc
PGRD	YR	025416	GENI	9100	Genetics Interdisciplinary Thesis	124	MAIN	BFN	360	Selection PhD
PGRD	S1	025466	GENM	6814	Recombinant Dna Technology	124	MAIN	BFN	16	Selection BScHons
PGRD	YR	028374	GENP	6804	Applied Conservation Genetics	124	MAIN	BFN	16	
PGRD	S2	025501	GENP	6824	Applied Population and Conservation Genetics	124	MAIN	BFN	16	Selection BScHons
PGRD	S1	025502	GENS	6814	Molecular Biosystematics	124	MAIN	BFN	16	Selection BScHons
PGRD	S2	018361	GENS	6824	Molecular Biosystematics	124	MAIN	BFN	16	Selection BScHons
CONSUMER SCIENCE (102)										
UGRD	S1	027325	CNCC	1612	Clothing Construction I	125	MAIN	BFN	8	None
UGRD	S2	027326	CNCC	1622	Clothing Construction II	125	MAIN	BFN	8	None
UGRD	S1	027327	CNCC	2612	Clothing Construction III	125	MAIN	BFN	8	None
UGRD	S2	027521	CNCC	2622	Clothing Construction IV	125	MAIN	BFN	8	None
UGRD	S1	027522	CNCC	3712	Clothing Construction V	125	MAIN	BFN	8	None
UGRD	S2	027523	CNCC	3722	Clothing Construction VI	125	MAIN	BFN	8	None
UGRD	S1	027524	CNCD	3732	Community Development	125	MAIN	BFN	8	None
UGRD	S2	023985	CNSF	2624	Food Preparation I	125	MAIN	BFN	16	None
UGRD	S1	025143	CNSF	3724	Food Preservation	125	MAIN	BFN	12	None
UGRD	S1	027330	CNSF	2613	Food Security I	125	MAIN	BFN	12	None
UGRD	S2	027525	CNFS	2623	Food Security II	125	MAIN	BFN	12	CNFS2623: Student must have passed AGEC1514 in order to continue with module.
UGRD	S1	027526	CNFS	3714	Food Security III	125	MAIN	BFN	16	CNFS3714: Student must have passed CNFS2613 and CNFS2623 in order to continue with module.
UGRD	S2	027527	CNFS	3724	Food Security IV	125	MAIN	BFN	16	CNFS3724: Student must have passed CNFS2613 and CNFS2623 in order to continue with module.
UGRD	S1	025808	CNOT	2614	Skills	125	MAIN	BFN	16	None
UGRD	S1	027530	CNSB	2614	Cosumer Behaviour III	125	MAIN	BFN	16	CNSB2614: Student must have passed CNSB1614 and CNSB1624 in order to continue with module.
UGRD	S2	023981	CNSB	2624	Consumer Behaviour IV	125	MAIN	BFN	16	
UGRD	S1	027531	CNSB	3714	Consumer Behaviour V	125	MAIN	BFN	16	CNSB3714: Student must have passed CNSB2614 in order to continue with module.
UGRD	S2	025087	CNSB	3724	Consumer Behaviour VI	125	MAIN	BFN	16	CNSB3724: Student must have passed CNSB3714 in order to continue with this module.
UGRD	S1	023983	CNSF	2614	Food III	125	MAIN	BFN	16	CNSF2614: Student must have passed CNSF1614 and CNSF1624 in order to continue with module.
UGRD	S1	027532	CNSF	3714	Food V	125	MAIN	BFN	16	CNSF3714: Student must have passed CNSF2614 and CNSF2624 in order to continue with module.
UGRD	S2	027533	CNSF	3724	Food VI	125	MAIN	BFN	16	None
UGRD	S1	025110	CNSI	3712	Interior V	125	MAIN	BFN	8	CNSI3712: Student must have passed CNSI2622 in order to continue with module.
UGRD	S2	025111	CNSI	3722	Interior VI	125	MAIN	BFN	8	CNSI3722: Student must have passed CNSI3712 in order to continue with module.
PGRD	S2	025525	CNCS	8900	Consumer Science Dissertation	125	MAIN	BFN	180	Selection MSc

Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
PGRD	YR	025086	CNCS	9100	Consumer Sciences Thesis	125	MAIN	BFN	360	Selection PhD
PGRD	S1	026423	CNST	6834	Social Aspects of Clothing	125	MAIN	BFN	16	Selection BScHons
PGRD	S2	026424	CNST	6844	Psychological Aspects of Clothing	125	MAIN	BFN	16	Selection BScHons
PGRD	S1	026425	CNST	6854	Natural Textile Fibres	125	MAIN	BFN	16	Selection BScHons
PGRD	S2	026426	CNST	6864	Finishes for Natural Textile Fibres	125	MAIN	BFN	16	Selection BScHons

14.2 TABLE 2A: **LEARNING OUTCOMES AND LEARNING CONTENT TABLE**

The table below provides information related to the course content of each module included in the learning programmes. The module code as well as a content description and learning outcomes are displayed in the table. This is organised according to departments, alphabetically first all undergraduate modules and then post graduate modules.

TABLE 2B: CONTENTS ORGANISED PER ACADEMIC DEPARTMENT

AGRICULTURAL ECONOMICS (99)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGEC	1514	Introduction to Agricultural Economics	The role of resources in the agricultural economy, supply and demand of agricultural products, marketing and the determination of price, farm management- and financial principles: the current agricultural-, trade- and development policies in South Africa. - Practical assignments will be given which to complement the theory done in class.	MAIN	Student will be able to: - Outline the role of resources in the agricultural economy. - Explain supply and demand of agricultural products, marketing and the determination of price. - Discuss farm management- and financial principles.
AGEC	1624	Agricultural Finance	- This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completion of this module the student will have knowledge: - About the purpose and components of a farm record keeping system. - The handling of depreciation, also in terms of the income tax act as well as the procedure for taking the impact of inflation into consideration. A basic overview of income tax as well as the handling of Value Added Tax (VAT) is also covered. - The purpose, components, completion and analysis of each of the financial statements. An economic and financial analysis of a farming business with interpretation and advice on the results. - Budgets for different enterprises (both livestock and crops). - Practical work: Upkeep and analysis of farming records and application of different techniques, also by means of a personal computer.	MAIN	Student will be able to: - discuss and explain the purpose and components of a farm record keeping system. - explain the handling of depreciation, income tax act and inflation and handling of Value Added Tax (VAT). -compile and analyse and interpret financial statements apply economic analysis of a farming business with interpretation and provide advice on the results. - develop budgets for different enterprises (both livestock and crops).
AGEC	1634	Business functions for Agribusiness	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completion of this module the student will have knowledge: - This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics. Introduction to management as well as the environments in which a business operates. - Special focus will be given to eight management functions: Marketing, Financial Management, Human Resource Management, Operational Management, Logistics Management, Administration, Public Relations and General Management - Practical work: Introduction to the fundamental knowledge, theories, principles and practices of Agricultural Economics. Emphasis on the eight management functions.	MAIN	Student will be able to: -Discuss the theories, principles and practices of Agricultural Economics. Introduction to management and the business environment. -List and discuss the eight management functions: Marketing, Financial Management, Human Resource Management, Operational Management, Logistics Management, Administration, Public Relations and General Management.
AGEC	2614	Farm Planning and Management	- The main purpose of this module is to enable the student to analyse and plan changes (risks and opportunities) within a farming business. The module is divided into two sections: Section I: Consists of the planning of livestock and crop production enterprises Section II: Consists of the composition of livestock and crop production enterprises in a whole farm production plan, given the marketing and financial plans, which include mechanisation and human resource planning as well as the planning of the business agreement. - The focus is further placed on all aspects of human resource management. - Practical work: The development of enterprise budgets, mechanisation planning, human resource planning and practical exercises to apply risk management instruments in practice.	MAIN	Student will be able to: -Discuss the difference in long term (strategic) and short term (tactical) decision making in agriculture. -Discuss and apply basic production economic concepts and decision rules that are followed with regard to profit maximising levels of inputs used and output produced. -Apply basic Agricultural Economics concepts in the case of animal production and be able to calculate break-even production levels and prices for animal production. -Apply basic Agricultural Economics concepts in the case of crop production and will be able to identify the factors that affect profitability of the current crop and how to select the most profitable crop in a crop-production system. -Explain the use of partial and whole-farm budgeting in agricultural decision making. -Calculate machinery cost that is necessary for machinery management and will also be able to motivate how he/she will go about improving the level of efficiency of an agricultural machine. -Understand the risk and uncertainty in agricultural decision making, the factors that affect the willingness and ability of a decision maker to take a risk, and be able to use decision support tools and decision rules to motivate a choice between risky alternatives

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGEC	2624	Introduction to Agricultural Marketing	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: (a) to provide the student with knowledge on the nature and dynamics of the food marketing system, from the production of agricultural commodities to the final consumption of food products and services; (b) to enable the student to plan and employ programmes to manage the price risks of agricultural commodities through the use of forward contracts, futures, and option strategies; (c) to introduce the students to the forecasting of agricultural product prices. The student will understand how to do analysis and interpretations of demand and supply, price and income elasticity. Knowledge of the quantification of agricultural marketing questions, the fitting of supply and demand curves, identification of variables that influence agricultural prices, the interdependence of the agriculture sector with the rest of the economy, the international environment and strategic planning will be obtained. - Practical work: Forecasting the prices of grains and oilseeds and trading on SAFEX. Analysing of supply, demand and price by means of basic econometric techniques. Compiling a marketing plan for an agricultural product taking cognisance of the financial implications.	MAIN	Student will be able to: - Explain and discuss the nature and dynamics of the food marketing system. - Plan and employ programmes to manage the price risks of agricultural commodities through the use of forward contracts, futures, and option strategies. - Introduce the students to the forecasting of agricultural product prices.
AGEC	3714	Managerial Economics	The aim of AGEC 3714 is to broaden the student's knowledge base with respect to the theoretical treatment of traditional production economics employing both detailed graphics, differential calculus and spreadsheets. Specifically factor-product, factor-factor and product-product relationships are considered. AGEC 3714 also aims at providing an introductory treatment of the development of linear programming models, solving the models using the simplex method and interpretation of results.	MAIN	Student will be able to: - Apply principles pertaining to the optimal allocation of one and two variable inputs necessary to evaluate the allocative and technical efficiency of production with the aim of maximizing profit; - Use alternative production functions to determine optimal resource allocation. -Apply principles pertaining short-run and long-run cost relationships. These relationships will enable the student to plan for the most profitable level of output (short-run) and the optimal scale of production (long-run). - Use mathematical skills to apply optimisation theory to determine: - Optimal input use (one variable and two variable inputs) - Optimal supply decision (one variable output). - The students will gain a better understanding of different types of activities that are used to construct linear programming models of complex decision-making problems. Students will also develop the skills to apply these activities to construct linear programming models, solve the models and to interpret the results.
AGEC	3721	Agricultural Economics Seminar	This module prepares students how to do a written assignment on specific Agricultural Economics and related topics.	MAIN	Student will be able to: -Do a written assignment on specific Agricultural Economics and related topics.
AGEC	3724	Resource Economics.	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: -Aspects that will be addressed include: property rights, externalities and environmental problems, market and government failures, optimal use/ management of natural resources and the environment with special reference to water, soil, natural vegetation, fisheries and other species, and pollution. - Practical work: Application of measuring techniques to determine the economic effects of natural resource and environmental problems. Evaluation of alternative solutions to problems.	MAIN	Student will be able to: -Utilize the theory of natural resource and environmental economics; and -Optimal use/management of natural resources and the environment with special reference to water, soil, natural vegetation, fisheries and other species, and pollution.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGEC	3734	Agribusiness Management.	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completion of this module the student will have knowledge: - Analyse and confidently handle challenges pertaining to the agribusiness system such as entrepreneurship, strategic management in agriculture, quality management, role and importance of value chains, competitiveness of SA agriculture, choice of legal business forms (sole proprietorship, partnership, close Corporation, private company, business trust, cooperative, new generation cooperative) and handling collaboration structures in the value chain, as well as human resource management within a modern transformed society. - Practical work: Develop a detailed and coherent business plan for an agribusiness deploying a wide range of agricultural economics techniques.	MAIN	Student is will be able to: -Analyse and confidently handle challenges pertaining to the agribusiness system such as entrepreneurship, strategic management in agriculture, quality management, role and importance of value chains, competitiveness of SA agriculture; -Choose legal business forms (sole proprietorship, partnership, close corporation, private company, business trust, cooperative, new generation cooperative); and -Handle collaboration structures in the value chain, as well as human resource management within a modern transformed society.
AGEC	3744	Agricultural Policy and Development	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: -Involvement of the government in agriculture, reasons for government interference, how agricultural policy causes distortions and the spill over effect of it, The effect of policy on the welfare of populations and on the competitiveness of agriculture, factors that prevent small scale farmers from becoming surplus producers, transaction costs and the utilisation of new technologies, The role of research in developing countries, the development of human capital and poverty. Practical work: Discussion of reading material and analyses of agricultural policy on computers.	MAIN	Student will be able to: -discuss and explain the involvement of the government in agriculture; -explore the effect of policy on the welfare of populations and on the competitiveness of agriculture; and -analyse the role of research in developing countries, the development of human capital and poverty.
AGMA	3714	Business Management and Entrepreneurship	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will understand: -Demonstrate his/her expertise in entrepreneurship relating to the basic principles and historical development and application thereof given the entrepreneurial environment, interpret the concept entrepreneurship along with the characteristics of the entrepreneur -Argue the importance of creativity and innovation as well as feasibility and viability in entrepreneurship -Develop an effective business plan in order to enter the business world with all the attachments thereof, employ all the different management and operational aspects that are part of starting and growing business and demonstrate the different ways that exist when he/she wants to start a business.	MAIN	Student will be able to: Demonstrate his/her expertise in entrepreneurship; Argue the importance of creativity and innovation as well as feasibility and viability in entrepreneurship; and do a business plan
AGMA	3724	Innovation Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: - Generate sustainable business ideas that will ensure a competitive advantage and growth in a business. - Analise and apply the innovation process. - Identify and evaluate the barriers as well as success factors to innovation	MAIN	Student will be able to: Generate sustainable business ideas; Analise and apply the innovation process; and -Identify and evaluate innovation
AGMA	3734	Farm Tax	An introductory course relating to the tax aspects of farming operations. This module will teach students about the basic tax aspects of a business (VAT, income tax, capital gains tax and estate duty) with a specific focus on farming operations. This will assist students in integrating tax planning with the financial planning of a business in order to manage it in the most effective way possible.	MAIN	Student will be able to: Discuss and apply different types of tax, including how these taxes can influence a farming operation`s planning from a tax and and cash flow perspective; and Use the necessary tools and methods, effective communication and clear and concise calculation of different tax liabilities

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGMA	3744	Strategic Agricultural Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: - Strategic thinking is, in the present turbulent agricultural environment, of crucial importance. In this module the student will gain knowledge about implementing the steps in strategic management as well as the tasks of the strategic manager; strategic management of new technologies; - Developing creative and innovative thoughts; setting a paradigm shift for a farm; re-engineering of a farm; drawing a scenario for any agricultural product or possible outcomes in the future; discounting droughts strategically in the decision-making process; - Developing a community development programme for any community (commercial agriculture) in the form of an executable plan. - Practical work: Development of a paradigm shift, re-engineering, scenarios and strategic plan for a farming business and a community development project as well as creativity exercises; practical demonstrations of new technologies in agriculture.	MAIN	Student will be able to: Implementing the steps in strategic management; - Developing creative and innovative thoughts setting a paradigm shift for a farm; and - Developing a community development programme
AGMA	3762	Seminar: Integrated Agricultural Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: -Developing an integrated farm management model on a spread sheet.	MAIN	Student will be able toDevelop an integrated farm management model on a spread sheet
Postgraduate					
AGEC	6800	Research Report Econometrics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: -Basic regression analysis and other econometric techniques and models. The module contains lessons that you can apply to a wide range of empirical economic problems. The course consists of both theoretical and practical application, where the student will be able to use various computer programmes to solve economic problems. Econometrics gives empirical content to most economic theory. -Completing a research project under the guidance of a supervisor and will become skilled in problem identification, development of research objectives and hypotheses, identification and reviewing of relevant literature, specification of a conceptual and analytical framework, locating sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data, presentation and interpretation of research results, and report writing.	MAIN	Student will be able to: -Formulate research problem, objectives and hypotheses, identification and reviewing of relevant literature; -Specify conceptual and analytical framework, locate sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data; -Apply regression analysis and other econometric techniques and models; -Give empirical content to most economic theory using econometric techniques; -Interpret and present research results, and report writing.
AGEC	6815	Advanced Production and Natural resource economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: - Theory and practical application of production economics to inform agricultural producers in terms of optimal input use. - Theory and practical application of environmental and natural resource economics and the important role of economic values in guiding resource allocation and management.	MAIN	Student will be able to: -Econometrically estimate production, cost and profit functions and to apply those functions to identify optimal input and output levels. -Motivate a choice of a specific functional form and to derive product supply and factor demand functions using both the primal and dual approaches. -Mathematically derive factor demand and product supply functions to inform optimal resource use. -Apply appropriate techniques to benchmark input use to inform efficient use of scarce resources. -Analyse and Evaluate the concept of value as it applies to resources and the important role of economic values in guiding resource allocation and management. -Apply valuation techniques such as the travel cost method, hedonic price methods and contingent valuation. - Use these techniques to determine the benefits to society from different natural resource management and environmental improvement policies and programmes.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGEC	6825	Agribusiness management and marketing	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: The overall learning outcome of this module is to obtain comprehensive knowledge of strategic management principles and methods for production, processing, wholesaling, retailing and service forms in the context of the markets of these firms, thus across specialised areas in agriculture.The necessary knowledge base, a deep understanding of the complexities of marketing agricultural products and Have the skills to compile an all-encompassing management and marketing plan.	MAIN	Student will be able to: -Examine and apply strategic management principles and methods for production, processing, wholesaling, retailing and service forms in the context of the markets of these firms, thus across specialised areas in agriculture; -Discuss the complexities of marketing agricultural products; and -Compile an all-encompassing management and marketing plan.
AGEC	6835	Macro economics and finance	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including, knowledge about macro and Agricultural Economics concepts and Market structures and concentration in the South African economy. Critically analyse and independently evaluate an agribusiness's financial position and Propose recommendations on the growth and protection of equity capital in a risky macro-economic environment.	MAIN	Student will be able to: -Analyse and discuss basic macro-economic structures and concepts-effect and implications for agriculture; -Discuss and interpret key economic indicators and cycles implications for agriculture and strategic management decisions. -Discuss and analyse monetary Policy and the effect on the agricultural sector and markets. -Explain the Government and Fiscal policy and effect on the agricultural economy and markets -Analyse and provide a discussion of financial statements and information; -Analyse and make recommendation on the feasibility of new projects using capital budgeting techniques; and -Devise a credit evaluation and scoring procedure to evaluate credit applications.
AGEC	6845	Agricultural Policy and Development	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will understand: - The agricultural policy process and have a good theoretical knowledge about agricultural policy; know the South African agricultural policy and have a thorough understanding of it; - Evaluate agricultural policy by using different methods. - Evaluate the effect of agricultural policy on agricultural development. - The theoretical and empirical knowledge to analyse agricultural households, rural markets and institutions. - Evaluate the alternative policies of agricultural and economic development, based on how agricultural households and rural organisations and institutions function. - International development of Agriculture and related industries	MAIN	Student will be able to: -Analyse and discuss the South African agricultural policy; -Evaluate agricultural policy by using different method; -Evaluate the effect of agricultural policy on agricultural development; -Analyse agricultural households, rural markets and institutions; -Evaluate the alternative policies of agricultural and economic development; and -Evaluate International development of Agriculture and related industries
AGEC	6865	Operational Research	This module aims at developing students` capacity to synthesize information regarding complex problems confronting agricultural, environmental and resource economists, to represent these problems mathematically using mathematical notation within a linear, mixed integer or a risk programming framework as appropriate, to solve these problems using appropriate software and to interpret the results. The course will also cover risk simulation and stochastic efficiency analyses.	MAIN	Student will be able to: - Use Linear Programming (LP), to set up simple decision problems as LP problems, to demonstrate how to solve maximisation and minimisation LP problems using graphical analyses and to discuss the notion of sensitivity analyses; -Represent a specific problem using mathematical notation specific to the GAMS modeling language, solve the model and interpret the results for various problem sets; - Examine the assumption of certainty of the input parameters of a mathematical programming model given due recognition of the underlying assumptions of alternative methods to include objective function risk (Mean Variance, MOTAD, Target-MOTAD), risks involving resource availability (Chance constraints) and technical coefficient risk (quadratic and MOTAD programming approaches) for various agricultural related problems; and - Analyse risk, quantify risk and apply risk efficiency criteria to choose amongst risky alternatives

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGEC	8900	Agricultural Economics extended dissertation	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: Research project in specialized field of Agricultural Economics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
AGEC	9100	Agricultural Economics Thesis	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: Research project in specialized field of Agricultural Economics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	The student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
AGEM	8900	Dissertation Agricultural Economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: Research project in specialized field of Agricultural Economics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
AGEN	7902	Land Valiation and Business Plans	Land Valiation and Business Plans	MAIN	Student will be able to: -Examine land value and the factors influencing land prices. -Use skills to compile Business Plans for development projects.
AGMA	6800	Research Report	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: -Completing a research project under the guidance of a supervisor and will become skilled in problem identification, development of research objectives and hypotheses, identification and reviewing of relevant information sources, specification of a conceptual and analytical framework, locating sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data, presentation and interpretation of research results, and report writing.	MAIN	Student will be able to: -Formulate research problem, objectives and hypotheses, identification and reviewing of relevant literature; -Specify conceptual and analytical framework, locate sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data; and -Interpret and present research results, and report writing
AGMA	6815	Farm and Agribusiness Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management including comprehensive knowledge of strategic management principles and directives, strategy formulation and implementation and contemporary strategic applications. The second learning outcome of this model relates to the development and application of strategic management principles within the broader business plan concepts	MAIN	Student will be able to: -Explain and apply the basis principles of strategic management; -Explain and apply the principles of corporate governance within a strategic management framework; -Explain and apply the principles of both internal and external environment analysis; -Explain and apply the principles of grand and functional strategies within the broader framework of strategic management; -Align strategy with industry life cycle; -Explain and apply chain management principles within the framework of strategic management; -Explain and apply structural drivers and instruments the context of strategy implementation; -Explain and apply strategic control and evaluation mechanisms; -Explain and apply the basic concept of business plan development; and -Apply general strategic management principles within a specific case studies/ business plan.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGMA	6825	Marketing and Human Resource Management.	This module contains fundamental knowledge, theories, principles and practices of Agricultural Marketing and Human Resource Management. After completing this course the student will understand: -The students will be equipped with the decision-making skills and knowledge needed to perform a complete marketing plan for an agri-business. -More specifically, the module encompasses the analysis of the macro and internal environment in which marketing takes place, strategic marketing process and the development of marketing plan. -A comprehensive knowledge of human resource management in South Africa. -Students will be able to analyse and confidently manage challenges pertaining to the management of their staff in terms of employment relationships, workforce planning, establishing employee relationships (recruiting, appointing and orientating), utilising and developing employees (motivating, leading and training) and the influence of Labour Laws and policies.	MAIN	Student will be able to: - Perform a complete marketing plan for an agri-business; - Develop a marketing plan; - Examine human resource management in South Africa; and - Analyse and confidently manage challenges pertaining to the management of their staff.
AGMA	6835	Macroeconomics and financial management	This module contains fundamental knowledge, theories, principles and practices of Agricultural management, including: - Market structures and concentration in the South African economy. - the student will be able to critically analyse and independently evaluate an agribusiness's financial position and - The evaluation of the impact and financial feasibility of new projects, growth strategies on the key financial ratios and the long term well-being of the business by taking into account the changing macro-economic environment	MAIN	Student will be able to: - Analyse the basic macro-economic structures and concepts-effect and implications for agriculture; - Discuss and interpret key economic indicators and cycles implications for agriculture and strategic management decisions. - Analysis and interpretation of the financial statements; - Evaluate the impact and financial feasibility of new projects, growth strategies on the key financial ratios; and - Interpret and present research results, and report writing
AGMA	6845	Production and Project Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will understand: -Project management is the process by which projects are defined, planned, implemented, monitored and controlled to realise project objectives. -After completing this module the student will be able to develop a project plan, define the scope of the project, set objectives, develop a time-schedule and a budget, manage resources, measure progress and -Manage the project to complete the project successfully.	MAIN	Student will be able to: -Examine the concept of project management cycle; -Contextualise and interpret project management concepts within the context of strategic goal achievement; -Explain and apply the principles of project scope management; -Explain and apply the principles of project intergration management; -Examine, explain and apply the principles of project communication management; -Explain and apply the principles of project time management; -Explain and apply the principles of project human resource management; -Explain and apply the principles of project quality management; -Explain and apply the principles of project cost management; -Explain and apply the principles of project procurement management; -Explain and apply the principles of project risk management; and -Apply general project management concepts and principles within different case studies
AGMA	8900	Agricultural Management extended dissertation	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management, including: Research project in specialized field of Agricultural Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Learning outcomes: -Having successfully completed this programme, the student will be able to demonstrate knowledge and understanding of supervised planning and execution of a research project in a natural or agricultural science discipline. - formulate hypothesis, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.
AGMA	9100	Agricultural Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management, including: Research project in specialized field of Agricultural Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	The student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

ANIMAL AND WILDLIFE AND GRASSLAND SCIENCES (100)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGRI	1514	Biological Principles in Agriculture	After completion students will be able to apply the principles of the physiology of farm animals and agricultural and horticultural crops within disciplines. The different body systems of the animal are addressed. The inherent physiological differences in plants are demonstrated, the establishment and vegetative and reproductive growth are discussed, while the surveying, transport and working of fertilisers, water and pesticides are addressed. Practical work: Demonstrations of the principles involved in the body. The most important theoretical aspects of crops are practically conducted	MAIN	Student should be able: Di-scuss, describe and explain concepts related to the anatomy and physiology of the different animal and plant systems and gain insight into the practical applied manipulation of certain aspects in the field of animal and plant production.
AGRI	1624	Mathematical and Biometrical Principles in Agriculture	Skills will be developed in mathematical and statistical calculations. The use of algebraic and graphical solutions of problems as applied to linear and quadratic equations. The use of descriptive statistics, with attention to central and dispersion parameters (mean and variance). Use and application of ANOVA, regression and correlation to solve agriculturally related problems. Practical work: Calculations will be done applying the theoretical knowledge in solving agriculturally orientated mathematical and statistical problems.	MAIN	Student will be able to: -describe and explain key terms, concepts, facts and principles of elementary statistics, with regard to mean, variance and linear regression; -select and apply standard statistical methods, procedures, and/or techniques within the discipline to analyse typical data sets found in agricultural; -Accessing, processing and managing information, in respect of which a learner is able to demonstrate an ability to gather information from various sources then apply appropriate analyses and evaluation of the data; and -Producing and communicating the information, accurately and coherently, using conventions appropriate to statistics and scientific reporting
AGRI	1664	Microbiological principles in Agriculture	Students who successfully complete this module will be qualified to describe the basic characteristics and importance of micro-organisms, with specific reference to their role in agriculture. This knowledge is based on the introductory cell structure, taxonomy, nutrition, microbial physiology, interaction between micro-organisms and plants or animals, the production of high-quality food products, as well as the factors that corrupt food. Practical work: Students that complete the practical part successfully will be equipped to conduct basic microbiological investigations relevant to the Agriculture sector.	MAIN	Students should be able to: - demonstrate basic knowledge and understanding, skills, qualities and other attributes in the microbial principles within the agricultural sector and should be able to; -Apply and demonstrate a clear understanding of knowledge and insight regarding the basic concepts and principles of micro-organisms such as the, morphology and nomenclature of bacteria, isolation and identification of food bacteria, industrial microbiology (making of cheese and bread), food spoilage and the control thereof, food pathogens and their life cycles, impact of plant and animal diseases, function and symbiosis of micro-organisms in the digestive tract of ruminant animals, manipulation of micro-organisms by nutrition, metabolic disorders and diseases caused by micro-organisms in animals and plants; and -Communicate efficiently through visual, numeric and/or language proficiency during oral/written feedback regarding any relevant topic within the basic microbial principles as applicable within the Agricultural sector.
ANIB	2624	Introduction to Animal and Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of animal and plant breeding including modes of inheritance: evolution and genetic diversity; mitosis and meiosis; chromosomes, locus and genes; Mendelian inheritance; sex chromosomes and determination of sex; linkage and crossing over; sex related inheritance; randomness of inheritance; dominance and epistasis. Population genetics: gene and genotypic frequencies, effect of selection and mating systems on gene and genotypic frequencies; Hardy-Weinberg law; deleterious genes and detecting carriers of deleterious genes; simply inherited and polygenic traits; natural and artificial selection; conservation genetics.	MAIN	Student will be able to: -Outline modes of inheritance and population genetics and how that knowledge relates to animal and plant breeding.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ANIB	3714	Theory of Animal Breeding	Genetic model for quantitative traits; genotype x environment interaction; statistical methods applied to animal breeding; probabilities and goodness of fit; the resemblance between relatives; heritability and repeatability; prediction of selection response; short and long term results of selection; introduction to quantitative traits; inbreeding and crossbreeding; threshold values and scale effects; phenotypic, genetic and environmental correlations; hybrid vigour; correlated responses; natural selection. Practical work: The student estimates heritability; genetic and phenotypic correlation and other parameters.	MAIN	Student will be able to: - An integrated knowledge of the resemblance between relatives; genetic parameters; prediction of selection response; short and long term results of selection; inbreeding and crossbreeding; threshold values and scale effects; genetic and environmental correlations; correlated responses; natural selection; hybrid vigour; epigenetics; - Detailed knowledge of the theory of animal breeding how this knowledge relates to other fields, disciplines or practices; -Evaluate types of knowledge and explanations typical within the animal breeding context; - Identify, evaluate and solve problems in unfamiliar contexts; - Calculate heritability; genetic and phenotypic correlations and other parameters; and - Communicate effectively through visual and numeric proficiency during oral and written presentations
ANIB	3724	Molecular Animal Breeding	Reproductive technologies, cloning, molecular genetic technologies, genetic markers, major genes and the ethical aspects of new technologies in livestock improvement. Practical work The student gain new knowledge of the practical aspects of this new technology through demonstrations.	MAIN	Students will be able to: -Discuss the impact of modern reproductive technologies, cloning, molecular genetic technologies, genetic markers, major genes and the ethical aspects of new technologies in livestock improvement.
ANIB	4814	Animal Breeding: Mixed Model Theory	This module includes the study of genetic model for quantitative traits, matrix algebra; statistics in animal breeding; importance of heritability and repeatability; methodologies for genetic prediction; optimisation of selection; different models for the prediction of breeding values; Sire model, animal model, Bayes theory, QTLs, genomic models; relationships and inbreeding; simple rules for computing A and A-1 matrices; joint estimation of several vectors of random effects; accounting for genomic information in genetic analyses. Practical work: The student estimates variance components and resulting breeding values using matrix algebra and is familiarised with the application of breeding values. The use of different computer programmes for preparation of genetic analyses of large datasets.	MAIN	Student will be able to: - Apply and engage with concepts of quantitative genetics in Animal breeding - Apply and engage with a range of terms, concepts and issues concerning the genetic analyses of Animal breeding data and the interpretation of the results as well as the components of the extended genetic model for quantitative traits; -Use relevant statistical techniques and the application in quantitative traits; -Discuss the importance of heritability and repeatability in animal breeding; -Use appropriate methodologies for genetic predictions: selection index and BLUP; - Optimize genetic change by manipulation of elements of the key equation -Apply appropriate statistical techniques for the calculation of correction factors; -Use matrix algebra in the prediction of breeding values using mixed model methodology: Sire model, Animal model, multiple trait models
ANIB	4823	Animal Breeding: Practical Application	"After completion the student is familiar with the basics of practical animal breeding; selection objectives; selection trials; mating systems; selection techniques; national livestock improvement schemes; selection for growth and efficiency; genotype x environment interactions; unique breeding problems in different breeds and species; linear type traits. Practical work The student interprets performance test data and herd profiles; conduct practical selection of breeding stock; evaluate breeding programmes. Demonstration of commercial herd/flock manage-ment software as used in different livestock industries."	MAIN	The student will be able to: 1. apply, integrate and engage with concepts of quantitative genetics in the animal breeding problems; 2. explain the meaning of BLUP of breeding values and know how to apply it in practice; 3. apply the criteria to determine the traits to be included in a breeding objective 4. formulate breeding plans for several livestock species; 5. discuss international developments in the animal breeding field; 6. know how to calculate individual inbreeding coefficients for a large dataset and be able to interpret it in a practical situation; and 7. utilise the objectives and application of all National Improvement Schemes of different species and be able to critically evaluate their design that influence the rate of genetic improvement for economic important traits.
ANIB	4824	Animal Breeding: Practical Application	After completion the student is familiar with the basics of practical animal breeding; selection objectives; selection trials; mating systems; selection techniques; national livestock improvement schemes; selection for growth and efficiency; genotype x environment interactions; unique breeding problems in different breeds and species; linear type traits. Practical work The student interprets performance test data and herd profiles; conduct practical selection of breeding stock; evaluate breeding programmes. Demonstration of commercial herd/flock manage-ment software as used in different livestock industries. The use of applicable computer programs to estimate variance components from field data.	MAIN	Student will be able to: -Apply, integrate and engage with concepts of quantitative genetics in the animal breeding problems; -Explain the meaning of BLUP of breeding values and know how to apply it in practice; -Apply the criteria to determine the traits to be included in a breeding objective -Formulate breeding plans for several livestock species; -Discuss international developments in the animal breeding field; -Calculate individual inbreeding coefficients for a large dataset and be able to interpret it in a practical situation; and -Utilise the objectives and application of all National Improvement Schemes of different species and be able to critically evaluate their design that influence the rate of genetic improvement for economic important traits. -Estimate variance components from field data using applicable programs

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ANIF	2624	Animal Fiber Production	This module aims to assist students to attain an advanced level of knowledge and understanding of the terminology, concepts and theory in the field of animal fiber production. To achieve this aim, the module includes the physiology, chemical and physical traits of fibres, the processing and marketing thereof, as well as classing techniques. The module includes a practical component where students will attend compulsory shearing and wool classing course.		Student will be able to: Explain the history of wool and mohair production, specifically related to the South African livestock industry · Provide an overview of the South African and global wool and mohair industries (including economic trends) and to discuss the role of wool and mohair in the global textile industry · Describe the histology of the skin and discuss the development phases of follicles and follicle groups in detail · Explain pre- and post-birth development of follicles · Distinguish between different fibre types, describe the formation of fibres and the factors influencing it and discuss the morphological structure of fibres · Discuss the chemical composition of fibres (referring to proteins and lipids), describe the keratinisation in detail and compare the role of different bonds in the stabilization of the wool fibre. · Discuss the phases and rhythms of wool growth and discuss the effect of seasonal pattern on fibre morphology. · Discuss wool cyclic variation between breeds (referring to growth and shedding patterns) and discuss biological harvesting · Discuss the physical and quality traits of wool and mohair, refer to their economic importance and compare the economically important traits of different fibres · Explain the application of different processes used in the processing of fibres · Describe the characteristics of the woollen and worsted processes and the detail required for the steps of both processes · Refer to materials and/or garments produced from the woollen and worsted processes · Discuss the most important defects and diseases related to wool · Discuss animal fibres with regards type of fleece, chemical, physical and microscopic traits and the specific use · Give an overview of plant-produced natural fibres and synthetic fibres · Do practical work related to Wool shearing, Wool classification, Processing of wool accordingly for marketing purposes
ANIF	4824	Meat Science	Principles involved in manufacturing whole-muscle, minced and emulsified meat products. Restructured, canned, fermented, dried and intermediary moisture meat products. Curing, smoking and cooking of meat products. Additives in meat products. Non-meat ingredients in meat products. Formulation of a meat product. In the practical work case studies will be performed regarding the slaughter line at poultry and red meat abattoirs. Practicals on meat product formulation and manufacturing of different types of products will be done.	MAIN	Student should be able to ; - Explain the functional properties of meat proteins; - Explain the processing technology of meat and meat products; - Formulate chemical analysis of processed meat products; - Evaluate knowledge of food processes regarding the processing of meat - Take responsibility of decision making when processing meat.
ANIF	4864	Dairy Science	Scientific and technological principles of the industrial processing of cheese and other fermented dairy products such as yogurt and cottage cheese. Practicals: processing of cheese and fermented products followed by analysis, quality control and packaging aspects.	MAIN	"Student will be able to: -Analyse the nutrient composition of milk; -Discuss the processing technology of milk; -Examine and discuss the chemical behaviour and changes of milk components during processing; -Evaluate the food processes regarding the processing of dairy material; and - Take responsibility of decision making when processing dairy material."
ANIG	1624	Introduction to Animal, Wildlife and Grassland Science	This module includes an introduction to the study of animal, wildlife and Grassland science. It includes the following: domestication and migration routes of livestock species, livestock industry, livestock breeds; handling of farm animals; concepts in livestock production; livestock and the environment; safety in livestock production; wildlife species and production systems; vegetation of South Africa and the Grassland ecosystem; career opportunities in the animal, wildlife and Grassland science industries. Practical work Visits to different production systems. Demonstrations of animal handling in different species. Grassland evaluation techniques. Identification of wildlife and vegetation species.	MAIN	Student will be able to: -Describe domestication and migration routes of livestock species; -Defend the importance of livestock industry; -Identify livestock breeds; -Explain handling of farm animals and concepts in livestock production, livestock and the environment and safety in livestock production based on an awareness of the complexity of ethical dilemmas; -Identify wildlife and vegetation species; -Evaluate production systems; and -Describe vegetation of South Africa and the Grassland ecosystem;
ANIG	2602	Animal Production Practical	After completion of this modules, students will be able to identify and apply practicalanimal scienceknowledge of basic production aspects such as facilities, scientific principles, handling and judging animals, attending courses,lecturesand workshopsby means of self-exploration, identifying industry role playersand understanding the processes involved in feed and food processing for both ruminant and monogastric production enterprises.	MAIN	Student will be able to: -Perform practical animal management and animal care activity such as castration, ear tagging, tail docking, paint branding, ear notching, clipping of needle teeth and injection of iron, handling, vaccinating, deworming, breeding.

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ANIG	2613	Introductory Ruminant Production	After completion the student will be familiar with the general principles of beef, dairy, sheep and goat production, the role of the four industries in South Africa, different breeds, the effect of nutrition, breeding, physiology and health on the efficient production of beef, mutton (lamb meat), milk and wool.	MAIN	Student will be able to: -Discuss the general principles of beef, dairy, sheep and goat production, and the role of the four industries in Southern Africa; -Identify different breeds, and the effect of breeding, nutrition, physiology and animal health on the efficient production of beef, mutton (lamb meat), milk and wool; -Apply animal husbandry skills (dipping, dosing, vaccination, castration, dehorning etc.); and -Apply principles of meat, milk and wool evaluation.
ANIG	2623	Introductory Monogastric Production	After completion the student will be familiar with the general principles of pig, poultry and ratite production, the role of the different industries in South Africa, different breeds, the effect of nutrition, breeding, physiology and health on the efficient production of meat, eggs and leather products.	MAIN	Student will be able to: - Demonstrate knowledge and understanding of the general principles of pig, poultry and ratite production, and the role of the three industries in Southern Africa, and the potential working opportunities within these industries; - Demonstrate knowledge and an understanding of the different breeds and the effect that breeding, nutrition, physiology and animal health have on the efficient production of meat, eggs, ostrich feathers and leather; - Demonstrate knowledge and an understanding of applied basic animal husbandry skills - Demonstrate knowledge and an understanding of the basic principles of meat, egg, feathers and leather evaluation and the principles behind marketing and value adding of these animal derived products.
ANIG	3704	Animal Science Praticals III	In this course, students practice all aspects of animal production and products processing which they covered the theory in class.		Student will be able to: -Perform animal management practices with hands-on experiences, the following animals will be included cattle, sheep, goats, swine and poultry. Perform routine farm management practices that include castration, ear tagging, tail docking, paint branding, ear notching, clipping of needle teeth and injection of iron, hoof trimming, vaccinating, parasite detection, pregnancy detection, lambing and neonatal care; make decisions regarding selection, breeding and culling and learn to recognize signs of illness and administer treatments.
ANIG	3713	Cattle Production Systems	Having successfully completed this module the student will understand the integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises.	MAIN	Student will be able to: -Discuss management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; -Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises; and -Compile and evaluate a management system for sheep, dairy and beef enterprises.
ANIG	3723	Sheep and Goat Production Systems	Having successfully completed this module the student will understand the integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises.	MAIN	Student will be able to: -Apply integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; -Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises; and -Compile and evaluate a management system for sheep, dairy and beef enterprises.
ANIG	3733	Poultry Production Systems	Having successfully completed this module the student will understand the integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in poultry enterprises.	MAIN	Student will be able to: -Discuss integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; -Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in poultry enterprises; -Compile and evaluate a management system for poultry enterprises.

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ANIG	3743	Pig Production Systems	This module includes the study of fertility and selection, vaccination and venereal diseases and crop residues and planted pastures in relation to pig management.	MAIN	The students will be able to: - Integrated knowledge and understand the concepts, principles and theories of elements of pig production systems and the practical application thereof in different situations; - Critically evaluate different production systems; - Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for pigs; - Develop a complete management program for this species; and - Communicate effectively through visual, numeric and language proficiency during oral and / written presentations.
ANIG	3754	Monogastric Production Systems	Having successfully completed this module the student will understand the integrated management aspects related to nutrition, breeding, products, animal diseases, husbandry and economy; and how these aspects can be manipulated within different production systems to increase efficiency of production in monogastric production systems enterprises.	MAIN	"After completing this module students will be able to: - Discuss integrated management aspects related to nutrition, breeding, products, animal diseases, husbandry and economy; - Discuss how nutrition, breeding, products, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in poultry enterprises; - Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for monogastric production systems; - Integrate knowledge and understand the concepts, principles and theories of elements of monogastric production systems and the practical application thereof in different situations; - Evaluate a management system for monogastric production enterprises; and - Communicate effectively through visual, numeric and language proficiency during oral and / written presentations."
ANIG	4808/ 6808	Research Project Animal Sciences	A subject specific project will be completed under the guidance of a supervisor and it is expected of students to submit a research report in the format of a scientific publication and to prepare and orally present the results in the format required by scientific conferences.	MAIN	Student will be able to: Student will be able to: - perform problem solving, hypothesis formulating, planning, execution and analysis of animal science experiments/research, - use a range of specialised skills to identify, analyse and address complex problems drawing systematically on the body of knowledge and methods appropriate to the field of animal science. - interpret results and prepare scientific report - communicate effectively through visual, numeric and/or language proficiency during oral and written presentations. -work effectively in a team or group, and to take full responsibility for own decisions and actions, and full accountability for the decisions and actions of others where appropriate. -demonstrate insight developed in this module provides a background for further post graduate studies.
ANIN	2624	Introduction to feed properties	This module contains fundamental knowledge, principles and practices of feed sources, properties and composition of feed ingredients, macro and micronutrients, feed additives and medicaments that are commonly used in animal diets for different species of farm animals (ruminants, monogastricts, and companion animals). Feed ingredients properties such as physical and chemical composition will be used for the identification, classification and utilization of feed sources for specific animals. Basic introductory techniques regarding feed preservation; processing equipment and feed label legislation will be addressed.	MAIN	Student will be able to: Perform feed ingredient identification, classify feed sources on nutritional characteristics and provide guidelines for inclusion levels of different feeds based on its properties. · Identify connections between feed properties and efficiency of nutrient utilization in relationship to the age and specie of animal fed. · Discuss the principles of feed processing, preservation and nutrient utilization of different feed sources. · Identify anti-nutrients, toxicity, chemical and physical properties of feed sources that will hinders the usage thereof in animal diets. · Explain the basic principles of feed manufacturing; feed legislation, label registration and retail practices.
ANIN	3734	Fundamental and Experimental Animal Nutrition	The student is familiar with the concepts of feeds and nutrients (water, carbohydrates, lipids, proteins, minerals and vitamins); digestive systems (monogastric, ruminant and lower digestive tract fermenters), digestion, absorption and metabolism; nutrient deficiencies, toxicity and metabolic disturbances; digestibility of feeds and feed components; techniques for the evaluation of feeds and pastures; nutrient requirements for monogastric animals, ruminants and lower digestive tract fermenters. Practical work:Students perform feeding and digestion trials, and laboratory analyses.	MAIN	Student will be able to: - Apply and discuss the basic concepts of nutrients; digestive systems of monogastric, ruminant and lower digestive tract fermenters, digestion, absorption and metabolism; nutrient deficiencies, toxicity and metabolic disturbances; digestibility of feeds and feed components; techniques for the evaluation of feeds and pastures; nutrient requirements for monogastric animals, ruminants and lower digestive tract fermenters; and - Communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding digestibility studies and/or any relevant topic.
ANIN	3744	Properties of Feeds Balancing Rations and Fodder Flow Planning	After completion the student willbe familiar with the principles of feed ingredients used in animal nutrition, categorized feed ingredients according to the Weende classification system, usage and inclusion levels of feed ingredients based on animal species (monogastric, ruminant and lower digestive tract fermenters); techniques used for the evaluation of feeds and pastures; preparing and processing of feeds; legislation regarding feed formulation and diet registration; basic diet formulation and fodder flow planning for farm animals.	MAIN	Students will perform feed and feed ingredient identification and nutritional classification, processing and toxicity of feeds; feed additives and animal by-products; Use feeds for diet formulation and fodder low planning for different types of monogastric and ruminant species of animals. Communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding digestibility studies and/or any relevant topic.

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ANIN	3764	Applied Nutrition of Wild Herbivores and Carnivores	After completion the student is familiar with the principles of nutrition, nutrients and the digestive systems of important groups of wild herbivores and carnivores in Africa. Diet selection, as well as the utilization of grasses, shrubs and trees by different wild herbivore species, is related to habitat preferences. Activities such as prey selection, hunting techniques, scavenging and the utilization of prey animals by wild carnivore species are related to their social behaviour and habitat. The nutrition and dietary requirements of wild animals are studied for both in situ and ex situ situations. Practical work Assignments form an integral part of the module, both for the theory and the practical work. Developing skills in identifying wild animal species, including their spoor and faecal excretion. Prey animals are identified anatomically by means of the remains of carcasses and the faeces of predators. Techniques are studied and applied to determine and study qualitative and quantitative aspects of the nutrition of wild animals.	MAIN	Student will be able to: Exa-mine and discuss the principles of nutrition, nutrients and the digestive systems of important groups of wild herbivores and carnivores in Africa; -Perform diet selection and discuss, as well as the utilization of grasses, shrubs and trees by different wild herbivore species, is related to habitat preferences. -Examine prey selection, hunting techniques, scavenging and the utilization of prey animals by wild carnivore species are related to their social behaviour and habitat. -Examine the nutrition and dietary requirements of wild animals are studied for both in situ and ex situ situations.
ANIN	4834/ 6834	Applied Monogastric Nutrition	On the successful completion of this module, the student is familiar with the principles of nutrient requirements, nutritional management and the interaction between nutrition and physiological development of poultry and pigs during different biological developmental phases and within intensive production systems. The comprehensive integration of biochemical and nutritional knowledge during the physical and chemical evaluation of diets for monogastric animals will be demonstrated. Practical work: The student performs balancing of diets using detailed computer assisted formulation software and production simulation models with specific reference to poultry and pig species. Participating in research activities with regard to applied nutritional management of the mentioned species.	MAIN	"Student will be able to: -apply and demonstrate principles and in-depth insight regarding basic concepts and nutritional requirements of broilers, layers, breeder parent stock, sows, piglets and boars in different physiological developmental stadiums and housing systems to produce economical high quality animal protein products; -apply the necessary principles needed to formulate diets for several monogastric species using computer assisted models with integrated knowledge and understanding of feed ingredient limitations as well as ingredient cost; -discuss and apply principles of international developments in the animal nutrition field; with specific reference to changes within the poultry and pig sectors; and -communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding diet formulation and/or any relevant topic within applied monogastric nutrition."
ANIN	4864/ 6864	Applied Ruminant Nutrition	On completion, the student is familiar with the nutrient requirements and nutritional management of dairy cattle, dairy calves, beef cattle, sheep and goats during different physiological stages; intensive, extensive and semi-intensive feeding systems for livestock, including drought feeding, over-wintering, stall feeding, supplementation on veld and irrigated pastures. Practical work: The student performs balancing of rations using computer assisted linear programming, formulation- and simulation models. Participation in any management and/or research activities with regard to applied nutritional management of the mentioned species.	MAIN	Student will be able to: -evaluate and engage with concepts and feeding management of dairy cattle, dairy calves, beef cattle, sheep and goats in different physiological stadiums and systems to produce economical high quality animal products within specific environmental conditions. -formulate diets for several ruminant species using computer assisted models; -evaluate and engage with international developments in the animal nutrition field; and -Communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding ration formulation and/or any relevant topic within applied ruminant nutrition.
ANIP	2614	Anatomy and Physiology of Body Compartments	On a basic systems approach the animal body is divided into body and fluid compartments. Body compartments are studied with emphasis on embryological development of the pleural and peritoneal cavities. Blood and its components will be studied followed by the lymphatic system (anatomy, histology and physiology). Bacterial and viral diseases as well as vector borne diseases will be covered. The anatomy and physiology of the different systems within each body compartment will be covered such as the cardiovascular, respiratory, endocrine and digestive system.	MAIN	Student will be able to: -Describe and explain embryological development of the body and fluid compartments; -Identify anatomical compartments of the body and systems within each compartment (cardiovascular, respiratory, endocrine and digestive systems); -Describe the physiology of the body compartments and systems within each compartment (cardiovascular, respiratory, endocrine and digestive systems); -Comprehend the physiology of the fluid compartments (hematopoiesis and immunology); -Identify anatomical structures of the lymphatic system; and -Identify and apply the control of bacterial, viral and vector borne diseases.
ANIP	3714	Animal Anatomy and Physiology of Growth in Farm Animals	Anatomy and Physiology of muscles and nerves. Animal growth and development, and the underlying physiological principles. Applied aspects of animal growth and development. Fundamental aspects of growth, development and size at different growth phases. The use and application of growth promotants in South Africa. Energy metabolism in live and post mortem muscle.	MAIN	Students will be able to: - Identify anatomical structures of locomotion; - Associate with animal growth and development and apply its underlying physiological principles; - Classify embryological development and factors that affect growth and development; - Debate the use and application of growth promotants in South Africa; and - Define and apply the knowledge on energy metabolism in live and post mortem muscle.
ANIP	3724	Animal Health	The student is familiar with the vaccination and dosing of farm animals, the immune reaction, diagnosis, symptoms, lesions, treatment and control of certain common diseases in livestock, external and internal parasite control and the occurrence of dystocia. Practical work: Elementary diagnostic and post mortem procedures. The principals involved with RIA determinants and immunological techniques are demonstrated.	MAIN	Student will be able to: - Discuss and explain causes, symptoms, lesions, diagnosis, treatment and control measures of certain common diseases of farm animals; -Examining, vaccinating and dosing techniques regarding farm animals; - Discuss the characteristics of the immune reaction and resistance against parasites and pathogens; and - Identify and address ethical issues on animal health problems

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ANIP	4814/ 6814	Applied Reproduction Physiology in Farm Animals	After completion the student is familiar with concepts such as rate of reproduction and means of increasing it in farm animals and poultry; gametogenesis; endocrine control of reproduction; puberty; factors influencing normal reproduction; teratology; principles and application of synchronisation, artificial insemination, super-ovulation and embryo transfer in sheep goats, cattle and pigs; mating systems and management practices; pregnancy diagnosis; reproduction abnormalities. Practical work Macroscopic examination of sex organs; semen evaluation, demonstration of synchronisation, laparoscopy and pregnancy diagnosis in sheep and cattle are performed. Visits are brought to AI stations, pig and poultry production units and dairies.	MAIN	Student will be able to: -execute certain reproductive techniques used to increase reproductive efficiency in sheep, goats, cattle and pigs;and -identify and address ethical issues based on the suitability of different ethical value systems on the application of animal reproductive techniques
ANIP	4824	Meat, Dairy and Egg Science	To provide an overview of meat, dairy and egg industry in South Africa, on the continent and worldwide. Post mortem energy metabolism in muscle, the composition and quality aspects of meat and milk, the process of meat and milk production, and factors that affect the quality attributes of meat and milk. Embryological development of eggs. Composition of carcass and meat, slaughtering process, meat quality, and the consumer. Dairy industry. Composition and nutritional value of milk and factors that influence it. Milk production, milk quality and distribution. Egg production and distribution.	MAIN	Student will be able to: -Explain the physiological processes of conversion of muscle to meat; -Discuss the marketing and factors affecting meat consumption; -Summarise the slaughtering processes and carcass processing and classification systems of different species; -Explain carcass health inspection; -Explain the physiological processes of lactation; -Discuss marketing and factors affecting dairy consumption; -Describe milk composition and dairy quality; and -Discuss egg production and marketing.
CROP	3744	Small grain, industrial and diverse crops	Cultivation practices concerning the most important winter grain, industrial and diverse crops of South Africa. The students will also be able to apply the theoretical and practical aspects of soil tillage, seedbed preparation, planting techniques, plant nutrition and pest control, harvesting and grading as it relates to these crops on a higher level. During practical sessions the student will study the morphology of these crops in detail and skills concerning the practical aspects of crop cultivation will be developed and practised by the students.	MAIN	"Student will be able to: - Identify and list the most important morphological characteristics of the crops dealt with in this module - Identify development stages, and explain the importance of crop development. - Analyse and interpret soil, crop and climate interactions. - Explain and assess cultivation practices for crops covered in this module. - Explain, assess, and be able to make recommendations, on both a theoretical and practical level, on the following principles related to these crops: -soil tillage and field preparation -planting techniques -crop nutrition -weed control - Identify and explain how to control of the main pests and diseases of each crop - Describe the grading and uses of the crops - Assess the suitability of a crop for production in any area, given a set of climatic and soil data, as well as being able to estimate/calculate the approximate yield that can be expected under those conditions. - Accurately identify and calculate inputs required for these crops under given circumstances and be able to assess the decisions and actions of others."
DATA	2614	Agricultural Datametry	The student will learn how to calculate and interpret statistics (mean, variance, analysis of variance (ANOVA) and multiple comparison of means) from various experimental designs. Data sets will be analysed during tutorials to illustrate the techniques learned.	MAIN	Student will be able to: -apply appropriate methods, procedures and/or techniques in statistical analyses within a defined context; and -interpret results from statistical analyses using real data sets.
DATA	2624	Agricultural Datametry	The student will do regression analyses (linear, non linear, multi linear), frequency tables and Chi square analysis of categorical and frequency data, graphical presentations, univariate and mixed model analyses of data applicable to Agricultural related industries and co-variance analysis combining regression and ANOVA. Practical work; The student will learn about regression (simple linear regression and multiple regression), correlation and co- variance	MAIN	Student will be able to: - apply appropriate methods, procedures and/or techniques in regression and co-variance analyses within a defined context. - interpret results from regression and co-variance analyses using real data sets.
DATA	3712	Statistical Analysis	The student will learn to use statistical software packages, SAS and EXCEL, to analyse data typically found in agricultural research. Using SAS and Excel, data will be processed to generate descriptive, analyses of variance (ANOVA) and regression statistics for further interpretation, inference and reporting regarding the analysed data. Practical work: The student will use the software statistical packages, SAS and Excel to analyse data using appropriate statistical methodology. The results will be tabulated, saved and exported as HTML, RTF, DOC and PDF files. These results will then be summarised and reported.	MAIN	Student will be able to: - apply appropriate statistical methods, procedures and/or techniques in analyses of data within a defined context using commercially available statistical software packages; and - interpret and report results from these data analyses

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GRAS	2614	Grassland Ecology	Students are introduced to Grassland Science and Wildlife Management and equipped with the basic principles of the ecology of veld vegetation and herbivore game species. Must be able to describe and evaluate the causes and results of vegetation changes. knowledgeble of ecological aspects of Grassland and Grassland ecosystems (domesticated and game animals). Identification and description of South African fodder plants including grasses, karoo shrubs and trees, as well as indicator and problem plants. Identification of herbivore game species and knowledge off their habitat requirements and diet selection.	MAIN	Student will be able to: - Discuss , explain and explore: The vegetation of South Africa, including the biomes and veld types of South Africa, Growth and development of pasture plants, Physiological aspects of pasture utilization, including photosynthesis, Indicator and problem plants, Ecological status and grazing values of grasses, Karoo shrubs and woody plants, including their identification. - Link these fundamental principles to practical, real-world situations
GRAS	3714	Applied Veld Management and Veld Evaluation	The aim and principles of veld management with livestock and wildlife will be studied in this module. Knowledge of grazing habits of livestock and wildlife and selective grazing will be attained. Identification and analysing of veld management methods and strategies will be discussed. The student will be equipped to determine grazing capacity and stock rate. The student will be able to do scientific planning of farm unit and study the methods for evaluating Grassland in terms of botanical composition and veld condition.	MAIN	Student will be able to: - differentiate between all applicable pasture terminologies and correctly use it. - interpret the conduct of the animal on veld and make calculations on the grazing capacity to determine the number and type of animals on natural veld. - discuss the development of camp systems over the last half century and describe the increasing developments in multi-camp systems and the group camp approach in a theoretical and practical example considering the principles of veld management. - analyse of the pasture data, and prescribe special applicable treatment for it, of which veld fires are an important factor. - analyse the economic implications of stock numbers and veld management, on the basis of the appraisal of the carrying capacity of veld. - determine the different measures of veld evaluation and study different methods of veld condition determination to eventually determine the carrying capacity of veld and; - apply above knowledge to do pasture scientific planning of a farm unit with consideration of the number of camps, carrying ability of veld, use of suitable number and type of animals, so that efficient veld management is applied and sustainable high production from veld is ensured, eventually measured in terms of animal products, while aiming at conservation farming.
GRAS	3724	Intensive Pasture Production	The student will be familiar with the importance, extent and purpose of intensive pasture production in South Africa, which include cultivated pastures and veld restoration. Principles for sustainable management and utilization of cultivated pastures will be evaluated. The student will be familiar with different factors influencing germination and defoliation of fodder crops. Integration of all aspects on the dynamics of cultivated pastures into a fodder flow planning. Visits to cultivated pastures and production systems will be arranged.	MAIN	Students will be able to: - Manage seed germination principles of fodder plants in pasture cultivation and veld restoration; - Evaluate factors important in veld reclamation, reinforcement and restoration; and - Identify and evaluate suitable fodder crops for planting/cultivating, which include cultivation aspects, choice of crops, quality, quantity, utilization and conservation
GRAS	3763	Applied rangeland and pasture management	Information about seed germination of fodder plants. Evaluation of factors important in veld reclamation and veld reinforcement will be discussed. Identification and evaluation of suitable crops for planting/cultivating: cultivation aspects, choice of crops, nutritive value, quality, utilisation and forage conservation will be studied. The aim and principles of veld management with livestock and wildlife will be studied in this module. Knowledge of grazing habits of livestock and wildlife and selective grazing will be attained. Identification and analysing of veld management methods and strategies will be discussed. The student will be equipped to determine grazing capacity and stock rate. The student will be able to do scientific planning of farm unit and study the methods for evaluating grassland in terms of botanical composition and veld condition.	MAIN	"Student will be able to: - Differentiate between all applicable rangeland and pasture terminologies. - Make calculation of correct animal numbers for the sustainable utilization of natural rangeland and pasture crops. - Calculate the grazing capacities of rangeland and cultivated pastures. - Apply principles of correct veld management towards the development of rangeland and pasture management systems. - Implement high pressure grazing principles as a means of regenerative grazing of rangeland and pastures. - Evaluate rangeland condition scientifically by using various rangeland condition assessment methods. - Restore degraded rangeland, like bare areas and bush encroached areas. - Identify and evaluate suitable fodder crops for cultivating, which include cultivation aspects, quality and expected yields of crops. - Manage the utilization and conservation (as hay and silage) of pasture crops. - Plan and conduct scientific research of rangeland and pasture dynamics."
GRAS	4806	Intensive Pasture Production	The application of veld intensification to improve natural grazing areas (Grassland and Grassland). In depth study on fertilization of veld as well as veld intensification (over sowing and reclamation of bare areas). The use of planted pastures to supplement the natural veld in order to maintain sustainable productivity. The adaption and application of various cultivated pasture crops in different rainfall areas of Southern Africa. Evaluation of cultivated pastures in terms of establishment, utilization and nutritive value. Study of the current and possible future management challenges of cultivated pastures for sustainable pasture production.	MAIN	

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GRAS	4808/ 6808	Research Project Grassland Sciences	A subject specific project will be completed under the guidance of a supervisor and it is expected of students to submit a research report in the format of a scientific publication and to prepare and orally present the results in the format required by scientific conferences.	MAIN	Student will be able to: - perform problem solving, hypothesis formulating, planning, execution and analysis of Grassland science experiments/research, - use a range of specialised skills to identify, analyse and address complex problems drawing systematically on the body of knowledge and methods appropriate to the field of Grassland Science - interpret results and prepare scientific report - communicate effectively through visual, numeric and/or language proficiency during oral and written presentations. -work effectively in a team or group, and to take full responsibility for own decisions and actions, and full accountability for the decisions and actions of others where appropriate. -demonstrate insight developed in this module provides a background for further post graduate studies.
GRAS	481/ 6814	Production and Utilisation Ecology	Students are introduced to the fundamental principles of ecology. The student must be able to evaluate the sustainability of the grassland ecosystem and the factors influencing it in order to find long-term, practical solutions to ecological problems. The hydrological and other biological cycles in the grassland ecosystem will be covered. Mathematical models for the estimation of the biomass of woody plants for purposes of calculating the browsing capacity for domestic stock and game species will be studied	MAIN	Students will be able to: Evaluate the sustainability of the rangeland ecosystem and the factors that may influence it in order to find long-term, practical solutions to ecological problems. They must have a fundamental knowledge of the principles of ecology and also be able to link this knowledge to practical, real-world situations. Specific aspects of study include the following: -The ecological approach and its meaning, -Principles concerned with the regulation and stabilisation of rangeland ecosystems, -Biogeochemical cycles in rangeland ecosystems, -Elasticity and condition of rangeland ecosystems, -Knowledge of the problem of bush encroachment and how to use principles of ecosystem functioning in finding long-term solutions, -The quantification of woody plants and the calculation of the browsing capacity for domestic stock and game species.
GRAS	4824 6824	Advanced Veld Management	Knowledge of the extent and history of the conservation idea will be studied in this module. Identification of the causes and results of veld deterioration (erosion) and measures to combat it will be done. The student should be able to identify the importance of veld management in different veld types and the critical evaluation of system/practices. Identification and analysing the grazing habits of livestock and game and selective grazing. Determination of grazing capacity and stocking rate and application of special treatments for veld will be discussed. Students will carry out veld management planning and bringing applied wildlife management in proper relation to marketing, legal aspects, economics and sosio-economical aspects of game. Students will be familiar with the management of communal areas.	MAIN	Student will be able to: -study the behaviour conduct of domestic animals and game on veld and make calculations on the grazing capacity to determine the influence of number and type of animals on natural veld; -recommend an exact or applied veld management system as well as special treatments for veld; -analyse the economic implications of stock and game numbers and veld management, based on estimating the carrying capacity of veld; and -use the above information to recommend a sound veld management strategy under different situations, with different kinds of animals and to take the management skills of the farmer into consideration.
GRAS	4834	Defoliation Phenology and Physiology	The student is on a higher level familiar with the physiological and phenological management principles for sustainable utilization of the grazing ecosystem. The student will be familiar with the influence of intensity and frequency of defoliation on the production and root growth of fodder plants. Different techniques for Grassland productivity quantification will be demonstrated and evaluated. The student must present practical work in the form of scientific reports. Visits to veld in different conditions will be arranged.	MAIN	Students will gain knowledge of seasonal variation in nutritional value and quality of fodder plants. Students will be able to: - Identify critical phenological and physiological periods in the growth cycle of fodder plants (grasses, shrubs and trees); - Apply defoliation physiological principles of fodder plant to ensure sustainable management of the grazing ecosystem; and - Evaluate the influence of intensity, frequency and season of defoliation on leaf and root growth, growth reserves and nutritive value of fodder plants.
GRAS	4844	Advanced Fodder Plant Evaluation	In this course students are trained in the classification of vegetation and the identification of the variables that influence the Grassland ecosystem. The appropriate approach to the planning and execution of Grassland science research is covered, including sampling, statistical tests and simulation models. Applied livestock and wildlife management systems will be studied. Students should be able to identify appropriate methods to measure environmental variables and the productivity of the Grassland ecosystem, including practical knowledge of the application of the techniques.	MAIN	Student should be able to identify methods to measure variables and the productivity of the Grassland ecosystem and knowledge of the practical application of the techniques. Student will be able to: - Examine advanced principles of the objectivity and application of methods and techniques to measure the composition and productivity of the ecosystem and any changes that may occur; and - Link these fundamental principles to practical, real-world situations and include knowledge of the following: Changes within the ecosystem, Planning and conducting research, Sampling vegetation, Cover as measure to evaluate veld, Presence and absence of species as measure of veld assessment, Density as measure of evaluating veld, Production as basis of veld assessment, Utilisation, forage intake and nutritive value of veld, Determination of veld condition

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GRAS	4851	Professional Skills	Knowledge attain concerning the principles for writing seminars and scientific publications, acquiring literature and consultation thereof, gathering of information, writing and presenting a seminar on a Grassland scientific subject, project presentations and reports; communication skills development.	MAIN	Student will be able to -Gather information on a specific topic in Grassland Science; and -Write a report and present the report to an audience.
WDMT	2624	Game and Natural Environment Interaction	A study is made of the interaction between game and their environment, with emphasis on their habitat and food selection in the natural veld, competition for it, as well as seasonal changes in the environment. The role that the wild animal's environment plays in its reproduction, herd size, migration, conflict with humans, etc. are also covered. General principles on ecology, availability and utilization of food by game in natural veld (extensive system), as well as basic methods of veld surveys and carrying capacity are discussed on an introductory level.	MAIN	Student will be able to: • understand the basic habitat requirements of game species in general, with emphasis on adaptations of certain specific animal species; • explain the reasons why wild animal species are present or absent in certain habitats and environments and how they interact with the environment; • know the influence that any changes to an environment, including the effect of natural disasters, may have on animal presence in that area; • have a concept of how the natural environment impacts on game animals' well-being, food selection, reproduction potential, social grouping, human-wildlife conflict, etc.
WDMT	3714	Applied Game Farm Management	Knowledge of the physical management of game species, including feeding requirements, genetic control and diseases. Familiar with legislation, feeding and breeding programs, diseases and parasitology. Familiar with ecological principles, monitoring, wildlife production and marketing. The evaluation and analysing of game-utilization, including aspects of nutrition, breeding and genetic principles will be very valuable for the future of the current game industry in South Africa.	MAIN	Student will be able to : - use the different methods of the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of wildlife on a game farm or nature reserve. identify the daily challenges on a physical game farm and handling of game. - explain and apply practical game management, veld (habitat) management and marketing, utilization systems, economic, socio-- economic aspects and legislation - make informed decisions regarding wildlife management.
WDMT	3723	Applied Game Farm Management	Knowledge of the physical management of game species, including feeding requirements, genetic control and diseases. Familiar with legislation, feeding and breeding programs, diseases and parasitology. Familiar with ecological principles, monitoring, wildlife production and marketing. The evaluation and analysing of game-utilisation, including aspects of nutrition, breeding and genetic principles will be very valuable for the future of the current game industry in South Africa.	MAIN	"Student will be able to : - use the different methods of the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of wildlife on a game farm or nature reserve. - identify the daily challenges on a physical game farm and handling of game. - explain and apply practical game management, veld (habitat) management and marketing, utilization systems, economic, socio-- economic aspects and legislation - make informed decisions regarding wildlife management."
WILD	3723	Wildlife Research and Monitoring	In this course students are introduced to rangeland and wildlife research techniques and monitoring and will be equipped with more advanced principles and skills. The students are also trained in ways dealing with specific herbivore game species within their natural habitat and how to proceed with different ecological and conservation careers. Modern techniques used for research purposes such as remote sensing and making use of UAV (drones) will be a prominent component throughout. Knowledge of the different aspects of game species would be covered in disciplines such as behaviour, feeding requirements, habitat selection, spatial ecology and home range evaluation. Students will be familiar with ethical research, different research techniques, monitoring of rangeland and wildlife, ecological principles and the status of African wildlife. This module contains fundamental knowledge, theories, principles and practices of wildlife, including several aspects that include key terms, concepts, facts, rules and theories associated with a wildlife species. Students will undergo both theoretical and practical training, acquiring a grasp of ongoing and previous studies, research methods and field-based research techniques. After successful completion of this course a student will be able to continue with a career in wildlife research based on their natural habitat and be well informed on the basic concepts of wildlife ecology. Successful students will be prepared for the advanced and honours courses in Wildlife Science.	MAIN	Student will be able to: - Examine and apply the key terms, concepts, facts, principles, rules and theories associated with wildlife studies with advanced principles in the objectivity and application of methods and techniques specific for wildlife research via information systems and data management; and - Link these fundamental principles to practical, real-world situations and include knowledge of the following: Changes within the ecosystem, Planning and conducting research, Sampling diet species and/or vegetation, Presence and absence of wildlife species according to what is present or absent in plant species as a measure of veld assessment, habitat utilization, forage intake and nutritive value of veld, determination of veld condition vs animal condition and success. - Explain and communicate ideas, using the appropriate academic decorum and professional formats and technologies such as written essays and PowerPoint presentations by access library and online resources, select information appropriate to the topics of given assignments and projects and synthesize relevant information. - Work effectively in a group and take responsibility for his/her decisions and actions, whether it is individually or as part of the group, including the responsibility for the use of resources where appropriate.
WILD	4814/ 6814	Veld and Game Ecology	Identification and analysis of ecological game ranching areas and be familiar with ecosystem characteristics. Must be aware of physiological, phenological and ecological principles of the management of the grassland ecosystem. Informed about population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing preferences.	MAIN	Student will be able to: -discuss, explore and explain basic ecology, physiology en phenology, of game species such as their social behaviour en feeding preferences; -manage the ecosystem in such a way that optimal production in a sustainable manner can be maintained; -confident in handling matters such as to identify ecological game ranching areas and ecosystem characteristics; and - advise on game species and behaviour patterns and on habitat preferences, diet selection and plant-animal-habitat interactions

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
WILD	4826	Integrated Planning and Practical Environmental Management Practices	The student will be familiar the physical planning of a game farm, including sustainability, stocking densities, fencing requirements, handling facilities, minimum farm sizes and legal aspects. The student will be familiar with different techniques on game capture and game counting, immobilisation, transport and handling of stress, game diseases and parasitology and the legal aspects thereof. The student will also be familiar with the evaluation and analysing of game-utilization, including all aspects of hunting and live sales, as well as processing of game-products.	MAIN	Student will be able to: -Examine and apply the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of the game farm or nature reserve based on scientific monitoring techniques. -Discuss and evaluate physical game farm planning (legislation and legal aspects) and handling of game (disease control and legal aspects). Practical veld (habitat) management and marketing, utilization systems, economic, socio-economic aspects and legislation.
WILD	4856	Applied Habitat Evaluation and Game Nutrition	The aims of this module are to apply the student's knowledge on how wildlife use different habitats and select their main or preferred diet; and also to familiarise the student with methodology to evaluate the habitat resource. The student will have knowledge on principles, applications and limitations concerning important wildlife management methodology and research techniques based on the natural veld where wildlife occurs.	MAIN	Student will be able to: The wildlife students should have knowledge of and be able to differentiate between different ecological methods used under specific circumstances or environments to determine habitat selection and feeding ecology. In addition, they should be able to: - Evaluate the habitat and/or natural veld by using suitable techniques and methods; - Calculate ecological carrying capacity of the tree and grass layers, in order to make an informed decision on stocking the optimal wild animal numbers and species combinations; - Apply knowledge on natural diet selection and habitat use of game species in a specific geographic area; - Have knowledge on morphological and physiological aspects of game feeding and nutrition.
Postgraduate					
AGRI	6808	Research Project Animal Production	A subject specific project will be completed under the guidance of a supervisor and it is expected of students to submit a research report in the format of a scientific report and to prepare and orally present the results in the format required by scientific conferences.	MAIN	Student will be able to: - perform problem solving, hypothesis formulating, planning, execution and analysis of animal production experiments/research, - use a range of specialised skills to identify, analyse and address complex problems drawing systematically on the body of knowledge and methods appropriate to the field of animal production. - interpret results and prepare scientific report - communicate effectively through visual, numeric and/or language proficiency during oral and written presentations. -work effectively in a team or group, and to take full responsibility for own decisions and actions, and full accountability for the decisions and actions of others where appropriate. -demonstrate insight developed in this module provides a background for further post graduate studies.
AGRI	6814	Advanced Cattle Production Systems	Integrated nutrition, breeding and reproduction management of the following will be studied in depth and compiled in an Excell worksheet: -a weaner vs steer vs ox systems -intensive (feedlot management) vs extensive production systems	MAIN	Student will be able to: - Conduct an in-depth discussion regarding advanced principles of cattle production systems and should be able to: - Apply and integrate the knowledge and in-depth insight regarding the basic concepts and principles of cattle production systems and the practical application thereof in different situations; -Critically evaluate different production systems; -Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for cattle; -Develop a complete management program for this species; -Communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding any relevant topic within this module; -Work efficiently in a group and to take responsibility for own decisions and actions. The student will be able to: 1. Identify, understand and discuss management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; 2. Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in beef enterprises

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGRI	6824	Advanced Sheep and Goat Production Systems	Integrated nutrition, breeding and reproduction management of the following will be studied in depth and summarized in an Excell worksheet: -Intensive vs extensive production systems of wool and meat sheep as well as Angora and meat producing goats	MAIN	Student will be able to: - integrate knowledge and discuss and analyse the concepts, principles and theories of elements of sheep and goat production systems and the practical application thereof under different scenarios; - critically evaluate different sheep and goat production systems; - collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for sheep and goats on an advanced level; -Discuss management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; -Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises; and -Compile and evaluate a management system for sheep, dairy and beef enterprises.
AGRI	6834	Advanced Poultry Production Systems	Integrated nutrition, breeding and reproduction management of different poultry production systems will be studied in depth and compiled in an Excell worksheet: - Production systems: layers, broilers and breeder parentstock.	MAIN	Student will be able to: -Integrate the concepts, principles and theories of various poultry production systems and the practical application thereof in different situations to develop production plans ; -Critically evaluate different poultry production systems; -Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for poultry; -Develop a complete management program for this species; -Communicate effectively through visual and numeric proficiency during oral and written presentations; and -Work effectively in a group, and to take responsibility for own decisions and actions
AGRI	6844	Advanced Dairy Production Systems	Integrated nutrition, breeding and reproduction management of dairy cattle will be studied in depth and compiled in an Excell worksheet: -TMR vs milk from pastures	MAIN	Student will be able to: -Explain and discuss the concepts, principles and theories of elements of dairy production systems and the practical application thereof in different situations; - Critically evaluate different dairy production systems; - Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for dairy cattle; - Develop a complete management program for this species; - Communicate effectively through visual and numeric proficiency during oral and written presentations; -Work effectively in a group, and to take responsibility for own decisions and actions
AGRI	6864	Advanced Pig Production Systems	Integrated nutrition, breeding and reproduction management of different pig producing systems will be studied in depth and compiled in an Excell worksheet: -Environmental controlled vs. semi-environmental controlled production systems of sows and grower/slaughtering pigs. (intensive vs semi-intensive)	MAIN	Student will be able to: -Integrate the concepts, principles and theories of elements of pig production systems and the practical application thereof in different situations; -Critically evaluate different pig production systems; -Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for pigs; -Equipped with the necessary knowledge and skills needed to develop a complete management program for this species; -Communicate effectively through visual, numeric and language proficiency during oral and/or written presentations; and -Work effectively in a team or group, and to take responsibility for own decisions and actions

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGRI	8900	Animal Production Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Production, including: Research project in specialized field of Animal Production as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. -offer the candidate the opportunity of increasing his/her knowledge of a specific field within Animal Production; -to guide the candidate in the planning and execution of a research programme; -to train the candidate in the collection, and interpretation of research results and writing of scientific papers; -to guide the candidate towards conducting independent research and communicating research results; and -to develop the candidate's management skills concerning integrated application of acquired knowledge and skills in actual situations, namely the running of farming enterprises and processing of agricultural products.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIB	6814	Animal Breeding: Mixed Model Theory	This module includes the study of genetic model for quantitative traits, matrix algebra; statistics in animal breeding; importance of heritability and repeatability; methodologies for genetic prediction; optimisation of selection; different models for the prediction of breeding values; Sire model, animal model, Bayes theory, QTLs, genomic models; relationships and inbreeding; simple rules for computing A and A-1 matrices; joint estimation of several vectors of random effects; accounting for genomic information in genetic analyses. Practical work: The student estimates variance components and resulting breeding values using matrix algebra and is familiarised with the application of breeding values. The use of different computer programmes for genetic analyses of large datasets is mastered. The use of different computer programmes for preparation of genetic analyses of large datasets.	MAIN	Studen - Apply and engage with concepts of quantitative genetics in Animal breeding - Apply and engage with a range of terms, concepts and issues concerning the genetic analyses of Animal breeding data and the interpretation of the results as well as the components of the extended genetic model for quantitative traits; -Use relevant statistical techniques and the application in quantitative traits; -Discuss the importance of heritability and repeatability in animal breeding; -Use appropriate methodologies for genetic predictions: selection index and BLUP; - Optimize genetic change by manipulation of elements of the key equation -Apply appropriate statistical techniques for the calculation of correction factors; -Use matrix algebra in the prediction of breeding values using mixed model methodology: Sire model, Animal model, multiple trait models; and -Estimate variance components from field data.
ANIB	6826	Applied Animal Breeding	After successful completion of this module the student will have a fundamental knowledge and insight of selection objectives, selection criteria, genetic parameters thereof and how to construct a com¬prehensive breeding plan that will result in genetic improved populations of different livestock species under South African environmental conditions.	MAIN	Student will be able to: -Apply and discuss selection objectives, selection criteria, genetic parameters thereof; -construct a breeding plan from start to finish that will result in a genetic improved population and ultimately profit for the breeder under South African environmental conditions, for a breed of their choice; - collect, filter and integrate the necessary evidence and apply it to an argument and decision making in different Animal breeding situations; - use and application of selection indexes on an international basis; - use and application of Genomics in modern animal breeding; - use the scientific literature effectively; - integrate and evaluate information from a variety of sources (books, scientific journals, electronic - internet) -Communicate effectively through visual, numeric and/or language proficiency during oral / written presentations.
ANIB	8900	Animal Breeding Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Breeding, including: Research project in specialized field of Animal Breeding as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ANIB	9100	Animal Breeding Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Breeding, including: Research project in specialized field of Animal Breeding as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	the student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIG	8900	Animal Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Science, including: Research project in specialized field of Animal Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. (a) offer the candidate the opportunity of increasing his/her knowledge of a specific field within Animal Science; (b) to guide the candidate in the planning and execution of a research programme; (c) to train the candidate in the collection, and interpretation of research results and writing of scientific papers; (d)to guide the candidate towards conducting independent research and communicating research results; and (e) to develop the candidate's management skills concerning integrated application of acquired knowledge and skills in actual situations, namely the running of farming enterprises and processing of agricultural products.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIG	9100	Animal Science General Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Sciences, General including: Research project in specialized field of Animal Sciences, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
ANIN	6815	Fundamental Animal Nutrition	Through self study (studying literature and written seminars) the student is familiarized with the concepts of feeds and nutrients (water, carbohydrates, lipids, proteins, minerals and vitamins); digestive systems (monogastric, ruminant and lower digestive tract fermenters), digestion, absorption and metabolism; nutrient deficiencies, toxicity and metabolic disturbances; digestibility of feeds and feed components; techniques for the evaluation of feeds and pastures; protein and energy requirements for monogastric animals, ruminants and lower digestive tract fermenters. The student is provided opportunity to master through self study specific topics and write seminars in scientific style and format.	MAIN	The student will be able to: * Classify and discuss the different types of feeds and nutrients (water, carbohydrates, lipids, proteins, minerals and vitamins); * Differentiate between digestive systems (monogastric, ruminant and lower digestive tract fermenters); * understand and describe digestion, absorption, metabolism of nutrients and nutrient deficiencies; * Identify and treat nutrient toxicity and metabolic disturbances; * Determine the digestibility of feeds, feed components and pastures; * Differentiate between protein and energy requirements for monogastric animals, ruminants and lower digestive tract fermenters; and * Write seminars in scientific style and format.
ANIN	6835	Experimental Animal Nutrition	On completion of this module the student will be well acquainted and have an in-depth knowledge regarding the quantitative aspect of nutrition e.g. the quantity of nutrients provided by the feed and secondly the nutrient requirements of various farm animals. Experi-mental techniques used for the quantification of nutrient utilization and requirements are addressed.	MAIN	Student will be able to: - examine the quantitative aspect of nutrition (quantity of nutrients provided by the feed); - examine the nutrient requirements of various farm animals; - apply and discuss experimental techniques used for the quantification of nutrient utilization and requirements of farm animals.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ANIN	6844	Applied Monogastric Nutrition	On the successful completion of this module, the student is familiar with the principles of nutrient requirements, nutritional management and the interaction between nutrition and physiological development of poultry and pigs during different biological developmental phases and within intensive production systems. The comprehensive integration of biochemical and nutritional knowledge during the physical and chemical evaluation of diets for monogastric animals will be demonstrated. Practical work: The student performs balancing of diets using detailed computer assisted formulation software and production simulation models with specific reference to poultry and pig species. Participating in research activities with regard to applied nutritional management of the mentioned species.	MAIN	Student will be able to: -apply and demonstrate principles and in-depth insight regarding basic concepts and nutritional requirements of broilers, layers, breeder parent stock, sows, piglets and boars in different physiological developmental stadiums and housing systems to produce economical high quality animal protein products; -apply the necessary principles needed to formulate diets for several monogastric species using computer assisted models with integrated knowledge and understanding of feed ingredient limitations as well as ingredient cost; -discuss and apply principles of international developments in the animal nutrition field; with specific reference to changes within the poultry and pig sectors; and -communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding diet formulation and/or any relevant topic within applied monogastric nutrition.
ANIN	8900	Animal Nutrition Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Nutrition, including: Research project in specialized field of Animal Nutrition as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIN	9100	Animal Nutrition Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Nutrition, including: Research project in specialized field of Animal Nutrition as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student must be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIP	8900	Animal Physiology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Physiology , including: Research project in specialized field of Animal Physiology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIP	9100	Animal Science Physiology Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Sciences, General including: Research project in specialized field of Animal Sciences, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
GRAS	6805	Intensive Pasture Production	The application of veld intensification and the use of planted pastures to improve and supplement the natural veld in order to maintain sustainable productivity.	MAIN	Student will be able to: -Examine and discuss veld-intensification; and -Use planted pastures to improve and supplement the natural veld in order to maintain sustainable productivity.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GRAS	6814	Production and Utilisation Ecology	Students are introduced to the fundamental principles of ecology. The student must be able to evaluate the sustainability of the Grassland ecosystem and the factors influencing it in order to find long-term, practical solutions to ecological problems. The hydrological and other biological cycles in the Grassland ecosystem will be covered. Mathematical models for the estimation of the biomass of woody plants for purposes of calculating the browsing capacity for domestic stock and game species will be studied	MAIN	Students will be able to: -Evaluate the sustainability of the Grassland ecosystem and the factors that may influence it in order to find long-term, practical solutions to ecological problems. They must have a fundamental knowledge of the principles of ecology and also be able to link this knowledge to practical, real-world situations. Specific aspects of study include the following: -The ecological approach and its meaning, -Principles concerned with the regulation and stabilisation of Grassland ecosystems, -Biogeochemical cycles in Grassland ecosystems, -Elasticity and condition of Grassland ecosystems, -Knowledge of the problem of bush encroachment and how to use principles of ecosystem functioning in finding long-term solutions, -The quantification of woody plants and the calculation of the browsing capacity for domestic stock and game species.
GRAS	6824	Advanced Veld Management	The student should be able to identify the importance of veld management in different veld types and the critical evaluation of system/practices. Identification and analysing the grazing habits of livestock and game and selective grazing. Determination of grazing capacity and stocking rate and application of special treatments for veld will be discussed. Students will carry out veld management planning and bringing applied wildlife management in proper relation to marketing, legal aspects, economics and socio-economic aspects of game.	MAIN	Student will be able to: -study the behaviour conduct of domestic animals and game on veld and make calculations on the grazing capacity to determine the influence of number and type of animals on natural veld; -recommend an exact or applied veld management system as well as special treatments for veld; -analyse the economic implications of stock and game numbers and veld management, based on estimating the carrying capacity of veld; and -use the above principles to recommend a sound veld management strategy under different situations, with different kinds of animals and to take the management skills of the farmer into consideration
GRAS	6834	Defoliation Phenology and Physiology	The student is on a higher level familiar with the physiological and phenological management principles for sustainable utilization of the grazing ecosystem. The student will be familiar with the influence of intensity and frequency of defoliation on the production and root growth of fodder plants. Different techniques for Grassland productivity quantification will be demonstrated and evaluated. The student must present practical work in the form of scientific reports. Visits to veld in different conditions will be arranged.	MAIN	Students will be able to: -Identify critical phenological and physiological periods in the growth cycle of fodder plants (grasses, shrubs and trees); -Apply defoliation physiological principles of fodder plant to ensure sustainable management of the grazing ecosystem; and -Evaluate the influence of intensity, frequency and season of defoliation on leaf and root growth, growth reserves and nutritive value of fodder plants.
GRAS	6844	Advanced Fodder Plant Evaluation	In this course students are trained in the classification of vegetation and the identification of the variables that influence the Grassland ecosystem. The appropriate approach to the planning and execution of Grassland science research is covered, including sampling, statistical tests and simulation models. Applied livestock and wildlife management systems will be studied. Students should be able to identify appropriate methods to measure environmental variables and the productivity of the Grassland ecosystem, including practical knowledge of the application of the techniques	MAIN	Student will be able to: -Examine advanced principles of the objectivity and application of methods and techniques to measure the composition and productivity of the ecosystem and any changes that may occur; and -Link these fundamental principles to practical, real-world situations and include knowledge of the following: Changes within the ecosystem, Planning and conducting research, Sampling vegetation, Cover as measure to evaluate veld, Presence and absence of species as measure of veld assessment, Density as measure of evaluating veld, Production as basis of veld assessment, Utilisation, forage intake and nutritive value of veld, Determination of veld condition
GRAS	8900	Grassland Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Grassland Science, including: Research project in specialized field of Grassland Scienceas discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GRAS	9100	Grassland Science Thesis	This graduate study aims at: -providing the candidate with the opportunity to prove her/his ability to plan and do research independently and to report the results; -enabling the candidate to make an original contribution to the respective discipline.	MAIN	Student will be able to: Manage independent planning and conducting of in-depth research in a natural or agricultural science discipline.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
WDMT	6808	Research Essay Wildlife Management	Short research essay - Integrated planning of a game farm/reserve where various aspects of wildlife management will be applied practically. Its objective is to solve management problems and to ensure the sustainable utilisation of the natural resources.	MAIN	Student will be able to: -execute an integrated planning of a game ranch/reserve where various aspects of wildlife management will be applied practically. - solve management problems and to ensure the sustainable utilization of the natural resources.
WDMT	6816	Veld and Game Ecology	Veld and Game Ecology - the identification and analysis of ecological game farming areas and familiarity with ecosystem characteristics. The student must be adjusted to physiological, phenological and ecological principles of the management of the Grassland ecosystem. Population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing habits.	MAIN	Identification and analysis of ecological game ranching areas and be familiar with ecosystem characteristics. Must be aware of physiological, phenological and ecological principles of the management of the Grassland ecosystem. Informed about population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing preferences.
WDMT	6826	Applied Habitat Evaluation	The aim is to apply the student's knowledge on the use of habitats by wildlife and to equip the student with methods to evaluate this resource (habitat). The student will obtain skills to determine primary production, veld condition and carrying capacity of the grass and tree layers, and also be familiar with techniques to determine feeding ecology of game species.	MAIN	Student will be able to: The wildlife management students should be able to execute certain practical techniques based on food and habitat use of wildlife on a game ranch. In addition, they should be able to: - Evaluate the natural veld in general by using those suitable techniques; - Calculate ecological carrying capacity of the tree and grass layers, in order to make an informed decision on stocking the optimal wild animal numbers and species combinations; - Apply knowledge on natural diet selection and habitat use of game species on a game ranch; - Have basic knowledge on morphological and physiological aspects of game feeding.
WDMT	6846	Applied Wildlife Management	Applied Wildlife Management - the student must have knowledge of the physical planning of a game farm, including fencing requirements, handling facilities, minimum farm sizes and legal aspects. The student must also be familiar with game capture, immobilisation, transport and handling of stress, game diseases and parasitology. The evaluation and analysing of game-utilisation, including all aspects of hunting and life sales, as well as processing of game-products.	MAIN	Student will be able to: -Explain the physical planning of a game farm, including fencing requirements, handling facilities, minimum farm sizes and legal aspects. Familiar with game capture, immobilisation, transport and handling of stress, game diseases and parasitology. The evaluation and analysing of game-utilization, including all aspects of hunting and live sales, as well as processing of game-products.
WDMT	8900	Wildlife Management Dissertation	Wildlife Management Dissertation	MAIN	Student will be able to: Manage supervised planning and execution of a research project in a natural or agricultural science discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results.
WDMT	9100	Wildlife Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Sciences, General including: Research project in specialized field of Wildlife, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
WILD	6808/ 4808	Research Report Wildlife	Execution of an integrated research project where specific aspects of wildlife management will be investigated. Its objective is to solve management problems and to ensure the sustainable utilization of the natural resources.	MAIN	Student will be able to: -apply the different aspects of game management practically and to successfully solve a clearly defined problem or deficiency in the management of a game ranch or nature reserve, whether ecological and/or economical. -apply the theory of game management in a practical game ranching or nature reserve situation. Emphasis is placed on the planning and methodology being used, the application of suitable techniques, as well as the utilization of the computer in the processing of data or the compiling of a management model where applicable. The planning of the project will commence during the first semester with execution throughout the year.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
WILD	6806	Habitat Evaluation and Monitoring	The student will be familiar with the principles, applications and limitations with regard to important wildlife management and research techniques. Students will be exposed to practical skills and techniques to determine primary production, veld condition and grazing capacity of the grass and tree layer involving an ecological game farm planning. The student will become familiar with techniques to determine fodder intake and feeding preferences of game species and will use the experience and literature to develop a detailed game management plan.	MAIN	Student will be able to: --discuss and apply practical techniques that can be used to evaluate the resource (habitat). -do a detailed game farm planning which include the calculation of the grazing capacity of both the herbaceous and tree layer, feed intake, food preferences of game species and game feeding in order to ensure the calculation of optimal game numbers and species combinations. -examine primary production, grazing capacity and veld condition assessment and to perform these techniques physically. Feed intake and food preferences of game species and the morphological and physiological aspects of game feeding will also be addressed via literature based on game ranch management.
WILD	6808	Research Report Wildlife	Execution of an integrated research project where a specific aspects of wildlife management will be investigated. Its objective is to solve management problems and to ensure the sustainable utilization of the natural resources.	MAIN	Student will be able to: - apply the different aspects of game management practically and to successfully solve a clearly defined problem or deficiency in the management of a game ranch or nature reserve, whether ecological and/or economical. -apply the theory of game management in a practical game ranching or nature reserve situation. Emphasis is placed on the planning and methodology being used, the application of suitable techniques, as well as the utilization of the computer in the processing of data or the compiling of a management model where applicable. The planning of the project will commence during the first semester with execution throughout the year.
WILD	6814	Veld and Game Ecology	Veld and Game Ecology - the identification and analysis of ecological game farming areas and familiarity with ecosystem characteristics. The student must be adjusted to physiological, phenological and ecological principles of the management of the Grassland ecosystem. Population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing habits.	MAIN	Student will be able to: -Identify and analyse ecological game ranching areas and be familiar with ecosystem characteristics; -Discuss and physiological, phenological and ecological principles of the management of the Grassland ecosystem; and -Outline population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing preferences.
WILD	6816	Habitat Preferences and Diet Selection of Game	The identification and analysis of ecological game farming areas and familiarity with ecosystem characteristics. The student must be adjusted to physiological, phenological and ecological principles of the management of the Grassland ecosystem. Population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing habits.	MAIN	Student will be able to: -examine basic ecology, physiology en phenology, as well as knowledge of game species such as their social behaviour en feeding preferences, -manage the ecosystem in such a way that optimal production in a sustainable manner can be maintained. - identify ecological game ranching areas and ecosystem characteristics, advise on game species and behaviour patterns and on habitat preferences, diet selection and plant-animal-habitat interactions.
WILD	6826	Integrated Planning and Practical Environmental Management Practices	The student will be familiar the physical planning of a game farm, including sustainability, stocking densities, fencing requirements, handling facilities, minimum farm sizes and legal aspects. The student will be familiar with different techniques on game capture and game counting, immobilisation, transport and handling of stress, game diseases and parasitology and the legal aspects thereof. The student will also be familiar with the evaluation and analysing of game-utilization, including all aspects of hunting and live sales, as well as processing of game-products.	MAIN	Student will be able to: -Examine and apply the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of the game farm or nature reserve based on scientific monitoring techniques. -Discuss and evaluate physical game farm planning (legislation and legal aspects) and handling of game (disease control and legal aspects). Practical veld (habitat) management and marketing, utilization systems, economic, socio-economic aspects and legislation.
WILD	6846	Applied Wildlife Management	Knowledge of the physical planning of a game farm, including fencing requirements, handling facilities, minimum farm sizes and legal aspects. Familiar with game capture, immobilisation, transport and handling of stress, game diseases and parasitology. The evaluation and analysing of game-utilization, including all aspects of hunting and live sales, as well as processing of game-products.	MAIN	Student will be able to: - Apply different methods of the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of the game farm or nature reserve. - Examine and apply principles of physical game farm planning and handling of game. Practical veld (habitat) management and Marketing, utilization systems, economic, socio-economic aspects and legislation.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
WILD	6856	Applied Habitat Evaluation and Game Nutrition	The aims of this module are to apply the student's knowledge on how wildlife use different habitats and select their main or preferred diet; and also to familiarise the student with methodology to evaluate the habitat resource. The student will have knowledge on principles, applications and limitations concerning important wildlife management methodology and research techniques based on the natural veld where wildlife occurs.	MAIN	Student will be able to: The wildlife students should have knowledge of and be able to differentiate between different ecological methods used under specific circumstances or environments to determine habitat selection and feeding ecology. In addition, they should be able to: - Evaluate the habitat and/or natural veld by using suitable techniques and methods; - Calculate ecological carrying capacity of the tree and grass layers, in order to make an informed decision on stocking the optimal wild animal numbers and species combinations; - Apply knowledge on natural diet selection and habitat use of game species in a specific geographic area; - Have knowledge on morphological and physiological aspects of game feeding and nutrition.
WILD	8900	Wildlife Dissertation	Wildlife Dissertation	MAIN	Student will be able to: Manage supervised planning and execution of a research project in a natural or agricultural science discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results
WILD	9100	Wildlife Thesis	This module contains fundamental knowledge, theories, principles and practices of Wildlife, including: Research project in specialized field of Wildlife as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student must be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

ARCHITECTURE (101)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
ARCR	2602	Architiritural Representation 2	This module contains fundamental knowledge, theories, principles and practices of Computer Draughting, including: The theory and practice of computer aided technical drawing and the graphic presentation of designs. Introduction to various CAD and graphic design software. Theoretical instruction coupled with practical exercises.	MAIN	The student will be able to: - distinguish between the use of different software packages; - demonstrate basic computer design, documentation and graphic skills; - effectively apply the software packages presented for the communication of architectural designs and technical drawings; - prepare and document simple structures, including the annotated production of site plans, floor plans, elevations and sections in 2D; and - adapt the 2D design into basic 3D models using software packages presented.
ARCR	1506	Architiritural Representation 1	This module contains fundamental knowledge, principles and practices of Presentation Techniques, including: The introduction of graphic representation techniques, form studies and the utilisation of different media.	MAIN	Student will be able to: -Use different graphic presentation techniques (watercolour, pencil rendering, pen sketching etc.) and the use of different media ideas relating to architectural design.
CONS	1506	Construction I	This module contains fundamental knowledge, theories, principles and practices of Construction, including: Theory: The basic structural solutions to design problems for a simple single storey house on a level site. The parts of the building and construction materials for the structure as a whole. Working drawings: (application of theory) Single-storey structure. Site visits: Illustration of theory.	MAIN	The student will be able to: -clarify different enclosure of activities and the application thereof within certain environment s/ contexts; identify, select and apply appropriate materials and skills for construction; -identify, evaluate and solve problems relating to the durability of structure, etc.; -evaluate the factors contributing toward construction of the enclosure of specific human activities and the built environment in general; -identify relevant structural principals and apply principals within a given context and site condition; and -associate alternative means of construction and the impact on local building industry / professionals.
CONS	2600	Construction II	This module contains fundamental knowledge, theories, principles and practices of Construction, including: Structural theories associated with the complete construction of a double-storey structure from site investigation, sub structures, waterproofing systems, superstructures, services, elements of framed structures to applicable building regulations. Solving construction problems, related to structural behaviour: Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance. Sanitation seviceability of buildings - South African Regulations Working drawings for a double-storey structure with basement; site visits illustrating of theory. Council submission drawings with focus on site restrictions, parameters, existing services	MAIN	Student will be able to: -describe and consolidate through theoretical application, council submission drawings, and working drawings the regulations and conventions within the build environment; - identify and address building practices during visits to familiar and new building sites; - identify and address theory of structures and the sanitary serviceability of buildings on a theoretical and practical level; - integrate the theoretical knowledge to identify, evaluate and solve structural problems in different design projects (integration with design module: DESN2600); - integrate the theoretical knowledge to identify, evaluate and solve construction problems related to structural behaviour - Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance; - present and communicate complex structural solutions through a accurate and clear set of working drawings appropriate to the architectural conventions and to the design context; and - evaluate and apply elementary conventional and alternative means of construction and the impact on local building industry / professionals / environment.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CONS	3700	Construction III	This module contains fundamental knowledge, theories, principles and practices of Construction, including: Structural theories associated with the complete construction of a multi-storey structures. Fundamental and physical principles of construction. Solving advanged construction problems, related to structural behaviour: Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance for multi-storey buildings. Mechanical and Electrical sevices of buildings - South African Regulations and supplier information. The study of the tectonics, an introduction to sustainable design, materials and building processes. The study of context relevant building construction and culture. Comprehensive council submission drawings for multi-storey buildings. Working drawings enabling the candidate to be employable in the appropriate category for which they qualify with the South African Council of the Architectural Profession. Site visits illustrating theory.	MAIN	Student will be able to: - Structurally analyse and evaluate different building elements and processes for construction of a multi-storey building; - Structurally analyse and evaluate different mechanical and electrical services and processes for construction of a multi-storey building; - Integrate the theoretical knowledge to identify, evaluate and solve construction problems related to structural behaviour in multi-storey buildings - Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance; - Interpret the regulations and conventions within the build environment, apply the regulations and conventions to complex design solutions and critically reflect on the application of the regulations and conventions through working drawings and council submission drawings; - Justify the properties and appropriate application of different building materials and uses within a specific context and building typology; - Evaluate and demonstrate the studied theory of building construction in different contexts through professional working drawings of different design projects (integration with design module: DESN3600); and - Responsible decide on the application of conventional and alternative means of construction and evaluate the impact of the application on local building industry / professionals / environment.
DESN	1500	Design I	This module contains fundamental knowledge, theories, principles, practices and processes of Architectural Design explored through the theme: the place of the individual (my building/structure) in the natural landscape. The design process is learnt by the completion of prescribed projects in the studio. The projects address inter alia the concepts: Genius Loci (sense of place), enclosure and threshold, typology, geometry, ergonomics, order and space, climate and meaning and architecture. The projects serve to identify and creatively solve problems concerning man's interaction with his physical environment. The design process involves the creation of spaces and artefacts (landscapes, cities, buildings, utility objects), to make the environment (natural, social and cultural) friendly and functional. Aspects such as functional planning, structural integrity and meaningful shaping is emphasised during this course, where the spectrum of design theories, a wide variety of project types and architectural history is utilised in varying combinations in order to integrate all the fields of study into the curriculum. Compulsory excursions form part of the Design module.	MAIN	Student will be able to: -investigate different sources of information pertaining to specific design problems concerning individual shelter; -develop and present an appropriate design solution to a particular architectural situation and context (natural landscape); -apply theoretical and historical principles to design problems and solutions;and -judge principles pertaining to Genius Loci (sense of place), enclosure and threshold, typology, geometry, ergonomics, order and space, climate and meaning and architecture for why, where and how it could be applied.
DESN	2600	Design II	This module contains fundamental knowledge, theories, principles, practices and processes of Architectural Design explored through the theme: the place of the individual group within the urban built environment. Through design projects the concepts topology, typology and morphology and the application thereof on different environmental levels are investigated in the study field of architecture. Compulsory excursions form part of this module.	MAIN	Student will be able to: -Locate and adapt different sources of knowledge pertaining to specific design problems taking into account different aspects influencing the individual group; -illustrate fitting design solution to a particular architectural situation within the built environment on the urban periphery; -translate and interpret universal design principals and individual project criteria applicable to individual urban groups within simple cultural and historical ecologies; -produce institutional spaces and artefacts concerned with plan typology, structural topology and morphological extrapolation. -meaningfully apply and investigate theoretical and historical principles to such design problems and solutions; -present and communicate all ideas of the design work in a reliable and coherent academic and professional manner, graphically as well as verbally; -evaluate appropriate design concepts and to select the sources that led to the design development within a specific context; and -order and deduce knowledge pertaining to topology, typology and morphology to why, where and how it could be applied.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
DESN	3700	Design III	This module contains fundamental knowledge, theories, principles, practices and processes of Architectural Design explored through the theme: the place of the community and the contextual relationship with the human ecological landscape. Through design projects the human body's relationship to space, the making of place, design methodologies, the use of metaphors, tectonic assembly and urbanity are critically formulated. Compulsory excursions form part of this module.	MAIN	Student will be able to: -Compare, differentiate and arrange different sources of knowledge pertaining to specific design problems taking into account different aspects influencing the complex group within a complex urban setting; -express, analyse, critically reflect on and address specific design problems taking into account all complex environmental, social, cultural and historical aspects, in order to conceptualise and implement fitting and organised design solution to a particular architectural situation within a complex urban environment; -differentiate and combine universal design principals and individual project criteria applicable to the urban public realm within competing cultural and historical ecologies; -design spaces on different environmental levels and public artefacts concerned with functional planning, structural integrity and meaningful shaping. -meaningfully investigate historical principles and investigate and devise a personal theoretical opinion towards design problems and solutions; -identify, research and construct according knowledge to why, where and how it could be applied; -develop, communicate and integrate all ideas of the design work in a clear, direct and unambiguous academic and professional manner, graphically as well as verbally; -develop appropriate design concepts and to independently validate the sources that led to the design development within a specific context; -design projects of three and more storey buildings as is required for the appropriate category for which they qualify for with the South African Council of the Architectural Profession at graduation.
HTRC	1506	Histories and Theories of Architecture 1	Introduction to world architecture, focusing on important buildings and key historical moments from pre-historic to contemporary times. Including study of multicultural, international and local examples. Architectural appreciation, through study of ideas and concepts that contribute to an understanding of architectural histories and design practices, including for example geometry, scale, proportion, context, function, metaphor and so on, with relevance to the first year design studio.	MAIN	Student will be able to: - Demonstrate knowledge of influential buildings and key historical periods in the development of world architectural history. - Instil ideas and methods that enable the appreciation and interpretation of architecture. - Appreciate the broad scope and timelines of different architectural cultures and eras. - Distinguish the leading differences and enduring qualities of important architectural events, eras and movements. - Distinguish between different cultural and historical contexts, and how these affect the creation of architecture. - Demonstrate the ability to appreciate architecture's contribution to human culture. - Show appreciation for the contextual, aesthetic, functional and technological qualities of architectural design.
HTRC	2606	Histories and Theories of Architecture 2	The study of foundational knowledge, theories and principles with application to the interpretation of various historical trajectories, until the early modern period. Including international and local, pre-colonial and indigenous histories, and material cultures. Inquiry pertaining for example, to genius loci, place making and the language of architecture expressed through topological, morphological and typological investigation, with relevance to the second year design studio.	MAIN	Student will be able to: - Contrast the different functions and objectives of history, critique and theory. - Demonstrate understanding of foundational ideas and principles of architecture, and how these are manifest in historical precedents. - Distinguish between different cultural and historical contexts, and how these affect the creation of architecture. - Interpret historical buildings and environments as precedents, containing principles that are relevant to contemporary design. - Identify the extent to which the leading ideas and principles of architecture evolve and change or remain constant through time. - Demonstrate various theatrical ideas and types of analysis that are required to study how architecture evolves from its unique social and cultural context, and to identify different approaches to architectural design. - Demonstrate how theories and histories of architecture might inform creativity in the second year design studio.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
HTRC	3706	Histories and Theories of Architecture 3	Histories and theories of architecture that have relevance to the contemporary practice of design, especially historical conditions and architectural movements of the last century. Focusing on modern versus postmodern debates with application to histories of international, African and local modernisms/post-modernisms, and post colonial trajectories. Histories and theories that might inform contemporary aesthetic, tectonic, social and environmental concerns, with relevance to the third year design studio.	MAIN	Student will be able to: - Demonstrate an understanding of key theoretical debates, pivotal occasions and players in the field of modern and contemporary architecture – internationally and locally. - Recognize and evaluate the leading movements and shifts in architectural practice and theory that have occurred during the last century. - Demonstrate an understanding of the mutations, revisions and hybrids that occurred within the Modernist/Postmodernist architectural traditions globally, and in South Africa. - Interpret historical buildings, environments and theories as precedents, containing principles that are relevant to contemporary design. - Demonstrate knowledge of architectural theories, types of analysis and precedents that are relevant for the study of South African social, cultural, ecological and technological contexts that might inform contemporary practice. - Initiate research toward a personal, theoretical interpretation of the architectural and urban contexts of Post-Apartheid South Africa that, in turn, might inform creativity in the third year design studio. - Interpret historical buildings, environments and theories as precedents, containing principles that are relevant to contemporary design. - Demonstrate knowledge of architectural theories, types of analysis and precedents that are relevant for the study of South African social, cultural, ecological and technological contexts that might inform contemporary practice. - Initiate research toward a personal, theoretical interpretation of the architectural and urban contexts of Post-Apartheid South Africa that, in turn, might inform creativity in the third year design studio.
Postgraduate					
ARCD	8900	Architecture Dissertation with Design	Research project in specialized fields of Architecture and another science discipline as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The research includes the investigative, and creative research of aspects pertaining to Architectural Design and Design in general; identification of design themes and challenges to formulate a research focus; independent planning and conducting of design-based analysis, and reflection upon analytical interpretations of selected material, discussion of interpretations and reflections, compiling the information according in an academically rigorous document and a curated exhibition, which includes written and visual presentation, a specified dissertation structure, grammatical and technical aspects of academic writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Identify, analysis and reflect upon design themes and challenges present in a selected design subject and design projects; -Formulate a Research Focus; -Do independent planning and design-based analysis; -Evaluations and reflection upon own analytic interpretations of selected material; -Discuss the interpretations and reflections comprehensively by combining and adapting a wide range of suitable theories, methods and principles that facilitate the thesis study; -Compile the information accordingly in an academically rigorous document and a curated exhibition, which includes written and visual presentation, a specified dissertation structure, grammatical and technical aspects of academic writing; and - Write a manuscript and curate an exhibition to communicate and defend the thesis.
ARCD	9100	Architecture Thesis with Design	This module contains fundamental knowledge, theories, principles and practices of Architectural Design and Design in general, including: Research project in specialized field of Architectural Design as discussed by study leader(s), Academic Departmental Head and student. The research includes the investigative, and creative research of aspects pertaining to Architectural Design and Design in general; identification of design themes and challenges to formulate a research focus; independent planning and conducting of design-based analysis, and reflection upon analytical interpretations of selected material, discussion of interpretations and reflections, compiling the information according in an academically rigorous document and a curated exhibition, which includes written and visual presentation, a specified dissertation structure, grammatical and technical aspects of academic writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Identify, analysis and reflect upon design themes and challenges present in a selected design subject and design projects; -Formulate a Research Focus; -Do independent planning and design-based analysis; -Evaluations and reflection upon own analytic interpretations of selected material; -Discuss the interpretations and reflections comprehensively by combining and adapting a wide range of suitable theories, methods and principles that facilitate the thesis study; -Compile the information accordingly in an academically rigorous document and a curated exhibition, which includes written and visual presentation, a specified dissertation structure, grammatical and technical aspects of academic writing; and - Write a manuscript and curate an exhibition to communicate and defend the thesis.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ARCH	8900	Architecture Dissertation	Research project in specialized fields of Architecture and another science discipline as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensive - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ARCH	9100	Architecture Thesis	This module contains fundamental knowledge, theories, principles and practices of Architecture , including: Research project in specialized fields of Architecture and another science discipline as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: Identify the problem Formulate a hypothesis do independent planning and then conduct the experiments Analyse and interpret the results Discuss the results comprehensively Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ATRE	7904	Architectural Treatise	This module involves a critical investigation of the theoretical aspects of the specific chosen and approved design subject and project and is complementary to the pursuit of the Design Dissertation (DDIS7900). The module includes: Critical analyses of relevant contemporary theoretical premises, as well as applicable theoretical issues pertaining to the specific design subject and project set out in an academically rigorous treatise.	MAIN	Student will be able to: 1.Critically identify, apply, organise and integrate appropriate research methodologies (abstract, storyline, historical investigation, precedent and case studies, concrete and abstract site investigation, cognitive mapping etc.) To a design strategy for a complex building; 2.Formulate and take responsibility for a grounded and critical point of view of applicable historical, social, environmental and cultural phenomena and related theory; 3.Prepare a criteria for adjudication of own and other theorists' theoretical position; 4.Identify, communicate and evaluate the essence and the extent of complex and challenging design problems within the field of architecture based on the prepared criteria; 5.Conceptualise, apply and integrate the said criteria to address a specific design problem and illustrate the theoretical and practical implication through a synthesis study; and 6.Communicate and defend the aspects of architectural theoretical discourse that is the product of responsible and ethical research developed in a specific human ecological landscape.
CONS	6808	Construction IV	This module contains fundamental knowledge, theories, principles and practices of Construction, including: The study of construction methods, materials and detailing through the four central themes of urban design, environment responsible design, conservation and housing. Critical discussion and evaluation of construction methods at an appropriate level of complexity, building processes, materials and restrictions. Working drawings enabling the graduates to be employable in the appropriate category for which they qualify with the South African Council of the Architectural Profession. Site visits illustrating theory.	MAIN	The student will be able to: - structurally formulate and assess different building elements and processes for construction of intricate buildings and building facilities; - critically investigate the regulations and conventions within the build environment, validated working drawings through the application of the regulations and conventions of the build industry; - resolve complex design solutions and generate working drawing through research in multiple sources of knowledge within the build environment; - recommend application of certain building materials based on their inherent properties and investigate appropriate application of different building materials and uses within a specific complex unfamiliar context and building typology; - compose professional working drawings of different design projects (integration with design module: DESN6800) through identifying, researching and selecting appropriate theories of building construction; - research and choose responsible conventional and alternative means of construction and critically evaluate the impact of the application on local building industry / professionals / environment; and - manage, produce and take responsibility for working drawings of complex buildings: required for the appropriate category for which graduates qualify with the South African Council of the Architectural Profession.
CONS	7908	Construction V	The module comprises the Construction theory and technical investigation (considering: materials, structural systems and construction methods) of the proposed design scheme, including: Detailed design- and technical development of the proposed scheme. Presentation of a technical report and a full set of working drawings enabling the graduates to be employable in the appropriate category for which they qualify with the South African Council of the Architectural Profession. This module takes place parallel to the Design Dissertation module (DDIS7900) but is examined separately.	MAIN	The student will be able to: - research and validate a wide range of specialist theoretical and technical sources particular to the identified design and construction problems; - use a wide range of knowledge and specialised skills in identifying, conceptualising, designing and implemental structural methods and construction materials to address complex and challenging design problems within a specific contextual setting; - design, select and apply appropriate and creative methods, techniques, processes and technologies to complex architectural use a full set of working drawings to communicate and defend substantial building construction ideas that are the products of research; and - independently investigate and arrange technical research and take responsibility for the appropriate technical decisions.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
DDIS	7900	Design Mini-dissertation	This module involves the investigative research and critical judgement of all aspects pertaining to the chosen and approved design subject and project, and is set out in an academically rigorous document, including: The development of the chosen design project with reference to concept development, development and setting out of programme, the integration of all aspects involved in an appropriate design solution and the presentation thereof in a document with the necessary illustrations, sketches, drawings and model(s).	MAIN	Student will be able to: -conceptualise, evaluate, design and apply processes of knowledge to an architectural design process appropriate for the specific chosen and approved design subject and project; -combine, evaluate and adapt a wide range of suitable and inventive design principles, methods, theories, techniques, processes and solutions to a specific architectural problem that attempts to address complex contextual, historical, social and cultural phenomena and/or a theoretical statement; -assess the consequences of an architectural solution generated in a specific human ecological landscape; -make autonomous ethical decisions based on contextual, historical, social, theoretical and technical resources and in accordance with architectural practice that will affect the architectural design; -identify, communicate and evaluate the essence and the extent of complex and challenging design problems within the field of architecture based on comprehensive review of leading and current research completed in ATRE7904 and CONS7908; -integrate all the accumulated skills, from the development of a programme to the detail design into a single architectural intervention; and -communicate and defend the aspects of architectural design solution and theoretical discourse that is the product of responsible and ethical research developed in a specific human ecological landscape.
DESN	6800	Design IV	This module contains fundamental knowledge, theories, principles, practices and processes of Architectural Design explored through the themes: urban design, environment responsible design (environmental impact, earth construction, alternative technologies, etc.), conservation and housing. A group investigation of each theme precedes the individual critical research of this theme, which then extends to reports and design projects. Every project has its own specific criteria to which it must adhere.	MAIN	Student will be able to: -structure and construct appropriate research pertaining to specific design problems taking into account all relevant aspects and addressing the relevant theme in a responsible manner; -examine, deduce and evaluate specific design problems taking into account all complex environmental, social, cultural and historical aspects specific to the relevant theme, in order to generate and propose a fitting and responsible design solution to a particular architectural situation within the wider context of the built environment; -integrate and arrange universal design principals and individual project criteria applicable to urban design, environmental responsible design, conservation and housing within complex human ecologies; -design spaces on different environmental levels and public artefacts concerned with functional planning, structural integrity and meaningful shaping; -identify, research and construct why, where and how knowledge could be applied to design problems; - apply and integrate historical principles to design problems and solutions and generate a responsible theoretical grounding for the design solutions; -formulate and manage an appropriate design process from concept identification and development to the incorporation of well-reasoned well-grounded theoretical/conceptual position/viewpoint to the finally design proposal which demonstrates the responsible and appropriate choice of material, construction method and articulation of detail; -justify the thought process behind the design solution; -communicate and integrate all work in a clear, direct and unambiguous manner, graphically as well as verbally; and -design multi-storey building: required for the appropriate category for which graduates qualify with the South African Council of the Architectural Profession.
DRET	6804	Design and Research Methods in Architecture	This module contains fundamental knowledge, theories, principles and practices of research and design methods in architecture. Including research and structuring devices in design, tacit knowledge, case studies, interviews, representational media, visual analysis and on-site observational study. Academic writing, literature review, annotated bibliography, research proposals, the relation between theory and design and the nature of a creative design dissertation.	MAIN	Student will be able to: - Apply design-research skills and methods particular to the built environment. - Learn to explore tacit forms of knowledge. - Develop strategies to organize and focus research interests that link design with theory. - Establish a research interest with respect to one's own design work, including appropriate questions and methods of inquiry. - Develop skills to search and organize literature, media and visual material relevant to a research topic. - Develop a research proposal, including the ideas, visual analysis and structure that is required of a creative dissertation. - Convey research results and findings in a written and visual form.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
HURB	6804	History of Urban Settlement	This module contains fundamental knowledge, theories, principles and practices of History of Urban Settlement, including: The study of the built form of human settlements in history, internationally and in South Africa, with an emphasis on town planning, urban design, housing, conservation and environment responsible design development. An assessment of cities during different periods to non-western, modern, third world and South African cities.	MAIN	Student will be able to: -interrogate and evaluate multiple concepts, facts, principals, rules and theories of the evolutionary history of cities, specifically with regard to town planning, urban design, housing, conservation and environment responsible design; -apply, transfer and critically reflect on the complexities of formative principles within the fragments of the urban settlement history by rigorously interpreting problems within the contemporary city; -Assess, process and manage information pertaining to the history of urban settlement within a context (specifically South Africa) and develop creative responses to urban issues; -develop skills in presenting and articulating formative principles in an appropriate academic and professional way as seminars and orals while offering creative insights into the problems and issues; -evaluate experience gained in projects that embrace the idea of architecture of city sense and to self-critically formulate formative principles as a method of design problem solving specific within a urban context.
PARC	7904	Professional Architect Practice	This module contains fundamental knowledge, theories, principles and practices of Professional Architect Practice, including: General office administration, financial administration, the scope of professional services to clients, communication and presentation of projects and professional marketing, and liaison with consultants and other members of the design team.	MAIN	The student will be able to: - summarise, relate, evaluate and recommend the management processes involved in an architects office; and - make and revise autonomous professional, administrative and ethical decisions which affect general office administration, financial administration, the scope of professional services to clients, communication and presentation of projects and professional marketing, and liaison with consultants and other members of the design team.
RARC	6808	Research in Theory of Architecture	This module contains fundamental knowledge, theories, principles and practices of the Research into Theory of Architecture, including: individual research, reflective assessment and critique of architecture by applying knowledge from contemporary architectural thought, humanities and social and natural sciences. Analyses of relevant contemporary premises. Research into Theoretical aspects applicable to a specific chosen design theme and project. Research into Concepts in contemporary architectural theory relating to urban design, environment responsible design, conservation and housing as applicable to the chosen design problem.	MAIN	Student will be able to: -identify, analyse and evaluate a specific design problem (specific site and specific design type on the site); -differentiate and integrate theories, terms, concepts, principles relating to contemporary architecture, humanities and social and natural sciences; -evaluate types of theoretical concepts and principles based on critical assessment of architecture specifically within the context of urban design, environment responsible design, conservation and housing; -interpret and interrogate the multiple functions, objectives and different aspects of contemporary architectural theory as applicable to a specific design problem; -critically identify and evaluate the theories applicable to a specific design problem from different theoretical and philosophical ideas that influenced architectural and urban design in order to develop creative responses to a specific choses design problem; -draw conclusions from above mentioned in order to analyse, evaluate and determine priorities in their applicability and to better understand the situation in architecture as applicable to a specific chosen design problem; -assess, process and manage information pertaining to the theory of architecture within a context (specifically South Africa) and develop creative responses to urban design, environmental design, conservation and housing issues as applicable to the specific choses design problem; -develop skills in presenting and articulating theoretical principles in an rigorously academic and professional way as seminars while offering creative insights into the problems and issues; -evaluate projects that embrace the idea of contemporary architecture and to self-critically formulate architectural design principles as a method of design problem solving specific within a urban context. -formulate research and take responsibility for the construction of an own theory, based on academic knowledge of contemporary architectural thought, the creative insights into the complex relationship between a specific context, siting, client etc., and the ethical issues based on critical reflection on the problems inherent to urban design, environment responsible design, conservation and housing. -comprehensive individual research into the field of architecture, specifically to include independent research into theoretical aspects illustrating an advance knowledge of a specific chosen site, the historical considerations of the specific human ecological landscape, the identifications of an appropriate architectural design problem, appropriate design hypothesis; -research and evaluate a wide range of suitable and inventive design principles, methods, theories, techniques, processes and solutions to a specific architectural problem that attempts to address complex contextual, historical, social and cultural phenomena and/or a theoretical statement.

SUSTAINABLE FOOD SYSTEMS AND DEVELOPMENT (102)

Module Code		Course Title	Course Description	Campus	Acad Org Description
Undergraduate					
AGEX	2614	Extension with the Agricultural Innovation System	Detailed knowledge of the Agricultural Extension disciplines and/or practices, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and paradigms of this field, discipline or practice; Knowledge of the Agricultural Extension discipline relates to Rural Advisory Services and Agricultural Innovation Systems discourse, and other fields, disciplines or practices.	MAIN	Student will be able to: Explain and discuss the Extension paradigms, methods, approaches, and tools -Explain of the history of agricultural extension paradigms, principles, methods, approaches and systems -discuss and analyse pluralism in extension and the need for and methods of coordination and linkages -Extension as a profession; extension science Explain and discuss the role of extension in innovation and development -explain and analyse the relationship between agricultural extension and Innovation systems List the component of the agricultural innovation systems concept and - defining innovation - agricultural innovations (product innovation and process innovation - define the innovation processes - explain the concept agricultural innovation systems - explain of the concept of the new extensionist - discuss and analyse the New extensionist concept and framework - explain of what these concepts imply for roles of extension and advisory services within the innovation system (Serve as facilitators or knowledge brokers. -explain the links to farmers between the information, markers and other services in order to diversity their farming systems and increase productivity) -Examples of approaches/ cases on the ground inline with the new extensionist concept (GFRAS, PEA, MEAS, the big five etc)
AGEX	2624	Communication for Innovation	Detailed knowledge of the Communication for Innovation disciplines and/or practices, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and paradigms of this field, discipline or practice; Knowledge of how Communication for Innovation relates to Extensions, Rural Advisory Services and Agricultural Innovation Systems discourse, and other related fields, disciplines or practices	MAIN	Student will be able to: - Explain why communication is critical for innovation - Discuss different communication models and modes - Explain the dynamics of communication and ways of minimizing barriers - Raise self-awareness - Discuss the principles and methods of knowledge management, learning & sharing Discuss the importance of information and communication technologies (ICTs) and mass media communication, when and how they are appropriate Display public speaking and presentation skills Ability to write for specific purposes and audiences; ability to document processes, structure reports and presentations effectively (reports, policy briefs etc) - Prepare and manage effective meetings (Chaired and facilitated meetings)
AGEX	3714	Facilitation for development	This course `Facilitation of Development' aims to introduce the learner to the basic principles of facilitation and what is means within the agricultural innovation systems context. The course will enhance students' capacity to translate conceptual ideas into actual intervention practice.	MAIN	Student will be able to: -Discuss why facilitation is necessary for development and good understanding of principles of facilitation, -Examine the theories, principles, focus and value of different methodologies used to create multi-stakeholder learning, negotiation, mobilisation and action; -Apply basic facilitation techniques such as the art of questioning & probing, listening skills, feedback, the use of codes etc); -Discuss and recognize group dynamics, process observation and multi-stakeholder learning and negotiation professes; -Coach individuals and groups, and instill the culture of feedback and sharing; and -Do a preliminary assessment of a situation, critically select an appropriate system thinking perspective and related inquiry methodology, and make a plausible process design;

Module Code		Course Title	Course Description	Campus	Acad Org Description
AGEX	3724	Extension programme management	This course will introduce students to the tools for creating a vision for effective extension programmes, and the important elements in the program planning cycle. Using the different tools such as results based planning, logical framework, theory of change, and impact pathways, the students will be exposed to integrated and systemic planning processes.	MAIN	Student will be able to: -create a vision for a functional agricultural extension systems (what the different actors would do or do differently if extension system would be successful) -discuss the importance of mission, policies, and objectives of the agency or organization - conduct extension programme planning, implementation, monitoring and evaluation and learning (project cycle) -apply different planning tools and different tools to use (Results based planning, logical frameworks, impact pathways, theory of change etc) -discuss the service delivery systems frameworks (Demand side, supply side and support for delivery; Intergrated planning & systemic interventions etc) -interpret the importance of the research-extension-farmer linkages and coordination opportunities & challenges - build strategic partnerships, network and manage stakeholders -apply research methods, data gathering, documentation and reporting -discuss the role of ICT in the management of extension programs
AGEX	3734	Community mobilization and local organizational development	This course aims at introducing the learner to the concepts and principles of community mobilization and local organisational development and how they relate to agricultural development. The course put emphasis on the understanding of the concepts required and the skills that are needed to be able to mobilize communities, develop their local organisational capacities and promote their equitable participation in agricultural innovation processes	MAIN	Student will be able to: -apply methods for the development of a shared vision for communities and their goal; - build local organizational capacities and organise the demands; -discuss aspects that build and break community linkages with actors in the innovation system value chain; -discuss culture and diversity within a community setting, including gender, youth and communication channels; -conduct livelihoods assets assessment; -employ problem solving and decision making approaches; -discuss leadership principles, accountability and leadership development; and -utilise resource mobilisation strategies.
AGEX	3744	Management of change and Adaptation	The course will help the student to develop an understanding of how change acts upon people, and what leadership behaviours are needed to manage it effectively. Using various models, the student will learn key skills for overcoming resistance to change, for supporting oneself and others in times of uncertainty, and for facilitating the transition process. Furthermore, linking these to the climate change adaptation discourse.	MAIN	Student will be able to: -Discuss the concepts and theory behind management of change and adaptation - Use tools and approaches to support farmers and enhance community capacity to adapt to risk and change in climate, markets, and disasters; and farmer coping strategies - Link change and adaptation to the climate change discourse - Analyse tools for adaptation options - Deal with risks, change, and uncertainties - Manage emotions under pressure, manage technological change and deal with ambiguity
AGEX	3754	Agricultural entrepreneurship and value chains	This course aims at introducing the students to the concept of entrepreneurship in the context of agricultural development. The course looks at the principles, qualities and competencies required, and how this links to the value chain discourse.	MAIN	Student will be able to: -apply entrepreneurship concepts and discuss how they relate to agricultural development; -analyse major trends and developments in the environment of the farming business; -examine the value chain concept and the link to agricultural entrepreneurship development; -define entrepreneurship competencies and qualities and ways of developing such; - analyse business opportunities and conduct market analysis, develop agricultural business plans, basic understanding of agricultural economics; and -examine basic concepts and tools in markets and value chains; -discuss market oriented extension- marketing education, coordination, business linkages, types of providers.
AGEX	3764	Adult learning, Behavioural change & Gender	This course will introduce the students to the concept of adult learning, behavioral changes and gender and how they relate to the agricultural development, extension and agricultural innovation systems	MAIN	Student will be able to: -outline adult learning and behavioural change theories; -assess learning needs for adults, design appropriate training and instructional techniques, training evaluation, participatory and collective learning, group learning, personal mastery within the agriculture spectrum; -manage cultural difference and gender diversities in adult learning; -discuss key concepts in gender, gender roles, gender analysis, gender mainstreaming and the application of a gender-sensitive approach, -discuss the importance of gender and youth in extension and rural development and why agricultural extension should be gender sensitive, and sensitive to the diverse needs of different age groups; -examine different approaches to address gender and youth and also how to attract and retain women and youth in agriculture extension; -use ICT to reach women extension staff, build the capacity of women extension advisors and include women in value chains; and -conduct gender analysis within agriculture extension context.

Module Code		Course Title	Course Description	Campus	Acad Org Description
SAAM	1716	Fundamentals of Agricultural Economics	Fundamentals of Agricultural Economics and Marketing	MAIN	Student will be able to: - use methods for processing and preserving perishable foodstuffs; - develop alternative marketing strategies; - introduce support systems to implement new marketing strategies; - improve the financial stability of the members of the communities; and - advance improved competitiveness in the markets.
SAAM	1726	Fundamentals of Agricultural Economics	Fundamentals of Agricultural Economics and Marketing	MAIN	Student will be able to: Within the area of production, marketing and adding value: - Outline methods for processing and preserving perishable foodstuffs; - develop alternative marketing strategies; - develop support systems to implement new marketing strategies; - improve the financial stability of the members of the communities; and - advance improved competitiveness in the markets.
SACP	1716	Foundational theories in plant production and practices	Improved biological and economical crop production practices. Conservation of soil structures. Enhancing crop produces for own consumption and marketing. Student will acquire practical skills and know-how to demonstrate the benefits of sustainable crop production practices to the communities to ensure that aforementioned issues are obtained.	MAIN	Student will be able to: - Develop water harvesting techniques; - demonstrate different cultivation practices; - choose correct cultivars for specific areas; - integrate weed control programmes; - establish an integrated pest management approach; - improve biological and economical crop production practices; - conserve soil structures; and - enhance crop produces for own consumption and marketing.
SACP	1726	Introduction to Plant Production Practices	Within the area of managing rural structures and dynamics, be able to -apply acquired skills and know-how to deal with the challenges of rural life; -resolve gender issues; -explain the important role of agriculture in communities; -contrast poverty vs. self-sufficiency; -introduce programmes to alleviate hunger and ensure food security; -initiate improved support structures in all spheres of rural life; -facilitate improved living environments; and -create capacity towards self-sufficiency.	MAIN	Student will be able to: - Design practical rotational grazing systems to avoid over grazing; - develop and apply sound animal husbandry practices; - identify nutritional needs of free ranging animals; - implement correct breeding practices; - introduce sound animal health procedures; - devise sound marketing practices; - improve biological and economical livestock production practices; - curb high mortality and low fertility rates; - improve genetic material for herd progress; - implement sound feeding regimes to avoid excessive mass losses in dry seasons.
SACT	1716	Basic Communication Skills	Improved overall effectiveness due to better communication and understanding of the spoken and written words. Enabled to formulate needs in an understandable context. Better appreciation of the transferred knowledge. Improved writing and oral skills. Students will acquire practical skills and know-how in public speaking, the use of audio and visual aids, formulating concepts into understandable ideas, written and oral skills, interpersonal discussions and the art of listening.	MAIN	Student will be able to: Within the area of written, communication and presentation skills, - Advance overall effectiveness with better communication and understanding of the spoken and written words; - facilitate effective interpersonal discussions; - improve harmony in diverse communities; - enhance writing, oral, communication and presenting skills; - develop skills to formulate needs in an understandable context; and - apply transferred knowledge.
SACT	1726	Basic Communication Skills	Improved overall effectiveness due to better communication and understanding of the spoken and written words. Enabled to formulate needs in an understandable context. Better appreciation of the transferred knowledge. Improved writing and oral skills. Students will acquire practical skills and know-how in public speaking, the use of audio and visual aids, formulating concepts into understandable ideas, written and oral skills, interpersonal discussions and the art of listening.	MAIN	Student will be able to: Within the area of written, communication and presentation skills: - Advance overall effectiveness due to better communication and understanding of the spoken and written words; - facilitate effective interpersonal discussions; - improve harmony in diverse communities; - enhance writing, oral, communication and presenting skills; - develop skills to formulate needs in an understandable context; and - apply transferred knowledge.

Module Code		Course Title	Course Description	Campus	Acad Org Description
SALP	1716	Foundation Theories in Animal Production practices	Improved biological and economical livestock production practices. Curbing high mortality and low fertility areas. Improved genetic material for herd progress. Implementation of sound feeding regimes to avoid excessive mass losses in dry seasons. Students will acquire practical skills and know-how to demonstrate sound animal husbandry practices which will ensure improved animal health, breeding, nutrition and pasture management practices.	MAIN	Student will be able to: Within the area of sustainable animal production practices, - Design practical rotational grazing systems to avoid over grazing; - develop and apply sound animal husbandry practices; - identify nutritional needs of free ranging animals; - implement correct breeding practices; - introduce sound animal health procedures; - devise sound marketing practices; - improve biological and economical livestock production practices; - curb high mortality and low fertility rates; - improve genetic material for herd progress; - implement sound feeding regimes to avoid excessive mass losses in dry seasons.
SALP	1726	Foundation Theories in Animal Production practices	Improved biological and economical livestock production practices. Curbing high mortality and low fertility areas. Improved genetic material for herd progress. Implementation of sound feeding regimes to avoid excessive mass losses in dry seasons. Students will acquire practical skills and know-how to demonstrate sound animal husbandry practices which will ensure improved animal health, breeding, nutrition and pasture management practices.	MAIN	Student will be able to: Within the area of sustainable animal production practices, - Design practical rotational grazing systems to avoid over grazing; - develop and apply sound animal husbandry practices; - identify nutritional needs of free ranging animals; - implement correct breeding practices; - introduce sound animal health procedures; - devise sound marketing practices; - improve biological and economical livestock production practices; - curb high mortality and low fertility rates; - improve genetic material for herd progress; - implement sound feeding regimes to avoid excessive mass losses in dry seasons.
SARD	1716	Fundamentals of Rural Development	Improved support structures in all spheres of rural life, thereby improving social, human and family livelihoods. Students will acquire skills and know-how to deal with the challenges of rural life; they will be able to facilitate improved living environments and create capacity towards self sufficiency.	MAIN	Student will be able to: Within the are of managing rural structures and dynamics: - Apply acquired skills and know-how to deal with the challenges of rural life; - resolve gender issues; - explain the important role of agriculture in communities; - contrast poverty vs. self-sufficiency; - introduce programmes to alleviate hunger and ensure food security; - initiate improved support structures in all spheres of rural life; - facilitate improved living environments; and - create capacity towards self-sufficiency.
SARD	1726	Fundamentals of Rural Development	Improved support structures in all spheres of rural life, thereby improving social, human and family livelihoods. Students will acquire skills and know-how to deal with the challenges of rural life; they will be able to facilitate improved living environments and create capacity towards self sufficiency.	MAIN	Student will be able to: Within the are of managing rural structures and dynamics, : - Apply acquired skills and know-how to deal with the challenges of rural life; - resolve gender issues; - explain the important role of agriculture in communities; - contrast poverty vs. self-sufficiency; - introduce programmes to alleviate hunger and ensure food security; - initiate improved support structures in all spheres of rural life; - facilitate improved living environments; and - create capacity towards self-sufficiency.
SFIF	1513	Introduction to Food Systems	The module aims to introduce students to global and local food systems. It investigates some challenges that drive the transformation of global food systems, i.e., globalisation, urbanisation, degradation of natural resources, climate change, culture and tradition, changing consumer trends, technological innovation, and the drive towards sustainability. It also offers a holistic view of Food Systems and its relevance to the Sustainable Development Goals.	MAIN	After successful completion of this module, students will be able to: • Define a food system. • Discuss the dominant activities and processes that constitute a food system. • Determine the key role players/components in a basic food system and discuss their interaction. • Identify various economic, social, and environmental forces that shape food systems and discuss the impact of each on food systems. • Compare conventional and alternative food systems. • Debate the link between food systems, sustainable food production and food security. • Explain how a functional food system can contribute to the Sustainable Development Goals.

Module Code		Course Title	Course Description	Campus	Acad Org Description
SFFS	1513	Food Safety: Fundamental Food Compliance	This module introduces students to an internationally recognised food safety management system, using the analysis and control of biological, physical, and chemical hazards. It includes an introduction to the theory underlying some fundamental principles for food safety and hygiene: Cleaning, Cross-contamination, Chilling and Cooking. Students will learn about relevant food safety and hygiene legislation and experience the essential maintenance and application of the Hazard Analysis Critical Control Point (HACCP) principles. The module aims to give students a holistic view of Food Safety and its relation to Sustainable Development Goals.	MAIN	After successful completion of this module, students will be able to: • Define food safety. • Demonstrate a solid knowledge of food hygiene and safety measures. • Identify and discuss the scientific principles underlying food safety. • Identify the dangers and hazards in food handling, transportation, and preparation. • Identify and discuss the food contaminants influencing the safety of food products. • Systematically search, select, and evaluate literature and other relevant materials on food safety. • Examine the aspects of a robust system for food safety at work and the maintenance thereof. • Apply the basic food safety principles to maintain excellent workplace personal hygiene and set a standard for all participants.
SFNH	1513	Food Systems for Nutrition and Health	This module aims to equip the student with basic knowledge and skills regarding the food environment as the interface with health within the food system, with specific application to South Africa.	MAIN	After successful completion of this module, students will be able to: • Define and explain malnutrition regarding undernutrition, overnutrition and hidden hunger and the link to non-communicable diseases. Explain the effect on the economy. • Describe how sustainable food systems must be realised within planetary and health boundaries. • Discuss the determinants of malnutrition within food systems by focussing on the conceptual framework of food environments as the interface between the food system and health outcomes. • Define the concept of food environment and distinguish between food environments that promote health instead of those that do not. • Identify the components of the food environment and their interactions to determine health: • External domain – availability, prices, vendor and product properties, marketing, and regulation. • Internal domain – accessibility, affordability, convenience, acceptability • Use the above conceptual framework to assess food environments.
SFCF	1513	Introduction to the Components of Food	This module aims to provide foundation knowledge of the major food components and how they contribute to the structure of major food groups. It seeks to stimulate, encourage, and develop scientific knowledge and understanding of foods' composition and structure. It will include energy (carbohydrates, proteins, and lipids) and non-energy components (vitamins, minerals, dietary fibres, and water). Students will obtain basic information about the chemical composition of main types of foods, biomolecules and other micro-components, additives, and contaminants. This module demonstrates how products change within specific food processing techniques and suggests ways to enhance, prevent/disrupt the process or procedure. An example of improving a strategy would be to encourage fermentation of dairy products with lactic acid; a preventing process would be stopping the Maillard reaction on the surface of freshly cut Red Delicious apples, whether by hand or mechanical methods.	MAIN	After successful completion of this module, students will be able to: • Define the structure of major food components. • Describe the composition of major food groups. • Explain the changes in selected food storage, preparation, and processing aspects. • Explain the properties and reactions of carbohydrates, lipids, and proteins during food storage and processing and how these influence the quality and properties of food. • Explain the importance of water for the stability and quality of foods. • Give an overview of the main classes of compounds influencing the colour and flavour of food. You also know essential vitamins and minerals in food and how these affect other quality aspects. • Classify food components (fats, proteins, carbohydrates, vitamins, minerals, pigments, enzymes, and additives), their structure, occurrence and changes during heat treatment, processing, and storage.
SFEC	1513	The Economics of Sustainable Food Systems	An introduction to basic economics and a specific focus on the economic principles needed to understand the food industry, agricultural production, food safety and how these are integrated into a sustainable food production system. This course covers the South African Food System from an applied economic perspective, intending to develop an understanding of the positive and negative aspects of the South African Food System. We examine the costs and benefits of food production, distribution, and consumption.	MAIN	After successful completion of this module, students will be able to: • Identify role-players' behaviour in the food system and discuss the incentives related to food choices. • Determine what food systems can and cannot achieve. • Illustrate the interactions between production, distribution, and consumption of food and regional self-reliance. • Debate the impacts of local food and network analyses.
SFSF	1523	Sustainable Food Systems	Students are introduced to the complexity of local and global food systems and define sustainability in the context of food and food systems. The course introduces food security and environmental sustainability within community food systems. Students will reflect and deepen their understanding of the role of businesses, consumers, and food and nutrition professionals in contemporary food systems and apply what they learn to food, nutrition, and environmental challenges, i.e. Food systems in the context of sustainability for environmental, economic, and social aspects; Food systems concerning human health, health policies, environmental policies, and food access.	MAIN	After successful completion of this module, students will be able to: • Identify and discuss the global challenges of sustainable food production and consumption. • Define sustainable food production and consumption from multiple perspectives. • Differentiate and compare types of sustainable food initiatives through their origins, advantages, and disadvantages. • Critically evaluating evidence supporting or contradicting common and competing claims and beliefs about food systems. • Point out the possibilities of alternative food production and consumption approaches. • List food strategies and diets contributing to a more sustainable food system

Module Code		Course Title	Course Description	Campus	Acad Org Description
SFPP	1623	Sustainable Food Production: Processes & Principles I	This module aims to introduce students to the different food preparation principles. It includes assessing selected food preparation methods and their influence on the food ingredient. Preparation methods are essential to retain the nutritional value and obtain optimum edible quality characteristics. This module includes vegetables, fruit, cereal and pasta, flour and flour mixtures, starches and sauces, quick bread, yeast bread, cake, cookies, and pastries.	MAIN	After successful completion of this module, students will be able to: • Demonstrate, interpret, and combine different food principles. • Describe techniques that can be used to monitor the quality of raw ingredients and final products. • Apply knowledge to describe the functions of ingredients in food. • Apply principles from the various facets of culinary science and related disciplines to solve practical, real-world problems. • Judge and critique different products' quality and results and propose quality improvement and possible ingredient substitution. • Document and report all the results of practical components.

SFHN	1523	Human Nutrition	This module aims to equip the student with basic knowledge and skills regarding human nutrition for health and wellness throughout the lifecycle, focussing on obtaining nutrients from dietary sources and evaluating nutrition information.
			The aim of the module is:
			• To provide students with the knowledge of basic terminology and several aspects of nutrition and the functions of food in healthy life sustenance.
			• To ensure that students are familiar with the food classification, nutrition during special conditions and the role of exceptional functional food.
			• To equip students with knowledge and understanding of modern aspects of nutritional science and novel food usage.
			The module will include:
			1. Food Choice and Human Health 2. Nutrition Tools, Standards, and Guidelines 3. Human Body 4. Carbohydrates 5. Lipids 6. Proteins 7. Vitamins, 8. Water and Minerals, 9. Energy and Metabolism 10. Nutrients, Physical Activity, and The Body's Responses 11. Diet and Health, 12. Food Safety, 13. Life Cycle Nutrition 14. Hunger and The Global Environment.
				MAIN	After successful completion of this module, students will be able to:
					• Demonstrate a broad and basic understanding of dietary guidelines, guides, and aids (including food labels) for planning or evaluating the adequacy of diets for health and wellness in general relation to food choices and basic roles in health and wellness:
					  • Energy
					  • Macronutrients - Protein, carbohydrates (including sweeteners) and fats.
					  • Fiber
					  • Micronutrients – vitamins and minerals
					  • Water and electrolytes,
					  • Phytochemicals
					  • Pre- and probiotics
					  • Alcohol
					• Define the life cycle stages and give a broad overview of each stage about changing nutritional needs.
					• Discuss the role of dietary supplements in health and wellness and the associated benefits and dangers.
					• Evaluate the quality and trustworthiness of nutrition information.

SFFD	1623	Food Dispersions	The module aims to provide students with a more profound knowledge of three main topics: Food Dispersions, Hydrocolloids and Intermediate Moisture Foods, and apply this knowledge to Convenience Foods and Food Analogous. The course concluded with convenience foods and food analogous, as examples of food dispersions, where the composition of the food system is linked to its convenience value.	MAIN	After successful completion of this module, students will be able to: • Identify food dispersions by simply looking at the ingredients in a formulation. • Identify food dispersions by reading the preparation techniques for a specific food product. • Identifying failed food dispersions and their consequences for the final product. • Apply the techniques to incorporate hydrocolloids into food formulations to successfully prepare intermediate moisture foods, convenience foods, and analogues. • Argue the influence of preparation on the formation of food dispersions. • Judge failed food dispersions and the consequences thereof for the final products.
SFFO	1523	Food Operations and Supply Chain Management	This course introduces participants to the concepts and practices of operations management in food processing and the food supply chain. Students are introduced to the theoretical and practical aspects of management within the food manufacturing sector, including planning, logistics, technical support, and resource management. Note that this is just an introductory module to familiarise students with managing a food supply chain. This topic will be discussed at an advanced level in the final year.	MAIN	After successful completion of this module, students will be able to: • Identify the concepts and practices of operations management in food processing and the food supply chain. • Manage the planning, logistics, technical support, and resources within the food manufacturing sector. • Apply knowledge to evaluate and manage an effective supply chain. • Understand the foundational role of logistics as it relates to transportation and warehousing. • Debate the alignment of the management of a supply chain with corporate goals and strategies. • Analyse and improve supply chain processes.

SFFS	2613	Food and Nutrition Security	This module aims to lay a foundation for the food security concept and how it relates to nutrition. Aspects to be covered include the various definitions and approaches of food security, the measurement of food security and the South African food security situation, and the different aspects influencing food security. Also, health and nutrition will be discussed in depth. The course will further give participants a fundamental understanding of the main determinants and issues connected to food and nutrition security.	MAIN	After successful completion of this module, students will be able to:
					• Define and classify the pillars of food security.
					• Analyse the global food security situation.
					• Interpret available data and report on the South African food security situation.
					• Understand and explain the influence of:
					  • Urbanisation
					  • poverty
					  • Education and employment
					  • human development
					  • coping strategies in emergencies and crises on food security.
					• Understand and explain the correlation between food security and nutrition, disease, and mortality.
					• Identify and interpret the influence of HIV/AIDS on food security.
					• Identify the role of non-food inputs such as safe water and sanitation in food security.
					• Discuss the effect of the type of governance on food security policies.
					• Identify the role that international humanitarian aid plays concerning a food security/insecurity status.
					• Distinguish between the different classification and monitoring systems for measuring food security.
					• Interpret food commodities' macro- and microeconomic principles within a food security context.

Module Code		Course Title	Course Description	Campus	Acad Org Description
SFPP	2613	Sustainable Food Production: Processes & Principles II	This module studies candy making, chocolates, frozen desserts, milk, cheese, and eggs. Topics include processed sugar terminology, tempering of chocolate, proper tool and equipment use, formula conversions, functions of ingredients and complementary combinations of flavours. This module will identify, describe, discuss, and apply appropriate preparation technologies and strategies for efficient dairy product preparation for sustainable food security and the development of the local dairy production sector. The module will be helpful to students to study dairy preparation and production, improvement, management and marketing of milk and cheese. The module introduces students to identifying appropriate dairy enterprises and production systems for more efficient dairy production. Topics include the composition of milk, some physical properties of milk, factors affecting the design of milk; microbiological aspects of milk production and the nutritional value of milk and milk products. A further aim includes the role that eggs play in the food preparation process, the nutritional value of eggs and the influence of preparation methods on the physical properties of eggs.	MAIN	After successful completion of this module, students will be able to: • Demonstrate a working knowledge of terms, ingredients, equipment, and tools. • Understand the properties and functions of the basic ingredients used in the preparation of sugar products. • Prepare a wide variety of chocolates and candies; understand how to vary basic formulas. • Plan each phase of production for maximum efficiency. • Understand the science of chocolates, particle size and flavour, viscosity, fats, and tempering, and panning. • Describe the procedures for milk hygiene and quality control. • Describe the procedures for poultry and egg hygiene. • Explain the influence of different preparation methods on the different food components. • Prepare frozen food products using different formulas.
SFPV	2613	Food processing, I (Plants)	The main aim of this module is to familiarise the student with the industrial processes which can be used to process and preserve food, especially plant products. Such methods include the application of heat, drying, cooling, and freezing so that the food's bacteriological, physical, and chemical decomposition is largely prevented. The processing requirements of plant products will be investigated. Both conventional and non-conventional processes will be dealt with. This module includes the theory and practice of food processing, specifically for plants/crops. It demonstrates the processes and technologies for processing vegetables, fruits and other plant materials or crops. The module also references food safety, hygiene, and relevant food regulations.	MAIN	After successful completion of this module, students will be able to: • Have a clear understanding of the term’s food preservation, safety, hygiene, and processing. • Will apply the different processing requirements of plants and crops. • Will know the different processing methods applicable to various plant parts and crops. • Differentiate between conventional and non-conventional processing methods.
SFMB	2613	Food Marketing and Branding	This course aims to give you insight into the process of packaging design, branding, and marketing, from initial research to the creation of brand ideas, and the brand's personality, to the philosophy of innovation, mock-ups, and presentation. If you separate the brand from the packaging and design, you are left with an empty container, some fonts, and colours. Packaging plays a critical role in becoming part of a brand's personality and outward manifestation. Packaging is the first point of communication with a brand's user. It is the vehicle on which a brand conveys the message. Throughout the course, you'll examine the complex, interconnected relationship between packaging, marketing, and branding. You will obtain valuable insight into the marketing process and its diverse fields by the end of this course. You will know how to create a brand and its packaging for the right market and how the ideas can be visualised and displayed. Coursework encompasses both strategic and "hands-on" experiences. Students investigate critical aspects of the food market, such as trends in consumption, supply and demand, distribution, sales, and technology. It includes understanding the food supply chain, innovative food packaging, optimizing food storage to prevent food losses, the impact of technology on processing and distribution; consumption trends, marketing, and the consumer and the newest marketing strategies.	MAIN	After successful completion of this module, students will be able to: • Identify the optimal food chain for products to prevent food losses. • Compare various preservation techniques in the supply chain. • Determine food waste and diet shifts in the supply chain. • Define consumer perception of suboptimal food. • Critically evaluate food waste at the retailer-consumer interface • Define Marketing strategies. • Compare marketing channels. • Define retailing and the consumer. • Apply different promotions in the marketing mix. • Understand advertising, public relations and sales promotion. • Define the ethical considerations in marketing. •

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SFAI	2613	Agricultural Innovation Systems (AIG)	Agricultural extension is essential to boost agricultural productivity and ultimately food production. This module examines the role of extension services in the sustainable food system by communicating to and supporting producers to meet challenges in the context of food systems, i.e., constraints due to environmental crises, climate change, technology and changing processes, health challenges, the growing importance of standards, etc. This module introduces Agricultural Extension as an academic discipline and covers the field's basic concepts, terminology, theories, and practices. Students will investigate the theory, principles and practices that inform Agricultural Extension, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and paradigms of this field, discipline or practice. Also, the module specifically focuses on the importance of agricultural extension for agricultural innovation. The module furthermore examines how Agricultural Extension relates to Rural Advisory Services, the Agricultural Innovation discourse, and other relevant fields, disciplines, or practices.	MAIN	After successful completion of this module, students will be able to: • Explain the history of extension paradigms, methods, approaches, and tools. • Define the major extension approaches and discuss the practicalities thereof. • Discuss the features of different extension tools and select appropriate ones based on programme goals and local context. • Make informed decisions and identify the appropriate approaches and tools to fit local conditions in response to changing contexts. • Describe the role of extension on innovation and development and how it has changed over the years.
SFSS	2623	Food security and sustainability	Economic, social, and environmental sustainability is essential to ensure a future for all life on Earth. Achieving global food security is a priority and should be done sustainably. This module will explore sustainability-related matters that influence food security, such as sustainable agriculture, crop losses and food waste, changing diets, using non-renewable resources, various footprints, and the Sustainable Development Goals (SDGs). While the need for more food is increasing, so are the external drivers that impact sustainable food production, i.e., climate change, poverty, food fraud, urbanisation, waste management and recycling, etc. • Look into the provision of food in a sustainable way. • Feeding people amidst a growing world population • Environmental threats and the impact on food security • Policy initiatives that influence sustainable food production and food security • Food security indicators	MAIN	After successful completion of this module, students will be able to: • Identify global and local agriculture sectors' role in food security. • Define the role of modern agricultural practices, aquaculture, agro-forestry, and permaculture in food security. • Evaluate how crop losses and food wastage affect global food security. • Interpret the impact of advances in sciences and technology concerning food security. • Critique the emergence of genetically modified organisms in the food system to attain food security. • Discuss the importance of changing diets on the sustainability of the global food security system. • Evaluate how the usage of non-renewable resources impacts provision and food security. • Define and differentiate between the water- and ecological footprints. • Analyse and compare the concepts of sustainability and environmentalism. • Interpret the Sustainable Development Goals (SDGs).
SFPT	2623	Food Production Processes and Technology	Food Processing and Technology includes a set of physical and chemical processing techniques that are used to transform food ingredients or agricultural products into food products. The module covers the theory, methods, and techniques to convert agricultural products into sustainable, safe, nutritious processed food products. The course will explore the advantages and disadvantages of food processing technologies and understand their impact on health, safety, quality, and sustainability. It includes many processed foods, and traditional and innovative food processing technologies, from home cooking to complex industrial methods used to produce convenience and processed foods. Students will discover how processed food products are created and learn how sensory analysis and food trends affect the production and processing of food. The module includes a section on food waste during processing and looks into innovative and sustainable strategies for the post-harvest management of agricultural products.	MAIN	After successful completion of this module, students will be able to: • Explore the principles of food processing and understand both traditional and modern industrial processing techniques. • Justify the importance of food processing to society in terms of health, safety, quality and sustainability • Engage with the debate on how beneficial specific processing techniques are to human health • Reflect on the challenges of feeding and growing populations safely and sustainably • Identify all the methods of food processing
SFPD	2623	Food Processing II (Dairy)	Introduce the basics of dairy food processing and the microbiology of dairy. It demonstrates the processes and technologies relevant to the processing of milk and the manufacturing of dairy products. The module also includes references to food safety, hygiene and dairy regulations.	MAIN	After successful completion of this module, students will be able to: • Have a basic knowledge of the processes and technologies involved in milk and milk • Products processing. • Have a basic knowledge of the quality criteria of milk and milk products • Have a basic knowledge of dairy regulations.

Module Code		Course Title	Course Description	Campus	Acad Org Description
SFAP	2623	Food and Agricultural Policy	Food and agricultural policy plays a crucial role in guidance towards the sustainability of food systems. This module sets out to equip the student to first understand the process of policy formation and regulation and then develop the working knowledge necessary to assess current relevant food and agricultural policies critically. Both local and international policies that affect the sustainability of our food system will be scrutinised and discussed.	MAIN	After successful completion of this module, students will be able to: • Discuss the role of food policies within the food system • Define the elements of effective food policies • Have a working knowledge of essential food policies involved in the food system • Critically assess the effectiveness of current food policies • Discuss the different food policies involved in the South African food system, their importance and efficiency. • Make a comparison between the essential food policies in South Africa and other developing countries
SFCF	2623	Communication and Facilitation for Sustainable Development	Competent communication and facilitation play a pivotal role in progressive, effective development. Sustainable development is more than just a one-dimensional process. It is a system involving a complex process that involves multiple challenges at different levels. Amidst such complexities, conflicts are inevitable. Meaningful interaction across levels is needed and does not happen by itself, it has to be initiated and managed. The role of facilitation and communication is increasingly recognised as crucial in ensuring that the voices of the marginalised groups are integrated into the decision-making process and managing conflicts, creating mutual understanding on issues of common interest, engaging the different stakeholders in sharing of knowledge and perspectives, and enabling them to find ways of dealing with the challenges in an amicable manner. This course focuses on equipping students with practical communication tools in different forms. These tools will then be applied in teaching them the skill of effective facilitation for their future profession.	MAIN	After successful completion of this module, students will be able to: • Understand why efficient communication and facilitation are necessary for sustainable development. • Be able to apply basic communication techniques (verbal, written and visual) to be used in the facilitation process. • Be able to apply basic facilitation techniques such as questioning and probing, listening, and providing feedback. • Understand and recognise group dynamics, process observation and multi-stakeholder learning and negotiation professes. • Interact with individuals and groups and instil a culture of feedback and sharing. • Be able to make a preliminary assessment of a situation, critically select an appropriate system thinking perspective and related inquiry methodology and make a plausible process design.
SFRF	3713	Regenerative Food Systems	The keyword in “Regenerative Food System” is the system. Systems thinking requires one to see the whole picture and all the moving parts that need a plan to thrive and be regenerative. This module aims to empower students with the knowledge to move away from what has become a “linear food system”: a take, make, dispose of the system in which, too often, synthetic inputs go into the land; the land gets overused, and a vast proportion of the food produced is wasted and ends up in the landfill. Also, many nutrients never return to the field, stacking up in contaminated sludge. The goal should be to move toward a regenerative model in which land is restored as it is used and in which nutrient and material loops provide much-needed inputs, resulting in a healthier food supply. This means creating a genuinely regenerative food system. Collaboration and active participation across the entire system are needed. This will take a village, but it’s the power of the collective village that will keep the system intact once it’s been successfully implemented. Increasingly, the Earth is under the constraint of resources and environmental uncertainty, which requires a dramatic change in our production and consumption habits. This course will equip you with the specialised knowledge and skills that are needed to respond to some of today’s biggest challenges. You will explore critical issues such as the human exploitation of the Earth’s resources, the ethical and cultural implications of policy development, the ecological basis for sustainable agricultural development, and critical capacity-building approaches. A genuinely regenerative food system will close loops of energy, nutrients, meaning, and culture.	MAIN	After successful completion of this module, students will be able to: • Demonstrate an understanding of regenerative food production and systems. • Explore regenerative food production principles and practices. • Determine how some industrial food production practices can disturb or destroy critical biological systems, particularly biodiversity and the nitrogen and carbon cycles. • Examine strategies and methods to restore a healthy ecosystem and contribute to solutions that may combat, e.g., climate change and pollution. • Reducing food waste.

Module Code		Course Title	Course Description	Campus	Acad Org Description
SFPD	3713	Food Product Development, Sensory Analysis and Gastronomy	Sensory analysis of food products includes sensory testing for product development and sensory assessment of food quality and taste. Sensory analysis is essential for food product development and marketing, providing insights into consumer preferences and quality assurance. This course aims to make the student familiar with the: • Process of product development in the food industry • Process of product development in the food industry • The role of the food scientist in the process and the interdisciplinary nature of food product development way in which the principles of subjects studied until now can be applied in the development of a food product. • Manner in which a large food company would approach the food product development process. • Factors that should be taken into consideration during the development of a new product • Generation of new ideas and testing of the concepts. The sensory evaluation process and everything it involves (also including elementary data analysis).	MAIN	After successful completion of this module, students will be able to: • Understand the role of the food scientist in the product development process. • Appreciate what a new food product entails and what criteria should be considered when developing a new food product. • Understand concepts such as the market, the consumer and the food processor about the new product. • Appreciate the basic steps of new product development. • Understand how to gather information to create new ideas. • Formulate and screen new idea concepts. • Refine new product concepts. • Understand the significance of a concept board and a positioning- and product blueprint. • Develop and test a new food product. • Appreciate and understand the regulations about additives and labelling.
SFPM	3713	Food Processing III	This module includes the theory and practice of meat processing. It demonstrates the processes and technologies relevant to the processing of meat the development of meat products, and the preservation of meat. The module also includes references to food safety, hygiene and relevant food regulations.	MAIN	After successful completion of this module, students will: • Have knowledge of the conversion of muscle to meat • Have knowledge of the factors (composition) of meat, the colour of meat, and tenderness of meat and other factors) that determine the quality of fresh and processed meat products. • Have knowledge of the functional properties of meat. • Have knowledge of the use of additives and ingredients in meat products in terms of function and permitted inclusion levels. • Have knowledge of the cuts of beef, lamb, and pig carcasses. • Have knowledge of the formulation of a meat product. • Have knowledge of the steps involved in manufacturing whole muscle, ground and emulsified meat products such as bacon, ham, fresh sausages, hamburger patties, polony, Vienna sausages, salami and other dried products. • Fish and poultry processing will also be addressed. • Cold storage and packaging of meat will also be addressed.
SFCB	3713	Consumer Behaviour and Food Consumption Trends	A full-scale transformation of the food system is required to enable healthy, enjoyable diets for all while contributing to socio-economic development and minimising (and eventually eliminating) environmental impacts and waste. The course defines consumer behaviour and demonstrates the impact of consumer trends on food production and the food system. It also covers theories of behaviour change and the modification of consumers' food choices. Students observe how consumer behaviour, specifically regarding food choices and consumption, affects the supply and demand of food and, ultimately the sustainability of food production. In this module, students discover peoples' relationships with food and how it is selected and consumed. They learn how to understand the theories of consumption from various social, economic and psychological perspectives. They will understand the impact of shifting trends in food consumption (consumption styles) and, consequently, production on the consumer. The module also includes examining indigenous and global food systems, food production and consumption.	MAIN	After successful completion of this module, students will be able to: • Define and understand the concept of consumer behaviour and food consumption. • Explain and understand consumer trends and the theories of food consumption from various disciplines. • Compare indigenous and global food systems, food production and consumption. • Evaluate the impact consumer behaviour has on the supply and demand of food.
SFMC	3713	Management of Change and Adaptation	This module will familiarise students with change and risk management and adaptation planning in EAS. You will be introduced to the concepts of risk and uncertainty to better understand the impact of factors such as market and climate variability in the agricultural sector. You will also be provided with skills, tools and knowledge to address these factors through risk management and change management or adaptation strategies. This module addresses the complexities of food systems, specifically within the context of change and risk management, and illustrates how a food system may react to change and innovation. It provides students with strategies and tools to manage change and adopt innovation and as such, maintain or improve the productive state of the food system.	MAIN	After successful completion of this module, students will be able to: • Explain the concepts of risk, uncertainty, resilience and adaptation. • Discuss ways to manage change through innovation. • Map, analyse, and evaluate elements of change and risk, and discuss adaptation applicable to food systems in the context of social, environmental and economic impacts. • Debate the obstacles and opportunities arising from risk and adaptation planning. • Evaluate example scenarios of change in the food system and provide possible adaptation strategies.

Module Code		Course Title	Course Description	Campus	Acad Org Description
SFES	3723	Environmental Sustainability of Food Systems	This course will strengthen the student's foundation on the water cycle, soil development, and energy and how it impacts the food system and link these separate areas in a systems-based approach toward sustainability. Major topics covered include water use, pollution, and reclamation; soil development, erosion, pollution, salinisation and remediation; food security, food safety, local food production and consumption, food packaging, global food production and consumption, GMOs; food waste and composting; energy needs, climate change and mitigation and feedbacks on the food system.	MAIN	After successful completion of this module, students will be able to: • Provide an understanding of the environmental sustainability of food systems. • Explore principles and practices of environmental sustainability concerning food systems. • Determine how economic development, social development, and environmental protection influence the sustainability of food systems. • Examine strategies and methods to develop environmental solutions to enhance food sustainability. • Identify problems and implement solutions to ensure the environmental sustainability of a food system.
SFIP	3726	Integrated Project Applied to Sustainable Food Systems: New Product Development/ New Venture Creation	The module aims to teach the students about the need for quality assurance, standardisation, transparency, and traceability in the food supply chain and food safety. The course emphasises food quality control as the mechanism for preventing food-borne illness and spoilage at the food manufacturing, storage and retail levels. Food safety is a leading priority for food manufacturing in response to rising consumer concerns, evolving safety standards, and increasing regulatory requirements. Industries. Students will experience how technological advances have profoundly influenced the food industry, imprinting on food safety and quality. Food safety and quality assurance demand immense expertise and an enormous commitment from the food industry (Sudheer *et al*., 2021).	MAIN	After successful completion of this module, students will be able to: • Identify the importance of hazards and standard regulations and procedures in food processing practices. • Understand the difference between a food quality management system (FQMS) and a food safety management system (FSMS) • Implement quality management systems and food safety management systems into the food process industry • Synthesise and apply the relevant food safety and food standard legislation at both national, regional and international levels • Understand the traceability system and tools currently used in the food industries • Plan and conduct the audits in food processing industries • Research a topic, synthesise current information and develop a food safety and quality management presentation.
SFQA	3723	Quality Assurance and the Food Value Chain	The module aims to teach the students about the need for quality assurance, standardisation, transparency, and traceability in the food supply chain and food safety. The course emphasises food quality control as the mechanism for preventing food-borne illness and spoilage at the food manufacturing, storage and retail levels. Food safety is a leading priority for food manufacturing in response to rising consumer concerns, evolving safety standards, and increasing regulatory requirements. Industries. Students will experience how technological advances have profoundly influenced the food industry, imprinting on food safety and quality. Food safety and quality assurance demand immense expertise and an enormous commitment from the food industry (Sudheer *et al*., 2021).	MAIN	After successful completion of this module, students will be able to: • Identify the importance of hazards and standard regulations and procedures in food processing practices. • Understand the difference between a food quality management system (FQMS) and a food safety management system (FSMS) • Implement quality and safety management systems into the food process industry. • Synthesise and apply the relevant food safety and food standard legislation at both national, regional and international levels • Understand the traceability system and tools currently used in the food industries. • Plan and conduct the audits of food processing industries. • Research a topic, synthesise current information and develop a food safety and quality management presentation.
SFMV	3723	Managing the food value chain: Logistics and Distribution of Food	Value chain management focuses on understanding what different customers value, measuring inputs and outputs to assess value, and generating higher value for customers and surpluses for organisations. This module demonstrates how the agricultural food value chain can adapt to change, address challenges by improving competitiveness by producing and supplying quality food products, and aim to achieve sustainability. Students will gain a deeper understanding of food value chains. Professional competence areas include food supply chain management, logistics, purchase management, distribution management, sustainability and logistics in practice.	MAIN	After successful completion of this module, students will be able to: • Unpack the food value chain and identify the critical elements in the food supply chain. • Debate the impact of food transport and warehousing in the food value chain, specifically about the quality of food products and food safety. • Apply the principles and processes of supply chain management and logistics of food distribution at managerial level. • Draw upon theory and examples to do integrated resource planning with the aim of developing a logistics and transport plan in a food system. • Identify and analyse an existing food distribution process to improve the food value chain, specifically in terms of logistics, food distribution and warehousing.
Postgraduate					
ANIF	4824	Meat Science	Principles involved in manufacturing whole-muscle, minced and emulsified meat products. Restructured, canned, fermented, dried and intermediary moisture meat products. Curing, smoking and cooking of meat products. Additives in meat products. Non-meat ingredients in meat products. Formulation of a meat product. In the practical work case studies will be performed regarding the slaughter line at poultry and red meat abattoirs. Practicals on meat product formulation and manufacturing of different types of products will be done.	MAIN	Student should be able to ; - Explain the functional properties of meat proteins; - Explain the processing technology of meat and meat products; - Formulate chemical analysis of processed meat products; - Evaluate knowledge of food processes regarding the processing of meat - Take responsibility of decision making when processing meat.

Module Code		Course Title	Course Description	Campus	Acad Org Description
ANIF	4864	Dairy Science	The course consists of 5 modules on advanced aspects in dairy science. This includes residues in milk and milk products such as residues and contaminants, antimicrobials, paraciticides, pesticides and mycotoxins. Bactieriophages in the cheese industry. Accelerated cheese ripening with enzyme technology. HACCP in the dairy industry. Finaly an assignment is required on the latest developments in Dairy Science.	MAIN	Student will be able to: -examine the nutrient composition of milk. -manage the processing technology of milk. -examine and discuss the chemical behaviour and changes of milk components during processing. -discuss and apply food processes regarding the processing of dairy material. -manage the decision making when processing dairy material.
FSCG	6826	Product Development and Sensory Analysis	Process of product development in the food industry; the role of the food scientist in the process and the interdisciplinary nature of food product development; manner in which a large food company would approach the food product development process; generation of new ideas and testing of the concepts; the sensory evaluation process and everything it involves.	MAIN	Student will be able to: process of product development in the food industry. the role of the food scientist in the process and the interdisciplinary nature of food product development. way in which the principles of subjects studied until now can be applied in the development of a food product. manner in which a large food company would approach the food product development process. factors that should be taken into consideration during the development of a new product. generation of new ideas and testing of the concepts. The sensory evaluation process and everything it involves (also including elementary data analysis).
FSCI	8900	Food Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Food Science, including: Research project in specialized field of Food Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FSCI	9100	Food Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Food Science, General including Research project in specialized field of Food Science, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FSCL	6806	Food Science Literature Study	The student prepares a comprehensive scientific literature review on a specific topic which is presented in the form of a seminar and oral presenation. After completion of this module the student will be capable of unlocking literature, organizing information, concluding this information according to a structured format, as well as written and oral communication.	MAIN	Student will be able to: - Integrate and select specialized knowledge of food science to identify, analyse and address problems; - Outline literature, organize information, conclude this information according to a structured format, as well as written and oral communication; and -Take responsibility and accountability of decisions made in the selection of existing knowledge in the choice of problem solving attempts.
FSCP	6814	Food products from plants	The student studies the functional, biochemical and quality aspects of the components of wheat and their importance in baked goods. Functional biochemical and quality aspects of soy and their importance in soy products. Concerning vegetables and fruit: quality before and after processing, shelf life, microbiology with relationship to different processing techniques, biological and chemical changes during modified atmosphere storage of minimally processed vegetables and fruit. Appropriate practical work.	MAIN	Student should be able to; - Explain the nutrient composition of plant material; - Explain the processing technology of plant material; - Discuss the chemical behaviour and changes of plant material components during processing; - Discuss the knowledge of food processes regarding the processing of plant material; and - Take responsibility of decision making when processing plant material.

Module Code		Course Title	Course Description	Campus	Acad Org Description
FSCR	6808	Research Project Food Science	Students will carry out, undersupervision of a study leader, a research project on aspects of Food Science. It is expected of the student to prepare the results in the format of a scientific article and deliver an oral presentation as would be expected at a scientific congress.	MAIN	Student will be able to: • Demostrate the ability to integrate specialised skills in food science to identify, analyse and address problems and draw on knowldge and methods to attempt solving the problems; • Develop and apply skills in problem identification,hypothesis formulatin, planning, carrying out experimental work in Food Science, as well as interpretation and communication of results in both written and oral presentation. The independence and scientific insight developed in theis module will provide the student with the necessary background for further postgraduate studies; and • Take responsibility and accountability of decisions made and results obtained in the choice of problem solving attempts.
SADR	9100	Sustainable Agriculture Thesis	Sustainable Agriculture This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Sustainable Agriculture as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
SAEC	5806	Economics for sustainable agriculture	Agronomics is the application of the social science of economics to the field of agriculture. This is the branch of economics dealing with the distribution, management, and productivity of land. It is therefore the use of economic methods to optimize decision making by agricultural producers or consultants concerned with the application of economic theory in optimizing the production and distribution of agricultural products. This includes topics like supply and demand, the value chain, micro- and macro-economics and entrepreneurship and strategic planning and management.	MAIN	Student will be able to: -Identify and analyze agricultural environment and resources, enabling them to realize threats of degradation and develop a system to manage the environment and resources in a sustainable way; -Use decision-making tools such as records, budgeting, break even analysis, and capital investment useful to the manager in planning and controlling the agribusiness unit; -Discuss and apply micro-economic theory, including producer- and consumer theory, demand and supply, how markets work and prices are formulated, market failure and other micro-economic principles; -Examine and distinguish macro-economic theory and its linkages to agriculture, including GDP, national income, how interest rates are formed, government spending and its impact on the economy, employment and unemployment, monetary and fiscal policies; and -Analyze factors which affect the decision-making process. These include calculations for depreciation, costs, marginality, revenue, gross margin, profit; understand and use the production and cost function; do cost calculations and use other mathematical equations to make calculated decisions.
SAEC	7906	Economics for Sustainable Agriculture	Agribusiness refers to all the business aspects of agricultural and agricultural-related activities. It has evolved into a huge and very complex system extending far beyond the farm. This include all role-players, throughout the whole value chain, involved in bringing food and fiber to the consumer. Since agribusiness systems has undergone rapid transformation, the traditional farming systems have grown much more specialized forcing and resulting in agribusiness owners and managers to be much more entrepreneurial. Due to the fact that agribusiness innovation is a fundamentally multi-disciplinary endeavor different aspects thereof would be studied in this module. These include strategy creation and development, the economic and financial aspects regarding agribusiness ventures and value chain management.	MAIN	Student will be able to: -analyse an agribusiness unit`s environment using basic tools; design a managerial process forming strategic vision, setting objectives, crafting and implementing a strategic plan enabling the agribusiness unit to create and sustain competitive advantage; -use and construction of integrated financial statements for sound financial planning; as well as the application of financial information, concepts and ratios to agribusiness management and management of the business` overall risk position; -examine and discuss the value chain concept, be able to assess risks and identify strategic opportunities to strengthen value chains, recognize how cohesive value chains can be used to reduce risks and learn how to apply value chain financial products to meet the needs of various factors in the value chain; and -develop an advanced business plan for an agricultural business unit by applying all principles and processes of strategic management.
SAEX	5806	Extension for sustainability	Introduce students to the new role of extension in the context of agricultural innovation systems and sustainable agriculture. The concept of food security and its dimensions will be discussed as an imperative for achieving sustainable agriculture. Explore the concepts of resilience, vulnerability and adaptation in relation to the `rural poor' or smallholder farmers who are often the ultimate target for many sustainable agricultural interventions. The ability of monitor and evaluate programmes towards sustainability is crucial for measuring progress. The module will then introduce the concept of Monitoring and Evaluation (M & E) and the different tools and methods that are deemed practical for fieldwork application.	MAIN	Student will be able to: -Examine the multidimensional nature of the concept of food security and emerging global challenges and opportunities related to it; -Apply the concepts of resilience, vulnerability and adaptation in relation to the rural poor and smallholder farmers; -Apply different tools for assessing household vulnerabilities and promotion of various adaptation strategies; -Construct a management and assessment tool and methods that are deemed practical for fieldwork application; -Contextualize and apply the new role of extension in the context of the sustainable agriculture; and -Promote the core competencies to support sustainable agriculture.
SAEX	7906	Sustainable Agriculture and Extension: Theory and Practice	Provide practical guidance in the monitoring and evaluation (M&E) of the environmental and social sustainability of Agricultural and Rural Development (ARD) programs and project.	MAIN	Students will be able to: -Use the systems theories to make interventions at an appropriate level within a system, based on an understanding of hierarchical relations within the system; and -Address the intended and unintended consequences of interventions.

Module Code		Course Title	Course Description	Campus	Acad Org Description
SAIT	5814	Introduction to Sustainable Agriculture	This module will explore the concept of sustainable agriculture with emphasis on the triple wins development path based on the inter-connections between economic, environmental and social dimensions. The module will also unpack the policy landscape (mix of actions and instruments) and how they either provide incentives for coherence and synergies, or are hindering factor towards bring agriculture closure to meeting the conditions for sustainability. Different approaches that are deemed to promote sustainable agriculture will also be identified and analyzed.	MAIN	Student will be able to: -Define the concepts of sustainable development and sustainable agriculture and complexities of the economic-environment-social nexus underpinning sustainability; -Unpack the dynamics of Economic, environment and social sustainability --Critically review the agricultural policy landscape and the extent to which they either provide enabling environment or hindering the successful implementation of sustainable agricultural efforts; -Use multiple source of knowledge to identify and analyze the different approaches that are deemed to be promoting sustainable agriculture in terms of effectiveness and efficiency; and -Create a score card to evaluate the sustainability of an agricultural production system.
SALS	5806	Livestock production for Sustainable Agriculture	Sustainable animal production incorporates a holistic approach which includes all key aspects of animal production. These include animal health, utilization of natural resources as animal feed, basic animal production systems. The focus will be on the whole to demonstrate how the various aspects of animal production inter relate to each other to contribute to sustainable production systems. Animal groups under discussion will include ruminants (small stock and large stock), monogastric animals and game in general. Animal nutrition, breeding and marketing for each grouping will be explained	MAIN	Student will be able to: -Distinguish between different animal diseases and be able to develop basic animal health programs; -Use appropriate techniques to assess Grassland condition and will be able to calculate animal numbers for specific areas. Furthermore they will be able to develop a simple Grassland management system; -Examine and apply the general principles of ruminant production systems and its implementation towards sustainable animal production; and -Examine and apply the general principles of mono-gastric production systems and its implementation towards sustainable animal production.
SALS	7906	Advanced livestock production for sustainable agriculture	Advanced animal production focus on strategic aspects for improved sustainable animal production. Aspects like recognition and treatment of animal diseases, intensive fodder production and fodder flow, advanced animal breeding and nutrition will be mastered. Emphasis will be on small advanced adaptations, to results into large improved outcomes. Animal groups under investigation include ruminants (small stock- sheep & goats and large stock- cattle), monogastric animals (poultry & pigs) and game in general.	MAIN	Student will be able to: -Recognize and treat the most common bacterial, viral and protozoal diseases in livestock and game; -Develop, plan and apply appropriate intensive fodder management systems towards improved fodder flow; -Apply advanced nutritional, breeding and managerial principles for efficient sustainable ruminant production; and -Apply advanced nutritional, breeding and managerial principles for efficient sustainable monogastric production.
SANR	5806	Assessment and management of natural resources	Utilizing the natural resources in a sustainable manner needs a holistic approach, which includes soil quality, utilization of climate data, as well as crop management. The focus will be on the basic principles that are of importance in the sustainable utilization of natural agricultural resources (soil, plant, atmosphere), and how to promote integrated assessment of these natural resources on a viable basis to contribute to a sustainable system.	MAIN	Student will be able to: -Apply principles of soil quality and the ways in which agricultural practices affect soil quality, as well as the maintenance for sustainable agriculture; -Evaluate the sensitivity of soil for degradation; -Discuss and apply the optimal utilization of climate data for agricultural production; and -Basic evaluation on crop production in order to give guidance for management in a sustainable manner.
SANR	7906	Assessment and Management of natural resources	Sustainable management of natural resources such as soil, atmosphere and plants, needs a holistic understanding of the interaction between environmental factors and human activity. One of the requirements of sustainable agriculture is that the quality of the natural agricultural resources must be maintained and if possible even improved. Emphasis will therefore be on soil quality, utilization of climate data, as well as crop management, in order to promote integrated assessment of natural resources on a viable basis to contribute to a sustainable system.	MAIN	Student will be able to: -Examine soil quality and the ways in which agricultural practices affect soil quality, as well as the maintenance for sustainable agriculture; -Evaluate the sensitivity of soil for degradation, and be able to make well-planned proposals on maintaining soil quality in various agricultural production systems to promote sustainability; -Apply advanced knowledge of the optimal utilization of climate data for agricultural production, and to place the atmosphere in perspective as a natural resource within the framework of sustainability; and -Evaluate and manage crop production in interaction with different climate and soil, in a sustainable manner.
SARP	5826	Research methods for sustainable agriculture	This module introduces students to the basics of scientific research. It aims to establish and understanding of research through critical exploration of research language, ethics, and approaches. The module covers the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Participants will use these theoretical underpinnings to begin to critically review literature relevant to the field of sustainable agriculture and determine how research findings are useful in informing their understanding of the field of study.	MAIN	Student will be able to: -Apply research terminology; -Apply the ethical principles of research, ethical challenges and approval processes; -Conduct a brief literature study and critically analyze published research; -Describe quantitative, qualitative and mixed methods approaches to research; and -Collect and analyze data to inform a short report.
SARP	7900	Mini-dissertation Sustainable Agriculture	The student identifies a topic for completion of their research questionnaire in qualitative of quantitative format - Research report : mini-dissertation formation	MAIN	Student will be able to: -Select a research topic; -Write a literature review; -Do research on the selected topic; and -Write a mini-dissertation.

CHEMISTRY (103)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
CHEM	1512	Introduction to general Chemistry	Discuss and clarifying ambiguous chemistry concepts in the school syllabus as well as critical (generic) outcomes aimed at the development of literacy skills (oral and written reasoning), numeracy and problem solving skills.	MAIN	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamental principles of general chemistry regarding: Mathematical skills (Significant numbers, mathematical calculations, handling of logarithms to the base 10 and natural logarithms, the drawing of graphs on scale on graph paper), Classification of matter, The Periodic table, Chemical formulas and nomenclature, Basic structure of the atom, fundamental principles, ions and formation of molecules, relative atomic mass, molar mass, The mole concept, molar concentration, parts per million and percentage concentration, Introduction to acids and bases, relevant acid-base theories and pH-calculation, Introduction to gases ‘ laws of Boyle, Charles and the combined gas laws as well as the Kelvin temperature, and will have obtained and developed basic analytical skills and techniques (quantitatively and to a lesser degree qualitatively) of physical/chemical applications and will be able to write a short scientific report. The student will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1513	Inorganic and Analytical Chemistry (Mainstream)	Fundamental principles; Atomic structure, classification of matter (valency, oxidation numbers, rules of nomenclature, orbital filling; Volumetric analysis, balancing or redox reactions, stoichiometric relations; Chemical bonding; Chemical equilibrium; Acids and bases	MAIN	Student will be able to: -Discuss and apply the fundamental experimental principles regarding Analytical, Physical and Organic Chemistry; -Display basic experimental skills and techniques with regards to analytical skills, (both quantitative and qualitative) of physical/chemical applications; and -Write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1551	Inorganic and Analytical Chemistry (Practical)	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Analytical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry; and -Conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	1623	Physical and Organic Chemistry (Mainstream)	Phases and Solutions: Gas laws,Colligative properties; Thermodynamics; Electrochemistry; Reaction kinetics; Quantum chemistry; Introduction to Organic Chemistry. Hybridization of the carbon atom; properties, synthesis and reactions of hydrocarbons, alkylhalides, alcohols, ketones, aldehydes, carboxylic acids and derivatives or carboxylic acids; introduction to stereochemistry and reaction mechanisms.	MAIN	After successful completion of this module the student will be able to demonstrate knowledge, and understanding or the fundamental principles underpinning physical and organic chemistry with respect to: Phases and Solutions: Description or the phases or matter and the influence or solutes on the phase characteristics or the gas phase (atmospheric pressure, pressure or a column {barometer, manometer} Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: Elementary calculations on heat transfer, the first law or thermodynamics and thermochemical processes. Introductory Electrochemistry (voltaic cell, cell potential, cell notation, spontaneity). Introductory Reaction kinetics: Reaction orders and calculation or reaction rates, reaction times and half-lives. (Emphasis on first order kinetics) Introduction or Organic Chemistry. Hybridization or the carbon atom, properties, synthesis and reactions or hydrocarbons, alkyl halides, alcohols, ketones, aldehydes, carboxylic acids, derivatives or carboxylic acids; introduction to stereoisomerism and simple reaction mechanisms. Everyday applications, including the influence of chemical structure on physical properties and biological activity will be emphasized,

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEM	1643	Physical and Organic Chemistry	Phases and Solutions: Gas laws,Colligative properties; Thermodynamics; Electrochemistry; Reaction kinetics; Quantum chemistry; Introduction to Organic Chemistry. Hybridization of the carbon atom; properties, synthesis and reactions of hydrocarbons, alkylhalides, alcohols, ketones, aldehydes, carboxylic acids and derivatives or carboxylic acids; introduction to stereochemistry and reaction mechanisms. Everyday applications, including the influence of chemical structure on physical properties and biological activity will be emphasized.	MAIN	Student will be able to: -Discuss and apply the fundamental principles underpinning physical and organic chemistry with respect to: Phases and Solutions: Description or the phases or matter and the influence or solutes on the phase characteristics or the gas phase (atmospheric pressure, pressure or a column {barometer, manometer} Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: Elementary calculations on heat transfer, the first law or thermodynamics, thermochemical processes and introduction to reaction entropy and free energy. Electrochemistry (voltaic cell, cell potential, cell notation, spontaneity). Reaction kinetics: Reaction orders and calculation or reaction rates, reaction times and half-lives. Quantum chemistry: Introductory concepts with respect to theoretical, structural and spectroscopic aspects. Hybridization of the carbon atom; properties, synthesis and reactions of hydrocarbons, alkylhalides, alcohols, ketones, aldehydes, carboxylic acids and derivatives or carboxylic acids; introduction to stereochemistry and reaction mechanisms,
CHEM	1661	Physical and Organic Chemistry (Practical)	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Physical and Organic Chemistryl Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports	MAIN	Student will be able to: -explain, discuss and analyse fundamental experimental principles with respect to Physical and Organic Practicals; -conduct experiments and use skills and techniques to make observations; -collect data, draw conclusions and write reports.
CHEM	2601	Physical Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Physical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry; and -Conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2613	Physical Chemistry Theory	Dynamics: Properties of gases and the kinetic molecular theory. Thermodynamics: Advanced application of the first, second and third laws of thermodynamics to chemical systems as well as thermochemical calculations. Phase studies: Properties of liquids and solutions. Phase equilibria: Quantify real gas-, liquid- and solid mixtures. Electrolytic solutions: To quantify electrolytic conductivity and transport. Quantum chemistry: Atomic structure through the Schrodinger equation as well as own functions, own values and amplitudes of selected examples. Quantum mechanics: Application of concepts in practice,	MAIN	Student will be able to: Discuss and apply the fundamental principles underpinning physical chemistry with respect to: Dynamics: Properties of gases and the kinetic molecular theory. Thermodynamics: Advanced application of the first, second and third laws of thermodynamics to chemical systems as well as thermochemical calculations. Phase studies: Properties of liquids and solutions. Phase equilibria: Quantify real gas-, liquid- and solid mixtures. Electrolytic solutions: To quantify electrolytic conductivity and transport. Quantum chemistry: Atomic structure through the Schrodinger equation as well as own functions, own values and amplitudes of selected examples. Quantum mechanics: Application of concepts in practice,
CHEM	2621	Organic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Organic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Organic Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2623	Organic Chemistry Theroy	After successful completion of this module the student will be able to demonstrate knowledge and understanding of the fundamental principles underpinning organic chemistry with respect to: Extension of the chemistry of carbonyl compounds, carboxylic acids and carboxylic acid derivatives. The chemistry of aromatic compounds: structure of benzene, aromaticity, electrophilic substitution, the influence of substituents on electrophilic substitution, aromatic halides and hydrocarbons, carbonyl and nitro compounds, phenols and hydroxycarbonyl compounds. Stereochemistry and conformation: synthesis and reactions of stereo-isomers. As well as the acquisition and development of skills and techniques with respect to analysis of organic/chemical applications such as natural product analysis and syntheses of organic compounds.	MAIN	Student will be able to: Examine and discuss the fundamental principles underpinning organic chemistry with respect to: - Extension of the chemistry of carbonyl compounds, carboxylic acids and carboxylic acid derivatives. - The chemistry of aromatic compounds: structure of benzene, aromaticity, electrophilic substitution, the influence of substituents on electrophilic substitution, aromatic halides and hydrocarbons, carbonyl and nitro compounds, phenols and hydroxycarbonyl compounds. - Stereochemistry and conformation: synthesis and reactions of stereo-isomers.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEA	2601	Analytical Chemistry practical	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning analytical chemistry with respect to: Basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.	MAIN	Student will be able to: -Apply basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.
CHEM	2633	Analytical Chemistry	Basic principles of analytical chemistry, laboratory safety and error evaluation, concentration and dilution principles, titrimetry and gravimetry, pH calculations and nuclear magnetic resonance spectroscopy analysis.	MAIN	Student will be able to: -Apply basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.
CHEM	2641	Inorganic Chemistry Practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Inorganic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Inorganic Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2643	Inorganic Chemistry Theory	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning inorganic chemistry with respect to: Properties of covalent bonding (localized and delocalized) employing the Molecular Orbital theory, calculations on electronegativity, effective nuclear charge and magnetism, molecular geometry, chemical properties of the 3d transition metal ions, chemistry of ‘-acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds.	MAIN	Student will be able to: Discuss and apply the fundamental principles underpinning inorganic chemistry with respect to: Properties of covalent bonding (localized and delocalized) employing the Molecular Orbital theory, calculations on electronegativity, effective nuclear charge and magnetism, molecular geometry, chemical properties of the 3d transition metal ions, chemistry of -acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds, as well as the acquisition and development of skills and techniques.
CHEM	3701	Analytical Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Analytical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	3713	Analytical Chemistry Theory	Modern analytical techniques such as nuclear magnetic resonance, spectrometry, electroanalytical methods and classical analytical techniques such as potentiometry, voltammetry and amperometry. Gas chromatography, complexometry and UV/visible spectrometry.	MAIN	Student will be able to: Outline and apply the fundamental principles underpinning analytical chemistry with respect to: -Modern analytical techniques such as nuclear magnetic resonance, spectrometry, electroanalytical methods and classical analytical techniques such as potentiometry, voltammetry and amperometry; and -Gas chromatography, complexometry and UV/visible spectrometry
CHEM	3721	Inorganic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic Chemistry practicals conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	3723	Inorganic Chemistry Theory	Bonding theories and the chemistry of organometallic complexes, solution behaviour of metal complexes, introductory theory of X-ray crystallography (powder and single-crystal X-ray crystallography) in structure analysis in the solid state, Solid state analyse of ionic compounds in centric cubic space groups. Advanced knowledge on coordination chemistry, specifically aimed at the crystal field and molecular orbital theories (as reflected in simple electronic spectra and magnetic properties), organometallic chemistry, substitution mechanisms in square-planar and octahedral complexes and general industrial and catalytic applications of organometallic catalysts.	MAIN	Student will be able to: Discuss and explain the fundamental principles underpinning inorganic chemistry with respect to: -Bonding theories and the chemistry of organometallic complexes, solution behaviour of metal complexes, introductory theory of X-ray crystallography (powder and single-crystal X-ray crystallography) in structure analysis in the solid state, -Solid state analyse of ionic compounds in centric cubic space groups. -Advanced knowledge on coordination chemistry, specifically aimed at the crystal field and molecular orbital theories (as reflected in simple electronic spectra and magnetic properties), organometallic chemistry, substitution mechanisms in square-planar and octahedral complexes and general industrial and catalytic applications of organometallic catalysts.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEB	3701	Physical Chemistry Practical	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning physical chemistry as well as the acquisition and development of skills and techniques with respect to analysis of physical/chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.	MAIN	Student will be able to: Outline and apply the fundamental principles underpinning physical chemistry as well as the acquisition and development of skills and techniques with respect to analysis of physical/chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	3733	Physical Chemistry Theory	Dynamics: chemical kinetics and surface chemistry. Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multi¬component systems and electrochemistry. Macromolecular chemistry: the syntheses, characterization and molecular mass determination of polymers. Basic principles of nuclear and radiochemistry	MAIN	Student will be able to: Outline and apply the fundamental principles underpinning physical chemistry with respect to: - Dynamics: chemical kinetics and surface chemistry; - Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multi component systems and electrochemistry; - Macro-molecular chemistry: the syntheses, characterization and molecular mass determination of polymers; and - Basic principles of nuclear and radiochemistry,
CHEM	3741	Organic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Organic Chemistry practicals in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Organic Chemistry practicals, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	3743	Organic Chemistry	The principles and applications of physical techniques (e.g. NMR). Introduction to dynamic stereochemistry. Advanced reactions, mechanisms and their stereochemistry including reactions of carbohydrates, the Diels-Alder reaction, the addition of alkenes (e.g. oxymercuration, hydroboration, analyse addition), nucleophilic addition of aldehydes and ketones (e.g. Wittig reaction, Cannizzarro reaction), alpha substitution of carbonyl compounds (e.g. alpha-halogenation, alkylation of enolate ions) and carbonyl condensation reactions (e.g. Claisen condensations).	MAIN	Student will be able to: -Outline and apply fundamental principles underpinning inorganic chemistry respect to: -The principles and applications of physical methods (eg NMR). -Introduction to dynamic stereochemistry. Carbohydrates, the Diels-Alder, advanced reactions, mechanisms and stereochemistry of among others, the addition of alkenes (eg oxymercuration, hydroboration, carbene), nucleophilic addition of aldehydes and ketones (eg Wittig reaction, reaction), alpha-substitution of carbonyl compounds (eg alpha-halogenation, alkylation of ions) and carbonyl (eg aldolreaksie, Claisen condensation, Robinson cancellation);
CHEM	1513	Inorganic and Analytical Chemistry (Mainstream)	Fundamental principles; Atomic structure, classification of matter (valency, oxidation numbers, rules of nomenclature, orbital filling; Volumetric analysis, balancing or redox reactions, stoichiometric relations; Chemical bonding; Chemical equilibrium; Acids and bases	QWAQWA	Student will be able to: -Discuss and apply the fundamental experimental principles regarding Analytical, Physical and Organic Chemistry; -Display basic experimental skills and techniques with regards to analytical skills, (both quantitative and qualitative) of physical/chemical applications; and -Write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1501	Inorganic and Analytical Chemistry (Practical)	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Analytical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry; and -Conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEM	1623	Physical and Organic Chemistry (Mainstream)	Phases and Solutions: Gas laws,Colligative properties; Thermodynamics; Electrochemistry; Reaction kinetics; Quantum chemistry; Introduction to Organic Chemistry. Hybridization of the carbon atom; properties, synthesis and reactions of hydrocarbons, alkylhalides, alcohols, ketones, aldehydes, carboxylic acids and derivatives or carboxylic acids; introduction to stereochemistry and reaction mechanisms.	QWAQWA	After successful completion of this module the student will be able to demonstrate knowledge, and understanding or the fundamental principles underpinning physical and organic chemistry with respect to: Phases and Solutions: Description or the phases or matter and the influence or solutes on the phase characteristics or the gas phase (atmospheric pressure, pressure or a column {barometer, manometer} Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: Elementary calculations on heat transfer, the first law or thermodynamics and thermochemical processes. Introductory Electrochemistry (voltaic cell, cell potential, cell notation, spontaneity). Introductory Reaction kinetics: Reaction orders and calculation or reaction rates, reaction times and half-lives. (Emphasis on first order kinetics) Introduction or Organic Chemistry. Hybridization or the carbon atom, properties, synthesis and reactions or hydrocarbons, alkyl halides, alcohols, ketones, aldehydes, carboxylic acids, derivatives or carboxylic acids; introduction to stereoisomerism and simple reaction mechanisms. Everyday applications, including the influence of chemical structure on physical properties and biological activity will be emphasized,
CHEM	1643	Physical and Organic Chemistry	Phases and Solutions: Gas laws,Colligative properties; Thermodynamics; Electrochemistry; Reaction kinetics; Quantum chemistry; Introduction to Organic Chemistry. Hybridization of the carbon atom; properties, synthesis and reactions of hydrocarbons, alkylhalides, alcohols, ketones, aldehydes, carboxylic acids and derivatives or carboxylic acids; introduction to stereochemistry and reaction mechanisms. Everyday applications, including the influence of chemical structure on physical properties and biological activity will be emphasized.	QWAQWA	Student will be able to: -Discuss and apply the fundamental principles underpinning physical and organic chemistry with respect to: Phases and Solutions: Description or the phases or matter and the influence or solutes on the phase characteristics or the gas phase (atmospheric pressure, pressure or a column {barometer, manometer} Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: Elementary calculations on heat transfer, the first law or thermodynamics, thermochemical processes and introduction to reaction entropy and free energy. Electrochemistry (voltaic cell, cell potential, cell notation, spontaneity). Reaction kinetics: Reaction orders and calculation or reaction rates, reaction times and half-lives. Quantum chemistry: Introductory concepts with respect to theoretical, structural and spectroscopic aspects. Hybridization of the carbon atom; properties, synthesis and reactions of hydrocarbons, alkylhalides, alcohols, ketones, aldehydes, carboxylic acids and derivatives or carboxylic acids; introduction to stereochemistry and reaction mechanisms.
CHEM	1661	Physical and Organic Chemistry (Practical)	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Physical and Organic Chemistryl Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports	QWAQWA	Student will be able to: -explain, discuss and analyse fundamental experimental principles with respect to Physical and Organic Practicals; -conduct experiments and use skills and techniques to make observations; -collect data, draw conclusions and write reports.
CHEM	2601	Physical Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Physical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry; and -Conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2613	Physical Chemistry Theory	Dynamics: Properties of gases and the kinetic molecular theory. Thermodynamics: Advanced application of the first, second and third laws of thermodynamics to chemical systems as well as thermochemical calculations. Phase studies: Properties of liquids and solutions. Phase equilibria: Quantify real gas-, liquid- and solid mixtures. Electrolytic solutions: To quantify electrolytic conductivity and transport. Quantum chemistry: Atomic structure through the Schrodinger equation as well as own functions, own values and amplitudes of selected examples. Quantum mechanics: Application of concepts in practice,	QWAQWA	Student will be able to: Discuss and apply the fundamental principles underpinning physical chemistry with respect to: Dynamics: Properties of gases and the kinetic molecular theory. Thermodynamics: Advanced application of the first, second and third laws of thermodynamics to chemical systems as well as thermochemical calculations. Phase studies: Properties of liquids and solutions. Phase equilibria: Quantify real gas-, liquid- and solid mixtures. Electrolytic solutions: To quantify electrolytic conductivity and transport. Quantum chemistry: Atomic structure through the Schrodinger equation as well as own functions, own values and amplitudes of selected examples. Quantum mechanics: Application of concepts in practice,
CHEM	2621	Organic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Organic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Organic Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEM	2623	Organic Chemistry Theroy	After successful completion of this module the student will be able to demonstrate knowledge and understanding of the fundamental principles underpinning organic chemistry with respect to: Extension of the chemistry of carbonyl compounds, carboxylic acids and carboxylic acid derivatives. The chemistry of aromatic compounds: structure of benzene, aromaticity, electrophilic substitution, the influence of substituents on electrophilic substitution, aromatic halides and hydrocarbons, carbonyl and nitro compounds, phenols and hydroxycarbonyl compounds. Stereochemistry and conformation: synthesis and reactions of stereo-isomers. As well as the acquisition and development of skills and techniques with respect to analysis of organic/chemical applications such as natural product analysis and syntheses of organic compounds.	QWAQWA	Student will be able to: Examine and discuss the fundamental principles underpinning organic chemistry with respect to: - Extension of the chemistry of carbonyl compounds, carboxylic acids and carboxylic acid derivatives. - The chemistry of aromatic compounds: structure of benzene, aromaticity, electrophilic substitution, the influence of substituents on electrophilic substitution, aromatic halides and hydrocarbons, carbonyl and nitro compounds, phenols and hydroxycarbonyl compounds. - Stereochemistry and conformation: synthesis and reactions of stereo-isomers.
CHEA	2601	Analytical Chemistry practical	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning analytical chemistry with respect to: Basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.	QWAQWA	Student will be able to: -Apply basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.
CHEM	2633	Analytical Chemistry	Discuss critical (generic) outcomes with respect to literacy skills in oral and written reasoning, numeracy, experimental and problem solving skills.	QWAQWA	Student will be able to: -Apply basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.
CHEM	2641	Inorganic Chemistry Practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Inorganic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Inorganic Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2643	Inorganic Chemistry Theory	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning inorganic chemistry with respect to: Properties of covalent bonding (localized and delocalized) employing the Molecular Orbital theory, calculations on electronegativity, effective nuclear charge and magnetism, molecular geometry, chemical properties of the 3d transition metal ions, chemistry of ‘-acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds.	QWAQWA	Student will be able to: Discuss and apply the fundamental principles underpinning inorganic chemistry with respect to: Properties of covalent bonding (localized and delocalized) employing the Molecular Orbital theory, calculations on electronegativity, effective nuclear charge and magnetism, molecular geometry, chemical properties of the 3d transition metal ions, chemistry of -acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds, as well as the acquisition and development of skills and techniques.
CHEM	3701	Analytical Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Analytical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports. .
CHEM	3713	Analytical Chemistry Theory	Modern analytical techniques such as nuclear magnetic resonance, spectrometry, electroanalytical methods and classical analytical techniques such as potentiometry, voltammetry and amperometry. Gas chromatography, complexometry and UV/visible spectrometry.	QWAQWA	Student will be able to: Outline and apply the fundamental principles underpinning analytical chemistry with respect to: -Modern analytical techniques such as nuclear magnetic resonance, spectrometry, electroanalytical methods and classical analytical techniques such as potentiometry, voltammetry and amperometry; and -Gas chromatography, complexometry and UV/visible spectrometry
CHEM	3721	Inorganic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic Chemistry practicals conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEM	3723	Inorganic Chemistry Theory	Bonding theories and the chemistry of organometallic complexes, solution behaviour of metal complexes, introductory theory of X-ray crystallography (powder and single-crystal X-ray crystallography) in structure analysis in the solid state, Solid state analyse of ionic compounds in centric cubic space groups. Advanced knowledge on coordination chemistry, specifically aimed at the crystal field and molecular orbital theories (as reflected in simple electronic spectra and magnetic properties), organometallic chemistry, substitution mechanisms in square-planar and octahedral complexes and general industrial and catalytic applications of organometallic catalysts.	QWAQWA	Student will be able to: Discuss and explain the fundamental principles underpinning inorganic chemistry with respect to: -Bonding theories and the chemistry of organometallic complexes, solution behaviour of metal complexes, introductory theory of X-ray crystallography (powder and single-crystal X-ray crystallography) in structure analysis in the solid state, -Solid state analyse of ionic compounds in centric cubic space groups. -Advanced knowledge on coordination chemistry, specifically aimed at the crystal field and molecular orbital theories (as reflected in simple electronic spectra and magnetic properties), organometallic chemistry, substitution mechanisms in square-planar and octahedral complexes and general industrial and catalytic applications of organometallic catalysts.
CHEB	3701	Physical Chemistry Practical	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning physical chemistry as well as the acquisition and development of skills and techniques with respect to analysis of physical/chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.	QWAQWA	Student will be able to: Outline and apply the fundamental principles underpinning physical chemistry as well as the acquisition and development of skills and techniques with respect to analysis of physical/chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	3733	Physical Chemistry Theory	Dynamics: chemical kinetics and surface chemistry. Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multi¬component systems and electrochemistry. Macromolecular chemistry: the syntheses, characterization and molecular mass determination of polymers. Basic principles of nuclear and radiochemistry	QWAQWA	Student will be able to: Outline and apply the fundamental principles underpinning physical chemistry with respect to: - Dynamics: chemical kinetics and surface chemistry; - Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multi component systems and electrochemistry; - Macro-molecular chemistry: the syntheses, characterization and molecular mass determination of polymers; and - Basic principles of nuclear and radiochemistry,
CHEM	3741	Organic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Organic Chemistry practicals in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Organic Chemistry practicals, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	3743	Organic Chemistry	The principles and applications of physical techniques (e.g. NMR). Introduction to dynamic stereochemistry. Advanced reactions, mechanisms and their stereochemistry including reactions of carbohydrates, the Diels-Alder reaction, the addition of alkenes (e.g. oxymercuration, hydroboration, analyse addition), nucleophilic addition of aldehydes and ketones (e.g. Wittig reaction, Cannizzarro reaction), alpha substitution of carbonyl compounds (e.g. alpha-halogenation, alkylation of enolate ions) and carbonyl condensation reactions (e.g. Claisen condensations).	QWAQWA	Student will be able to: -Outline and apply fundamental principles underpinning inorganic chemistry respect to: -The principles and applications of physical methods (eg NMR). -Introduction to dynamic stereochemistry. Carbohydrates, the Diels-Alder, advanced reactions, mechanisms and stereochemistry of among others, the addition of alkenes (eg oxymercuration, hydroboration, carbene), nucleophilic addition of aldehydes and ketones (eg Wittig reaction, reaction), alpha-substitution of carbonyl compounds (eg alpha-halogenation, alkylation of ions) and carbonyl (eg aldolreaksie, Claisen condensation, Robinson cancellation)
CHEM	1532	Organic Chemistry	Experience critical (generic) outcomes with respect to literacy skills (oral and written reasoning) and problem solving skills.	SOUTH	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamental principles of organic chemistry regarding: Hybridization of the carbon atom; properties, preparation and reaction of hydrocarbons, alkyl halides, alcohols, ketones, aldehydes, carboxylic acids, derivatives of carboxylic acids; introduction to stereoisomerism and reaction mechanisms, and will have obtained and developed basic analytical skills and techniques (both quantitative and qualitative) of chemical applications, synthesis of organic compounds and the analysis/application of natural products. The student will be able to write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEM	1552	Introduction to chemistry-development module	Discuss and clarifying ambiguous chemistry concepts in the school syllabus as well as critical (generic) outcomes aimed at the development of literacy skills (oral and written reasoning), numeracy and problem solving skills.	SOUTH	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamental principles of general chemistry regarding: Mathematical skills (Significant numbers, mathematical calculations, handling of logarithms to the base 10 and natural logarithms, the drawing of graphs on scale on graph paper), Classification of matter, The Periodic table, Chemical formulas and nomenclature, Basic structure of the atom, fundamental principles, ions and formation of molecules, relative atomic mass, molar mass, The mole concept, molar concentration, parts per million and percentage concentration, Introduction to acids and bases, relevant acid-base theories and pH-calculation, Introduction to gases ‘ laws of Boyle, Charles and the combined gas laws as well as the Kelvin temperature, and will have obtained and developed basic analytical skills and techniques (quantitatively and to a lesser degree qualitatively) of physical/chemical applications and will be able to write a short scientific report. The student will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1622	Physical Chemistry	Experience critical (generic) outcomes with respect to literacy skills (oral and written reasoning) and problem solving skills.	SOUTH	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamentalprinciples of physical chemistry regarding: Phases and Solutions: Description of the phases of matter and the influence of solutes on the phase characteristics of the gas phase (atmospheric pressure, pressure of a column {barometer, manometer}; Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: elementary calculation on heat transfer, the First Law of thermodynamics, thermochemical processes and introduction to reaction entropy and free energy. Reaction kinetics: Reaction orders and calculation of reaction rates, reaction times and half-lives. Electrochemistry (Voltaïc cell, cell notation, cell potential, spontaneity), and will have obtained and developed basic analytical skills and techniques (both quantitative and qualitative) of physical/chemical applications. The student will be able to write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1642	Inorganic and Analytical Chemistry	Discuss critical (generic) outcomes with respect to literacy skills (oral and written reasoning) and problem solving skills.	SOUTH	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamental principles of inorganic and Analytical chemistry regarding: Empirical and molecular formulas as well as stoichiometry, Quantitative analyses (Gravimetry en Volumetry), Oxidation, reduction, oxidation number and balancing of redox reaction equations ; Quantum mechanical atomic theory, Electron distribution, polarity and periodicity, Bonds, Lewis structures and molecular geometry; Chemical equilibrium and solubility products, Acids, bases, pH and buffers,and will have obtained and developed basic analytical skills and techniques (both quantitative and qualitative) of physical/chemical applications. The student will be able to write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.
Postgraduate					
CHEM	6808	Research Report Chemistry	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -integrate knowledge obtained from both literature and experimental results; -outline how his / her research fit within the larger picture of Botanical research; -report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialisation; -communicate his / her results in the form of a PowerPoint presentation; -assist in the preparation of the results for publication; and -self-evaluate his / her own development within Chemistry.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEA	6803	Inorganic Chemistry	(a) Multi-Nuclear NMR applications with regard to structure/reactivity relationships in Organometallic Chemistry General Principles (Nucleus type; Natural abundance; Relative receptivity; Spin), Specific examples: Coupling, Correlation between first-order coupling and bond distance, Kinetics (b) Industrial processes and chemicals, the chemical industry The production of inorganic chemicals, Summary of the most important sectors of the chemical industry, Some important synthesis/recovery of inorganic chemicals and applications, Separation of platinum group metals, Application of metal complexes in the medical field, Synthesis of glass, Uses of inorganic chemicals, Ore deposits and separation of minerals. (c) Organometallic Chemistry 18 e rule; carbonyls, ligands, carbenes	MAIN	Student will be able to: - explain and explore the fundamental principles underpinning inorganic chemistry of the selected topics; - explain and explore the acquisition and development of skills and techniques with respect to the analysis of inorganic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group
CHEE	6803	Inorganic Chemistry	This module covers selected aspects of more advanced Inorganic Chemistry topics and consists of theoretical and practical work. (a) Nuclear Medicine A general introduction to Nuclear Medicine is presented, which includes aspects of isotopes utilized, rationale behind the design of a radiopharmaceutical, examples specific agents, etc. (b) Intimate Reaction mechanisms in Coordination Chemistry and Selected studies on reaction mechanisms Derivation of basic intimate Rate laws, Iodomethane Oxidative Addition to [Rh(Bid)(CO)(PPh3)] complexes, Octahedral substitution in the presence of acid/ base equilibria, Square- planar reversible substitution, Multi-order reactions. (c) Homogeneous Catalysis Complete coverage of selected chapters from P v Leeuwen, Homogeneous Catalysis: Understanding the Art, Kluwer 2004. (d) X-Ray Crystallography Practical aspects of single crystal X-ray structure determination will be given, from basic data collection, to utilizing programs such as WinGX, SIR for the refinement and complete structure solution. Students will also utilize databases (CSD) in depth.	MAIN	Student will be able to: -Explain and explore the fundamental principles underpinning inorganic chemistry of the selected topics as well as the acquisition and development of skills and techniques with respect to the analysis of inorganic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEB	6803	Physical Chemistry	Selected topics from the following list: Polymer Chemistry: molecular mass and its influence on physical properties of polymers, Step reaction polymerization, degree of polymerisation, impurity effects on polymerization, chemical kinetics, case study Molecular Structure and Spectroscopy: rotational (microwave region), vibrational (infra red region), electronic spectra (UV/vis region), fluorescent emission and phosphorescent emission, application to structural determinations. Thermodynamics: advanced calorimetry and determination of excess thermodynamic quantities. Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Activation parameters and molecular dynamics: The influence and implications of temperature and volume changes on reaction rates and reaction mechanisms are studied with respect to (1) the Arrhenius theory, (2) The transition state theory of absolute reaction rates and (3) activation parameters, including volume of activation and entropy of activation. Physical techniques such as light absorption, dilatometry, polarimetry and conductance to obtain reaction orders and rate constants Electrolytic Chemistry: cell conventions, cell potentials, reversible decomposition potential, real decomposition potential. Electrolysis and polarization. Application of reduction potentials to calculate the the reversible decomposition potential. Over potential, electrode kinetics, concentration polarization of diffusion over potential. Statistical Thermodynamics: Introduction to the terms probability and randomness, micro- and macro state properties. The statistical link between the first and second law of thermodynamics and use of a partition function, Q, that, together with it's first and second derivatives with respect to time allows calculation of all the thermodynamic properties of a system. Applications in terms of the calculation of 'E, and selected problems, Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Bio-Inorganic Chemistry: Blue copper proteins (plastocyanines) ribonucleotide reductase, its function as natural polymers in nature, and how it was revealed by kinetic studies. Coordination and organometallic complexes in anticancer drug research. Electrochemistry: Special emphases on cyclic voltammetry, square wave voltammetry, linear sweep voltammetry, bulk electrolyses, electrode kinetics, reversible and irreversible processes and interpretation of experimentally obtained results. Inorganic polymer chemistry: Silicon polymers ' silicones and polysilylenes. Phosphorus polymers ' polyphosphazenes. Sulphur polymers ' polythiazyl.	MAIN	Student will be able to: - Explain and explore the fundamental principles underpinning physical chemistry of the selected topics as well as - the acquisition and development of skills and techniques with respect to the analysis of physical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHEF	6803	Physical Chemistry	Selected topics will be from the following list: Polymer Chemistry: molecular mass and its influence on physical properties of polymers, Step reaction polymerization, degree of polymerisation, impurity effects on polymerization, chemical kinetics, case study Molecular Structure and Spectroscopy: rotational (microwave region), vibrational (infra red region), electronic spectra (UV/vis region), fluorescent emission and phosphorescent emission, application to structural determinations. Thermodynamics: advanced calorimetry and determination of excess thermodynamic quantities. Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Activation parameters and molecular dynamics: The influence and implications of temperature and volume changes on reaction rates and reaction mechanisms are studied with respect to (1) the Arrhenius theory, (2) The transition state theory of absolute reaction rates and (3) activation parameters, including volume of activation and entropy of activation. Physical techniques such as light absorption, dilatometry, polarimetry and conductance to obtain reaction orders and rate constants Electrolytic Chemistry: cell conventions, cell potentials, reversible decomposition potential, real decomposition potential. Electrolysis and polarization. Application of reduction potentials to calculate the reversible decomposition potential. Over potential, electrode kinetics, concentration polarisation of diffusion over potential. Statistical Thermodynamics: Introduction to the terms probability and randomness, micro- and macro state properties. The statistical link between the first and second law of thermodynamics and use of a partition function, Q, that, together with its first and second derivatives with respect to time allows calculation of all the thermodynamic properties of a system. Applications in terms of the calculation of ‘E, and selected problems, Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Bio-Inorganic Chemistry: Blue copper proteins (plastocyanines) ribonucleotide reductase, its function as natural polymers in nature, and how it was revealed by kinetic studies. Coordination and organometallic complexes in anticancer drug research. Electrochemistry: Special emphases on cyclic voltammetry, square wave voltammetry, linear sweep voltammetry, bulk electrolyses, electrode kinetics, reversible and irreversible processes and interpretation of experimentally obtained results. Inorganic polymer chemistry: Silicon polymers ‘ silicones and polysilylenes. Phosphorus polymers ‘ polyphosphazenes. Sulphur polymers ‘ polythiazyl.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning physical chemistry of the selected topics as well as; and the acquisition and development of skills and techniques with respect to the analysis of physical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEC	6803	Organic Chemistry	-Biosynthesis -Organometallic Reactions Palladium catalyzed reactions Olefin metathesis Chromium catalyzed reactions Copper catalyzed reactions - NMR and Mass spectrometry - Protecting Groups in Organic Synthesis Protection/deprotection of carbonyl compounds. Protection/deprotection of alcohols. Protection/deprotection of carboxylic acids.	MAIN	Student will be able to: -Explain and explore the fundamental principles underpinning organic chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to the analysis of organic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEG	6803	Organic Chemistry	Radical and photo chemistry, Secondary metabolites, Retrosynthesis, Stereochemistry and stereoselective reactions.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning organic chemistry of the selected topics: and the acquisition and development of skills and techniques with respect to the analysis of organic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CHED	6803	Analytical Chemistry	Statistical evaluation of analytical data. Theories of specific molecular analyses like Nuclear Magnetic Resonance Spectroscopy, spectrophotometric methods such as UV/visible spectroscopy, Inductive Coupled Plasma and Atomic Absorption Spectroscopy. Other topics include Infrared spectroscopy and Fundamentals of Chromatographic separations. Chemical analyses using ion exchange and electro-gravimetry as well as method development and validation in line with the requirements of ISO 17025 is also covered in this course	MAIN	Student will be able to: - Explain and explore the fundamental principles underpinning analytical chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to analytical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEH	6803	Analytical Chemistry	Theories on Separation Techniques, XRD/XRF, Mass Spectroscopy, Liquid/liquid extraction. Radiochemical and Thermal Methods as well as surface characterisation are included in this course. Continuation of technical and managerial requirements for method development and validation in line with the requirements of ISO 17025 are also included in the course.	MAIN	Student will be able to: -Explain and explore the fundamental principles underpinning analytical chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to analytical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	8900	Chemistry Dissertation	This module contains fundamental knowledge, theories, principles and practices of Chemistry, including: Research project in specialized field of Chemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.S
CHEM	9100	Chemistry Thesis	This module contains fundamental knowledge, theories, principles and practices of Chemistry, General including: Research project in specialized field of Chemistry, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CMPA	6814	Polymer Testing and Characterisation I	- Theoretical description of polymers in solution - Number-average molar mass - Scattering methods - Frictional properties of polymers in solution - Chromatographic and polymer separation techniques - Molar mass distribution - Chemical composition and molecular microstructure	QWA	Student will be able to: - examine the principles behind a number of techniques used in polymer analysis and characterization, as well as the instrumental setups and experimental designs of these techniques; and - interpret and explain typical results obtained from the different techniques.
CMPA	6824	Applied Polymer Science	- Polymer processing - Additives in polymers - Biomedical applications of synthetic polymers - Polymers for the electronics industry - Speciality polymer applications - Introduction to paints and adhesives	QWA	Student will be able to: - Compare the different polymer processing techniques; -Discuss the purpose of different types of additives in polymers, as well as the influence these additives have on the polymer properties; and - Examine the use of polymers in biomedical applications, the electronics industry, paints and adhesives, as well as other speciality polymer applications.
CMPB	6824	Polymer Blends, Composites and Nanocomposites	General introduction to polymer blends - Compatibilization methods in polymer blends - Characterization of polymer blends - Properties of polymer blends - General overview of composites science - Polymer composite and nanocomposite research: Case studies	QWA	Student will be able to: - Examine the concept of polymer blending; - Explain the morphology of polymer blends, and its relation to the properties of these blends; - Discuss the different methods used to characterize polymer blends, and be able to interpret and explain the results obtained from these methods; - Discuss and apply the different compatibilization methods used in polymer blending; - Compare the relation between blend morphology and properties; - Calculate a number of aspects related to polymer composites and nanocomposites; and - Examine and explain the results presented and discussed in some research-based case studies.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CMPC	6824	Polymer Testing and Characterization II	- Thermal analysis - Testing of mechanical properties - Testing of thermal and electrical conductivity - Electron and atomic force microscopy	QWA	Student will be able to: - examine the principles behind a number of techniques used in polymer analysis and characterization, as well as the instrumental setups and experimental designs of these techniques; and - interpret and explain typical results obtained from the different techniques.
CMPO	6814	Polymers and Polymerization	- Concepts and nomenclature - Step polymerization - Radical polymerization - Ionic polymerization - Stereochemistry and coordination polymerization - Copolymerization	QWA	Student will be able to: - Examine principles underlying polymer science, and the properties that distinguish polymers from other substances; - Develop a kinetic/mechanistic understanding of step polymerization; - Develop a kinetic/mechanistic understanding of free-radical polymerization; - Compare the differences between step-growth and free-radical addition polymerization; - Develop a kinetic/mechanistic understanding of living and coordination polymerization processes; - Share insight in the possibilities and limitations of the various techniques for living and coordination polymerization; - Display practical insight in the design of polymer structures via implementation of living polymerization techniques; and - Develop a kinetic/mechanistic understanding of co-polymerization.
CMPP	6814	Physical Polymer Science	The amorphous state - The crystalline state - Elastic deformation - Viscoelasticity - Elastomers - Yield and crazing - Fracture and toughening	QWA	Student will be able to: - Understand the chain-like structure of polymers, and be able to describe and explain polymer features like crystalline structure, amorphous structure, glass transitions and melting, models used to explain the morphology in semi-crystalline polymers, and orientation - Know and understand the relationships between polymer structure/morphology and the different physical properties - Understand and be able to apply the different principles and models related to the mechanical properties of solid polymers
CMPR	6808	Research project	A research project in the field of polymer science, reading and summarising literature and correctly present the results. .	QWA	Student will be able to: Plan and execute a research project in the field of polymer science Search for relevant literature, read content and critically and comparatively summarise the information from the literature. Correctly present and interpret the research results. Neatly write a dissertation in the correct format.
CMPR	6814	Polymers and Polymer Reactions	- Inorganic, organometallic and inorganic-organic polymers - Reactions involving polymers - Properties of commercial polymers - Polymer structure-property relationships	QWA	Student will be able to: - Examine and discuss a number of examples of inorganic, organometallic and inorganic-organic polymers; - Compare the reactions that polymers can undergo, and the structural and morphological factors that have an influence on these reactions; -Examine and discuss the properties of a number of commercially important polymers; and - Relate polymer structures with their thermal and mechanical properties.
GECE	8900	Geochemistry Dissertation	This module contains fundamental knowledge, theories, principles and practices of Geochemistry, including: Research project in specialized field of Geochemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
NSCH	7900	Advanced Nanochemistry	Advanced Nanochemistry Synthesis (3 Weeks) (i) Synthetic methods: Electrosynthesis, chemical, thermal and microwave synthesis. Thin Film Deposition Methods. Physical synthetic methods including carbon arc discharge, laser ablation, thermal chemical vapor deposition (CVD), catalytic synthesis and plasma synthesis. (ii) Properties of nanomaterials: Chemical, electrochemical, spectroscopic, microscopic, mechanical, electrical and optical properties of materials (iii) Synthetic nanomaterials: Ceramics, glasses, polymers, fullerenes, nanotubes, graphenes, carbon nanotubes, metal oxides and catalysts (PGMs etc), nanocrystals, nanocomposites, nano-alloys, quantum dots, zeolites, MOFs and dendrimers.	MAIN	Student should be able to: - Discuss the synthesis and characterisation techniques suitable for producing organic and inorganic nanomaterials. - Use simple models (e.g. particles in a box, tight binding, molecular orbitals) to describe the electronic structure of molecular and solid state nanosystems. - Use simple models and examples to describe how the electronic structure of nanosystems is influenced by electron-electron interactions (charge, spin) and coupling to the vibrations. - Explain electronic conduction through nanosystems and identify different regimes (Ballistic, Coulomb Blockade etc)
NSCH	7914	Experimental Techniques in Nano-chemistry	Chemical, electrochemical or physical synthesis of specific nanomaterials and catalysts and their characterization for applications in energy devices, sensors and catalysis. The practical involve the use of spectroscopic (FTIR, Raman, liquid and SS_NMR, UV - VIS, XPS, XRD, XRF), microscopic (TEM, SEM AFM) and physical techniques (Hall Effect, TGA, BET, Contact Angle, fluorescence, etc.) in the analysis of nanomaterials.	MAIN	Student should be able to: - Synthesise, characterize and apply nanomaterials in sensor technology, development of biomaterials, drug delivery and in food preservation and food quality determination. - Use advanced characterization techniques and instruments to study nanomaterials.
PLYS	8900	Polymer Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Polymer Science , including: Research project in specialized field of Polymer Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PLYS	9100	Polymer Science Thesis	Polymer Science This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Chemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Produce evidence of advanced study and research characterised by intellectual independence and advanced ability to assess principles of a specialisation area in the subject; -Evaluate his/her own results and as well as that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny; and -Set up leadership for independant research projects on a doctorate level.

COMPUTER SCIENCE AND INFORMATICS (104)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
BCIS	1513	Introduction to Information Systems	Introduction to information systems, information systems in organisations, hardware: input, processing, output, software: systems and application software, organisation of data and information, telecommunications and networks, the Internet and Intranet. Transaction processing systems, management information systems, decision support systems, information systems in business and society, systems analysis, systems design, implementation, maintenance and revision.	MAIN	The student will be able to: - Discuss how and why information systems are used today; - Explain the technology, people, and organizational components of information systems; - Explain how businesses are using information systems for competitive advantage vs. competitive necessity; - List the major components of an information systems infrastructure; - Understand how information systems are enabling new forms of commerce between individuals, organizations, and governments; - Explain how various types of information systems provide the information needed to gain business intelligence to support the decision making for the different levels and functions of the organization; - Explain how organizations develop and acquire information systems and technologies; and - Describe how to secure information systems resources, focusing on both human and technological safeguards.
BCIS	1623	Introduction to Software Design	The student obtains the ability to specify, visualise and document the components of a simple business software system through flow charts, class diagrams, use case diagrams and other means.	MAIN	The student will be able to: - Elicit specifications for a required system. - Model the optimised solution for the system. - Design graphical representations of the relevant models.
BCIS	2614	Systems Analysis & Design	Systems analysis. Systems design: construction; application architecture; input design; output design; interface design; internal controls; program design; object design; project management; system implementation; use of computer-aided development tools.	MAIN	Student will be able to: - Discuss the types of business needs that can be addressed using information technology-based solutions; - Initiate, specify, and prioritize information systems projects and to determine various aspects of feasibility of these projects; - Clearly define problems, opportunities, or projects; - Use at least one specific methodology for analyzing a business situation (a problem or opportunity), modeling it using a formal technique, and specifying requirements for a system that enables a productive mandates that initiate; - Change in a way the business is conducted; - Within the context of the methodologies they learn, write clear and concise business requirements documents and convert them into technical specifications; - Communicate effectively with various organizational stakeholders to collect information using a variety of techniques and to convey proposed solution characteristics to them; - Manage information systems projects using formal project management methods; - Articulate various systems acquisition alternatives, including the use of packaged systems (such as ERP, CRM, SCM, etc.) and outsourced design and development resources; - Compare the acquisition alternatives systematically; - Incorporate principles leading to high levels of security and user experience from the beginning of the systems development process; - Design high-level logical system characteristics (user interface design, design of data and information requirements); and - Analyze and articulate ethical, cultural, and legal issues and their feasibilities among alternative solutions.
BCIS	2624	Systems Infrastructure & Integration	An overview of systems infrastructure and integration.	MAIN	Student will be able to: - Describe the core computing systems architecture concepts and building blocks. - Describe key principles of data representation and manipulation in computing solutions. - Clearly define and explain the various data storage technologies available in a computer system, including the concept of cloud computing. - Describe the network hardware building blocks and communication technologies available for configuring networking systems in an organisation. - Explain basic operating system concepts. - Describe the principles underlying service virtualization. - Explain the role and structure of the Internet and distributed software architecture. - Describe the role of IT systems administration and control in managing a large-scale organizational IT infrastructure solution. - Configure simple infrastructure security solutions. - Explain what a datacentre entails.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BCIS	3714	Information Systems in Organisations	Information systems in organisations, social and ethical responsibilities, the role of the Informatician. IT end-user relationships; IT management.	MAIN	Student will be able to: -Discuss the various functions and activities within the information systems area, including the role of IT management and the CIO, structuring of IS management within an organization, and managing IS professionals within the firm. -View an organization through the lens of non-IT senior management in deciding how information systems enable core and supportive business processes as well as those that interface with suppliers and customers. -Discuss and apply the concepts of information economics at the enterprise level. -Appreciate how IS represents a key source of competitive advantage for firms. -Structure IS-related activities to maximize the business value of IS within and outside the company. -Examine existing and emerging information technologies, the functions of IS and its impact on the organizational operations -Evaluate the issues and challenges associated with successfully and unsuccessfully incorporating IS into a firm. -Discuss how strategic decisions are made concerning acquiring IS resources and capabilities including the ability to evaluate the different sourcing options and apply this knowledge to scenarios. -Apply information to the needs of different industries and areas. -Examine the role of IT control and service management frameworks from the perspective of managing the IS function in an organization.
CSIL	1511	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	MAIN	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it,; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
CSIL	1521	Computer Literacy: Part 2	This module covers basic commands of a database program, as well as advanced commands of a general word processing program, a spreadsheet program and a presentation program. The student must also be able to apply the knowledge.	MAIN	Student will be able to: -Describe advanced aspects of word processing, such as tables, table of contents and bibliography, and must be able to apply it; -Describe advanced aspects of spread sheets, including graphs and linking with documents, and must be able to apply it; -Describe advanced aspects of a presentation program and must be able to apply it; and -Describe the basic commands of a database program and must be able to apply it.
CSIL	1551	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	MAIN	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
CSIS	1534	Introduction to Programming: Part 1	This module provides an extended introduction into the world of computer programming and is aimed at students who do not intend to take CSI modules in the second or third year of study. The module deals with aspects that include the origins and development of the computer, the basic working of a computer, computerised problem solving and an introduction of algorithms, control structures, classes, objects, properties and methods using a high-level programming language.	MAIN	Student will be able to: -Explain the working of a computer; -Describe the basic principles of object oriented programming, i.e. classes, objects, properties and methods; and -Do basic problem solving in an object oriented, high-level programming environment.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIS	1553	Introduction to Computer Hardware	This module contains fundamental knowledge, theories, principles and practices of Information Technology, including the underlying electronics of computer hardware, supporting Microsoft Windows, servicing PC's, operating system overview, computer basic, tools and safety, inside the PC, input/output devices, miscellaneous hardware, troubleshooting, customer service and support.	MAIN	Student will be able to: -Describe a personal computer system; -Discuss lab safety procedures and correct tool usage; -Discuss and perform a computer assembly; -Practice preventive maintenance and troubleshooting; -Describe and use fundamental operating systems; -Discuss the fundamentals of laptops and portable devices; -Discuss the fundamentals of printers and scanners; -Discuss the fundamentals of networks; -Discuss the fundamentals of security; and -Practice correct communication skills.
CSIS	1614	Programming and Problem Solving: Part 1	This module deals with the professional implementation of computerised solutions in an object-oriented, high-level programming environment. The module provides an introduction to problem solving, algorithms, classes, objects, properties and methods. Control structures, e.g. selection and iteration, and input and output are also covered.	MAIN	Student will be able to: -Explain the basic principles of object oriented programming, i.e. classes, objects, properties and methods; -Describe basic control structures; and -Solve problems in an object-oriented, high-level programming environment.
CSIS	1624	Programming and Problem Solving: Part 2	This module deals with information systems and problem solving in business and scientific environments. Advanced object oriented concepts, debugging, storing data in files and access to simple databases.	MAIN	Student will be able to: -Solve programming problems using a modern, object oriented, high-level programming environment; -Program professionally, to design programs and debug them; -Explain methods and parameter transfer, debugging techniques, arrays, file handling and database access; and -Implement simple interfaces, with prompts, sentinels and error conditions.
CSIS	1644	Introduction to Programming: Part 2	This module deals with the use of control structures, classes, objects, properties and methods to do computerised problem solving in a high-level programming language.	MAIN	Student will be able to: -Explain control structures, e.g. selection and iteration; -Do basic problem solving in an object oriented, high-level programming environment; and -Implement basic database access.
CSIS	1664	Introduction to the Internet and Web Page Development	This module deals with various web aspects and technologies. This includes the working of the Internet, graphical interfaces, Internet protocols and web page development.	MAIN	Student will be able to: -Discuss the evolution of the Internet and the Web; -Conduct Internet searches; -Explain the working of Internet protocols; and -Apply client-side scripting and style sheets to develop a complete web site.
CSIS	1683	Visual Basic for Applications (VBA) with the focus on Excel	This module covers concepts to insert text strings as macros; automate frequently performed tasks; automate repetitive operations; creating a custom command, toolbar button, menu command, front end, new worksheet functions; create complete macro-driven applications.	MAIN	Student will be able to: -Develop Excel utilities with VBA; -Create a user-form with VBA; -Create interaction of a VBA-application with other applications; and -Apply VBA to automate aspects of Excel, such as Budgeting, Forecasting and Analysing scientific data.
CSIS	2614	Data Structures and Advanced Programming	This module deals with advanced programming that requires an understanding of data structures and the professional implementation thereof.	MAIN	Student will be able to: -Discuss and implement classes, objects, inheritance and polymorphism; -Discuss what data structures are and how to use them; -Demonstrate knowledge of recursion and its use; -Implement and use lists, stacks and queues; -Implement and use binary trees; and -Explain how to design and modify data structures to solve a problem.
CSIS	2624	Human-Computer Interaction	This module provides the user with an introduction to Human-Computer Interaction (HCI). Aspects that are covered include usability, human factors, models of interaction, data collection, the design of user interfaces, visual interfaces and the evaluation of interfaces.	MAIN	Student will be able to: -Examine and discuss the principles of Human-Computer Interaction; -Explain the role of the computer user in the design of computer systems; -Design a user-friendly visual interface by applying all the factors that determine a user-friendly interface; and -Evaluate a user interface while considering all the role-players.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIS	2634	Introduction to Databases and Database Management Systems: Part 1	This module deals with database concepts, design and implementation concepts, transaction management and concurrency control, distributed database management systems, object-oriented databases and database programming.	MAIN	Student will be able to: -Use the fundamental principles of databases; -Design and implement a database; and -Develop applications that make use of databases.
CSIS	2642	Information Technology Service Learning	This module enables the students to serve the community by ploughing back the IT knowledge gained during their studies. While serving the community the students will learn how to work with people with varying computer literacy skills or levels. By teaching or helping others, their own knowledge will be expanded.	MAIN	Student will be able to: -Serve the community with relevant IT skills; and -Learn from practical experience of working with people in the community.
CSIS	2664	Software Design	This module entails an introduction to UML and to class types ('patterns'). Various patterns are discussed and analysed in detail. Various sub-patterns of patterns will be covered. Practical work includes the implementation of patterns in various applications.	MAIN	Student w -Use UML in order to present class diagrams; -Explain the necessity of patterns; -Identify, implement and apply various patterns; and -Combine patterns to design and implement applications.
CSIS	3714	Introduction to Databases and Database Management Systems: Part 2	This module deals with advanced database concepts, advanced queries, optimising queries, distributed databases, cloud computing and administrative tasks related to data and database management. The module also provides an introduction to data warehousing and OLAP.	MAIN	Student will be able to: -Demonstrate an understanding of advanced database concepts; -Write advanced SQL queries; -Optimise SQL queries; -Demonstrate an understanding of distributed databases; -Demonstrate an understanding of cloud computing; -Perform administrative tasks related to data and database management; and -Demonstrate an understanding of basic data warehousing and OLAP principles.
CSIS	3724	Software Engineering	This module provides the student with an introduction to Software Engineering. Aspects covered are requirement definition, program design, programming practice, programming languages, tests and debugging, documentation, maintenance, and aids.	MAIN	Student will be able to: - Demonstrate the principles of Software Engineering, - Discuss aspects of Software Engineering in order to apply it, -Discuss management of a project and be able to apply it, - Successfully participate as a member of a team.
CSIS	3734	Internet Programming	This module deals with server-side Internet programming and web management.	MAIN	Student will be able to: - Do server-side Internet programming; - Develop web applications that utilise databases; and - Publish websites.
CSIS	3744	Computer Networks	This module provides the student with an overview of network concepts. Aspects that are covered are network architecture, network technologies, coupling techniques, internetwork concepts, end-to-end protocols, security, standards and models, transmission basics, and network applications.	MAIN	Student will be able to : -Distinguish between the fundamental network types; -Conceptualise and explain network communications by means of the OSI model, TCP/IP model and TCP/IP protocols; -Describe and explain wired as well as wireless LAN and WAN topologies, transmission methods, network media, access methods and Ethernet standards; -Identify and distinguish between network hardware and explain switching and routing methods; -Explain IP addressing, implement subnetting and troubleshoot network problems; -Explain and discuss network management aspects and network security techniques; and -Implement a virtual network.
CSIQ	1512	Computer Literacy For Computer Science	This module introduces the learner to the world of computers. The course is aimed at students who have little or no background of computers and their functionality. The course covers basic computer literacy, which includes programmes used on a day-to-day basis such as Microsoft Windows and Office. Learners also get the opportunity to explore the internet and email environments. The course prepares the learners how to search for information and stay abreast with current trends in the computing arena.	QWA	Student will be able to: -Discuss basic computer functionality; -Implement intermediate ms office word, excel, powerpoint, access concepts; -Perform basic to intermidiate internet functions; -Discuss software and internet programming terms; and -Analyze global and local trends in computer technologies

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIQ	1531	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	QWA	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
CSIQ	1533	Introduction to Software Development Concepts	This module introduces the core concepts of writing computer programs - variables, decisions, loops, functions, and objects - which apply regardless of the programming language, but uses concrete examples and exercises in the dynamic environment to apply and reinforce these concepts. The course is aimed at students who have little or no background of computers and their functionality. The course prepares the learner to think logically before delving into complex programming concepts. The use of visual code-less programming tools will be used.	QWA	Student will be able to: -describe basic programming principles -discuss the concepts of a class, object and method -apply programming logic concepts -apply programming concepts using Visual Programming tools -discuss basic software development concepts -use data types and flow control
CSIQ	1541	Computer Literacy: Part 2	This module covers basic commands of a database program, as well as advanced commands of a general word processing program, a spreadsheet program and a presentation program. The student must also be able to apply the knowledge.	QWA	Student will be able to: -Describe advanced aspects of word processing, such as tables, table of contents and bibliography, and must be able to apply it; -Describe advanced aspects of spread sheets, including graphs and linking with documents, and must be able to apply it; -Describe advanced aspects of a presentation program and must be able to apply it; and -Describe the basic commands of a database program and must be able to apply it.
CSIQ	1553	Introduction to Computer Hardware	This module contains fundamental knowledge, theories, principles and practices of Information Technology, including computer hardware from the basic terms, assembly, configuring through to troubleshooting and computer hardware’s integration with software.	QWA	Student will be able to: -Describe basic computer physical components functionality; -Discuss computer and laptop assembly; -Perform computer hardware configuration and troubleshooting; -Perform operating system and application software installation; and -Explain Windows system commands.
CSIQ	1614	Programming and Problem Solving: Part 1	This module deals with the professional implementation of computerised solutions in an object-oriented, high-level programming environment. The module provides an introduction to problem solving, algorithms, classes, objects, properties and methods. Control structures, e.g. selection and iteration, and input and output are also covered.	QWA	Student will be able to: -Explain the basic principles of object oriented programming, i.e. classes, objects, properties and methods; -Describe basic control structures; and -Solve problems in an object-oriented, high-level programming environment.
CSIQ	1623	Introduction to Computer Networks	This module introduces the learner to the theory and practice computer networks. The course is aimed at computer science students who have background of computers and their functionality. The course includes topics; computer networks concept, organization, topologies, hardware, media, OSI Model, TCP/IP suite, addressing and basic troubleshooting.	QWA	Student will be able to: -describe computer networks functions -discuss the basics of LANs, MANs and WANs -identify and explain topologies -identify network device and media -discuss OSI model and protocols -discuss IP addresses and wireless networks -apply basic network troubleshooting
CSIQ	1624	Programming and Problem Solving: Part 2	This module deals with information systems and problem solving in business and scientific environments. Advanced object oriented concepts, debugging, storing data in files and access to simple databases.	QWA	Student will be able to: -Solve programming problems using a modern, object oriented, high-level programming environment; -Program professionally, to design programs and debug them; -Explain methods and parameter transfer, debugging techniques, arrays, file handling and database access; and -Implement simple interfaces, with prompts, sentinels and error conditions.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIQ	1634	Introduction to Programming: Part 1	his module provides an extended introduction into the world of computer programming and is aimed at students who do not intend to take CSI modules in the second or third year of study. The module deals with aspects that include the origins and development of the computer, the basic working of a computer, computerised problem solving and an introduction of algorithms, control structures, classes, objects, properties and methods using a high-level programming language.	QWA	Student will be able to: -Explain the working of a computer; -Describe the basic principles of object oriented programming, i.e. classes, objects, properties and methods; and -Do basic problem solving in an object oriented, high-level programming environment.
CSIQ	1644	Introduction to Programming: Part 2	This module deals with the use of control structures, classes, objects, properties and methods to do computerised problem solving in a high-level programming language.	QWA	Students will be able to: -Explain control structures, e.g. selection and iteration; -Do basic problem solving in an object oriented, high-level programming environment; and -Implement basic database access.
CSIQ	1645	Programming and Problem solving	This module covers intermediate to advanced problem solving using object oriented concepts. Students also will learn UML (Unified Modelling Language), multidimensional arrays, event-driven programs, GUIs (Graphical User Interfaces), class inheritance and interfaces, libraries, as well as storing data in files and access to simple databases.	QWA	Student will be able to: -discuss and apply inheritance, abstraction, encapsulation and polymorphism -use arrays, classes, objects and methods -design graphical user interface components -programme stream reading and writing -perform debugging and error handling
CSIQ	1662	Introduction to Computer Networks	This module introduces the learner to the theory and practice computer networks. The course is aimed at computer science students who have background of computers and their functionality. The course includes topic; computer network concepts, organization, topologies, hardware, media, OSI Model, TCP/IP suite, addressing and basic troubleshooting.	QWA	Students will be able to: -Describe computer network functions; -Discuss the basics of LANS, MANs and WANS; -Identify and explain topologies; -Identify network devices and media; -Discuss OSI model and protocols; -Discuss IP addresses and wireless networks; and -Apply basic network troubleshooting.
CSIQ	1681	Introduction to Software Development Part 2	This module deals with the introduction of the core concepts of writing computer programs - Defensive programming, GUI development and Enumerations and Collections - that apply regardless of the programming language, but concrete examples and exercises in the dynamic environment to apply and reinforce these concept.	QWA	Student will be able to: -Develop applications that make use of defensive programming; -Develop applications that makes use of GUI's Graphical User Interface; and -Develop applications that make use of Enumerations and Collections.
CSIQ	2614	Data Structures and Advanced Programming	Change to the new 8-digit module code This module deals with advanced programming that requires an understanding of data structures and the professional implementation thereof.	QWA	Student will be able to: -Discuss and implement classes, objects, inheritance and polymorphism; -Discuss what data structures are and how to use them; -Demonstrate knowledge of recursion and its use; -Implement and use lists, stacks and queues; -Implement and use binary trees; and -Explain how to design and modify data structures to solve a problem.
CSIQ	2624	Human-Computer Interaction	This module provides the user with an introduction to Human-Computer Interaction (HCI). Aspects that are covered include usability, human factors, models of interaction, data collection, the design of user interfaces, visual interfaces and the evaluation of interfaces.	QWA	Student will be able to: -discuss user interface design principles -design user interfaces for desktop and mobile platforms -perform a system usability analysis -evaluate various types of interfaces
CSIQ	2634	Introduction to Databases and Database Management Systems: Part 1	This module deals with database concepts, design and implementation concepts, transaction management and concurrency control, distributed database management systems, object-oriented databases and database programming.	QWA	Student will be able to: -Demonstrate knowledge about the fundamental principles of databases; -Design and implement a database; and -Develop applications that make use of databases.
CSIQ	2642	Information Technology Service Learning	This module enables the students to serve the community by ploughing back the IT knowledge gained during their studies. While serving the community the students will learn how to work with people with varying computer literacy skills or levels. By teaching or helping others, their own knowledge will be expanded.	QWA	Student will be able to: -serve the community with relevant IT skills; and -learn from practical experience of working with people in the community.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIQ	2644	Mobile Development	Today's applications are increasingly mobile. The module introduces the learner to developing mobile applications. Students learn how to write native and web applications for mobile devices such as phones and tablets.	QWA	Student will be able to: -evaluate the capabilities and limitations of mobile platforms that affect application development and execution -develop applications for and take advantage of the capabilities of a mobile platform -work with software/hardware tools to develop, test and debug mobile applications -develop software using design patterns that are applicable to mobile development
CSIQ	2654	Introduction to Website Development	This module introduces the learner to developing web sites. The development of good web pages requires that the programmer has knowledge of various web aspects and technologies. This includes the working of the Internet, graphical interfaces, Internet protocols, web page development with XHTML, HTML5, and CSS. JavaScript will also be introduced.	QWA	Student will be able to: -discuss and apply website development principles; -collect requirements and design a website; -programme in XHTML, HTML5; -create Cascading Style Sheets; and -apply basic JavaScript.
CSIQ	2664	Software Design	This module entails an introduction to UML and to class types ('patterns'). Various patterns are discussed and analysed in detail. Various sub-patterns of patterns will be covered. Practical work includes the implementation of patterns in various applications.	QWA	Student will be able to: -Use UML in order to present class diagrams; -Explain the necessity of patterns; -Identify, implement and apply various patterns; and -Combine patterns to design and implement applications.
CSIQ	3714	Introduction to Databases and Database Management Systems: Part 2	This module deals with advanced database concepts, advanced queries, optimising queries, distributed databases, cloud computing and administrative tasks related to data and database management. The module also provides an introduction to data warehousing and OLAP	QWA	Student will be able to: -Demonstrate an understanding of advanced database concepts; -Write advanced SQL queries; -Optimise SQL queries; -Demonstrate an understanding of distributed databases; -Demonstrate an understanding of cloud computing; -Perform administrative tasks related to data and database management; and -Demonstrate an understanding of basic data warehousing and OLAP principles.
CSIQ	3724	Software Engineering	Software Engineering	QWA	This module provides the student with an introduction to Software engineering. Aspects covered are requirement definition, program design, programming practice, programming languages, tests and debugging, documentation, maintenance and aids. After the successful completion of the module the student should: (a) have a thorough knowledge and understanding of the principles of Software engineering; (b) have a thorough theoretical knowledge of aspects of Software engineering in order to apply it; (c) have knowledge of the management of a project and be able to apply it; (d) be able to successfully participate as a member of a team.
CSIQ	3734	Internet Programming	This module deals with server-side Internet programming and web management.	QWA	Student will be able to: -Do server-side Internet programming; -Develop web applications that utilise databases; and -Publish websites.
CSIQ	3764	Databases and Database Management Systems 2	This module deals with advanced database concepts, advanced queries, optimising queries, distributed databases, cloud computing and administrative tasks related to data and database management. The module also provides an introduction to data warehousing and OLAP.	QWA	Student will be able to: -Apply advanced database concepts; -Write advanced SQL queries; -Optimise SQL queries; -Use distributed databases; -Discuss cloud computing; -Perform administrative tasks related to data and database management; and -Discuss basic data warehousing and OLAP principles.
CSIQ	3784	Software Development Project	The students will experience the process of the system life cycle and will develop the information system by following an iterative incremental development. Students will be expected to formulate a scenario for their chosen topic and develop an information system to meet the customer's requirements.	QWA	Student will be able to: -use principles and practices of an Object Oriented approach to the design and development of computer systems; and -apply these principles in practice

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIL	1551	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	SOUTH	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
CSIL	1561	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	SOUTH	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
Postgraduate					
CSIA	6813/ 6823	Advanced Data Science	This module covers advanced Data Science concepts and techniques used to analyse and interpret large amounts of structured and unstructured data.	MAIN	Student will be able to: - Implement advanced Data Science concepts and techniques by means of computer code; - Experiment with different machine learning algorithms and feature engineering techniques to create machine-learning models.
CSIC	6813	Artificial Intelligence	The science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.	MAIN	Student will be able to: -apply the basic principles of artificial intelligence.
CSIC	6823	Artificial Intelligence	The science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.	MAIN	Student will be able to: - Discuss, describe and apply the principles of artificial intelligence
CSIC	6833/ 6843	Robotics	The design, construction, operation and application of robots and computer systems for their control, sensory feedback, and information processing.	MAIN	Student will be able to: -apply the principles of robotics.
CSIC	6853	Capita Selecta	Capita Selecta	MAIN	Student will be able to: Examine and apply principles of the selected field.
CSIC	6863	Capita Selecta	Capita Selecta	MAIN	Student will be able to: -Examine and apply principles of their chosen field.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSID	6813/ 6823	Business Intelligence	The emphasis here is on business intelligence deployed in corporate environments, including approaches for turning e-commerce data into knowledge that organizations can act upon and tools and techniques for deploying these systems.	MAIN	Student should be able to ; -Learn to analyse data from a data warehouse in order to make relational decisions; -Explored and compared concepts and current methodologies for creating OLAP databases and data mining models; -Investigated the development of Key Performance Indicators (KPIs), dashboards and scorecards; -Been exposed to hands-on exercises with Business Intelligence tools (Microsoft SQL Server 2012 and IBM Cognos 10.2 Workspace); -Investigated the development of three popular machine learning algorithms namely; clustering (k-means), decision trees and artificial neural networks; -Delivered a Business Intelligence solution. This will entail the following: a.compile business requirements from a business of your choice b.design the dimensional model from the business requirement specification c.load the dimensional model with your own data using ETL routines d.develop at least two OLAP cube(s) e.include at least two Key Performance Indicators (KPI) in the cube(s) f.develop at least one data mining model g.develop your own BI frontend using C# and Visual Studio which will demonstrate your own interpretation of a Scorecard and a Dashboard
CSID	6833	Advanced Databasis	The administration of a database requires thorough knowledge from planning through to creating the database, the database users, their privileges and determining backup and recovery strategies, including: architecture and installation options, physical structures and settings of the database, and queries of data dictionary views to manage a database.	MAIN	Student should be able to ; -Explain and use the following aspects of databases: Architecture, Database administrator tools, Database Instance, Physical Architecture and Data Dictionary, Basic Storage Concepts and Settings, Basics of Querying a Database, Table management, Index and Constraints Management, Basic Data Management, Advanced Data Management, Security Management, Backup and Recovery; and -Write the two certified Oracle Associate (OCA) exams
CSID	6843	Advanced Databases	The administration of a database requires thorough knowledge from planning through to creating the database, the database users, their privileges and determining backup and recovery strategies, including: architecture and installation options, physical structures and settings of the database, and queries of data dictionary views to manage a database.	MAIN	Student will be able to ; -Explain and use the following aspects of databases: Architecture, Database administrator tools, Database Instance, Physical Architecture and Data Dictionary, Basic Storage Concepts and Settings, Basics of Querying a Database, Table management, Index and Constraints Management, Basic Data Management, Advanced Data Management, Security Management, Backup and Recovery; and -Write the two certified Oracle Associate (OCA) exams
CSID	6853	Data Warehousing	The development of a data warehouse requires thorough knowledge from planning through to implementing the warehouse, as well as the mining of the information in the warehouse.	MAIN	Student will be able to ; -Learnt the fundamentals of data warehousing and how to apply their existing knowledge of database systems in a data warehouse environment; -Gained the theoretical knowledge around the development lifecycle of a data warehouse developed by Ralph Kimball; -Been exposed to hands-on exercises in constructing a STAR schema from a relational entity relationship diagram (ERD) using the Ralph Kimball methodology; -Learnt to compile information packages on the business requirements for a STAR schema for a data warehouse; -Explored and compared ETL concepts including slow changing dimensions for creating and loading a data warehouse; -Combined all the above mentioned theory to design and deliver a data warehouse solution. This will entail the following: -compile business requirements; -design the dimensional model from the business requirement specification; -develop all the necessary ETL routines using SQL Server SSIS; and -develop a front-end browser in C# connecting to the data warehouse

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSID	6863	Data Warehousing	The development of a data warehouse requires thorough knowledge from planning through to implementing the warehouse, as well as the mining of the information in the warehouse.	MAIN	Student will be able to; -Learnt the fundamentals of data warehousing and how to apply their existing knowledge of database systems in a data warehouse environment; -Gained the theoretical knowledge around the development lifecycle of a data warehouse developed by Ralph Kimball; -Been exposed to hands-on exercises in constructing a STAR schema from a relational entity relationship diagram (ERD) using the Ralph Kimball methodology; -Learnt to compile information packages on the business requirements for a STAR schema for a data warehouse; -Explored and compared ETL concepts including slow changing dimensions for creating and loading a data warehouse; -Combined all the above mentioned theory to design and deliver a data warehouse solution. This will entail the following: -compile business requirements; -design the dimensional model from the business requirement specification; -develop all the necessary ETL routines using SQL Server SSIS; and -develop a front-end browser in C# connecting to the data warehouse
CSIE	6813/ 6823	Knowledge-based Systems	The basic knowledge management principles, concepts, technologies and systems, including knowledge discovery systems, knowledge capture systems, knowledge sharing systems and knowledge application systems, as well as the evaluation and application thereof in practice.	MAIN	Student will be able to; -Demonstrate basic knowledge management principles and concepts; -Use and demonstrate technologies for knowledge management; -Explain knowledge management systems which include knowledge discovery systems, knowledge capture systems, knowledge sharing systems and knowledge application systems; -Discuss the future of knowledge management;and -Explain the evaluation of an organisation's knowledge management system.
CSIE	6833	Management Information Systems	All the aspects involved with managing Information Technology in an organization, including: strategic information systems, supply chain management, ERP, electronic commerce, networking, business process reengineering, knowledge management, decision support systems, data management, managing the information services department, managing information resources and security.	MAIN	Student will be able to; -apply the principles of Management Information Systems in a business environment.
CSIE	6853	IT Project Management	Basic principles of Project Management, including: the differences between Project Management and IT Project Management, how to perform as a Project Manager and to be part of a project team in al the 9 knowledge areas of Project Management, using a Project Management software tool in order to manage an IT project.	MAIN	Student will be able to: -perform as a project manager.
CSIE	6863	IT Project Management	Basic principles of Project Management, including: the differences between Project Management and IT Project Management, how to perform as a Project Manager and to be part of a project team in al the 9 knowledge areas of Project Management, using a Project Management software tool in order to manage an IT project.	MAIN	Student will be able to: -perform as a project manager.
CSIE	6873	Decision Support Systems	A decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs include knowledge-based systems. Students learn how to help decision makers compile useful information from a combination of raw data, documents, and personal knowledge, or business models to identify and solve problems and make decisions.	MAIN	Student will be able to: -apply the concepts of decision support systems to support the decision making processes of managers in business environments.
CSIE	6883	Decision Support Systems	A decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs include knowledge-based systems. Students learn how to help decision makers compile useful information from a combination of raw data, documents, and personal knowledge, or business models to identify and solve problems and make decisions.	MAIN	Student will be able to: -apply the concepts of decision support systems to support the decision making processes of managers in business environments.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSII	6813/ 6823	Information Security	Fundamental concepts of computer security, including: security threats, harden internal systems and services, harden internetwork devices and services, secure network communications, security best practices for creating and running web-based applications, managing public key infrastructure (PKI), managing certificates, enforcing organisational security policies, monitoring the security infrastructure and security incidents.	MAIN	Student will be able to: -identify fundamental concepts of computer security; -identify security threats; -establish security best practices; -manage public key infrastructure (PKI); -enforce organisational security policies;and -manage security incidents.
CSII	6833	Human-Computer Interaction	Theoretical background and practical experience in Human-Computer Interaction, with specific emphasis on Usability Engineering. The module provides an in-depth knowledge and understanding of issues involved in the evaluation of user interfaces for interactive computer systems.	MAIN	Student will be able to: -Explain the issues involved in the evaluation of interactive systems; -Identify the different types of metrics used in evaluating the user experience; -Plan and design a usability study;and -Conduct a usability study, making use of the usability laboratory and its equipment in the department.
CSII	6843	Human-Computer Interaction	Theoretical background and practical experience in Human-Computer Interaction, with specific emphasis on Usability Engineering. The module provides an in-depth knowledge and understanding of issues involved in the evaluation of user interfaces for interactive computer systems.	MAIN	Student will be able to: -Explain the issues involved in the evaluation of interactive systems; -Identify the different types of metrics used in evaluating the user experience; -Plan and design a usability study;and -Conduct a usability study, making use of the usability laboratory and its equipment in the department.
CSII	6853/ 6863	Computer Ethics	Computer Ethics is a branch of practical philosophy which deals with how computing professionals should make decisions regarding professional and social conduct. It is a set of moral principles that regulate the use of computers. Some common issues of computer ethics that are covered include intellectual property rights (such as copyrighted electronic content), privacy concerns, and how computers affect society.	MAIN	Student will be able to: -examine and apply the principles of Computer Ethics and be able to advise on the ethical use of computers.
CSII	6883	Digital Forensic Science	The module introduces the student to the world of digital forensics through the application of information security concepts to perform a high-tech cyber investigation from acquiring digital evidence to reporting on its findings.	MAIN	Student will be able to: - describe and explain the digital forensics profession and investigations; - setup an investigators office and laboratory; - apply information security concepts to gather digital forensic data; - process a crime and incident scene; - effectively work with GUI and CLI systems; - work with different digital forensic tools; - report on the findings of the digital evidence.
CSIM	6813/ 6823	Theory of Algorithms	The theory of algorithms is a subfield of information theory and computer science that concerns itself with the relationship between computation and information. Algorithmic information theory principally studies complexity measures on strings (or other data structures). Because most mathematical objects can be described in terms of strings, or as the limit of a sequence of strings, it can be used to study a wide variety of mathematical objects, including integers and real numbers.	MAIN	Student will be able to: -Explain current theories on the origins of life and how it unfolds in nature; -Describe the structure of living cells and how complex molecules in cells interact with each other to make the flow of energy, material and information possible in the cell; -Explain the transfer of genetic information and how it influences the patterns of inheritance between generations of organisms;and -Understand the fundamental principles regarding the biology of the different levels of organization in living organisms from viruses to eukaryotic micro-organisms.
CSIM	6833/ 6843	Automata Theory and Applications	Automata theory is the study of mathematical objects called abstract machines or automata and the computational problems that can be solved using them.	MAIN	Student will be able to: -apply the principles of automata theory to solve computational problems.
CSIN	6823	Network Management	This module covers the fundamental management principles, practices and technologies for managing networks, systems, applications and services.	MAIN	Student will be able to: -Apply and discuss the foundations of network management and the different technologies involved. -Discuss, compare and implement different network management architectures. -Discuss and compare different management communication protocols. -Apply network management principles to practical aspects of network management.
CSIN	6833/ 6843	Advanced Computer Networks	Detailed investigation and study of computer networks, standards, communications concepts, hardware concepts, internetworking layer concepts, dialup, baseband, broadband and wireless networking concepts and network security issues.	MAIN	Student must be able to: - Use and apply his/her knowledge of the technical aspects of computer networks to set u pand maintain such networks.
CSIP	6813/ 6823	Object Design	Emphasis and deeper knowledge in the design of objects in the object-oriented design paradigm.	MAIN	Student will be able to: - Use the advanced concepts of object oriented design to develop high-quality software systems.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIP	6833/ 6843	Advanced Internet Programming	Client side programming of web sites, scripting languages, cookies and session objects, request & response objects, and server side programming.	MAIN	Student will be able to: - Do client-side Internet Programming; - Do server-side Internet Programming; - Write secure code; - Effectively use AJAX; - Develop web applications that utilise databases; and - Publish web sites.
CSIP	6853/ 6863	Advanced Proramming I	The programming skills of the students are taken to the next higher level compared to pre-graduate programming.	MAIN	Student will be able to: - Work effectively as individuals or members of a team/group in achieving the required programming outcomes; - Plan a complex class hierarchy to develop a robust application; - Design and develop robust class hierarchies; and - Apply advanced programming concepts.
CSIP	6873/ 6883	Advanced Programming II	The programming skills of the students are taken to the next higher level compared to pre-graduate programming.	MAIN	Student will be able to: - Work effectively as individuals or members of a team/group in achieving the required programming outcomes; - Plan a complex class hierarchy to develop a robust application; - Design and develop robust class hierarchies; and - Apply advanced programming concepts.
CSIQ	6809	Computer Information Technology Research Project	The development of a complete working computer project to solve a real life or theoretical problem.	QWA	Student will be able to: -Design and create a complete working computer project; -Design and create a User Manual based on the project; -Design and create a Technical Manual based on the project; -Demonstrate the project to staff and students.
CSIQ	6824	Advanced Mobile Development	This module deals with advanced mobile development concepts, advanced user interface and components, compatibility, mapping and location based services, server-side programming, client access to software agent system, connectivity and testing strategies.	QWA	Student will be able to: -design and implement mobile applications with interface support for various screen sizes. -design and implement mobile applications with underlying database supports -demonstrate a critical understanding of making use of multimedia based applications for mobile devices -demonstrate a critical understanding of making use of location based applications for mobile devices -develop mobile applications that can smartly communicate with a server applications
CSIQ	6833	Human-Computer Interaction	Theoretical background and practical experience in Human-Computer Interaction, with specific emphasis on Usability Engineering. The module provides an in-depth knowledge and understanding of issues involved in the evaluation of user interfaces for interactive computer systems.	QWA	Student will be able to: -Explain the issues involved in the evaluation of interactive systems; -Identify the different types of metrics used in evaluating the user experience; -Plan and design a usability study;and -Conduct a usability study, making use of the usability laboratory and its equipment in the department.
CSIQ	6844	Gamification	Gamification is the concept of applying game mechanics and game design techniques to engage and motivate people to achieve their goals. It is the application of game-design elements and game principles in non-game contexts.	QWA	Student will be able to: -apply game theory, gamification and simulation. -discuss the different techniques of gamification. -explain the different gamification application areas. -thoroughly explore a case study of gamification. -design and development of a goal-based, computer game for learning
CSIQ	6853	Gamification	Gamification is the concept of applying game mechanics and game design techniques to engage and motivate people to achieve their goals. It is the application of game-design elements and game principles in non-game contexts.	QWA	Student will be able to: -apply game theory, gamification and simulation; -discuss the different techniques of gamification; -explain the different gamification application areas; -thoroughly explore a case study of gamification; and -design and development of a goal-based, computer game for learning.
CSIQ	6863	IT Project Management	Basic principles of Project Management, including: the differences between Project Management and IT Project Management, how to perform as a Project Manager and to be part of a project team in al the 9 knowledge areas of Project Management, using a Project Management software tool in order to manage an IT project.	QWA	Student will be able to: -Perform as a project manager.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIQ	8900	Computer Science and Informatics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Computer Informatics Systems, including: Research project in specialized field of Computer Informatics Systems as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CSIQ	9100	Computer Science and Informatics Thesis	This module contains fundamental knowledge, theories, principles and practices of Computer Informatics Systems, General including: Research project in specialized field of Computer Informatics Systems, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	QWA	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
CSIS	6808	Computer Information Technology Project	The development of a complete working computer project to solve a real life or theoretical problem.	MAIN	Student will be able to: -Design and create a complete working computer project; -Design and create a User Manual based on the project; -Design and create a Technical Manual based on the project; -Demonstrate the project to staff and students.
CSIS	6809	Computer Information Technology Research Project	The development of a complete working computer project to solve a real life or theoretical problem.	MAIN	Student will be able to: -Design and create a complete working computer project; -Design and create a User Manual based on the project; -Design and create a Technical Manual based on the project; -Demonstrate the project to staff and students.
CSIS	6813/ 6823	Introduction to Research	Guidance on how to conduct research in a structured, methodical manner, to analyze collected data and subsequently how to write a well-structured report/article.	MAIN	Student will be able to: -Provide an overview of the principles of conducting research; -Analyse collected data;and -Report on the data collected.
CSIS	6853	Capita Selecta	Capita Selecta	MAIN	No learning outcomes provided.
CSIS	7910	Extended Research Essay	Mini-dissertation based on one of the research areas in the Department of Computer Science & Informatics.	MAIN	Students will be able to : - Produce a mini-dissertation containing the following: -an introduction, literature study, problem statement, research questions, methodology, and research results after data gathering, as well as conclusions reached on one of the chosen research topics.
CSIS	7915	Human-Computer Interaction	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in Human-Computer Interaction, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a a document that contains an introduction and literature study based on the chosen research topic in Human-Computer Interaction, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7920	Extended Research Essay	Mini-dissertation based on one of the research areas in the Department of Computer Science & Informatics.	MAIN	Student will be able to : -Produce a mini-dissertation containing the following: -an introduction, literature study, problem statement, research questions, methodology, and research results after data gathering, as well as conclusions reached on one of the chosen research topics.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSIS	7925	Human-Computer Interaction	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in Human-Computer Interaction, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a a document that contains an introduction and literature study based on the chosen research topic in Human-Computer Interaction, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7935	Data Warehousing	This module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in data warehousing, as well as the problem statement and research questions of a possible mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a document that contains an introduction and literature study based on the chosen research topic in data warehousing, as well as the problem statement and research questions of a possible mini-dissertation that might flow from it.
CSIS	7945	Data Warehousing	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in data warehousing, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a document that contains an introduction and literature study based on the chosen research topic in data warehousing, as well as problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7955	Educational Technology	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in educational technology, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a document that contains an introduction and literature study based on the chosen research topic in educational technology, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7965	Educational Technology	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in educational technology, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a document that contains an introduction and literature study based on the chosen research topic in educational technology, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7975	Eye-tracking	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in eye-tracking, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a a document that contains an introduction and literature study based on the chosen research topic in eye-tracking, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7985	Eye-tracking	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in eye-tracking, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a a document that contains an introduction and literature study based on the chosen research topic in eye-tracking, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	8900	Computer Science and Informatics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Computer Informatics Systems, including: Research project in specialized field of Computer Informatics Systems as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

CENTRE FOR ENVIRONMENTAL MANAGEMENT (106)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Postgraduate					
ENMT	7900	Mini-Dissertation	This module contains fundamental knowledge, theories, principles and practices of Environmental Management, including: A research project, specialising in Environmental Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation or paper structure, grammatical and technical aspects of scientific writing.		The student should be able to: - Apply appropriate methods to address a clearly defined research problem. - Analyse and describe data in a clear and appropriate manner. - Present findings in a concise, coherent and logical sequence. - Interpret data in the context of previously published research. - Draw broader conclusions based on specific research findings. - Communicate research according to the highest academic standard using written and verbal media.
ENMT	7905	Research Methods	This module introduces students to the process of scientific research. During this module, the research process will be broken down into various sub-step: (1) identifying a tractable research problem relevant to environmental management, (2) interrogating this problem in the context of existing academic literature, (3) developing robust and appropriate methods to address the problem, (4) integrating this information into a coherent research proposal, and (5) understanding and considering the highest ethical standards during the whole research process. The purpose of this module is to prepare the students for the research component of this MSc degree.	MAIN	Student will be able to: -Identify and conceptualise a research problem; -Synthesise, integrate and critique appropriate academic literature; -Identify appropriate methods to solving a clearly-defined research problem; -Articulate a research strategy in a formal written proposal, which can be defended verbally; and -Prepare and submit an application for ethical clearance.
ENMT	7935	Introduction to Sustainability Science	This module describes the historical progression of sustainable development as the integration of economic, social, and environmental aspects. It is grounded on the concept of planetary boundaries, which describes the safe operating space for humanity. For each planetary boundary, students will (1) define indicators for the boundary, (2) identify critical thresholds of these indicators and (3) explore scale-dependencies in these indicators.	MAIN	The student should be able to: - Describe the historical progression of sustainable development as a concept. - Evaluate the concept of planetary boundaries as a framework of sustainable development. - Identify indicators of planetary boundaries. - Articulate critical thresholds for each of the planetary boundaries. - Critically analyse the scale-dependency of planetary boundaries.
ENMT	7965	Environmental Impact Assessment	This module focuses on environmental management best practice prior to environmental authorisation. It introduces students to legislation regulating the environmental authorisation process and describe advances in environmental assessment (land-use planning, strategic environmental assessments, environmental impact assessments and basic assessments).	MAIN	The student should be able to: - Discuss the environmental legislative framework that regulates the environmental authorisation process. - Apply the mitigation hierarchy to environmental impacts of development. - Judge the appropriateness of different assessment tools (for example land-use planning, SEA, EIA, public participation, social impact assessment, ecological impact assessment, risk assessment, etc.) for specific developments. - Outline the various steps of each environmental assessment tool. - Evaluate the need and appropriateness of environmental specialist studies during the environmental assessment process. - Synthesise multidisciplinary evidence to support the environmental decision-making process.
ENMT	7985	Environmental Management Systems	This module focuses on environmental management best practice after environmental authorisation has been obtained. It introduces students to legislation regulating the conditions of environmental authorisation and the value of environmental management systems. This includes the implementation and application of a process for monitoring and evaluating environmental impacts during the project life cycle, up until the point of project closure and post-development rehabilitation.	MAIN	The student should be able to: - Discuss the environmental legislative framework that regulates the environmental management process. - Demonstrate the value of EMS for managing environmental impacts and improving the efficiency of development projects. - Outline the characteristics of an effective EMS. - Analyse the features of an effective monitoring and evaluating systems for environmental impact.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
IWRM	7935	Water resources and environmental change	This module deals with the novel pressures being place on water management due to widespread and rapid environmental change. It begins by outlining the current availability of freshwater from surface and underground sources, and how this water is currently allocated to various different sectors internationally and nationally. It then explores how this current allocation is likely to be affected by increased human population growth, changing human consumption patterns, environmental pollution, climate change and habitat transformation. The purpose is to equip water managers with the ability to manage novel future pressures and maintain resilience in the water system.	MAIN	The student should be able to: - Analyse current freshwater availability from surface and underground sources nationally and internationally. - Classify the current allocation of freshwater to various sectors (i.e. domestic, industry, agriculture and ecosystems). - Describe how future pressures (i.e. population growth, urbanisation, consumption, pollution, climate change and habitat loss) will alter the allocation of future freshwater resources. - Evaluate management approaches to handle novel pressures to freshwater systems, to maintain socio-ecological resilience and mitigate the negative effects of water shortages.
IWRM	7965	Water Resources Management in Arid Environments	This module focusses on the management of natural surface and ground water resources in arid environments. Starting at the catchment scale, it describes how climate, topography, substrate, land-cover and human development affects the water cycle. It then explores how changes to the water cycle affects the quantity and quality of water in natural systems and how this, in turn, influences the integrity of natural ecosystems and the continued supply of ecosystem services.	MAIN	The student should be able to: - Describe the unique pressures on water management in arid environments. - Outline how climate, topography, substrate, land-cover and human development affects the flow regime. - Evaluate how changes to the water system affects the quality and quantity of water in natural systems. - Analyse how changes to the flow regime affect the integrity of ecosystems and how effective management can modulate these changes. - Demonstrate why managing ecological infrastructure is important for the continued supply of water in arid environments.
IWRM	7985	Water management in an urbanising world	This module focuses on how water needs can be met in urban environments. It begins by outlining international and national trends in urbanisation within the context of water security. Students will be exposed to management best practice of water supply to densely populated human settlement, including the treatment of water to drinking quality standards, the distribution of water to households and industries, and the treatment of wastewater from urban environments. Lastly, the module will introduce novel approaches to water recycling in urban areas in the form of Water Sensitive Urban Design (WSUD), in order to address the risk of water scarcity and related environmental disasters.	MAIN	The student should be able to: - Outline the unique pressures of supplying water in urban environments. - Discuss the legal obligations cities and town have to supply adequate water to citizens. - Describe the management principles of water treatment and distribution to households and industries. - Synthesise the characteristics to WSUD and how these can mitigate the risks of water shortages and floods.
IWRM	7900	Mini-dissertation	This module contains fundamental knowledge, theories, principles and practices of Integrated Water Management, including: A research project, specialising in Integrated Water Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation or paper structure , grammatical and technical aspects of scientific writing.	MAIN	The student should be able to: - Apply appropriate methods to address a clearly defined research problem. - Analyse and describe data in a clear and appropriate manner. - Present findings in a concise, coherent and logical sequence. - Interpret data in the context of previously published research. - Draw broader conclusions based on specific research findings. - Communicate research according to the highest academic standard using written and verbal media.
IWRR	7905	Research Methods	This module introduces students to the process of scientific research. During this module, the research process will be broken down into various sub-step: (1) identifying a tractable research problem relevant to environmental management, (2) interrogating this problem in the context of existing academic literature, (3) developing robust and appropriate methods to address the problem, (4) integrating this information into a coherent research proposal, and (5) understanding and considering the highest ethical standards during the whole research process. The purpose of this module is to prepare the students for the research component of this MSc degree.	MAIN	The student should be able to: - Identify and conceptualise a research problem - Synthesise, integrate and critique appropriate academic literature - Identify appropriate methods to solving a clearly-defined problem - Articulate a research strategy in a formal written proposal, which can be defended verbally - Prepare and submit an application for ethical clearance

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ENMT	8900	Environmental Management Dissertation	This module contains fundamental knowledge, theories, principles and practices of Environmental Management, including: Research project in specialized field of Environmental Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	The student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
ENMT	9100	Environmental Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Environmental Management, including: Research project in specialized field of Environmental Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing	MAIN	The student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
IWRM	5810	Introduction to Integrated Water Management	This module contains fundamental knowledge, theories, principles, and practices relating to integrated water resources (IWR) science, including topics such as the Integrated Water Resources Management paradigm, water governance, water security, multi-sector-use of water, population dynamics and water scarcity, the application of geographical information systems in water management, and the history of water management in Southern Africa.	MAIN	The student should be able to: - Demonstrate an understanding of the systemic nature of hydrological processes and the complex pathways linking the various components of the global hydrological cycle to the global ecosystem (soil and rocks, ground water, atmosphere, surface water, oceans, aquatic organisms, etc.) by applying this knowledge and understanding to develop, implement and manage integrated solutions to complex real-life water-related environmental problems; -Interrogate multiple sources from various disciplines, such as geology, pedology, atmospheric and aquatic sciences, ecology and resource economics, to evaluate and integrate knowledge from these disciplines and to apply this integrated understanding to develop creative responses to multifaceted water-related problems and issues within the present day legal and policy environment; - Consult and evaluate multiple knowledge sources, including quantitative and qualitative data, scientific reports, and strategies, policies and plans; - Identify, analyse and address complex or abstract problems as they relate to the resources and processes relevant to water resources management; - Critically review, synthesise, evaluate and manage information in order to develop creative responses to water-related problems and issues; - Participate in self-study activities, manage their own learning processes, effectively address their professional and ongoing learning needs, and demonstrate the ability to take full responsibility for their work, decision-making and use of resources; - Communicate ideas, solutions and conclusions to academic, professional and public audiences, verbally, in writing or by means of other media, and participate in interdisciplinary collaboration to solve and manage complex water-related problems.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
IWRM	5820	Integrated Water Resources Science	This module contains fundamental knowledge, theories, principles and practices relating to integrated water resources (IWR) science (e.g. resource integrity and its measurement; social and economic aspects of water), ecosystem components, drivers and indicators (e.g. meteorology, hydrology, geohydrology, chemistry, hydraulics, geomorphology, riparian vegetation, fish communities etc.), and technical aspects relating to pollution and rehabilitation, and waste water engineering.	MAIN	The student should be able to: - Demonstrate an understanding of the systemic nature of hydrological processes and the complex pathways linking the various components of the global hydrological cycle to the global ecosystem (soil and rocks, ground water, atmosphere, surface water, oceans, aquatic organisms, etc.) by applying this knowledge and understanding to develop, implement and manage integrated solutions to complex reallife water-related environmental problems; -Interrogate multiple sources from various disciplines, such as geology, pedology, atmospheric and aquatic sciences, ecology and resource economics, to evaluate and integrate knowledge from these disciplines and to apply this integrated understanding to develop creative responses to multifaceted water-related problems and issues within the present day legal and policy environment; - Consult and evaluate multiple knowledge sources, including quantitative and qualitative data, scientific reports, and strategies, policies and plans; - Identify, analyse and address complex or abstract problems as they relate to the resources and processes relevant to water resources management; - Critically review, synthesise, evaluate and manage information in order to develop creative responses to water-related problems and issues; - Participate in self-study activities, manage their own learning processes, effectively address their professional and ongoing learning needs, and demonstrate the ability to take full responsibility for their work, decision-making and use of resources; - Communicate ideas, solutions and conclusions to academic, professional and public audiences, verbally, in writing or by means of other media, and participate in interdisciplinary collaboration to solve and manage complex water-related problems.
IWRM	5846	Integrated Water Resources Management and Legislation	This module contains fundamental knowledge, theories, principles and practices relating to integrated water resources (IWR) science (e.g. relevant governance and legislation, as well as topics related to catchment management, water health, risk management and project management.	MAIN	The student should be able to: - Discuss, explain and analyse theories and terminologies relating to water health and risks, water governance, water policies, and relevant legislation in order to analyse real-life case studies and situations that relate to integrated catchment and risk management; - - Identify and take into consideration ethical issues, such as those involved in good governance, public participation and other relevant practices relating to legislation when applying appropriate tools and knowledge to matters relating to water management; - Consult multiple knowledge sources, including quantitative and qualitative data, scientific reports, and strategies, policies and plans, in order to critically, synthesise, evaluate and manage information, and develop creative responses to water health and risk problems and issues; - Communicate ideas, solutions and conclusions to academic, professional and public audiences, verbally, in writing or by means of other media, with regard to resource integrity, water availability and scarcity, water health risks, water drinking standards, waste and disaster management and to manage conflict that may arise from these issues; - Work effectively in an interdisciplinary team to solve complex water-related problems and to develop negotiating and conflict management skills.
IWRM	8900	Integrated Water Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Integrated Water Management, including: Research project in specialized field of Integrated Water Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	The student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
IWRM	9100	Integrated Water Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Integrated Water Management, including: Research project in specialized field of Integrated Water Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	The student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
LIMH	9100	Limnology Thesis (PhD)	This module contains fundamental knowledge, theories, principles and practices of Limnology, General including Research project in specialized field of Limnology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

GEOGRAPHY (107)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
GEOG	1512	Essential Skills For Geographers	In this module the students will use the following tools, Compasses, Fundalula software (esri), Ruler, Calculator, Basic Word functionality, Basic Excel functionality, Instrument box to draw, e.g. pie charts of population of the provinces of South Africa to demonstrate the ability use geospatial skills, reading and accessing different sources to obtain data, analyse it and produce written and oral presentations. This module will enable students lower mathematical performance levels to obtain the skills need to manage the mathematical demand in the geography modules	MAIN	The module offers an introduction to the working of the universe, solar system, earth, climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, and environmental geography. Practicals: Elementary cartography and the representation and interpretation of map data. After completing the module students will be able to: - Navigate an area using a map and compass, locate objects on a map in the study area (field) and analyse, read and interpret a map (identify places, how high/altitude, where/spatiality, to understand cross-sections); - Develop a map to scale, capture data in the field and express it on map; - Sketch a landscape/study site/city scape with descriptive annotations; - Identify informal versus formal city spatiality (the internal structure of cities); - Discuss different spatial and temporal scales and different spatial datasets and (e.g., soil, land use-landcover, climate, topography); - Describe different Geographical approaches ('tool boxes') used to gather information and spatial data; - Identify different between types of information sources, e.g. books, articles, reports etc., appropriate for the task required and read this scientific literature related to module content to conduct a introductory literature review; - Gather and condense information from different info sources (research and write a summative work); - Discuss the difference between types of writing style: scientific vs. technical report vs. argumentative writing; - Analyse the importance of current affairs (especially in Geography); - Apply principles of scientific methodology; - Apply basic numerical skills, basic lab etiquette, basic graphical skills, basic statistical skills and data transformational skills; and - Critically discuss human-and-nature interactions.
GEOG	1512	Essential Skills For Geographers	In this module the students will use the following tools, Compasses, Fundalula software (esri), Ruler, Calculator, Basic Word functionality, Basic Excel functionality, Instrument box to draw, e.g. pie charts of population of the provinces of South Africa to demonstrate the ability use geospatial skills, reading and accessing different sources to obtain data, analyse it and produce written and oral presentations. This module will enable students lower mathematical performance levels to obtain the skills need to manage the mathematical demand in the geography modules	QWA	The module offers an introduction to the working of the universe, solar system, earth, climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, and environmental geography. Practicals: Elementary cartography and the representation and interpretation of map data. After completing the module students will be able to: - Navigate an area using a map and compass, locate objects on a map in the study area (field) and analyse, read and interpret a map (identify places, how high/altitude, where/spatiality, to understand cross-sections); - Develop a map to scale, capture data in the field and express it on map; - Sketch a landscape/study site/city scape with descriptive annotations; - Identify informal versus formal city spatiality (the internal structure of cities); - Discuss different spatial and temporal scales and different spatial datasets and (e.g., soil, land use-landcover, climate, topography); - Describe different Geographical approaches ('tool boxes') used to gather information and spatial data; - Identify different between types of information sources, e.g. books, articles, reports etc., appropriate for the task required and read this scientific literature related to module content to conduct a introductory literature review; - Gather and condense information from different info sources (research and write a summative work); - Discuss the difference between types of writing style: scientific vs. technical report vs. argumentative writing; - Analyse the importance of current affairs (especially in Geography); - Apply principles of scientific methodology; - Apply basic numerical skills, basic lab etiquette, basic graphical skills, basic statistical skills and data transformational skills; and - Critically discuss human-and-nature interactions.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GEOG	2644	Biogeography and climate of Southern Africa	The module aimed at introducing learners to Biogeography and climatic processes affecting regional South African environment. It adopts a multi-disciplinary approach which looks at the interactions between the Biogeography and Climate and explains, in terms of systems theory, how the environment is modified and the role that humans have on these processes within the Southern African Context.	MAIN	Student will be able to: -Discuss how history of Biogeography and Climate shaped the environment of Southern Africa -Identify the Climatic indices and classifications in relation to the biogeography of southern Africa -Explain the factors responsible for climatic seasons of Southern Africa
GEOH	1624	Introduction to Human Geography	This module aims to introduce the student to basic Human Geography concepts divided into three themes: Cultural geography describes the origin of and spread of cultures, and differentiates between dominant, popular and folk culture using examples from our communities. Population geography describes population dynamics, economics and spread if disease. Urban Geography focusses on the development of and origin of rural and urban settlements, urbanisation, and informal settlements in cities. Practicals build on the basic map work and cartography principles introduced in the first semester and continue with advanced map interpretation, ellipsoids, datums, and map projections.	MAIN	Student will be able to: - Describe and discuss the scope of the discipline of Human Geography; - Discuss the roots and meaning of culture and culture hearths; - Define and discuss the dynamics of population growth and consider the implications of global geographies of disease; - Define and discuss the economic inequalities between and within countries; - Define and describe factors and concepts influencing rural and urban development and the movement of people; - Describe the interaction of people on the environment and critically reflect on human impacts on the environment; and - Interpret and analyse topographical maps.
GEOH	2614	Urban Geography	This is a human geography module that explores various urban theories and urban concepts involved in the social development planning of cities from a global perspective. Components of development: theoretical framework: development and criteria of measuring, spatial models, characteristics of third world countries, local development. Urban components: human settlements, spatial models, intra urban structure, urbanisation in first and third world context, impact of urbanisation on the physical and social environment, economic activities, residential function, housing and services, transport, social dynamics, institutional framework,problems and challenges of first and third world cities, case studies.Spatial analysis: theoretical, conceptual techniques of urban spatial analysis, statistical analysis of urban spaces from a quantitative perspective, comparative qualitative analysis of urban case studies.	MAIN	Student will be able to: - explain the causes of city development in terms of population and economic growth and decline; - explain triggers of rural-urban migration; - discuss the transport problems experienced in cities; - contextualize global environmental problems caused by, and experienced in, cities; - analyse housing for the urban poor and changing land-use patterns in cities; - conceptualize cities of the future; and - use conceptual tools and theoretical methods to solve / explain urbanization processes.
GEOH	3714	Applied Urban Development and Spatial Transformation	Geography of apartheid, inequality and post-apartheid, spatial transformation of urban areas, changing urbanisation processes and patterns and the spatial re-integration of the former homelands are topics of discussion in this module.	MAIN	Student will be able to: - analyse the geography of apartheid scientifically; - interpret the geography of inequality on a national, regional and local level; - examine the geography of post-apartheid and to be able to apply the concept; - critically analyse urbanisation and urban growth as spatial processes; - identify challenges associated with fast growing cities and to propose possible solutions; - critically analyse the spatial transformation of urban areas, to identify future challenges and to propose possible solutions in this regard.
GEOH	3724	Rural Geography	The course aims to provide the historical development of rural areas focusing on the policies that were active in creating the homelands. It investigates the debates centred around the marginalization of rural areas (social, economically and politically). Students are introduced to post-apartheid policies formulated to address the lack of development in former homelands as well addressing the issues of land administration in rural areas.	MAIN	Student will be able to: - Reflect on how betterment planning impacted on the development of rural areas using case studies; - Reflect on the social and economic impacts of betterment planning on the livelihoods of people in rural areas; - Explain the challenges and constraints experienced with regard to land reform; - Evaluate local economic development in rural areas; - Evaluate the developmental challenges experienced in former homelands; and - Assess the future of rural areas
GEOP	1514	Introduction to Physical Geography	The module offers an introduction to the working of the universe, solar system, earth, climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, and environmental geography. Practicals: Elementary cartography and the representation and interpretation of map data.	MAIN	Student will be able to: - Describe the basic factors and issues influencing weather and climate and be able to apply that knowledge to the South African situation; - Describe and discuss internal and external earth processes and apply the knowledge to the South African geomorphological landscape; - Describe the concepts influencing biogeography and the environment; and - Interpret topographical maps and do basic cartographical calculations
GEOP	2614	Process Geomorphology	The module builds on physical geography with a focus on geomorphological processes and landforms. This course deals with geomorphic processes and landforms in selected environments and relate it to humans by briefly highlighting some of the related hazards that pose risks to humanity.	MAIN	Student will be able to: - Identify relevant geomorphic processes at work in different environments; - explain how these processes create certain related landforms; - discuss what hazards some processes and landforms pose to humans; and - explain how geomorphologists monitor these processes.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GEOP	2624	Environment and climate studies	Environmental problems and causes, history of the use and conservation of resources, ecosystems and how they work, population dynamics and the influence on the environment, pollution and solid waste. Weather and climate systems of the Souhern hemisphere and climate variability.	MAIN	Student will be able to: • Identify and discuss the problems associated with resource use; • Discuss and identify environmental problems and their causes; • Identify and compare developmental options in terms of their environmental impacts; • Identify and interpret weather and climate systems that affect the South African situation; and • Assesses the link between environmental problems and climate variability.
GEOP	3714	Environmental Geomorphology	Students are familiarized with the development of geomorphology as a discipline in environmental management. More specifically, students are familiarized with applied geomorphology and micro-scale geomorphology, including soil geography and fluvial geomorphology. Latter focus on important hydrological processes such as hydrological and sedimentological connectivity, catchment response, water erosion processes, causes, assessment and control. Furthermore, aeolian processes including wind erosion processes, causes, assessment and control.	MAIN	Student will be able to: • Explain and compare micro-scale approaches used to reconstruct geomorphic history; • Identify properties that influence the development of soil and movement of soil water, as well as soil erodibility; • Evaluate the use of digital soil mapping as an approach to map soils; • Analyse and relate hydrological processes such as connectivity, catchment response; • Explain and compare water erosion processes, causes, assessment and control; • Explain and compare wind erosion processes, causes, assessment and control.
GEOP	3724	Environmental management and analysis	Environmental management as a broad field of study, with a focus on the South African situation. Processes and systems in the environment, envronmental management plans, integrated environmenta management procedures, environmental impact analyses, environmental auditing, evaluation models.	MAIN	Student will be able to: • Interpret South African environmental law; • Distinguish between various environmental management tools, and be able to evaluate the use of different environmental management options under various situations; • Apply various environmental management tools (EIA, SIA, EA, SEA); and • evaluate the effective use of environmental management tools in various case studies.
GEOG	3702	Geography Excursion	The module builds on the introductory modules covered in first and second years. Specifically, the module builds on various other modules in the programme including introduction to human geography, introduction to physical geography, introduction to spatial analysis and GIS and remote sensing. The focus is on providing students the opportunity to apply the acquired insights and skills to a specific real-life context. The excursion engages students in (1) learning to integrate the knowledge acquired in human and physical geography and (2) applying academic knowledge to practice and making sense of real-life situations. Students will need to draw upon their academic knowledge to understand the conflict region and similarly will be invited to question theoretical insights based on what they find out during the excursions.	MAIN	Student will be able to: •Explain the major physical and human geography features in the area(s) visited. •Connect different theoretical strands and concepts of human and physical geography in exploring and explaining the status quo in time and space. •Situate the theoretical debates to empirical field-work experiences in a designated geographic area.
GISC	3704	Professional practice, Ethics and legal aspects of Geographical Information Science	The module investigates professionalism and professional ethics in GIS, private practice, partnerships and relevant legislation. It further focusses on the SA geospatial profession, SA Geomatics Council (including all relevant legislation and rules). Social responsibility including topics on social issues in GIS such as public participation , data privacy, project management and participatory GIS are also discussed.	MAIN	Student will be able to: • Interpret the purpose of the Geomatics Act and other legislation pertaining to GISc Practice; • Apply and comment on the concepts of corporate strategy, budgeting, the pricing decision, decentralised control and standard costing as they relate to the processes of planning and control; • Assess and evaluate ethical conduct as expected from registered persons; and • Identify the ethical issues that typically arise in GISc Projects, evaluating existing codes of ethical conduct in various situations.
GERS	3714	Remote Sensing and Image Processing	This module aims to provide students with a working knowledge and skills to learn methods and techniques for collecting, processing and analysing remotely sensed data. This course will introduce fundamental concepts and techniques in the context of remote sensing and image processing for Earth observation from space. The course starts by introducing core concepts in remote sensing (describing the processes by which images are captured by sensors mounted on satellite and airborne platforms and key characteristics of the acquired images). Then, fundamental methodologies for processing, analysing, and visualising remotely sensed imagery are introduced. Topics include representation of high-dimensional remote sensing images, time and frequency domain representations, filtering and enhancement. The final part of the course will introduce Google Earth Engine, a cloud-based remote sensing and image analysis platform. Students will explore basic image processing techniques with Google Earth Engine. Practical applications will be provided throughout the course.	MAIN	Student will be able to: • Understand the different types of RS techniques and imageries. • Gain theoretical and practical knowledge of fundamental concepts and techniques for processing and analysing of remote-sensing images.
GERS	3724	Advanced Spatial analysis	Advanced spatial analysis of spatial data models. Applying and using different geospatial statistics. Presentation of information with the aid of different geospatial software and applications.	MAIN	Student will be able to: •Justify data collection and transfer techniques in relation to the analysis method; •Evaluate analytical methods used with different data models; •Be proficient in the use of different geospatial statistical applications; and •Develop, apply and report on a suitable methodology to solve a spatial analysis problem.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GEOP	1624	Introduction to Physical Geography	The module offers an introduction to the working of the universe, solar system, earth, climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, and environmental geography. Practicals: Elementary cartography and the representation and interpretation of map data.	QWA	Student will be able to: • Describe the basic factors and issues influencing weather and climate and be able to apply that knowledge to the South African situation; • Describe and discuss internal and external earth processes and apply the knowledge to the South African geomorphological landscape; • Describe the concepts influencing biogeography and the environment; and • Interpret topographical maps and do basic cartographical calculations
GEOH	1614	Introduction to Human Geography	This module aims to introduce the student to basic human Geography concepts including: Population dynamics, development of rural and urban settlements, urbanisation, agriculture and the provision of food, rural land use, sources of energy, and economic geography. Practicals build on the basic map work and cartography principles introduced in the first semester and continue with advanced map interpretation, ellipsoids, datums, and map projections.	QWA	Student will be able to: • Describe and discuss population dynamics and the movement of people and apply this knowledge to the South African situation; • Explain the factors and concepts influencing rural and urban development and land use and apply the knowledge to the South African situation; • Describe energy availability and economic geography and how these factors influence human movement; and • Interpret and analyse topographical maps and aerial photographs
GEOG	2614	Process Geomorphlogy	Fluvial geomorphology, hydrology and hydraulics, flow modelling, aeolian geomorphology, karst geomorphology, slopes and slope processes. .	QWA	Student will be able to: • Explain how geomorphic processes (i.e. fluvial, aeolian, karst and slope) shape/create landforms; • Compare and contrast the role of surface and subsurface processes in landscape development; • Discuss the interaction between landforms, geomorphic processes and human activities; • Defend why certain landscapes are not suitable for human activities; and • Propose a number of solutions on how certain landscapes should be managed
GEOP	2624	Environment and climate studies	Environmental problems and causes, history of the use and conservation of resources, ecosystems and how they work, population dynamics and the influence on the environment, pollution and solid waste. Weather and climate systems of the Souhern hemisphere and climate variability.	QWA	Student will be able to: • Identify and discuss the problems associated with resource use; • Discuss and identify environmental problems and their causes; • Identify and compare developmental options in terms of their environmental impacts; • Identify and interpret weather and climate systems that affect the South African situation; and • Assesses the link between environmental problems and climate variability.
GEOG	2644	Biogeography and climate of Southern Africa	The module aimed at introducing learners to Biogeography and climatic processes affecting regional South African environment. It adopts a multi-disciplinary approach which looks at the interactions between the Biogeography and Climate and explains, in terms of systems theory, how the environment is modified and the role that humans have on these processes within the Southern African Context.	QWA	Student will be able to: -Discuss how history of Biogeography and Climate shaped the environment of Southern Africa -Identify the Climatic indices and classifications in relation to the biogeography of southern Africa -Explain the factors responsible for climatic seasons of Southern Africa
GEOG	3704	Ethical debates in Geography	This course will examine many of the current major environmental issues related to the atmosphere, the hydrosphere, the lithosphere, and the biosphere as well as looking at major threats posed by the environment itself in the form of natural hazards. In addition, the issue of nuclear threat and the ever-increasing demand for energy are explored. It explores environmental materials in a variety of media and teaches students how to navigate these materials; how to analyze and evaluate information; how to balance information from a variety of scientific and non-scientific, objective and subjective sources; and how to develop arguments surrounding environmental problems. Finally, the matter of sustained development and intelligent management of the planet for this and future generations is addressed.	QWA	Student will be able to: • identify and discuss a number of major global, regional and local environmental issues and link them to contemporary socio-economic and political considerations while maintaining a geographical perspective -use basic environmental literacy, take part in informed debate and apply this skills to develop action plans
GEOG	3704	Ethical debates in Geography	This course will examine many of the current major environmental issues related to the atmosphere, the hydrosphere, the lithosphere, and the biosphere as well as looking at major threats posed by the environment itself in the form of natural hazards. In addition, the issue of nuclear threat and the ever-increasing demand for energy are explored. It explores environmental materials in a variety of media and teaches students how to navigate these materials; how to analyze and evaluate information; how to balance information from a variety of scientific and non-scientific, objective and subjective sources; and how to develop arguments surrounding environmental problems. Finally, the matter of sustained development and intelligent management of the planet for this and future generations is addressed.	MAIN	Student will be able to: • identify and discuss a number of major global, regional and local environmental issues and link them to contemporary socio-economic and political considerations while maintaining a geographical perspective -use basic environmental literacy, take part in informed debate and apply this skills to develop action plans

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GERS	1624	Introduction to Geoinformatics Systems and Remote Sensing	This module is designed for students who are interested in the spatial dynamics of the environment with a focus on Geographic Information Systems (GIS) and imagery analysis. The module introduces students to the basics of GIS and Remote Sensing (RS), visual perception, graphical presentation, elementary cartography and the representation and interpretation of map data, symbolisation, basic characteristics of remote sensors, and GIS and RS applications in academic disciplines and professional industries.	MAIN	After completing this module students will be able to: - Discuss the conceptual foundations and technical skills to apply Geographic Information Systems and Remote Sensing for problem-solving in the environment; - Interpret topographical maps and do basic cartographical calculations; and - Demonstrate the concepts and techniques of basic Geographic Information Systems and Remote Sensing practically.
GERS	2614	Introduction to Remote Sensing Applications	The module builds on the introductory part in the first year (GERS 1624) by looking in details at the history and practical applications of remote sensing for monitoring the Physical, Social and Human environments. Overview of study includes including but not limited to geography, climatology, geomorphology, hydrology, geology, engineering geology, soil science, environmental management, environmental science, development studies, urban systems and human settlement, planning, land management, civil engineering, mining, health, economics, disasters management, sustainable development, natural environmental systems (water, atmospheric, oceanographic, fauna/flora etc.), tourism, agriculture, ecology, biodiversity, conservation (natural or heritage), climate change.	MAIN	After successful completion of this module, students will be able to: • Understand applications of RS in different environments. • Be able to apply RS techniques on their own to a chosen subject. • Be able to recommend which RS data and tools could be used for different applications.
GERS	2624	Introduction to Spatial Analysis	Geographical data, and the computer, data collection, transfer and verification, data structures and databases, quality control, interpolation, basic spatial analysis and spatial modelling with raster and vector data, and the presentation of information with the aid of GIS, together with the management of a GIS. Coordinate transformations, projections-to-projection transformations.	MAIN	After successful completion of this module, students will be able to: • Evaluate data collection methods regarding the data quality; • Calculate coordinate and projection transformations • Be proficient in the use of a GIS software
Postgraduate					
BIOG	6826	Biogeography	Biogeography aims to understand the origin and distribution of species and the processes that cause them to change over time. The module introduces students to classic biogeographical theory and current research topics such as biological invasions and species distribution. In addition, the module will discuss how biogeographic information can be used to predict biological responses to future environmental change, and it will review concepts on biodiversity conservation.	MAIN	Students will be able to • compare the main theories underlying biogeographical research • describe the historical factors that influence current species distributions • analyse processes such as extinctions, biological invasion, and dispersal in interpreting biogeographical patterns • apply biogeographical concepts to a wide range of environmental problems
ENVG	6816	Environmental Policy and Practice	The course examines the nature of the environment, our environmental right and responsibilities towards nature and the environment. Subsequently, various environmental laws and the implications these have on environmental management are dealt with.	MAIN	Student will be able to: • Critically analyse the concept of nature and the environment; • Argue and motivate humanity's responsibility towards nature and the environment; • Identify and interpret various environmental laws pertaining to various environmental management tools; and • Apply various environmental laws to a case study.
ENVG	6846	Integrated Environmental Management	The module starts with an in depth discussion on sustainability, sustainable development and sustainable assessment which forms the background on which Integrated Environmental Management is based. The module continues to investigate various IEM tools including, EIA, EMS, SIA, SEA, etc. from an academic and theoretical point of view by trying to answer questions regarding the goal, achievement, success, quality and contribution towards sustainability.	MAIN	Student will be able to: • Critically evaluate and compare various sustainability theories and principles; • Critically analyse various IEM tools in terms of goal, success and quality; and • Critically analyse the contribution of various IEM tools towards sustainability
GEOF	6816	Theoretical Foundations of Geography	The module aims to familiarise students with philosophy of science in general, and the philosophy of geography in particular. It starts with a brief introduction to philosophy in general, the universe around us, and the general ethics behind scientific enquiry and research. It proceeds to examine the development of geographical thought and the evolution of the discipline. Conceptions in geography from the late seventeenth century, through positivism and into post modernism are assessed and evaluated.	MAIN	Student will be able to: • Formulate and express his or her own opinion based on philosophical principles and viewpoints, regarding Nature in general, and Geography in particular; • Identify and uphold responsible conduct as an essential part of "good" research; • Review and analyse the main trends in Geographical research over the past 20 years; and • Reflect on his or her own contribution to Geography as a discipline.
GEOH	6816	Urban Geography	The aim of this course is to understand the dynamic constitution of urban geography as a sub-discipline, as well as to gain insight into the relationship between past and present approaches to cities. Furthermore, this course aims to engage a selection of themes that represent significant foci in current urban geographical research. There is a central focus on what "ordinary cities" are, the core debates concerning "world cities", gentrification, gated communities and our "right to the city".	MAIN	Student will be able to: • Critically analyse and reflect on different historical and contemporary theoretical conceptualisations of cities; • Identify and critically analyse urban processes that shape contemporary urban places; and • Reflect on the relevance of historical and contemporary conceptualisations of the cities and the processes shaping them.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GEOH	6836	Rural Geography	The course aims to discuss spatial transformation of rural areas in South Africa from 1950s to the present. History of rural areas will be uncovered and debates on issues of the economy, betterment planning, background on homeland development and relocation camps in rural areas are discussed. Post-apartheid policies towards rural development that address issues of economy, society, politics and environment will be analysed. Finally, beyond the rural-urban divide, the role of women in rural-urban linkages is assessed.	MAIN	Student will be able to: • Assess the historical development of rural areas, • Evaluate the impact of post-apartheid policies on rural development, • Analyse land reform issues in South Africa, • Assess local economic development in rural areas, and • Evaluate the role of women in rural-urban linkages
GEOH	8900	Geography Dissertation	This module contains fundamental knowledge, theories, principles and practices of Geography, including: Research project in specialized field of Geography as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Displayed independent research skills and the ability to present the results in a dissertation written according to academic standards; -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEOH	9100	Geography Thesis	This module contains fundamental knowledge, theories, principles and practices of Environmental Management, including: Research project in specialized field of Environmental Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: Identify the problem Formulate a hypothesis Do independent planning and then conduct the experiments Analyse and interpret the results Discuss the results comprehensively Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEOP	6826	Applied Geomorphology	The module familiarise students with the role of geomorphology as an important branch of physical earth sciences. Specifically, the module deals with: Applied geomorphology in the context of land management, and in particular fluvial and aeolian processes; The combined application of GIS and remote sensing techniques, and in particular mapping and modelling of soils and erosion risk in South Africa; The development of twentieth and twenty first century geomorphology, including the shift to more process-oriented studies and a range of new methodologies (microgeomorphology) over the past few decades; Selected landforms that occur in a variety of environments, and investigate their development through past or present climate-driven processes as well as the materials & methods used to investigate and monitor these landforms; Discuss biological factors that act as landscape development agents; The future of process geomorphology - looking towards Mars.	MAIN	Student will be able to: • Critically analyse how the discipline of Geomorphology, and particularly the focus and approach to geomorphological research, has changed since the late nineteenth century; • Evaluate the role of remote sensing and GIS techniques in geomorphology; • Justify why Geomorphologists look at processes at the macro• and the micro-scale; and • Motivate the role that Geomorphologists play in identifying, assessing and managing problems in the physical environmental
GEOR	6808	Geography Research Report	This module includes deciding on a paradigm; using literature; writing an introduction; stating a purpose for the study; identifying research questions and hypotheses; using theory; defining, delimiting and stating the significance of the study and advancing methods and procedures for data collection and analysis. The objective of this course is to guide the research student through this process in a structured manner.	MAIN	Student will be able to: • Critically analyse the practical considerations that would influence the success of his/her research project; • Confidently prepare and present presentations regarding the progress of his/her project using appropriate technology; • Evaluate and appropriately address critique against the project; and • Present his/her research project in a well written report incorporating all aspects as discussed in the theory sessions, including the research findings, discussion of findings, drawing logical conclusions from the findings and linking it to published literature in the field of study.
GEOR	8900	Geography Disseration	This module contains fundamental knowledge, theories, principles and practices of Geography, including: Research project in specialized field of Geography as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Reflect critically on theory and its application -Deal with complex issues both systematically and creatively, -Design and critically appraise research, -Make sound judgement using data and information at their disposal -Communicate their conclusions clearly to specialist and non-specialist audiences -Demonstrate self-direction and originality in tackling and solving problems, -Act autonomously in planning and implementing tasks with a theoretical underpinning and continue to advance their knowledge, understanding and skills.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GEOR	9100	Geography Thesis	This module contains fundamental knowledge, theories, principles and practices of Geography, including: Research project in specialized field of Geography, as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure; and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
GISC	6816	Spatial analysis and modelling	Organising concepts of geospatial analysis and their methodological context, core components of geospatial analysis including distance and directional analysis, geometrical processing, map algebra and grid models, the use of exploratory spatial data analysis and spatial statistics, spatial auto correlation and spatial regression, surface analysis, interpolation and analysis of form, network and locational analysis, geocomputational methods such as cellular automata, agent based modelling, neural networks and genetic algorithms.	MAIN	Student will be able to: • Appraise various geo-analytical methods and techniques with reference to the contextual background of spatial analysis and modelling; • Construct suitable analytical models for the solution of spatial problems; • Motivate and apply suitable statistical techniques in the analysis of spatial data; and • Develop and deploy suitable methods for the solution of geocomputational problems.
GISC	8900	Geographical Informatic Sience Disseration	This module contains fundamental knowledge, theories, principles and practices of GIS, including: Research project in specialized field of GIS as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: • Identify the problem; • Formulate a hypothesis; • Do independent planning and then conduct the experiments; • Analyse and interpret the results; • Discuss the results comprehensively; • Compile the information according to a specified dissertation structure; and • Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GISC	9100	Geography Thesis	Geography This module contains fundamental knowledge, theories, principles and practices including: Research project in the specialized field of Geographical Information Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GISR	6826	Remote Sensing and Image processing	Topics for discussion include the fundamentals of remote sensing, elements and basic principles of photogrammetry, visual image interpretation, multispectral, thermal and hyperspectral sensing, recourse satellites such as Landsat and Spot as well as microwave and radar sensing. Basic practical procedures include image rectification and enhancement, contrast and spatial manipulation and various classification methods.	MAIN	Student will be able to: • Differentiate and undertake various calculations relating to photogrammetry; • Analyse various methods used in image interpretation; • Compare and critique Landsat and Spot; as well as high versus low resolution remote sensing systems; and • Successfully complete software based calculations, processes and manipulations of images.
GEOR	6808	Research Report in Geography	This module includes deciding on a paradigm; using literature; writing an introduction; stating a purpose for the study; identifying research questions and hypotheses; using theory; defining, delimiting and stating the significance of the study and advancing methods and procedures for data collection and analysis. The objective of this course is to guide the research student through this process in a structured manner.	QWA	Student will be able to: • Critically analyse the practical considerations that would influence the success of his/her research project; • Confidently prepare and present presentations regarding the progress of his/her project using appropriate technology; • Evaluate and appropriately address critique against the project; and • Present his/her research project in a well written report incorporating all aspects as discussed in the theory sessions, including the research findings, discussion of findings, drawing logical conclusions from the findings and linking it to published literature in the field of study.
GEOG	6814	Intermediate geographic information systems	This module aims to provide a working knowledge of GIS to students with little or no previous experience of the science After successful completion of the module, the student should have a thorough knowledge of the basic principles of Geographic Information Systems and be able to do simple data import, processing, analyses and presentation on a computer. The student will have basic cartographic and surveying skills; be able to identify features on photographs; and have basic knowledge of satellite images and image processing.	QWA	Student will be able to: • Examine possibilities and constraints of a GIS and Remote Sensing is; • Identify and collect the most suitable data for specific objectives; • Apply GIS and Remote Sensing to different projects ; • Plan and execute a GIS and Remote Sensing project, and • Use a GIS and Remote Sensing programme.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GEOF	6816	Theoretical Foundations of Geography	The module aims to familiarise students with philosophy of science in general, and the philosophy of geography in particular. It starts with a brief introduction to philosophy in general, the universe around us, and the general ethics behind scientific enquiry and research. It proceeds to examine the development of geographical thought and the evolution of the discipline. Conceptions in geography from the late seventeenth century, through positivism and into post modernism are assessed and evaluated.	QWA	Student will be able to: • Formulate and express his or her own opinion based on philosophical principles and viewpoints, regarding Nature in general, and Geography in particular; • Identify and uphold responsible conduct as an essential part of 'good' research; • Review and analyse the main trends in Geographical research over the past 20 years; and • Reflect on his or her own contribution to Geography as a discipline
ENVG	6816	Environmental policy and Practice	The course examines the nature of the environment, our environmental right and responsibilities towards nature and the environment. Subsequently, various environmental laws and the implications these have on environmental management are dealt with.	QWA	Student will be able to: • CriticalLy analyse the concept of nature and the environment; • Argue and motivate humanitys responsibility towards nature and the environment; • Identify and interpret various environmental laws pertaining to various environmental management tools; and • Apply various environmental laws to a case study
GEOP	6836	Applied Geomorphology	Students are familiarised with: the development of nineteenth, twentieth and twenty first century geomorphology, the move towards process-oriented studies and new methodologies (micro-geomorphology) , southern African geomorphology and the Quaternary of southern Africa, the geomorphology of semi-arid and arid southern Africa, including the Free State province, applied geomorphology in the context of land management in the Free State and its impacts on landforms and the agricultural base.	QWA	Student will be able to: • Critically analyse how the discipline of Geomorphology, and particularly the focus and approach to geomorphological research, has changed since the late nineteenth century; • Explain how process geomorphology and historical geomorphology inform each other; • Evaluate the role of remote sensing and GIS techniques in geomorphology; • Justify why Geomorphologists look at processes at the macro• and the micro-scale; and • Motivate the role that Geomorphologists play in identifying, assessing and managing problems in the physical environmental.
ENVG	6846	Integrated Environmental Management	The module starts with an in depth discussion on sustainability, sustainable development and sustainable assessment which forms the background on which Integrated Environmental Management is based. The module continues to investigate various IEM tools including, EIA, EMS, SIA, SEA, etc. from an academic and theoretical point of view by trying to answer questions regarding the goal, achievement, success, quality and contribution towards sustainability.	QWA	Student will be able to: • Critically evaluate and compare various sustainability theories and principles; • Critically analyse various IEM tools in terms of goal, success and quality; and • Critically analyse the contribution of various IEM tools towards sustainability
GEOG	8900	Geography : Disseration	This module contains fundamental knowledge, theories, principles and practices of Geography, including: Research project in specialized field of Geography as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: • Identify the problem; • Formulate a hypothesis; • Do independent planning and then conduct the experiments; • Analyse and interpret the results; • Discuss the results comprehensively; • Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and • Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEOG	9100	Geography Thesis	This module contains fundamental knowledge, theories, principles and practices of Geography, General including: Research project in specialized field of Geography, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student should be to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GISC	6816	Spatial analysis and modelling	Organising concepts of geospatial analysis and their methodological context, core components of geospatial analysis including distance and directional analysis, geometrical processing, map algebra and grid models, the use of exploratory spatial data analysis and spatial statistics, spatial auto correlation and spatial regression, surface analysis, interpolation and analysis of form, network and locational analysis, geocomputational methods such as cellular automata, agent based modelling, neural networks and genetic algorithms.	QWA	Student will be able to: • Appraise various geo-analytical methods and techniques with reference to the contextual background of spatial analysis and modelling; • Construct suitable analytical models for the solution of spatial problems; • Motivate and apply suitable statistical techniques in the analysis of spatial data; and • Develop and deploy suitable methods for the solution of geocomputational problems.
GISR	6826	Remote Sensing and Image processing	Topics for discussion include the fundamentals of remote sensing, elements and basic principles of photogrammetry, visual image interpretation, multispectral, thermal and hyperspectral sensing, recourse satellites such as Landsat and Spot as well as microwave and radar sensing. Basic practical procedures include image rectification and enhancement, contrast and spatial manipulation and various classification methods.	QWA	Student will be able to: • Differentiate and undertake various calculations relating to photogrammetry; • Analyse various methods used in image interpretation; • Compare and critique Landsat and Spot; as well as high versus low resolution remote sensing systems; and • Successfully complete software based calculations, processes and manipulations of images.

GEOLOGY (108)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
GLGY	1614	Introduction to Geology	- Introduction to geology and planet Earth; Structural geology and plate tectonics; Mineralogy and crystallography; Petrology and classification of rocks; Weathering, erosion and deposition; Metamorphism; Mineral and energy resources; Groundwater resources; Geologic time; Sustainable development in relation to the Earth system; Geomorphology - Practical: Identification of 6 crystal systems using idealised crystal models; How to use a hand lens; Macroscopic characteristics of ~40 minerals (list to be supplied); Identification and description of common rocks.	MAIN	Student will be able to: -Describe processes acting on and in the Earth including execution of processes to solve problems and explain natural phenomena related to minerals, rocks and geological process -Recognise and classify minerals, rocks and geological structures;and -Evaluate, select and apply appropriate methods, procedures and/or techniques in processes of investigation or application within a defined context.
GLGY	1624	General Geology and South African Stratigraphy	Revision of the following topics: Structural geology, Plate tectonics, Mineralogy, Igneous rocks and processes, Sedimentary rocks and processes, Metamorphic rocks and processes; Introduction to palaeontology; Geological time: Principles of stratigraphy, Geological time scale, Relative and radiometric age determination; Stratigraphy of South Africa (from the Archean to the Holocene) Practical: Macroscopic characteristics of ~40 minerals (list to be supplied); Identification of common rocks; Study of representative rock samples from different stratigraphic units in South Africa; Common South African fossils (1 practical); Basic map exercises (latitude / longitude, topographic maps, map scales, legends, magnetic north versus true north, basic geological maps)	MAIN	Student should be able: -Explore and explain natural geological processes active in, on and under the Earth's crust; -Apply the basic skills and techniques to identify, compile and interpret geological processes and phenomena; -Explore the stratigraphy and associated rocks and fossils of Southern Africa -ID common rocks, give macroscopic descriptions of 40 minerals; -ID common South African fossils.
GLGY	2612	Practical Mineralogy	Practical: The study of hand specimens (120 samples); Crystallography (idealised crystal models); Introduction to the petrographic microscope; The role of light in optical mineralogy; Snell's Law; Optical properties of minerals; Sketching of observations; Microscopic study of the following minerals: Quartz, feldspar, calcite, biotite, muscovite, garnet, andalusite, sillimanite, kyanite, staurolite, olivine, amphiboles, pyroxenes, serpentine, chlorite, sodalite, leucite, nepheline	MAIN	Student will be able to: - Identify minerals in hand specimens; - Use a petrographic microscope and identify minerals under the microscope; and - Identify crystal structures and lattices and discuss and present on these structures.
GLGY	2614	Mineralogy	Properties and chemical composition of minerals; Crystallography; Analytical techniques used in mineralogy (XRD, XRF, SEM, TEM, EMPA, SIMS, LA-ICP-MS); Systematic mineralogy; Gemstones	MAIN	Student will be able to: -Identify minerals; -Identify Crystal systems and lattices; -Identify Physical properties; -Identify Chemical properties; -Discuss the difference between rock-forming and ore minerals and their implication; and -Discuss and apply the theoretical principles of crystallography and the crystal chemistry of ore and rock-forming minerals.
GLGY	2626	Sedimentology	- Physical characteristics, mineralogical composition and classification of sedimentary rocks; sedimentary structures; transport and deposition of sediments; diagenesis; the fossil record; depositional environments; sedimentary facies analysis; stratigraphy; analysis of selected depositional basins in Southern Africa; the reconstruction of Gondwana - Practical: Physical and mineralogical properties of sedimentary rocks; classification of sedimentary rocks and their sedimentary structures; basic palaeontology; paleogeographic reconstruction	MAIN	Student will be able to: - Discuss and apply processes, which operate on the surface of the Earth and will also be able to identify the products of these processes; - Interpret all stratigraphic data in a competent manner in order to forecast where minerals and rocks of economic and strategic importance could occur; and -Examine and discuss sedimentology and sedimentological principles. Practical: - Compile and interpret sedimentological maps; - Measure and compile geological profiles; - Log borehole core and compile geological profiles; and - Study sedimentary units and reconstruct the palaeo depositional environment.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGY	2632	Geological Field Techniques	Practical: Basic map reading (Relief; scales; dates; coordinates & map projections; magnetic declination; elements of a geological map); Measurement of geological features (Using a GPS; compass; hammer; hand lens; magnet; measuring planes and lines) Sampling (Hand samples and thin sections; geochemistry; geochronology; taking oriented samples); Preparation for field work (Field work ethics; field work safety; equipment; defining the objectives; deciding where to go; determining your position; scale and regional context); Aerial photographs and Google Earth; Use of magnetometer, Grid mapping; Measuring profiles with a Jacob Staff and Abney level; construction of stratigraphic profiles; Compilation of a geological map; Report writing; Core logging.	MAIN	Student will be able to: - Discuss and apply techniques that may be employed in field-based geological analyses - Apply theoretical knowledge on a practical basis - Map areas geologically, measure profiles, make geological observations and write reports.
GLGY	2641	Geology for Engineers (Practical)	Description and identification of the most common rock forming minerals, their applications in industry and the environmental impacts associated with their extraction and use Identification and description of the different rock types (igneous, sedimentary and metamorphic) and an investigation of their textural properties and the influence thereof on their suitability for construction and civil engineering applications Exposure to groundwater resources in South Africa, practical exposure to pump tests as well and the interpretation of groundwater quality. Exposure to waste management practices and a visit to waste disposal facilities in Bloemfontein.	MAIN	Student will be able to: - Describe and apply the basic principles related to natural processes; - Describe the influence of these processes on man and his environment and the influence of man on the environment; and - Apply theoretical knowledge with sound judgement to identify and manage geological hazards. - Be able to interpret data with sound judgement and discuss the observations in a report
GLGY	2643	Environmental Geology	-Introduction to Environmental Geology; The Earth; Structural Geology and Plate Tectonics; Mineralogy with a focus on environmental issues (e.g. acid mine drainage, silicosis, asbestosis, clay minerals etc.); Petrology with a focus on the engineering properties of rocks; weathering, erosion and pedogenesis; geomorphology with a focus on karst topography and the formation of sinkholes; geohydrological principles; groundwater (dewatering, water quality and pollution); introduction to environmental geochemistry; applications of geochemistry in mineral exploration; pollution; geological hazards; volcanism; slope stability; construction and the environment and waste management.	MAIN	Student will be able to: - Describe and apply the basic principles related to natural processes; - Describe the influence of these processes on man and his environment and the influence of man on the environment; and - Apply theoretical knowledge with sound judgement to identify and manage geological hazards. - Be familiar with the practical techniques in the identification of heavy metal pollution. - Be able to interpret data with sound judgement and discuss the observations in a report.
GLGY	2646	Environmental Geology: Principles and Practical	- Introduction to Environmental Geology; The Earth; Structural Geology and Plate Tectonics; Mineralogy with a focus on environmental issues (e.g. acid mine drainage, silicosis, asbestosis, clay minerals etc.); Petrology with a focus on the engineering properties of rocks; weathering, erosion and pedogenesis; geomorphology with a focus on karst topography and the formation of sinkholes; geohydrological principles; groundwater (dewatering, water quality and pollution); introduction to environmental geochemistry; applications of geochemistry in mineral exploration; pollution; geological hazards; volcanism; slope stability; Practical: - Description and identification of the most common rock forming minerals, their applications in industry and the environmental impacts associated with their extraction and use - Identification and description of the different rock types (igneous, sedimentary and metamorphic) and an investigation of their textural properties and the influence thereof on their suitability for construction and civil engineering applications - Exposure to groundwater resources in South Africa, practical exposure to pump tests as well and the interpretation of groundwater quality. - Exposure to waste management practices and a visit to waste disposal facilities in Bloemfontein.	MAIN	Student will be able to: - Describe and apply the basic principles related to natural processes; - Describe the influence of these processes on man and his environment and the influence of man on the environment; and - Apply theoretical knowledge with sound judgement to identify and manage geological hazards. - Be familiar with the practical techniques in the identification of heavy metal pollution. - Be able to interpret data with sound judgement and discuss the observations in a report
GLGY	2652	Geological structures and maps	Practical: Interpretation of geological maps and structures; Basic techniques used to construct geological sections; Vertical exaggeration in geological sections; Interpretation of geological structures with the help of structural contours; Three point problems; Construction of geological sections without strike lines; Horizontal strata, dipping strata, unfonformities, folds and faults on geological maps and in geological sections; Basic trigonometry applied to geological maps and sections	MAIN	Student will be able to: - Interpret geological structures and maps; - Apply the basic principles and techniques used in the construction of sections; and - Apply theoretical knowledge to practical problems with sound judgement
GLGY	2662	Field School	Practical: Stratigraphic relationships, occurrences and origin of rocks; development of fieldwork skills; using the geological compass; mapping of rocks in the field; profiles and traverses	MAIN	Student will be able to: - Identify and classify rocks and minerals in nature - Apply theoretical knowledge with sound judgement - Understand the stratigraphic relationships of different geological units with one another

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGY	3714	Igneous Petrology	- Melt formation and factors influencing melt composition; macroscopic features of igneous rocks and their use in classification; classification of igneous rocks with special emphasis on the IUGS-scheme; igneous textures and the stories they tell; the phase rule; the interpretation of T-X phase diagrams in binary systems under equilibrium conditions during heating & cooling; the interpretation of T-X phase diagrams in ternary systems under equilibrium conditions during heating & cooling; volcanism & intrusion; specific rocks, their occurrence and genesis: basalts, granites, andesites, alkaline igneous rocks, kimberlites & ultrapotassic igneous rocks, anorthosites, ultramafic igneous rocks; igneous differentiation and layered intrusions with special reference to the Bushveld Complex - Practical: A study of the more common igneous rocks in hand specimen and with the aid of the petrographic microscope	MAIN	Detailed learning outcomes are contained in the module study guide. At the end of this module, students will be able to: - Classify igneous rocks according to IUGS recommendations. - Appreciate and discuss the variability of the chemical, mineralogical and textural characteristics of igneous rocks and the reasons for them. - Effectively use the petrographic microscope in the study of igneous rocks and igneous petrogenesis. - Interpret binary and ternary phase diagrams as an aid to the understanding of melting and crystallization in igneous systems.
GLGY	3724	Economic Geology	- Igneous ore forming processes; magmatic-hydrothermal ore forming processes; hydrothermal ore forming processes; sedimentary and surficial ore forming processes; tectonics and ore-forming processes - Practical: Ore description and evaluation in hand specimen; core logging; ore reserve estimation	MAIN	Student will be able to: - Discuss and apply the ore-forming processes under different conditions and in different environments, how ore deposits form in the evolving Earth system and global tectonics. - Evaluate ore deposits and to make educated recommendations regarding the exploitation of the ore-body.
GLGY	3734	Structural Geology	- Stress; strain; deformation; mechanical behaviour of rocks; foliation& cleavage; lineations; folds; shear zones; faults; joints; stress and strain equations and the Mohr diagram; tectonic settings; Anderson theory of faulting - Practical: Balanced cross sections; fold projections and block diagrams; stereonets; strain analysis; geological maps in structural analysis; remote sensing in structural analysis; description and classification of S and L tectonites; descriptionand classification of folds	MAIN	Student will be able to: - Discuss and apply the principles and techniques associated with structural geology; - Apply this knowledge conceptually and practically for the purpose of a professional geological service; and - Develop suggested proposal to display readiness for independent post-graduate studies.
GLGY	3744	Metamorphic petrology	- Introduction to metamorphism; metamorphic minerals; the metamorphic facies concept; the process of metasomatism; chemographic representation of metamorphism; the phase rule and its application to metamorphic rocks; metamorphic textures and what they tell us; tectonothermal history of metamorphic terranes; deformation of metamorphic rocks; metamorphism of specific protoliths (mafic igneous rocks, pelites, carbonates) - Practical: A study of the more common metamorphic rocks in hand specimen and with the aid of the petrographic microscope	MAIN	Student will be able to:- Discuss the role the process of metamorphism plays in determining rock properties and which properties may be instrumental in unravelling the geological history (ore history) of an area; - Differentiate between the various metamorphic rocks and be able to apply internationally acceptable names to these rocks; and - Proceed with the mapping of metamorphic terrains
GLGY	3754	Introduction to Geochemistry	- Formation of the elements and elemental abundances; chemical differentiation in the Solar System; meteorites and the "chondritic Earth"; geochemical classification of elements; Goldschmidt's rules and partition coefficients; Igneous geochemistry (Isochron geochronology; radiogenic isotope differentiation; fractionation of O isotopes in magmas; classification using geochemistry; normalised multi-element plots (e.g. REE); deduction of plate tectonic settings using geochemistry); Sedimentary geochemistry (Chemostratigraphy; source identification; weathering; radiogenic damage dating); Metamorphic rocks (Thermobarometry; metasomatism; concordias and Ar-Ar dating) - Practical: Calculation of mineral formulae; CIPW and Niggli norms; geochronological calculations and applications; isotope evolution diagrams; plotting of geochemical data (binary, ternary and multi-component); research techniques and presentation of research results	MAIN	Student will be able to: -Discuss and explain distribution of elements in rocks; -Discuss and describe the classification schemes for elements and their applications; - Apply the application of distribution coefficients in geochemical interpretation; - Apply the principles and basic applications of geochronology and isotope geochemistry; -Define and discuss geothermobarometry and its application; -Define and discuss the basic applications of geochemistry on sedimentary cycles;and -Formulate and interpret the calculations of mineral formulas and normative mineralogy, using major element oxide data.
GLGY	3764	Mining and Exploration Geology	- Mineral resources and the mining cycle; Geology of types of mineral deposits; Mineral resource exploration stages; Mineral deposit models; Exploration methods; Mineral resource evaluation; Sampling; Grade determination; Ore reserve estimation; Resource extraction; Surface mining; Underground mining; Drilling and blasting; Mineral processing; Managing environmental impact. - Practical: Geological compass overview and exercises; recording of geological data in the field; using field data to generate a map; advanced cross-section generation; field mapping techniques; interpretation of geochemical datasets; interpretation of core logs.	MAIN	Student will be able to: - Analyze varying geological datasets in modern context for the purpose of resource exploration. - Predict likely factors that will influence the outcomes of an exploration project. - Describe the components of a successful open cast and underground mine. - Interpret mining geology data for the purpose of furthering mine development and productivity.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGY	3774	Analytical Geochemistry	- Sampling for geochemical purposes; sample preparation for mineralogical and geochemical techniques; interaction of EM radiation with matter; signals and noise; Overview of analytical methods (wet chemical techniques; infrared techniques; UV-VIS spectroscopy; X-ray techniques (wavelength and energy dispersive techniques); NAA; AAS and AES; In-situ techniques (EMPA, SEM, PIXE, MLA, TEM); Mass spectrometry (SIMS, SHRIMP, TIMS)); choosing the right analytical technique; quantification of analytical data (statistics, accuracy and precision, use of standards, calibrations and blanks etc.); the SAMREC code and its influence on analytical geochemistry - Practical: Spatial plots and identification of anomalies; gravimetric analysis to determine LOI; use of handheld XRF technologies; mass spectrometry applications and interpretation of data; Practical demonstrations: Sample preparation, electron microscopy, X-ray fluorescence spectrometry etc.	MAIN	Student will be able to: - Reduce geochemical data in a sensible way for application to geological problems; - Prepare rocks for chemical analysis, especially by XRF; - Assess the quality of geochemical data; - Describe the role of the geologist within the mineral beneficiation cycle; - Discuss and apply the principles on which instrumental spectrometry is based; - Separate dense and magnetic minerals from a silicate matrix; and - Write a geochemical report and present conclusions.
GLGY	3784	Environmental Geochemistry	- Box models and geochemical cycles; laws of thermodynamics and Le Chatelier's Principle; acids, bases, dissociation of water and pH; redox reactions; Eh-pH diagrams and mineral stability; the role of micro-organisms in redox reactions; C geochemistry and hydrocarbon pollution; radioactivity and the radiometric dating of water; CHONS isotopes and their applications (mass dependent); atmospheric geochemistry; clay minerals, asbestos, amorphous silica and zeolites; mineral – water interactions; ocean geochemistry; environmental impacts of fossil fuels and nuclear fuels; fracking; the Oklo natural reactor and radioactive waste disposal - Practical: Construction of Eh-pH diagrams; IUPAC naming; using isotopic data for dating and tracing; calculation of delta values; CO_2 emission volume calculations; AMD calculations; water diagrams; chemical index of alteration (CIA) calculations	MAIN	Student will be able to: - Apply pH-Eh reactions in water and soils and the ability to construct and interpret simple pH-Eh diagrams; - Discuss air chemistry and possible causes of atmospheric pollution; - Outline the manipulation water chemistry; - Describe the effects of mining and associated contamination on the natural environment, especially acid mine drainage; - Describe trace element distribution of typical soil profiles and the effect of grain size on concentration; - Familiarity with the most important factors that lead to toxicity in the natural environment and its rehabilitation; and - Discuss the application of isotopes in environmental geochemistry.
Postgraduate					
GECE	9100	Geochemistry Thesis	This module contains fundamental knowledge, theories, principles and practices of Geochemistry, General including Research project in specialized field of Geochemistry, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
GLGA	7913	Overview of Geology, Mining, Metallurgy and Business Processes	This module introduces learners to the different functional disciplines through an overview of the important principles of Mineral Resource Management in strategic, tactical and operational environments, each in the different functional areas. The functional areas include geology, mining, beneficiation (plant), marketing, finance, human resources, plant maintenance, planning and scheduling, budgeting, maintenance and supporting processes, which in turn help to develop an adequate level of understanding in each of the functional areas and the interdependencies between functional areas present in the production environment with specific emphasis on product production, income, costs and market demand.	MAIN	Student will be able to: - Discuss and apply the fundamental concepts and principles of Geology, Mining, Metallurgy and Business Processes and the interdependency between these processes in the mining value chain. - Access, evaluate and synthesise scientific information. - Generate scientific information. - Communicate scientific understanding in writing and orally.
GLGA	7923	Overview of Geology, Mining, Metallurgy and Business Processes	This module introduces learners to the different functional disciplines through an overview of the important principles of Mineral Resource Throughput Management in strategic, tactical and operational environments, each in the different functional areas. The functional areas include geology, mining, beneficiation (plant), marketing, finance, human resources, plant maintenance, planning and scheduling, budgeting, maintenance and supporting processes, which in turn help to develop an adequate level of understanding in each of the functional areas and the interdependencies between functional areas present in the production environment with specific emphasis on product production, income, costs and market demand.	MAIN	Student will be able to: - Discuss and apply the fundamental concepts and principles of Geology, Mining, Metallurgy and Business Processes and the interdependency between these processes in the mining value chain. - Access, evaluate and synthesize scientific information. - Generate scientific information. - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGA	7933	Mineral Resource Management I (Methodology)	This module highlight the principles and methodology of Mineral Resource Management through the identification and quantification of process variables. The development of a business process concept with emphasis on product delivery, cost, income and market demand for the strategic, tactical and operational environments. Included are strategic evaluation of the long-term environment, as well as management and control of operations in terms of the budget and short-term plan. To enable learners to apply MRM principles to a business analysis with the purpose of identifying variables and dependencies that impact product delivery. To align the variables through planning and operations processes of the functional areas as a single business process.	MAIN	Student will be able to: - Describe MRM principles; - Apply MRM principles in a mining business analysis; - Identification and alignment of variables and dependencies impacting mining value chain performance; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGA	7943	Mineral Resource Management I (Methodology)	This module highlight the principles and methodology of Mineral Resource Management through the identification and quantification of process variables. The development of a business process concept with emphasis on product delivery, cost, income and market demand for the strategic, tactical and operational environments. Included are strategic evaluation of the long-term environment, as well as management and control of operations in terms of the budget and short-term plan. To enable learners to apply MRM principles to a business analysis with the purpose of identifying variables and dependencies that impact product delivery. To align the variables through planning and operations processes of the functional areas as a single business process.	MAIN	Student will be able to: -Explain MRM principles -Apply MRM principles in a mining business analysis -Identify and align variables and dependencies impacting mining value chain performance -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGA	7953	Applied Geology	This module assists the student with the identification of the influence of geological variables in the Mineral Resource Management environment in terms of the exploitation needs in the longterm and production environments. The learners will be lectured in the application of geology and geological information to the total production process to achieve optimum ore-utilisation through the application of a product focus. To enable the learner to determine and quantify variables pertaining to ore and ore- body morphology that has a critical influence on product delivery and profit. To equip the learner to structure and apply geological information in the Mineral Resource Management environment in order to better exploit the resource and utilise information to do target driven grade control.	MAIN	Student will be able to: - Identify of geological variables impacting mining value chain performance; - Identify of ore and ore body morphological factors impacting mining value chain performance; - Use geological data and information within the MRM context to improve ore extraction and grade control; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGA	7963	Applied Geology	This module assists the student with the identification of the influence of geological variables in the Mineral Resource Management environment in terms of the exploitation needs in the longterm and production environments. The learners will be lectured in the application of geology and geological information to the total production process to achieve optimum ore-utilisation through the application of a product focus. To enable the learner to determine and quantify variables pertaining to ore and ore- body morphology that has a critical influence on product delivery and profit. To equip the learner to structure and apply geological information in the Mineral Resource Management environment in order to better exploit the resource and utilise information to do target driven grade control.	MAIN	Student will be able to: -Identify of geological variables impacting mining value chain performance; -Identify of ore and ore body morphological factors impacting mining value chain performance; -Use geological data and information within the MRM context to improve ore extraction and grade control; -Access, evaluate and synthesise scientific information; -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGA	7973	Applied Mining	This module teaches the students to develop and apply condition-driven standards in mine planning, scheduling and production management and control. Methods to determine the influence of “run-of-mine” quality on plant efficiency and product delivery. Exposure to the quantification, application and relevance of mining information to the production process (beneficiation, stockpile management). Included are the effects of maintenance performance and strategy in terms of condition-driven standards. The learner will be exposed to methods to align the “run-of-mine” volume and quality with the plant process, as well as determine the impact of variable ore and ore body morphology on the budget, economic evaluations and ore reconciliation. The practical application of the concepts in a production environment to optimise and improve income and profit on a daily basis will be emphasised.	MAIN	Student will be able to: - Develop and apply condition-driven standards in mine planning, scheduling and production management and control; - Determine the influence of “run-of-mine” quality on plant efficiency and product delivery; - Quantify and apply mining information to the production process (beneficiation, stockpile management). Included are the effects of maintenance performance and strategy in terms of condition-driven standards; - Align the “run-of-mine” volume and quality with the plant process, as well as determine the impact of variable ore and ore body morphology on the budget, economic evaluations and ore reconciliation; - Apply these concepts in a production environment to optimise and improve income and profit on a daily basis will be emphasised; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGA	7983	Applied Mining	This module teaches the students to develop and apply condition-driven standards in mine planning, scheduling and production management and control. Methods to determine the influence of “run-of-mine” quality on plant efficiency and product delivery. Exposure to the quantification, application and relevance of mining information to the production process (beneficiation, stockpile management). Included are the effects of maintenance performance and strategy in terms of condition-driven standards. The learner will be exposed to methods to align the “run-of-mine” volume and quality with the plant process, as well as determine the impact of variable ore and ore body morphology on the budget, economic evaluations and ore reconciliation. The practical application of the concepts in a production environment to optimise and improve income and profit on a daily basis will be emphasised.	MAIN	Student will be able to: -Develop and apply condition-driven standards in mine planning, scheduling and production management and control. -Determine the influence of run-of-mine quality on plant efficiency and product delivery. -Quantify and apply mining information to the production process (beneficiation, stockpile management). Included are the effects of maintenance performance and strategy in terms of condition-driven standards. -Sign the run-of-mine volume and quality with the plant process, as well as determine the impact of variable ore and ore body morphology on the budget, economic evaluations and ore reconciliation. -Apply these concepts in a production environment to optimise and improve income and profit on a daily basis will be emphasised. -Access, evaluate and synthesise scientific information. -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGB	7913	Applied Metallurgy	This module introduces learners to the influence of plant conditions and standards on the long-term and production environments, with particular focus on product range, will be examined using Mineral Resource Management principles. The value of beneficiation information when focusing on adding value to the production process (beneficiation, stockpile management and product specifications) will be highlighted as well as the way in which the information is used to achieve optimum product delivery. To equip the learner to identify, structure and apply the process variables in terms of the influence on product delivery, production cost and income by using beneficiation information. The learner will be exposed to methods to align the process, process efficiency, plant feed quality and optimum yield to determine which critical variables have to be managed.	MAIN	Student will be able to: - Identify plant conditions and standards that impact the long-term and production environments, with particular focus on product range; - Discuss the value of beneficiation information when focusing on adding value to the production process (beneficiation, stockpile management and product specifications) as well as the way in which the information is used to achieve optimum product delivery; - Structure and apply the process variables in terms of the influence on product delivery, production cost and income by using beneficiation information; - Align plant processes, process efficiencies, plant feed quality and product recovery/ yield; - Determine which critical variables have to be managed; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGB	7923	Applied Metallurgy	This module introduce learners to the influence of plant conditions and standards on the long-term and production environments, with particular focus on product range, will be examined using Mineral Resource Management principles. The value of beneficiation information when focussing on adding value to the production process (beneficiation, stockpile management and product specifications) will be highlighted as well as the way in which the information is used to achieve optimum product delivery. To equip the learner to identify, structure and apply the process variables in terms of the influence on product delivery, production cost and income by using beneficiation information. The learner will be exposed to methods to align the process, process efficiency, plant feed quality and optimum yield to determine which critical variables have to be managed.	MAIN	Student will be able to: - Identify plant conditions and standards that impact the long-term and production environments, with particular focus on product range; - Discuss the value of beneficiation information when focusing on adding value to the production process (beneficiation, stockpile management and product specifications) as well as the way in which the information is used to achieve optimum product delivery; - Structure and apply the process variables in terms of the influence on product delivery, production cost and income by using beneficiation information; - Align plant processes, process efficiencies, plant feed quality and product recovery/ yield; - Determine which critical variables have to be managed; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGC	7913	MRM Implementation Practices	The applicability of project management as a major critical performance area in sustainable Mineral Resource Management will be examined and discussed. The module will emphasise the practical application of TOC thinking processes in structuring projects on how to deal with the challenges in implementing MRM in a mining operation. Examples and exercises will be presented in the course to equip learners to design, implement and operate a Mineral Resource Management programme.	MAIN	Student will be able to: - Discuss applicability of project management as a major critical performance area in sustainable Mineral Resource Management; - Describe the practical application of TOC thinking processes in structuring projects on how to deal with the challenges in implementing MRM in a mining operation; - Equip learners to design, implement and operate a Mineral Resource Management programme; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGC	7923	MRM Implementation Practices	The applicability of project management as a major critical performance area in sustainable Mineral Resource Management will be examined and discussed. The module will emphasise the practical application of TOC thinking processes in structuring projects on how to deal with the challenges in implementing MRM in a mining operation. Examples and exercises will be presented in the course to equip learners to design, implement and operate a Mineral Resource Management programme.	MAIN	Student will be able to: -Outline the applicability of project management as a major critical performance area in sustainable Mineral Resource Management. -Explain the practical application of TOC thinking processes in structuring projects on how to deal with the challenges in implementing MRM in a mining operation. -Equip learners to design, implement and operate a Mineral Resource Management programme. -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGC	7933	MRM Information Practices	Availability of flow information is an important component for sustainable Mineral Resource Management. This module will examine all the key elements of data structures, recording challenges, validation issues and presentation. The question of information provision to management structures and the timeliness impact on the mining value chain will be examined. Examples and exercises will be presented in the course to equip learners to understand, identify, implement and manage the flow information environment for the mining value chain.	MAIN	Student will be able to: - Identify all the key elements of data structures, recording challenges, validation issues and presentation; - Discuss the requirements of information provision to management structures and the timeliness impact on the mining value chain will be examined; - Identify, implement and manage the flow information environment for the mining value chain; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGC	7943	Mineral Resource Management Information Practices	Availability of flow information is an important component for sustainable Mineral Resource Management. This module will examine all the key elements of data structures, recording challenges, validation issues and presentation. The question of information provision to management structures and the timeliness impact on the mining value chain will be examined. Examples and exercises will be presented in the course to equip learners to understand, identify, implement and manage the flow information environment for the mining value chain.	MAIN	Student will be able to: - Identify all the key elements of data structures, recording challenges, validation issues and presentation. -Outline the requirements of information provision to management structures and the timeliness impact on the mining value chain will be examined. -Identify, implement and manage the flow information environment for the mining value chain. -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGC	7953	MRM Organizational Change Practices	Change management and practices are often misunderstood and methodologies are used with little visible return on investment. The reason is that typical training approaches are neither appropriate nor effective within this environment. The subject-matter will be examined and discussed in four broad areas under the heading of enterprise resource alignment. These areas are strategy and guidance mapping, mobilisation, enablement and performance, and competence tracking. The process methodologies and how they apply within Mineral Resource Management will be discussed. Practical and simplistic management procedures to ensure HR optimisation are imparted for continuous measurable results. To equip the learner to understand the broad change management issues applicable when implementing MRM. The learner will be enabled to identify critical performance areas of change management, to design a basic change management strategy and learn how to execute that strategy.	MAIN	Student will be able to: - Obtain visible return on investment on succesful implementation of the MRM principles. - Describe the role of enterprise resource alignment within mining and the MRM context. - Implement change through strategy and guidance mapping, mobilisation, enablement and performance, and competence tracking. - Ensure HR optimization through practical and simplistic management procedures - Discuss the broad change management issues applicable when implementing MRM. - Identify critical performance areas of change management, to design a basic change management strategy and learn how to execute that strategy. - Access, evaluate and synthesise scientific information. - Generate scientific information. - Communicate scientific understanding in writing and orally.
GLGC	7963	MRM Organizational Change Practices	Change management and practices are often misunderstood and methodologies are used with little visible return on investment. The reason is that typical training approaches are neither appropriate nor effective within this environment. The subject-matter will be examined and discussed in four broad areas under the heading of enterprise resource alignment. These areas are strategy and guidance mapping, mobilisation, enablement and performance, and competence tracking. The process methodologies and how they apply within Mineral Resource Management will be discussed. Practical and simplistic management procedures to ensure HR optimisation are imparted for continuous measurable results. To equip the learner to understand the broad change management issues applicable when implementing MRM. The learner will be enabled to identify critical performance areas of change management, to design a basic change management strategy and learn how to execute that strategy.	MAIN	Student will be able to: -Obtain visible return on investment on succesful implementation of the MRM principles; -Explain the role of enterprise resource alignment within mining and the MRM context; -Implement change through strategy and guidance mapping, mobilisation, enablement and performance, and competence tracking; -Ensure HR optimization through practical and simplistic management procedures; -Discuss the broad change management issues applicable when implementing MRM; -Identify critical performance areas of change management, to design a basic change management strategy and learn how to execute that strategy; and -Access, evaluate and synthesise scientific information. Generate scientific information. Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGC	7973	Virtual Mining: Simulation and Optimisation	This module covers the design of a cost and production simulation model based on the total production process (reserve to market). The simulation model will incorporate relevant variables and dependencies. Strategic, tactical and operational planning and budgeting will be addressed in terms of the variables and condition-driven standards, as well as the application of the model in an operational management and control environment. To equip the learner to build strategic, tactical and operational simulation models. To enable the learner to apply simulation models in the management and process control environments.	MAIN	Student will be able to: -Design cost and production simulation models based on the total production process (reserve to market).Identify relevant variables and dependencies to be used in strategically, tactical and operational planning and budgeting. -Develop and use condition-driven standards in financial modelling and simulation. -Apply financial models in an operational management and control environment. -Build strategic, tactical and operational simulation models. -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGC	7983	Virtual Mining: Simulation and Optimisation	This module covers the design of a cost and production simulation model based on the total production process (reserve to market). The simulation model will incorporate relevant variables and dependencies. Strategic, tactical and operational planning and budgeting will be addressed in terms of the variables and condition-driven standards, as well as the application of the model in an operational management and control environment. To equip the learner to build strategic, tactical and operational simulation models. To enable the learner to apply simulation models in the management and process control environments.	MAIN	Student will be able to: -Design cost and production simulation models based on the total production process (reserve to market). Identify relevant variables and dependencies to be used in strategically, tactical and operational planning and budgeting. -Develop and use condition-driven standards in financial modelling and simulation. -Apply financial models in an operational management and control environment. -Build strategic, tactical and operational simulation models. -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGD	7900	Mineral Resource Management Mini Dissertation	This module contains fundamental knowledge, theories, principles and practices of of Mineral Resource Management. The research project stretches over a year under the guidance of a supervisor. The topic is selected in consultation with the supervisor and in collaboration with the departmental chair. The supervisor and an external examiner will evaluate the research dissertation.	MAIN	Student will be able to: - Discuss and apply principles of fundamental concepts, principles and processes of mining and MRM principles; - Access, evaluate and synthesise scientific information; - Generate scientific information; - Solve scientific problems; and - Communicate scientific understanding in writing and orally.
GLGD	7913	Mineral Resource Management II (Advanced)	The methodology for the evaluation of strategic drivers for the total production process are discussed. The variables to be evaluated include quality and reliability of information, dilution, production rate, mining method, etc. and how these variables influence one another as well as the final product quality, quantity and cost. In the production environment, the identification and implementation of working procedures for grade control, an ore balance sheet, ore-utilisation and measurement of production rate, system availability and utilisation are covered. Determination of economically recoverable ore and its associated processes will also be included.	MAIN	Student will be able to: - Identifiy and implement working procedures for grade control, an ore balance sheet, ore-utilisation and measurement of production; - Determine economically recoverable ore according to MRM principles; - Identify the critical business process variables through evaluation of a production process; - Design and implement suitable business changes to enhance value; - Evaluate the influence of variables on final product volume and quality and production cost in the production process; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGD	7923	Mineral Resource Management II (Advanced)	The methodology for the evaluation of strategic drivers for the total production process are discussed. The variables to be evaluated include quality and reliability of information, dilution, production rate, mining method, etc. and how these variables influence one another as well as the final product quality, quantity and cost. In the production environment, the identification and implementation of working procedures for grade control, an ore balance sheet, ore-utilisation and measurement of production rate, system availability and utilisation are covered. Determination of economically recoverable ore and its associated processes will also be included.	MAIN	Student will be able to: -Identify and implement working procedures for grade control, an ore balance sheet, ore-utilisation and measurement of production. -Determine economically recoverable ore according to MRM principles -Identify the critical business process variables through evaluation of a production process. -Design and implement suitable business changes to enhance value. -Evaluate the influence of variables on final product volume and quality and production cost in the production process. -Access, evaluate and synthesise scientific information. -Generate scientific information.Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGD	7933	Geological Modelling and Applied Geo-Statistics	The importance of accurate and reliable geological information to the short-term mine schedule and production environment is significant. In the mining environment, the most important information is contained in the geological models. Understanding the role of geo-statistics in Mineral Resource Management and how it is used to determine optimum ore-utilisation and product delivery is imperative. The learner is empowered to ensure that relevant and accurate geological information is made available to all role players in the production process to enable them to make better decisions.	MAIN	Student will be able to: -Explain the importance of accurate and reliable geological information to the short-term mine schedule and production environment; -Outline the role of geo-statistics in Mineral Resource Management and how it is used to determine optimum ore-utilisation and product delivery; -Use geo-statistical approaches strategically to optimise ore-utilisation and maximise product delivery in the long-term; -Make relevant and accurate geological information available to all role players in the production process to enable them to make better decisions; -Access, evaluate and synthesise scientific information; -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGD	7943	Geological Modelling and Applied Geo-Statistics	The importance of accurate and reliable geological information to the short-term mine schedule and production environment is significant. In the mining environment, the most important information is contained in the geological models. Understanding the role of geo-statistics in Mineral Resource Management and how it is used to determine optimum ore-utilisation and product delivery is imperative. The learner is empowered to ensure that relevant and accurate geological information is made available to all role players in the production process to enable them to make better decisions.	MAIN	Student will be able to: -Explain the importance of accurate and reliable geological information to the short-term mine schedule and production environment; -Outline the role of geo-statistics in Mineral Resource Management and how it is used to determine optimum ore-utilisation and product delivery; -Use geo-statistical approaches strategically to optimise ore-utilisation and maximise product delivery in the long-term; -Make relevant and accurate geological information available to all role players in the production process to enable them to make better decisions; -Access, evaluate and synthesise scientific information; -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGE	7913	Capita Selecta	Capita selecta	MAIN	Capita selecta
GLGE	7923	Capita Selecta (course place holder)	Capita selecta (course place holder)	MAIN	Capita selecta
GLGE	7933	Mining Throughput Accounting and Modelling	Application of throughput accounting, so that the learner understands how to calculate and make operational financial decisions that guarantee/deliver the required financial returns. Learning what determines optimal profitability, cash-flow and a healthy balance sheet as applied to daily and practical operational performance and improvement decisions, considering efficiencies and productivity. Understanding what necessary inputs are required, why, where and how to obtain it. Basic understanding of financial statements and how it is used in financial decisionmaking. Making of decisions that are based on financial statements and where these decisions lead to. Learn how to define a goal (its boundaries), what should be evaluated and the function and purpose of assumptions in financial models.	MAIN	Student will be able to: - Apply the basics of throughput accounting; - Calculate and make operational financial decisions that guarantee/deliver the required financial returns; - Describe what determines optimal profitability, cash-flow and a healthy balance sheet as applied to daily and practical operational performance and improvement decisions, considering efficiencies and productivity; - Apply the basics of financial statements and what they mean; - Define a goal (its boundaries) and what should be evaluated and the function and purpose of assumptions; - Create a relevant operational financial decision model, and to calculate this into a net profit, with some basic simulation scenarios for investment ranking; - Utilise MS Excel with some practical examples to decide whether an investment or change should either proceed or not; - Discuss what differentiates cash-flow and net profit, and apply it; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGE	7943	Mining Throughput Accounting and Modelling	Application of throughput accounting, so that the learner understands how to calculate and make operational financial decisions that guarantee/deliver the required financial returns. Learning what determines optimal profitability, cash-flow and a healthy balance sheet as applied to daily and practical operational performance and improvement decisions, considering efficiencies and productivity. Understanding what necessary inputs are required, why, where and how to obtain it. Basic understanding of financial statements and how it is used in financial decisionmaking. Making of decisions that are based on financial statements and where these decisions lead to. Learn how to define a goal (its boundaries), what should be evaluated and the function and purpose of assumptions in financial models.	MAIN	Student will be able to: -Apply the basics of throughput accounting -Calculate and make operational financial decisions that guarantee/deliver the required financial returns. -Explain what determines optimal profitability, cash-flow and a healthy balance sheet as applied to daily and practical operational performance and improvement decisions, considering efficiencies and productivity. -Explain the basics of financial statements and what they mean. -Define a goal (its boundaries) and what should be evaluated and the function and purpose of assumptions. -Create a relevant operational financial decision model, and to calculate this into a net profit, with some basic simulation scenarios for investment ranking. -Utilise MS Excel with some practical examples to decide whether an investment or change should either proceed or not. Explain what differentiates cash-flow and net profit, and how to apply it. -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGE	7953	MRM Risk Practices	Application of risk management principles as applied to the minerals industry. To equip the learner with sufficient knowledge, background and understanding of what a risk is and practical tools to identify and evaluate risks typically encountered in the mining industry. Risks that could hamper the performance of the production process and the implementation of the MRM programme will be highlighted. The learner will further be exposed to risk management principles that could ensure a safe and healthy working environment.	MAIN	Student will be able to: - Describe what a risk is; - Identify and evaluate risks typically encountered in the mining industry; - Apply risk management principles in the minerals industry; - Discuss how risks could hamper the performance of the production process and the implementation of the MRM programme; - Discuss and apply risk management principles that could ensure a safe and healthy working environment; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGE	7963	MRM Risk Practices	Application of risk management principles as applied to the minerals industry. To equip the learner with sufficient knowledge, background and understanding of what a risk is and practical tools to identify and evaluate risks typically encountered in the mining industry. Risks that could hamper the performance of the production process and the implementation of the MRM programme will be highlighted. The learner will further be exposed to risk management principles that could ensure a safe and healthy working environment.	MAIN	Student will be able to: -Explain what a risk is; -Identify and evaluate risks typically encountered in the mining industry; -Apply risk management principles in the minerals industry; -Describe how risks could hamper the performance of the production process and the implementation of the MRM programme; -Apply risk management principles that could ensure a safe and healthy -working environment; -Access, evaluate and synthesise scientific information; -Generate scientific information; abd -Communicate scientific understanding in writing and orally.
GLGE	7973	Modern Mining Supply Chain Principles	An overview of the traditional and MRM-adjusted supply chain principles and mining supply chain optimisation through systems and business process integration, internal and external collaborative planning and studying the interlinked nature of downstream processes with the ore characteristics and what can be done about it. A case study is discussed to aid the learner in identifying and exploring the hurdles in supply chain optimisation. Understanding and applying supply chain management principles will maximize the current and future profitability of the organisations. The mining supply chain management module aims to highlight the key aspects of the process of optimizing the flow of materials, intermediary and final products throughout the chain of operations.	MAIN	Student will be able to: - Discuss and apply the traditional and MRM-adjusted supply chain principles; - Discuss and apply the mining supply chain optimisation through systems and business process integration, internal and external collaborative planning and studying the interlinked nature of downstream processes with the ore characteristics and what can be done about it; - Identify and explore the hurdles in supply chain optimisation; - Apply supply chain management principles to maximize the current and future profitability of an organisation; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGE	7983	Modern Mining Supply Chain Principles	An overview of the traditional and MRM-adjusted supply chain principles and mining supply chain optimisation through systems and business process integration, internal and external collaborative planning and studying the interlinked nature of downstream processes with the ore characteristics and what can be done about it. A case study is discussed to aid the learner in identifying and exploring the hurdles in supply chain optimisation. Understanding and applying supply chain management principles will maximize the current and future profitability of the organisations. The mining supply chain management module aims to highlight the key aspects of the process of optimizing the flow of materials, intermediary and final products throughout the chain of operations.	MAIN	Student will be able to: - Discuss and apply the traditional and MRM-adjusted supply chain principles; - Discuss and apply the mining supply chain optimisation through systems and business process integration, internal and external collaborative planning and studying the interlinked nature of downstream processes with the ore characteristics and what can be done about it; - Identify and explore the hurdles in supply chain optimisation; - Apply supply chain management principles to maximize the current and future profitability of an organisation; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGE	8900	Environmental Geology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Environmental Geology, including: Research project in specialized field of Environmental Geology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.The candidate will present at least one seminar/ research report in each year in accordance with departmental regulations.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GLGE	9100	Environmental Geology Thesis	This module contains fundamental knowledge, theories, principles and practices of Environmental Geology, General including Research project in specialized field of Environmental Geology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GLGY	6801	Skills development and ethics for geoscience professionals	This module is an attendance based module in which students will be exposed to the skills needed to work as professionals within geoscience. The knowledge, skills and attitudes of students will be honed by exposing them to enrichment activities not covered as part of other modules presented within the honours programmes presented by the department. The module is aimed at generating students that will be committed to continued professional development and ethical behaviour as geoscience professionals.		Student will be able to: - Act ethically as geoscience professionals; - Understand the importance of deadlines and punctuality as geoscience professionals; - Examine the importance of continued professional development and lifelong learning. - Understand the role of the individual in teams formed around the pursuance of a common goal.
GLGY	6808	Research Report Geology	Identifying a research project and formulating a research question; consultation of primary literature relevant to the chosen topic of inquiry; consideration of research ethics and development of an appreciation of the scientific method; generation of data relevant to a specific research project; development of critical reading and scientific writing skills; presentation of research data in a final report; reaching conclusions that are grounded on the data collected; identifying (where necessary) the need for further research.	MAIN	Student will be able to: - Explain, explore and apply fundamental concepts and principles of Geology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGY	6816	Plate Tectonics	Origin of the Solar System and planetary tectonics; origin and evolution of the Earth; Archaean plate tectonics; crust formation processes through time; theory of the modern plate tectonics; plate movements and triple junctions; continental graben systems; passive and active continental margins; mid-ocean ridges, hot spots, and flood basalts; subduction zones; transform faults; continental drift, the Wilson cycle, and supercontinents through time; mineral deposits, igneous, metamorphic and sedimentary processes within the framework of plate tectonics and meteorite impacts.	MAIN	Student will be able to: - Connect all geological processes, as well field, geophysical, structural and geochemical observations to the theory of plate tectonics in a holistic approach; - Provide evidence of the acquisition of sophisticated theoretical and practical insight of Geoscience as a discipline in light of plate tectonics; - Examine and apply interpretative procedures, critical appreciation of literature and independent analysis of information and observed field, geophysical, (micro) structural, geochemical, mineralogical and remote sensing data in support of conclusions and interpretations. - Demonstrate skills in the oral and written presentation of reviews of scientific geoscience literature and its critical discussion, aided by slide presentations, posters, and technical reports/essays. - Prepare and format reference lists and demonstrate the ability to distinguish between scientific and popular (non-scientific) sources.
GLGY	6823	Advanced Sedimentology	Theory: Concepts of scale in sedimentology (spatial and temporal); Basin analysis; topical issues in sedimentology; relative sea level; coal and hydrocarbons. Practical: Sedimentological profiling, data acquisition; reporting and interpreting geophysical logs. Basic Basin modelling.	MAIN	Student will be able to: - Outline the fundamental concepts and principles of Sedimentology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6863	Advanced economic and exploration geology	Exploration techniques; use of indicator minerals in mineral exploration; ore resource and reserve estimation; drilling practice. Practical: Visits to South African mineral deposits and mining operations; thin section description and interpretation; practical resource / reserve estimation (manual and computer-based)		Student will be able to: -Describe, discuss and explain fundamental concepts and principles of Economic and Exploration Geology; - Access, evaluate and synthesise scientific information; -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGY	6836	Advanced and Applied Mineralogy	Calculation of complex mineral formulae; determination of specific gravity (theory); heavy mineral separation and zircon picking (theory); thin and thick section preparation (theory); ore microscopy (theory); X-ray Diffractometry (theory); crystallographic stereonet measurements (goniometry) and construction. Practical: SG determination; electron microscopy; X-ray Fluorescence and X-ray Diffractometry; zircon extraction (magnetic separation, Wilfley table, stereo microscopy); transmitted and reflected light microscopy.	MAIN	Student will be able to: - Outline fundamental concepts and principles of mineralogy. - Discuss, and explain fundamental concepts and principles of applied mineralogy and process mineralogy. - Have a thorough knowledge of the theoretical principles underlying and practical exposure to the analytical techniques commonly used in mineralogical investigations applied to ore and rock-forming minerals, including optical mineralogy, chemical techniques, crystallographic techniques and physical properties measurements. - Generate, evaluate and synthesise scientific information. - Communicate scientific concepts orally and in writing.
GLGY	6843	Advanced Geochemistry	Analytical methods for isotope determination; radioactive isotopes and their uses in geochemistry; deep Earth geochemistry; stable isotope geochemistry; applications of isotope studies to ores; applications of isotope studies to sedimentary and metamorphic rocks; surface geochemistry. Practical: Semester project and practical exercises using real datasets		Student will be able to: - Outline fundamental concepts and principles of Geochemistry; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6853	Advanced Igneous Petrology	Interpretation of phase diagrams (under equilibrium conditions & conditions of fractional crystallization); variation diagrams and the use of major element data; introduction to trace element modeling as applied to igneous rocks; the application of isotopes in igneous petrology; selected topical themes in igneous petrology.	MAIN	Detailed learning outcomes are contained in the module study guide. At the end of this module, students will be able to: - Effectively use a variety of methods available to the igneous petrologist in interpreting the genesis of igneous rocks. - Read a selection of primary texts in igneous petrology with comprehension.
GLGY	6856	Advanced Structural Geology	Principles and techniques of structural geology and applications thereof; planning and execution of structural mapping projects; collection, interpretation, processing and presentation of structural data. Practical: Surface and underground geological and structural mapping	MAIN	Student will be able to: - Examine and apply fundamental concepts and principles of Structural Geology and Processes; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GLGY	6873	Advanced Environmental Geochemistry	Environmental geochemical processes; environmental geochemical systems (sources and sinks); sampling and laboratory analysis; data analysis; Legislative context (Geochemical risk assessments, waste classification, water contamination assessments, soil contamination assessments); geochemical modelling; basic equilibrium thermodynamics; box models (as applied to mine water and salt balances and global geochemical cycling); enrichment factors and environmental pollution (backgrounds, baselines and thresholds). Practical: Practical geochemical assessment project based on real datasets	MAIN	Student will be able to: - Examine and apply the concepts and practical application of conceptual and numeric geochemical modelling from an equilibrium thermodynamic point of view as well as global element cycling.
GLGY	6883	Capita Selecta	This module is an introduction to the geophysical methods commonly used for geological investigations and mineral exploration. It will focus on providing the students with an understanding of the physical principles on which the various geophysical methods are based, and how these methods may be applied to gain information on the subsurface conditions. The module will furthermore introduce students to the planning and execution phases of geophysical surveys, as well as the processing and analyses of geophysical data. Although the module will focus on the magnetic, resistivity, electromagnetic, gravimetric and seismic methods, it will include an introduction to other commonly used geophysical methods.	MAIN	Student will be able to: - Describe the physical principles on which various geophysical methods operate; - Explain key concepts of the various geophysical techniques most commonly used in geological studies; - Plan and execute geophysical surveys with various geophysical techniques; and - Process, analyse and interpret geophysical data in terms of the local geological conditions.
GLGY	8900	Geology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Geology, including: Research project in specialized field of Geology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GLGY	9100	Geology Thesis	This module contains fundamental knowledge, theories, principles and practices of Geology, General including Research project in specialized field of Geology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

INSTITUTE FOR GROUNDWATER STUDY (109)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Postgraduate					
GEHI	8900	Geohydrology Interdisciplinary Dissertation	This module consists of a research project that the student must complete under guidance of his/her supervisor.	MAIN	Student will be able to: -Displayed independent research skills and the ability to present the results in a dissertation written according to academic standards -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEHI	9100	Thesis Geohydrology Interdisciplinary	This module consists of a research project that the student must complete under guidance of his/her supervisor.	MAIN	Student will be able to: Identify the problem; Formulate a hypothesis; Do independent planning and then conduct the experiments; Analyse and interpret the results; Discuss the results comprehensively; Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEHR 6808	Research Report Geohydrology	Research Report Geohydrology	This module requires a student to prepare a research report under the close supervision of one of the academic staff members of the department. The module stretches over the course of a full academic year.	MAIN	Student will be able to: -Develop the ability to identify a suitable research project and to formulate a research question. -Become familiar with the primary literature relevant to their chosen topic and the resources available to them to do so. -Develop a strong sense of research ethics and appreciation of the scientific method. -Develop the ability to generate data relevant to a specific research project. -Develop their critical / comprehensive reading skills. -Develop their scientific writing skills. -Present the data they have generated throughout their course of study in a scientific way. - Reach conclusions that are grounded on the data that they have collected. - Identify (where necessary) the need for further research.
GEHR	8900	Geohydrology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Geohydrology, including: Research project in specialized field of Geohydrology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEHR	9100	Geohydrology Thesis	This module consists of a research project that the student must complete under guidance of his/her supervisor.	MAIN	Student will be able to: Identify the problem Formulate a hypothesis Do independent planning and then conduct the experiments Analyse and interpret the results Discuss the results comprehensively Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GEOH	6815	Groundwater Hydraulics	This module focuses on the fundamental knowledge, theories, principles and practices of groundwater hydraulics. Students will obtain theoretical and practical knowledge on the assessment of groundwater resources in terms of the volumes that can be sustainably abstracted.	MAIN	Student will be able to: - Develop a conceptual model of a specific groundwater-related problem; - Apply practical knowledge gained to conduct various hydraulic tests; - Explain and apply the theory related to pumping tests; - Evaluate hydraulic test data and interpret the results in order to estimate the sustainable yield of a borehole; - Analyse the data from laboratory scale tests on samples to determine hydraulic conductivity or permeability and porosity and effective porosity; - Discuss the relation between field and laboratory observations; and - Summarise the results of pumping tests in a professional fashion.
GEOH	6825	Groundwater Modelling	This module will provide students with a basic understanding of numerical groundwater flow and mass transport models. The module will combine and apply all knowledge students have gained in the first semester honours modules to develop conceptual models, basic numerical models and to assess groundwater models. This module will further expose students to various types of groundwater models, and will discuss the advantages and disadvantages of each model.	MAIN	Student will be able to: - Explain the principles of groundwater flow and transport; - Prepare the necessary input data for mathematical models; - Interpret hydrogeological data and to develop site-specific conceptual models based on these data as a prerequisite for the application of mathematical models; - Select suitable mathematical models for a given problem; - Solve analytical equations and develop finite-difference equations; - Develop and document site-specific finite-difference flow and transport models; and - Critically evaluate groundwater model related parameters like porosity, hydraulic conductivity/ transmissivity, storativity/specific yield, recharge, etc.
GEOH	6835	Hydrochemistry and Pollution	Due to the fact that groundwater pollution is the key issue regarding the study of groundwater chemistry, this module focuses on geochemical principles and an understanding of geochemical processes with regard to groundwater. Special emphasis is placed on the understanding of the interaction between groundwater, the geological environment and anthropogenic waste to provide the student with integrated understanding of groundwater chemistry and contaminant hydrogeology as preparation for a career as a geohydrologist or geohydrochemist. Students will also be prepared to provide expert hydrochemical input to the industry.	MAIN	Student will be able to: - Plan groundwater sampling, develop monitoring programs as well as sampling and sample preparation procedures; - Use interpretation programmes to present and interpret hydrochemical data and to solve problems; - Use statistical methods to interpret hydrochemical data; - Apply the principles of low temperature geochemistry, including the interactions between groundwater, the geological environment and anthropogenic waste to interpret hydrochemical data; - Explain the principles of redox, sorption and ion exchange reactions; - Explain the principles of contaminant transport and the use of environmental isotopes in hydrogeology; and - Explain the formation of Acid Mine Drainage and analyse common geochemical tests.
GEOH	6845	Mining Geohydrology and Hydrology	This module focuses on groundwater influxes in mines, dewatering of mines, water quality management at mines, groundwater risk management, water balances, monitoring of groundwater, as well as modelling of groundwater flows and qualities in the mining environment. It deals with hydrology field techniques with a strong emphasis of surface water- groundwater interaction. It also explains basic flood hydrology and discusses the management of flood levels.	MAIN	Student will be able to: - Analyse and interpret groundwater influxes in mines; - Calculate dewatering volumes and describe dewatering schemes; Apply groundwater models to estimate the volumes of groundwater influxes; - Calculate water balances of a mine; - Describe water management systems at a mine; - Describe the risks associated with groundwater influxes and dewatering, and perform risk assessments; - Apply hydrology field techniques in mines; - Discuss surface water- groundwater interactions at a mine; - Interpret the results of basic flood hydrology calculations; and - Explain every- day management of flood levels at a mine.
GEOH	6855	Groundwater Geophysics	This module will provide students with an understanding of the physical principles on which the geophysical methods routinely used in groundwater studies are based. Students will be able to plan and execute geophysical surveys aimed at addressing geohydrological problems, such as groundwater exploration and contaminant plume mapping. In addition, students will be able to process, analyse and interpret geophysical data in terms of the geological and geohydrological conditions within the surveyed area.	MAIN	Student will be able to: - Describe the physical principles on which various geophysical methods operate; - Define key concepts of the various geophysical techniques most commonly used in groundwater studies; - Plan and execute geophysical surveys with the various geophysical techniques during geohydrological investigations; and - Process, analyse and interpret the geophysical data in terms of the ambient geological and geohydrological conditions.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GEOH	6865	Groundwater Management	This module will provide students with a global understanding of managing and protecting groundwater resources. They will also learn to combine and apply all their knowledge gained in the other honours modules to develop an understanding of groundwater systems by assessing all available data and using all available tools. Once this is understood, management and protection strategies can be developed taking into account South African guidelines and legislation.	MAIN	Student will be able to: - Design a risk plan according to a specific risk matrix; - Develop a risk register and risk evaluation plan for a company; - Describe interpolation and the differences between the various methods; - Generate interpolated data and maps using the software provided; - Estimate groundwater recharge using different methods; - Explain the importance of the groundwater reserve; - Name and discuss the four levels of the groundwater reserve determination; - Name and discuss the groundwater reserve determination activities and post-groundwater reserve determination activities; - Name and discuss the groundwater-dependent ecosystem classification to recognise the various groundwater-dependent systems; - Illustrate the protocol to identify groundwater-dependent vegetation and set groundwater resource quality objectives; - Determine a groundwater reserve as part of a case study; - Develop a risk management plan; - Illustrate their understanding and application of the future groundwater planning within the Department of Water Affairs; - Interpret the Environmental Management Act; - Prepare a Basic Assessment Report, a Scoping Report, Environmental Impact Assessment Report, Specialist Reports, and an Environmental Management Programme; - List notices related to any water aspects; - Interpret the purpose of the National Mineral and Petroleum Resources Development Act; - Interpret the purpose of the Waste Act and the application thereof; - Interpret and apply the National Water Act together with the National Strategies.

MATHEMATICS AND APPLIED MATHEMATICS (111)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
MATA	1684	Engineering Statics	Vector operations; resultants of forces;moments of forces about points and axes; equilibrium of forces acting on a point or a rigid body; friction;center of gravity and centroid;moments of inertia	MAIN	Student will be able to: - add and subtract forces - calculate moments of forces - calculate projections of forces along given lines - analyse the equilibrium of given force systems - calculate centroids and centers of gravity; and - calculate certain moments of inertia
MATA	2674	Engineering Dynamics	Particle kinematics, including continuous, erratic, rectilinear, curvilinear and relative motion. Particle kinetics, including equations of motion for particles and systems of particles in several types of coordinate systems; work and energy; impulse and momentum.	MAIN	Student will be able to: - analyse the motion of particles acted upon by given force systems - apply the principles of work and energy, as well as conservation of energy - calculate power and efficiency - apply the principles of momentum and conservation of momentum to collisions and other relevant mechanical situations.
MATA	2684	Dynamics of rigid bodies	Planar kinematics of a rigid body, including translation, rotation about a fixed axis, absolute and relative motion analysis, rotating axes. Planar kinetics of a rigid body, including moments of inertia, equations of motion for translation, rotation about a fixed axis and general planar motion; Work and energy; Impulse and momentum;vibrations	MAIN	Student will be able to: - analyse the motion of a rigid body subject to a given system of planar forces. - calculate power and energy, and apply the principles of energy and the conservation of energy to the motion of rigid bodies where suitable. - calculate the momentum of a rigid body, and apply the principles of momentum and impulse to the motion of rigid bodies under suitable circumstances; and - analyse vibrating systems.
MATA	2664	Introduction to Mathematical Modelling	Principles of modelling. Optimisation models. Physical, chemical, biological and financial models. Decision and Game Theory.	MAIN	Student will be able to: - Apply modelling techniques, such as difference and differential equations, proportionality, dimensional analysis, curve fitting and interpolation techniques, and elementary optimisation techniques; - Use the basic steps to build a model, in conjunction with the techniques; and - Construct a simple model on his own, or as part of a small team.
MATA	2654	Ordinary Differential Equations	Non-linear first order differential equations: substitution techniques, exact equations, integration factors. Non-homogeneous higher order differential equations with constant coefficients. Series methods. Systems of linear differential equations. Applications such as mixtures, orthogonal trajectories and the logistic equation.	MAIN	Student will be able to: -Solve various non-linear first order differential equations, linear second order differential equations with constant coefficients, as well as some with non-constant coefficients; and -Apply ordinary differential equations to solve some basic scientific problems from various disciplines.
MATA	2754	Scientific Computing	Programming with Matlab. Scientific computing. Introductory numerical techniques		The student will be able to: - Implement mathematical formulas, computations and algorithms on a computer; and - Use the techniques in 1. to solve scientific problems numerically.
MATA	3764	Industrial Mathematics	Introduction to linear programming. Actual problems from industry with the necessary mathematics to model it mathematically and solve the models. Communication of results. Project.	MAIN	Student should be able to ; -Solve linear programs; -Describe several case studies from industry; and -Solve simple similar problems and communicate the results.
MATA	3774	Numerical Analysis	Non-linear equations in one variable: iterative methods, error analysis. Polynomial interpolation: Lagrange, barycentric, Newton, Chebyshev and Hermite interpolation ; splines; error estimation. Numerical differentiation and integration. Initial-value problems in ordinary differential equations: elementary theory, high-order Taylor, Runge-Kutta and multistep methods, stability.	MAIN	Student should be able to: - Implement the theory of numerical techniques such as the iterative solution of non-linear equations, interpolation, numerical differentiation and integration, and the numerical solution of ordinary differential equations on a computer. - Perform accuracy and reliability tests.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATA	3784	Dynamical Systems	Elementary stability considerations in systems of linear first order ordinary differential equations: chemical, medical, biological and other applications. Systems of non-linear first order ordinary differential equations. Local stability and the classification of fixed points: Applications to biological and medical models. Global stability and limit cycles: Forced non-linear oscillations. First order perturbation techniques. Applications of ordinary differential equations.	MAIN	Student should eb able to ; -Use phase diagrams to analyze equilibrium points and trajectories of non-linear ordinary differential equations; -Use techniques from asymptotic analysis to obtain approximate solutions of such differential equations; -Apply these techniques to manipulate models in Chemistry, Physics, Medical Science and Biology.
MATM	1502	Introductory Calculus and Statics	Calculus: polynomial, trigonometric and logarithmic functions, curve sketching, the function concept, and outline of differentiation and integration. Statics: forces and moments, stress and strain, shear force and bending moment, trusses.	MAIN	Student will be able to: -apply basic differentiation, integration and strength of materials and be able to use calculus to solve construction problems.
MATM	1534	Calculus	This module contains introductory theory and applications of one variable calculus including the concept of a function, polynomial, exponential, trigonometric and logarithmic functions, graphs, limits, continuity, derivatives, curve sketching, applications of the derivative, the definite and indefinite integral and some integration techniques	MAIN	Student will be able to: - find the domain and range of a given function. - find the inverse of an invertible function - shift and stretch a given function - solve simple problems involving exponential functions, including population growth and radioactive decay - solve equations using logarithmic functions - solve problems involving sinusoidal and tangent functions - find the horisontal and vertical asymptotes of rational functions - identify parts of a function which are continuous, and points at which it is not - calculate limits, including left hand and right hand limits of a function - identify the inner and outer functions of a composite function - construct a composite function from given functions - calculate the derivative of polynomial functions using the definition of the derivative at a point and as a function - use the rules of differentiation to calculate derivative functions for polynomial, exponential, logarithmic, trigonometric and inverse trigonometric functions - find the derivatives of implicit functions - finding and identifying local maxima and minima and inflection points of functions - find the global maximum and minimum of a given function and apply this to simple optimisation problems - calculate indefinite integrals using some simple rules - calculate definite integrals using the fundamental theorem of calculus - use simple substitutions to calculate definite and indefinite integrals; and - use integration by parts to calculate definite and indefinite integrals
MATM	1542	Introductory Calculus and Statics	Calculus: polynomial, trigonometric and logarithmic functions, curve sketching, the function concept, and outline of differentiation and integration. Statics: forces and moments, stress and strain, shear force and bending moment, trusses.	MAIN	Student will be able to: -apply basic differentiation, integration and strength of materials and be able to use calculus to solve construction problems.
MATM	1574	Precalculus I	Number systems. Properties of real numbers. Notations. Exponents and radicals. Special product formulas. Factorizing. Distance and midpoint formulas. Simplify algebraic expressions. Solve equations. Modeling. Applications: Interest; speed; distance; time; percentages; depreciation; inflation; ratio and proportion. Exponential and logarithmic laws. Functions. Domain and Range. Graphs: Linear; Quadratic; circles ; Half-circle and hyperbola; exponentials and logarithms graphs ; absolute value. Elimination and substitution. Principles of geometry. Perimeter, circumference, area, volume and total area. principles of trigonometry and solving triangles; applications and modeling. Arithmetic and Geometric series.	MAIN	Student will be able to: - identify natural numbers, integers, rational and real numbers, and be able to prove theorems by induction. - derive the sum formulas for geometric and arithmetic series, and apply these, as well as induction to the solution of financial problems involving compound interest, mortgages, depreciation and inflation. - use the concepts of ratio and proportion to solve practical problems, such as determining the approximate height of buildings. - demonstrate a comprehension of exponentials and logarithms, and be able to solve appropriate problems using the exponential and logarithmic laws. - demonstrate a thorough comprehension of graphs of lines, parabolas and circles. - factor polynomial expressions up to cubic, and find zeros of more complicated functions by numerical methods not involving derivatives. - demonstrate a thorough comprehension of the basic geometry of triangles, circles, quadrilaterals, cylinders and spheres. - use the various trigonometric functions to solve triangles and to do some basic surveying; and - do some basic modelling, using the mathematical concepts above.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATM	1584	Precalculus II	Definition of a function, domain and range; symmetry; even and odd functions; translating and combining functions; composite functions; inverse functions; linear and quadratic functions; power functions and polynomials; rational functions and their properties; exponential and logarithmic functions; the exponential and logarithmic laws; the trigonometric functions and their inverses; trigonometric identities; limits and continuity; basic statistics and probability theory.	MAIN	Student will be able to: - determine the domain and range of given functions. - recognize symmetric functions, and make use of it in manipulating such functions. - translate functions horisontally and vertically and combine it with other functions. - determine the inverses of given functions, either graphically, or analytically, or both. - investgate and explain the properties of linear and quadratic functions and their graphs. - explain the properties and graphs of power functions and polynomial functions. - explain the properties of the sin cos and tan functions, and be able to solve practical problems involving sinoidal functions. - derive trigonometric identities and use these to simplify and manipulate appropriate functions. - explain the properties and graphs of the inverse trigonometric functions. - explain the properties and graphs of exponential and logarithmic functions. - identify when and how to use logarithms to solve equations. - model exponential growth and decay processes. - demonstrate a sufficient explanation of continuity and the concept of a limit to be well prepared for a calculus module. - use some simple statistical techniques as well as some probability theory in order to process experimental data; and - do some basic modelling, using the mathematical concepts above.
MATM	1622	Introduction to Advanced Mathematics	Number systems. Elementary logic and set theory. Methods of proof. Mathematical induction. Newton’s method. Conic sections. Applications of integration. Problem solving strategies.	MAIN	Student will be able to: - Use the principals of logic to prove results; - Solve problems involving sets; - Work with relations and functions; - Apply mathematical induction; - Analyse and find roots using Newton’s method; - Master the properties, derivatives, anti-derivatives and applications of the hyperbolic functions; - Use integration to calculate lengths, areas and volumes; and - Become familiar with mathematical problem solving strategies.
MATM	1644	Calculus and Algebra	This module contains some theory and applications of Calculus and Algebra, including: calculation of definite and indefinite integrals by substitution and partial fractions, solving separable ordinary differential equations, complex numbers, vectors in 2 and 3 dimensions, vector equations of lines and planes, solving systems of linear equations, introduction to matrix algebra.	MAIN	Student will be able to: - Recognise and calculate indefinite and definite integrals which can be calculated by algebraic, sine, and cosine substitutions. - Recognise and calculate both definite and indefinite integrals which can be solved by partial fractions. - Recognise a separable ordinary differential equation and solve it. - Calculate the absolute value and conjugate of a complex number. - Add, subtract, multiply and divide complex numbers and write the result in standard form. - Covert a complex number to polar form and back. - Calculate an integer power of a complex number. - Calculate all the roots of a complex number for a given integer root. - Convert a vector from its geometrical definition to component form and back. - Add and subtract vectors - Calculate the dot and vector product of two vectors. - Use the vector product to calculate the areas of triangles and parallelograms. - Calculate the box product of three vectors. - Use the box product to calculate the volume of a parallelopiped. - Write the equation of a line in vector and parametric form in two and three dimensions. - Write the equation of a plane in vector and parametric form in three dimensions. - Calculate relationships between lines and lines and planes using vector methods. - Add, subtract and multiply matrices. - Calculate the determinant of a matrix. - Calculate the inverse of an invertible matrix by both the cofactor and Gauss-Jordan method.
MATM	2614	Vector Analysis	Vector functions: limits, derivatives and integrals. Curves: parameterization, tangent vectors, arc length. Multivariable functions: qua¬dratic surfaces, partial derivatives, limits, continuity, differentiability, gra¬dients and directional derivatives, the Mean Value theorem, the chain rule for partial derivatives, tangent planes. Multiple and line integrals: Theory and applications.	MAIN	Student will be able to: -Describe and prove the theory of more ad¬vanced calculus, including vector calculus, multivariable functions, line integrals and surface integrals. -Apply the theory in 1. to solve both mathematical and real life problems.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATM	2624	Linear Algebra	Real vectors/spaces, subspaces, basis, dimension, rank, nullity, matrix transformations. Eigenvectors and diagonalisation. Inner products and Gram-Schmidt process. Orthogonal matrices and orthogonal diagonalisation. General linear transformation and isomorphism.	MAIN	Student will be able to: -Describe and prove the theory of linear algebra, and specifically the algebra of abstract vector spaces which includes linear mappings, inner products, orthogonality, quadratic forms, symmetric matrices and diagonalisation; and -Apply the theory in 1. to solve mathematical and certain real life problems.
MATM	2664	Sequences and Series	Sequences of real numbers: convergence, limits, boundedness, indeterminate forms, LHospitals rule. Improper integrals. Infinite series: tests for convergence, absolute and conditional convergence. Taylor series. Power series: intervals of convergence. Fourier analysis.	MAIN	Student will be able to: -Describe and prove the theory of sequences and series of real numbers. -Solve linear first and second order difference equations with constant coefficients. -Investigate the convergence of sequences and calculate their limits when applicable. -Test series for convergence -Calculate the interval of convergence of power series -Expand given functions into Taylor or Fourier series.
MATM	3784	Complex Analysis	The complex numbers. Functions of a complex variable. Limits, continuity and differentiability. The Cauchy-Riemann equations. Power series. Analytic functions. Cauchy's theorem. Residue theory and applications.	MAIN	Student should be able to ; -Describe and prove the basic theory of complex functions; and -Apply the theory in 1. To solve various mathematical problems, including the calculation of integrals.
MATM	3774	Real Analysis	Axiomatic construction of the real numbers. Sequences of real numbers. The Weierstrass-Bolzano theorem. Limits and continuity. The intermediate value theorem. The Riemann integral.	MAIN	Student should be able to; -Describe and prove the basic theory of the field of real numbers, including continuity, differentiablity and Riemann integrability
MATM	3734	Discrete Mathematics	Predicate Logic, methods of proof, set theory, functions and relations, Division Algorithm, Pigeonhole Principle, elementary number theory, induction, effectivity of algorithms, combinatorics, graph theory.	MAIN	Student will be able to ; -Describe the foundation of mathematics; -Show when sentences are logically equivalent; -Describe and use notions such as countability and infinity; and -Study and understand the theory of algorithms .
MATM	3744	Algebra	Integers: Induction, greatest common divisors, well-ordering principle, equivalence relations, arithmetic modulo n. Groups: Finite and infinite groups, subgroups, cyclic groups, dihedral groups, permutation groups, Lagrange's theorem, cosets, conjunction, homomorphisms, isomorphism theorems. Rings: Commutative rings, rings with unity, integral domains, polynomial rings, fields, principle ideal domains, ideals, homomorphisms, fields of fractions of an integral domain, isomorphism theorems	MAIN	Student will be able to; -Describe notions around certain algebraic structures such as groups, rings and fields; -Apply these notions; -Determine the possibility of certain geometric constructions; and -Study coding theory.
MATR	1534	Calculus	This module contains introductory theory and applications of one variable calculus including the concept of a function, polinomial, exponential, trigonometric and logarithmic functions, graphs, limits, continuity, derivatives, curve sketching, applications of the derivative, the definite and indefinite integral and some integration techniques	MAIN	Student will be able to: - find the domain and range of a given function. - find the inverse of an invertible function - shift and stretch a given function - solve simple problems involving exponential functions, including population growth and radioactive decay - solve equations using logarithmic functions - solve problems involving sinoidal and tangent functions - find the horisontal and vertical asymptotes of rational functions - identify parts of a function which are continuous, and points at which it is not - calculate limits, including left and right limits of a function - identify the inner and outer functions of a composite function - construct a composite function from given functions - calculate the derivative of polynomial functions using the definition of the derivative at a point and as a function - use the rules of differentiation to calculate derivative functions for polynomial, exponential, logarithmic, trigonometric and inverse trigonometric functions - find the derivatives of implicit functions - finding and identifying local maxima and minima and inflection points of functions - find the global maximum and minimum of a given function and apply this to simple optimisation problems - calculate indefinite integrals using some simple rules - calculate definite integrals using the fundamental theorem of calculus - use simple substitutions to calculate definite and indefinite integrals; and - use integration by parts to calculate definite and indefinite integrals.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Postgraduate					
MATA	6814	Algebra	Group action on a set, the Sylow Theorems, Fundamental Theorem of Finite Abelian groups, Nilpotent and Solvable Groups, p-Groups. Integral domains, Fields of Fractions, Polynomial Rings, Introduction to Lattices and Boolean Algebras.	MAIN	The student should be able to understand and solve fundamental problems in elementary group theory, ring theory and lattices.
MATA	6824	Algebra	Group action on a set, the Sylow Theorems, Fundamental Theorem of Finite Abelian groups, Nilpotent and Solvable Groups, p-Groups. Integral domains, Fields of Fractions, Polynomial Rings, Introduction to Lattices and Boolean Algebras.	MAIN	The student should be able to understand and solve fundamental problems in elementary group theory, ring theory and lattices.
MATA	7914	Algebra	Axiom of Choice, Order, Zorn's Lemma, Free Groups, Free Products, Generators and Relations, Character Theory. Lattice Theory. Introduction to Universal Algebra.	MAIN	The student should be able to understand and solve fundamental problems in advanced algebra.
MATA	7924	Algebra	Axiom of Choice, Order, Zorn's Lemma, Free Groups, Free Products, Generators and Relations, Character Theory. Lattice Theory. Introduction to Universal Algebra.	MAIN	The student should be able to understand and solve fundamental problems in advanced algebra.
MATA	8900	Mathematics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Mathematics, including: Research project in specialized field of Mathematics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: Identify the problem; Formulate a hypothesis; Do independent planning and then conduct the experiments; Analyse and interpret the results; Discuss the results comprehensively; Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MATA	9100	Applied Mathematics Thesis	This module contains fundamental knowledge, theories, principles and practices of Applied Mathematics, General including Research project in specialized field of Applied Mathematics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
MATB	6814	Galois Theory	Field Extensions: Kronecker's Theorem, Algebraic Extensions, Finite Extensions. Constructibility. Splitting Fields, Finiet Fields, Galois Groups, Galois' Theorem. Solvability of Polynomial Equations by Radicals.	MAIN	The student should be able to understand and solve fundamental problems related to field extensions and finite Galois extensions.
MATB	6824	Galois Theory	Field Extensions: Kronecker's Theorem, Algebraic Extensions, Finite Extensions. Constructibility. Splitting Fields, Finiet Fields, Galois Groups, Galois' Theorem. Solvability of Polynomial Equations by Radicals.	MAIN	The student should be able to understand and solve fundamental problems related to field extensions and finite Galois extensions.
MATB	7914	Galois Theory	Introduction to Galois's theory. Multiplicative and additive Kummer theory. Infinite Galois extensions. The Kull topology, inverse limits, valuation theory, Extensions of valuated fields.	MAIN	Student will be able to: Use advanced results and techniques from Galois theory and field extensions.
MATB	7924	Galois Theory	Introduction to Galois's theory. Multiplicative and additive Kummer theory. Infinite Galois extensions. The Kull topology, inverse limits, valuation theory, Extensions of valuated fields.	MAIN	Student will be able to: Use advanced results and techniques from Galois theory and field extensions.
MATC	6814	Introduction to Topology	Basic topological constructions and definitions. Connectedness; Compactness and metrization theorems	MAIN	Student should be able to; -Read and understand papers in topology; -Carrying on with more advanced topology courses such as modern topology; and -Apply his/her knowledge in topology to other areas of pure mathematics
MATC	6824	Introduction to Topology	Basic topological constructions and definitions. Connectedness; Compactness and metrization theorems.	MAIN	Student should be able to; -Read and understand papers in topology; -Carrying on with more advanced topology courses such as modern topology; and -Apply his/her knowledge in topology to other areas of pure mathematics

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATC	7914	Introduction to Topology	In depth covererage of topological constructions and definitions. Advanced topics in connectedness, compactness and Tychonov's theorem.	MAIN	The student should be able to: - Read and understand papers in topology; - Carrying on with more advanced topology courses such as modern topology; - Apply his/her knowledge in topology to other areas of pure mathematics
MATC	7924	Introduction to Topology	In depth covererage of topological constructions and definitions. Advanced topics in connectedness, compactness and Tychonov's theorem.	MAIN	The student should be able to: - Read and understand papers in topology; - Carrying on with more advanced topology courses such as modern topology; and - Apply his/her knowledge in topology to other areas of pure mathematics
MATD	6814	Modern Topology	The course covers topics in pointless topology, the interaction of Sober spaces with spatial frames via the Stone duality, as well as an introduction to Category theory.	MAIN	Student should be able to; -Read and understand papers in pointless topology; -Carrying on with a course in Category theory; and -Explain the concept of duality
MATD	6824	Modern Topology	The course covers topics in pointless topology, the interaction of Sober spaces with spatial frames via the Stone duality, as well as an introduction to Category theory.	MAIN	Student should be able to ; -Read and understand papers in pointless topology; -Carrying on with a course in Category theory; and -Explain the concept of duality
MATD	7914	Modern Topology	The course covers some of the deepest results in pointless topology, the interaction of Sober spaces with spatial frames via the Stone duality, as well as covering reflective Sub-Category of constructs.	MAIN	The student should be able to: -Read and understand papers in pointless topology; -Carrying on with a course in Category theory; and -Explain the concept of duality
MATD	7924	Modern Topology	The course covers some of the deepest results in pointless topology, the interaction of Sober spaces with spatial frames via the Stone duality, as well as covering reflective Sub-Category of constructs.	MAIN	The student should be able to: -Read and understand papers in pointless topology; -Carrying on with a course in Category theory; and -Outline the concept of duality
MATE	6814	Functional Analysis	Metric spaces, completeness, normed spaces, Banach spaces, bounded linear operators, dual spaces, inner product spaces, Hilbert spaces, orthonormal sets and sequences.	MAIN	The student should be able to understand, apply and prove results in functional analysis.
MATE	6824	Functional Analysis	Metric spaces, completeness, normed spaces, Banach spaces, bounded linear operators, dual spaces, inner product spaces, Hilbert spaces, orthonormal sets and sequences.	MAIN	The student should be able to understand, apply and prove results in functional analysis.
MATE	7914	Functional Analysis	Metric spaces, completeness, normed spaces, Banach spaces, bounded linear operators, dual spaces, inner product spaces, Hilbert spaces, orthonormal sets and sequences, representation of functionals on Hilbert spaces, Hilbert-adjoint operator, unitary and normal operators	MAIN	The student should be able to understand, apply and prove results in functional analysis.
MATE	7924	Functional Analysis	Metric spaces, completeness, normed spaces, Banach spaces, bounded linear operators, dual spaces, inner product spaces, Hilbert spaces, orthonormal sets and sequences, representation of functionals on Hilbert spaces, Hilbert-adjoint operator, unitary and normal operators	MAIN	The student should be able to understand, apply and prove results in functional analysis.
MATF	6814	Measure and Integration Theory	Introduction to the theory of sigma algebra, measure and measurable spaces, with particular focus on the construction and applications of the Lebesgue measure. The Lebesgue integral and its relation to the Riemann integral is also investigated.	MAIN	After the successful completion of this module, the student will: - have a working knowledge of the fundamentals of measure and integration theory. - be able to continue with courses in probability theory and functional analysis.
MATF	6824	Measure and Integration Theory	Introduction to the theory of sigma algebra, measure and measurable spaces, with particular focus on the construction and applications of the Lebesgue measure. The Lebesgue integral and its relation to the Riemann integral is also investigated.	MAIN	After the successful completion of this module, the student will: - have a working knowledge of the fundamentals of measure and integration theory. - be able to continue with courses in probability theory and functional analysis.
MATF	7914	Measure and Integration Theory	Introduction to the theory of sigma algebra, measure and measurable spaces, with particular focus on the construction and applications of the Lebesgue measure. The Lebesgue integral and its relation to the Riemann integral is also investigated. The Radon-Nikodym theorem as well as the Radon-Nikodym derivative are also introduced.	MAIN	After the successful completion of this module, the student will: - have a working knowledge of the fundamentals of measure and integration theory. - be ablte to continue with courses in probability theory and functional analysis.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATF	7924	Measure and Integration Theory	Introduction to the theory of sigma algebra, measure and measurable spaces, with particular focus on the construction and applications of the Lebesgue measure. The Lebesgue integral and its relation to the Riemann integral is also investigated. The Radon-Nikodym theorem as well as the Radon-Nikodym derivative are also introduced.	MAIN	After the successful completion of this module, the student will: - have a working knowledge of the fundamentals of measure and integration theory. - be ablte to continue with courses in probability theory and functional analysis.
MATG	6814	CodingTheory	Coding and its use, basic definitions, prefix-free codes. Economical coding, entropy, Huffman codes. Data compression, stationary sources, arithmetic coding. Noisy channels, capacity of a channel, error correction, the packing bound. Linear codes, Hamming codes, cyclic codes.	MAIN	After completing this module successfully, a student will be able to answer questions on: - Prefix-free codes, economical coding, entropy, Huffman codes. - Data compression, stationary sources, arithmetic coding - Noisy channels, capacity of a channel, error correction, the packing bound - Linear codes, Hamming codes, cyclic codes - Prove basic results
MATG	6824	CodingTheory	Coding and its use, basic definitions, prefix-free codes. Economical coding, entropy, Huffman codes. Data compression, stationary sources, arithmetic coding. Noisy channels, capacity of a channel, error correction, the packing bound. Linear codes, Hamming codes, cyclic codes.	MAIN	After completing this module successfully, a student will be able to answer questions on: - Prefix-free codes, economical coding, entropy, Huffman codes. - Data compression, stationary sources, arithmetic coding - Noisy channels, capacity of a channel, error correction, the packing bound - Linear codes, Hamming codes, cyclic codes - Prove basic results
MATG	7914	Coding Theory	Coding and its use, basic definitions, prefix-free codes. Economical coding, entropy, Huffman codes. Data compression, stationary sources, arithmetic coding. Noisy channels, capacity of a channel, error correction, the packing bound. Noisy coding theorems. Linear codes, Hamming codes, cyclic codes. Introduction to cryptography, the development of cryptography.	MAIN	After completing this module successfully, a student will be able to answer questions on: - Prefix-free codes, economical coding, entropy, Huffman codes. - Data compression, stationary sources, arithmetic coding - Noisy channels, capacity of a channel, error correction, the packing bound - Noisy coding theorems - Linear codes, Hamming codes, cyclic codes - Introduction to cryptography, the development of cryptography - Prove results in the area
MATG	7924	Coding Theory	Coding and its use, basic definitions, prefix-free codes. Economical coding, entropy, Huffman codes. Data compression, stationary sources, arithmetic coding. Noisy channels, capacity of a channel, error correction, the packing bound. Noisy coding theorems. Linear codes, Hamming codes, cyclic codes. Introduction to cryptography, the development of cryptography.	MAIN	After completing this module successfully, a student will be able to answer questions on: - Prefix-free codes, economical coding, entropy, Huffman codes. - Data compression, stationary sources, arithmetic coding - Noisy channels, capacity of a channel, error correction, the packing bound - Noisy coding theorems - Linear codes, Hamming codes, cyclic codes - Introduction to cryptography, the development of cryptography - Prove results in the area
MATH	6814	Discrete Mathematics	Introduction to the notions and definitions of discrete mathematics. Fundamental theorems and results of discrete mathematics.	MAIN	Student will be able to: - Outline the notions of discrete mathematics; and - Use the basic theorems and results of discrete mathematics.
MATH	6824	Discrete Mathematics	Discrete Mathematics (Second Semester MATH6814)	MAIN	
MATH	7914	Discrete Mathematics	Introduction to the notions and definitions of discrete mathematics. Advanced theorems and results of discrete mathematics.	MAIN	Student will be able to: Apply the notions of discrete mathematics; and Use the advanced theorems and results of discrete mathematics.
MATH	7924	Discrete Mathematics	Introduction to the notions and definitions of discrete mathematics. Advanced theorems and results of discrete mathematics.	MAIN	Student will be able to: Apply the notions of discrete mathematics; and Use the advanced theorems and results of discrete mathematics.
MATI	6814	Set Theory	Axioms of set theory. The natural number system and arithmetic. Finite, countable and infinite sets. Zorn's lemma and applications.	MAIN	Student should be able to ; -Be familiar with set theoretic language and tools.
MATI	6824	Set Theory	Axioms of set theory. The natural number system and arithmetic. Finite, countable and infinite sets. Zorn's lemma and applications.	MAIN	Student should be able to; -Be familiar with set-theoretic language and tools.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATI	7914	Set Theory	The well-ordering theorem. Ordinal numbers. Equipotency, the Schroder/Bernstein Theorem. Cantor's Theorem.	MAIN	Student will be able to: Put into practise set theory and its applications.
MATI	7924	Set Theory	The well-ordering theorem. Ordinal numbers. Equipotency, the Schroder/Bernstein Theorem. Cantor's Theorem.	MAIN	Student will be able to: Put into practise set theory and its applications.
MATJ	6814	Group Theory	Periodic, torsion-free and mixed Abelian group. Schreier's theorem, semidirect products, extensions of Abelian groups	MAIN	Student should be able to ; - solve basic problems in group theory.
MATJ	6824	Group Theory	Periodic, torsion-free and mixed Abelian group. Schreier's theorem, semidirect products, extensions of Abelian groups.	MAIN	Student should be able to: Solve basic problems in group theory.
MATJ	7914	Group Theory	Periodic, torsion-free and mixed Abelian group. Schreier's theorem, semidirect products, extensions of Abelian groups. The Wreath product and the Sylow subgroups of the symmetric groups. Nilpotent and supersoluble groups.	MAIN	Student will be able to: Solve basic problems in advanced group theory.
MATJ	7924	Group Theory	Periodic, torsion-free and mixed Abelian group. Schreier's theorem, semidirect products, extensions of Abelian groups. The Wreath product and the Sylow subgroups of the symmetric groups. Nilpotent and supersoluble groups.	MAIN	Student will be able to: Solve basic problems in advanced group theory.
MATK	6814	Ring Theory	Localization of integral domains, semisimple modules chain conditions, modules with finite length and tensor product	MAIN	Student should be able to; Solve basic problems in ring theory.
MATK	6824	Ring Theory	Localization of integral domains, semisimple modules chain conditions, modules with finite length and tensor product.	MAIN	Student should be able ; Solve basic problems in ring theory.
MATK	7914	Ring Theory	Localization of integral domains, semisimple modules chain conditions, modules with finite length and tensor product. Modules over PDI's, prime and primitive ideals, the Jacobson radical, semisimple Artinian rings.	MAIN	Student will be able to: Solve advanced problems in ring theory.
MATK	7924	Ring Theory	Localization of integral domains, semisimple modules chain conditions, modules with finite length and tensor product. Modules over PDI's, prime and primitive ideals, the Jacobson radical, semisimple Artinian rings.	MAIN	Student will be able to: Solve advanced problems in ring theory.
MATL	6814	Category Theory	Categories, functors, natural transformations, monics, epis, zeros, large categories.	MAIN	Student should be able to; - solve basic problems in category theory.
MATL	6824	Category Theory	Categories, functors, natural transformations, monics, epis, zeros, large categories.	MAIN	Student should be able to ; - solve basic problems in category theory.
MATL	7914	Category Theory	Categories, functors, natural transformations, monics, epis, zeros, large categories. Duality, functor categories, universals and limits, adjoints.	MAIN	Student will be able to: - Solve problems in category theory; and - Use technique from category theory to solve problems in other areas of mathematics.
MATL	7924	Category Theory	Categories, functors, natural transformations, monics, epis, zeros, large categories. Duality, functor categories, universals and limits, adjoints.	MAIN	Student will be able to: Solve problems in category theory; and Use technique from category theory to solve problems in other areas of mathematics.
MATM	6814	Methods of Mathematics	General system of coordinates, ordinary differential equations, special functions	MAIN	Student should be able to; -Solve problems involving change of coordinates systems; and -Apply ordinary differential equations and using properties of special functions to compute specific results.
MATM	6818	Research Report	Research on a subject provided by the supervisor of the research report.	MAIN	Student will be able to ; - Conduct guided research; and - Write a scientific research report.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATM	6819	Research Report Mathematics	Research on a subject provided by the promoter of the Research Report.	MAIN	Student will be able to: -Perform guided research; and -Write a scientific report.
MATM	6824	Methods of Mathematics	General system of coordinates, ordinary differential equations, special functions	MAIN	Student should be able to; -Solve problems involving change of coordinates systems; and -Use ordinary differential equations and using properties of special functions to compute specific results.
MATM	6828	Mini Dissertation	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: - Do guided research ; and - Formulate a scientific report.
MATM	6829	Research Report Mathematics	Research on a subject provided by the promoter of the Research Report	MAIN	Student will bea ble to: -Perform guided research;and -Write a scientific paper.
MATM	7910	Mini Dissertation	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: -Do guided research; and -Write a scientific report.
MATM	7914	Methods of Mathematics	General system of coordinates, ordinary differential equations, special functions. Complex functions. Integral equations. Laplace and Fourier transforms.	MAIN	Student will be able to: - Solve problems involving change of coordinates systems, ordinary differential equations and using properties of special functions to compute specific results; and - Solve integral equations and use Laplace and Fourier transforms.
MATM	7920	Mini Dissertation	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: Conduct guided research; and Write a scientific report.
MATM	7924	Methods of Mathematics	General system of coordinates, ordinary differential equations, special functions. Complex functions. Integral equations. Laplace and Fourier transforms.	MAIN	Student will be able to: - Solve problems involving change of coordinates systems, ordinary differential equations; - Use properties of special functions to compute specific results; and - Solve integral equations and use Laplace and Fourier transforms.
MATM	7930	Mini Dissertation Mathematics	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: -Do guided research; and -Write a scientific report.
MATM	7940	Mini Dissertation Mathematics	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: Conduct guided research; and Write a scientific mini -dissertation
MATM	8900	Mathematics Dissertation	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATM	9100	Mathematics Thesis	This module contains fundamental knowledge, theories, principles and practices of Mathematics, General including Research project in specialized field of Mathematics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MATN	6814	Digital Image Processing	Concepts of Digital Images, Point Processing, Spatial and Frequency Domain Image Enhancement, Radon Transformation, Resizing images	MAIN	After completing this module successfully, a student should: - Have a good general theoretical background of processing images in the spatial and Fourier domains. - Understand what happens in the spatial and Fourier domain for the Radon transformation and Image resizing. - Develop skills in the implementation of common algorithms for Image Enhancement. - Know the fundamental Matlab commands for image processing.
MATN	6824	Digital Image Processing	Concepts of Digital Images, Point Processing, Spatial and Frequency Domain Image Enhancement, Radon Transformation, Resizing images	MAIN	After completing this module successfully, a student should: - Have a good general theoretical background of processing images in the spatial and Fourier domains. - Understand what happens in the spatial and Fourier domain for the Radon transformation and Image resizing. - Develop skills in the implementation of common algorithms for Image Enhancement. - Know the fundamental Matlab commands for image processing.
MATN	7914	Digital Image Processing	Images Restoration, Colour Image processing, Image Segmentation, Image Representation and description, Object recognition	MAIN	After completing this module successfully, a student should: - Implement and design appropriate noise filters - Describe, analyse and implement various segmentation, representation and description algorithms - Apply decision-theoretic methods of object recognition - Apply structural methods of object recognition
MATN	7924	Digital Image Processing	Images Restoration, Colour Image processing, Image Segmentation, Image Representation and description, Object recognition	MAIN	After completing this module successfully, a student should: - Implement and design appropriate noise filters - Describe, analyse and implement various segmentation, representation and description algorithms - Apply decision-theoretic methods of object recognition - Apply structural methods of object recognition
MATO	6814	Numerical Linear Algebra	Fundamental numerical methods for solving linear algebraic systems of equations.	MAIN	Student should be able Use numerical methods for solving algebraic systems of equations.
MATO	6824	Numerical Linear Algebra	Fundamental numerical methods for solving linear algebraic systems of equations.	MAIN	Student should be able: Use numerical methods for solving algebraic systems of equations.
MATO	7914	Numerical Linear Algebra	Ordinary differential equations: Euler's method, multistep methods, Explicit and implicit Runge-Kutta methods, Collocation, Linear stability, Difference operators. Partial differential equations: Finite difference schemes for Poisson's equation, Algebraic solution of large systems. *Finite elements and Spectral methods.*	MAIN	After completing this module successfully, a student will be able to discretise ordinary and partial differential equations according to different numerical methods and will be able to investigate the stability of these different schemes.
MATO	7924	Numerical Linear Algebra	Ordinary differential equations: Euler's method, multistep methods, Explicit and implicit Runge-Kutta methods, Collocation, Linear stability, Difference operators. Partial differential equations: Finite difference schemes for Poisson's equation, Algebraic solution of large systems. *Finite elements and Spectral methods.*	MAIN	After completing this module successfully, a student will be able to discretise ordinary and partial differential equations according to different numerical methods and will be able to investigate the stability of these different schemes.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATP	6814	Numerical Solution of Differential Equations	Ordinary differential equations: Euler's method;multistep methods; Explicit and implicit Runge-Kutta methods; Collocation; Linear stability; Difference operators. Partial differential equations: Finite difference schemes for Poisson's equation; Algebraic solution of large systems	MAIN	Student should be able to ; -Discretise ordinary differential equations according to different numerical methods; and -Will be able to investigate the stability of these different schemes.
MATP	6824	Numerical Solution of Differential Equations	Ordinary differential equations: Euler's method;multistep methods; Explicit and implicit Runge-Kutta methods; Collocation; Linear stability; Difference operators. Partial differential equations: Finite difference schemes for Poisson's equation; Algebraic solution of large systems.	MAIN	Student should be able to; -Discretise ordinary differential equations according to different numerical methods ;and -Will be able to investigate the stability of these different schemes.
MATP	7914	Numerical Solution of Differential Equations	Ordinary differential equations: Euler's method;multistep methods; Explicit and implicit Runge-Kutta methods; Collocation; Linear stability; Difference operators. Partial differential equations: Finite difference schemes for Poisson's equation; Algebraic solution of large systems.	MAIN	Student ahould be able to; -Discretise ordinary differential equations according to different numerical methods; and -Investigate the stability of these different schemes.
MATP	7924	Numerical solution of differential equations	Ordinary differential equations: Advanced Euler method;multistep methods; Explicit and implicit Runge-Kutta methods; Collocation; Linear stability; Difference operators. Partial differential equations: Advanced finite difference schemes for Poisson's equation; Algebraic solution of large systems.	MAIN	Student will be able to: - Discretise ordinary differential equations according to different numerical methods; and - Investigate the stability of these different schemes.
MATQ	6814	Optimisation	Unconstrained Optimizations Problems: Line search numerical algorithms such as the golden section search and parabolic interpolation. Direction picking methods such as conjugate direction method, Newton's method and quasi-Newton's method. Analytic first order and second order tests for extremums. Solving Nonlinear Equation: Nonderivative methods such as Gaussian-Seidel iterative scheme. Derivative methods such as Newton-Raphson Method, Broyden and Broyden-SMW iterative methods. Constrained Optimization Problems: Lagrange method for equality constraints (with both first order and second conditions). The Kuhn-Tucker method for inequality constraints.	MAIN	After completing this module successfully, a student will be able to numerically find a local maximum or minimum to any well-formed twice differentiable optimization problem possibly with equality constraints, to numerically solve any well-formed system of equations, to solve small optimization problems with inequality constraints and know how to theoretically systematically solve large optimization problems. They should be able to visualize what the various algorithms do when applied to a function of two variables.
MATQ	6824	Optimisation	Unconstrained Optimizations Problems: Line search numerical algorithms such as the golden section search and parabolic interpolation. Direction picking methods such as conjugate direction method, Newton's method and quasi-Newton's method. Analytic first order and second order tests for extremums. Solving Nonlinear Equation: Nonderivative methods such as Gaussian-Seidel iterative scheme. Derivative methods such as Newton-Raphson Method, Broyden and Broyden-SMW iterative methods. Constrained Optimization Problems: Lagrange method for equality constraints (with both first order and second conditions). The Kuhn-Tucker method for inequality constraints.	MAIN	After completing this module successfully, a student will be able to numerically find a local maximum or minimum to any well-formed twice differentiable optimization problem possibly with equality constraints, to numerically solve any well-formed system of equations, to solve small optimization problems with inequality constraints and know how to theoretically systematically solve large optimization problems. They should be able to visualize what the various algorithms do when applied to a function of two variables.
MATQ	7914	Optimisation	Linear programming: Simplex method. Interior points methods such as affine scaling and path-following versions (barrier function approach). Definition of a linear program's dual. Problem variations such as equality constraints, integer programming and multi-goal problems. Examples of linear programming problems such as transportation problem and assignment problem. Nonlinear programming: revision of Kuhn-Tucker approach. Numerical solutions via linearization of the problem, or interior points like methods (which use Zoutendijk's method of feasible directions or Rosen's gradient projection method), or barrier function approach. Analytic method for quadratic programming.	MAIN	After completing this module successfully, a student will be able to use the simplex method or interior points method to solve a linear program. They should be able to write down the equations associated with the simplex table both for the original problem and the dual. They should also be able to do nonlinear programming. They should be able to visualize what the various methods do when applied to a function of two variables.
MATQ	7924	Optimisation	Linear programming: Simplex method. Interior points methods such as affine scaling and path-following versions (barrier function approach). Definition of a linear program's dual. Problem variations such as equality constraints, integer programming and multi-goal problems. Examples of linear programming problems such as transportation problem and assignment problem. Nonlinear programming: revision of Kuhn-Tucker approach. Numerical solutions via linearization of the problem, or interior points like methods (which use Zoutendijk's method of feasible directions or Rosen's gradient projection method), or barrier function approach. Analytic method for quadratic programming.	MAIN	After completing this module successfully, a student will be able to use the simplex method or interior points method to solve a linear program. They should be able to write down the equations associated with the simplex table both for the original problem and the dual. They should also be able to do nonlinear programming. They should be able to visualize what the various methods do when applied to a function of two variables.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATR	6814	Cryptography	Basic methods and algorithms of cryptography.	MAIN	Student will be able to: - apply the different methods of cryptography.
MATR	6824	Cryptography	Basic methods and algorithms of cryptography.	MAIN	Student will be able to: - apply the different methods of cryptography.
MATR	7914	Cryptography	Advanced methods and algorithms of cryptography.	MAIN	Student will be able to: - apply the different advanced methods of cryptography.
MATR	7924	Cryptography	Advanced methods and algorithms of cryptography.	MAIN	Student will be able to: - apply the different advanced methods of cryptography.
MATS	6814	Partial differential equations	Formulation of Partial Differential Equations. Use of differential operators in solving linear Partial Differential Equations in two independent variables with constant coefficients. The Cauchy Problem for first order Partial Differential Equations in two variables. Characteristic Curves. Non-linear first order Partial Differential Equations in two variables. Second order Partial Differential Equations: (i) Canonical forms, (ii) Method of Separation of variables. Second order Partial Differential Equations: D'Alembert's method of solution. Second order hyperbolic Partial Differential Equations: Cauchy Problem.	MAIN	After completing this module successfully, a student will be able to analyze and solve various PDE's with 2 variables.
MATS	6824	Partial differential equations	Formulation of Partial Differential Equations. Use of differential operators in solving linear Partial Differential Equations in two independent variables with constant coefficients. The Cauchy Problem for first order Partial Differential Equations in two variables. Characteristic Curves. Non-linear first order Partial Differential Equations in two variables. Second order Partial Differential Equations: (i) Canonical forms, (ii) Method of Separation of variables. Second order Partial Differential Equations: D'Alembert's method of solution. Second order hyperbolic Partial Differential Equations: Cauchy Problem.	MAIN	After completing this module successfully, a student will be able to analyze and solve various PDE's with 2 variables.
MATS	7914	Partial differential equations	Formulation of Partial Differential Equations. Use of differential operators in solving linear Partial Differential Equations in two independent variables with constant coefficients. The Cauchy Problem for first order Partial Differential Equations in two variables. Characteristic Curves. Non-linear first order Partial Differential Equations in two variables. Second order Partial Differential Equations: (i) Canonical forms, (ii) Method of Separation of variables. Second order Partial Differential Equations: D'Alembert's method of solution. Second order hyperbolic Partial Differential Equations: Cauchy Problem Second order hyperbolic Partial Differential Equations: (i) Use of the Riemann Method; Construction of the Riemann function, (ii) The telegraph equation. Second order Partial Differential Equations: Transform Methods.	MAIN	After completing this module successfully, a student will be able to analyze and solve various PDE's with 2 variables.
MATS	7924	Partial differential equations	Formulation of Partial Differential Equations. Use of differential operators in solving linear Partial Differential Equations in two independent variables with constant coefficients. The Cauchy Problem for first order Partial Differential Equations in two variables. Characteristic Curves. Non-linear first order Partial Differential Equations in two variables. Second order Partial Differential Equations: (i) Canonical forms, (ii) Method of Separation of variables. Second order Partial Differential Equations: D'Alembert's method of solution. Second order hyperbolic Partial Differential Equations: Cauchy Problem Second order hyperbolic Partial Differential Equations: (i) Use of the Riemann Method; Construction of the Riemann function, (ii) The telegraph equation. Second order Partial Differential Equations: Transform Methods.	MAIN	After completing this module successfully, a student will be able to analyze and solve various PDE's with 2 variables.
MATT	6814	Fluid mechanics	Kinematics of the flow field, equations of motion for a fluid, ideal fluids, potential flow, viscous flows.	MAIN	After completing this module successfully, a student will be able to analyze and solve various problems of fluid mechanics.
MATT	6824	Fluid mechanics	Kinematics of the flow field, equations of motion for a fluid, ideal fluids, potential flow, viscous flows.	MAIN	After completing this module successfully, a student will be able to analyze and solve various problems of fluid mechanics.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATT	7914	Fluid mechanics	Tensors, kinematics of the flow field, equations of motion for a fluid, ideal fluids, potential flow, viscous flows.	MAIN	After completing this module successfully, a student will be able to analyze and solve various problems of fluid mechanics.
MATT	7924	Fluid Mechanics	Tensors, kinematics of the flow field, equations of motion for a fluid, ideal fluids, potential flow, viscous flows.	MAIN	After completing this module successfully, a student will be able to analyze and solve various problems of fluid mechanics.
MATU	6814	Biological Modelling	Continuous population models for single species. Discrete population models for single species. Discrete Age-structured population models. Continuous models for interacting populations. Discrete growth models for interacting populations. Analysis of Predator-Prey models.	MAIN	A student should have a good theoretical background on what has become the basis for the field of mathematical biology.
MATU	6824	Biological Modelling	Continuous population models for single species. Discrete population models for single species. Discrete Age-structured population models. Continuous models for interacting populations. Discrete growth models for interacting populations. Analysis of Predator-Prey models.	MAIN	A student should have a good theoretical background on what has become the basis for the field of mathematical biology.
MATU	7914	Biological Modelling	Continuous population models for single species. Discrete population models for single species. Discrete Age-structured population models. Continuous models for interacting populations. Discrete growth models for interacting populations. Analysis of Predator-Prey models. *Reaction and Diffusion in Biological settings. Chemotaxis. Models for development and pattern formation in Biological systems.*	MAIN	A student should have a good theoretical background on what has become the basis for the field of mathematical biology.
MATU	7924	Biological Modelling	Continuous population models for single species. Discrete population models for single species. Discrete Age-structured population models. Continuous models for interacting populations. Discrete growth models for interacting populations. Analysis of Predator-Prey models. *Reaction and Diffusion in Biological settings. Chemotaxis. Models for development and pattern formation in Biological systems.*	MAIN	A student should have a good theoretical background on what has become the basis for the field of mathematical biology.
MATV	6814	Fractional Calculus	Introduction to fractional calculus. Integral methods. Laplace Transform. Riemann and Liouville fractional integrals. Riemann and Liouville fractional derivatives. Ordinary differential equations of fractional order.	MAIN	Student will be able to: - Have theoretical background on what has become the basis for the field of fractional calculus; and - Solve ordinary differential equations involving fractional order derivatives.
MATV	6824	Fractional Calculus	Introduction to fractional calculus. Integral methods. Laplace Transform. Riemann and Liouville fractional integrals. Riemann and Liouville fractional derivatives. Ordinary differential equations of fractional order.	MAIN	Student will be able to: - reason using a theoretical background on what has become the basis for the field of fractional calculus; and - solve ordinary differential equations involving fractional order derivatives.
MATV	7914	Fractional Calculus	Introduction to fractional calculus. Integral methods. Laplace Transform. Riemann and Liouville fractional integrals. Riemann and Liouville fractional derivatives. Ordinary differential equations of fractional order. System of differential equations of fractional order. The Weyl fractional derivative.	MAIN	Student will be able to: -Have a good theoretical background on what has become the basis for the field of fractional calculus; - Solve system of ordinary differential equations involving fractional order derivatives; and - compute the Weyl derivative of various functions.
MATV	7924	Fractional Calculus	Introduction to fractional calculus. Integral methods. Laplace Transform. Riemann and Liouville fractional integrals. Riemann and Liouville fractional derivatives. Ordinary differential equations of fractional order. System of differential equations of fractional order. The Weyl fractional derivative.	MAIN	Student will be able to: - Discuss the theoretical background on what has become the basis for the field of fractional calculus; - Solve system of ordinary differential equations involving fractional order derivatives; and - Compute the Weyl derivative of various functions.
MATW	6814	Financial Mathematics	Introduction to derivative instruments. Discrete securities models. Black-Scholes-Merton framework and Martingale Pricing Theory.	MAIN	A student should have a good notional knowledge of financial mathematics and will be able to analyse basic money market situations.
MATW	6824	Financial Mathematics	Introduction to derivative instruments. Discrete securities models. Black-Scholes-Merton framework and Martingale Pricing Theory.	MAIN	A student should have a good notional knowledge of financial mathematics and will be able to analyse basic money market situations.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATW	7914	Financial Mathematics	Introduction to derivative instruments. Discrete securities models. Black-Scholes-Merton framework and Martingale Pricing Theory. *Interest Rate Models and Bond Pricing. Interest Rate Derivatives: Bond Options, LIBOR and Swap Products*	MAIN	A student should have a good notional knowledge of financial mathematics and will be able to analyse basic money market situations.
MATW	7924	Financial Mathematics	ntroduction to derivative instruments. Discrete securities models. Black-Scholes-Merton framework and Martingale Pricing Theory. *Interest Rate Models and Bond Pricing. Interest Rate Derivatives: Bond Options, LIBOR and Swap Products*	MAIN	A student should have a good notional knowledge of financial mathematics and will be able to analyse basic money market situations.
MATX	6814	Graph Theory	Definition of graphs and fundamental parameters, operation on graphs, isomorphic graphs, distance in graphs, cut-vertices and bridges, trees, Eulerian graphs, planar graphs and Hamiltonian graphs.	MAIN	Students must be able to answer questions on: - Fundamental graph parameters - Operation on graphs, isomorphic graphs, distance in graphs, cut-vertices and bridges - Trees, Eulerian graphs, planar graphs and Hamiltonian graphs - Prove basic results
MATX	6824	Graph Theory	Definition of graphs and fundamental parameters, operation on graphs, isomorphic graphs, distance in graphs, cut-vertices and bridges, trees, Eulerian graphs, planar graphs and Hamiltonian graphs.	MAIN	Students must be able to answer questions on: - Fundamental graph parameters - Operation on graphs, isomorphic graphs, distance in graphs, cut-vertices and bridges - Trees, Eulerian graphs, planar graphs and Hamiltonian graphs - Prove basic results
MATX	7914	Graph Theory	Definition of graphs and fundamental parameters, operation on graphs, isomorphic graphs, distance in graphs, cut-vertices and bridges, trees, Eulerian graphs, planar graphs and Hamiltonian graphs. Automorphism groups of graphs, Menger's theorem, colorings, graph Ramsey theory.	MAIN	Students must be able to answer questions on: - Fundamental graph parameters - Operation on graphs, isomorphic graphs, distance in graphs, cut-vertices and bridges - Trees, Eulerian graphs, planar graphs and Hamiltonian graphs - Automorphism groups of graphs, Menger's theorem, colorings, graph Ramsey theory - Prove results in the area
MATX	7924	Graph Theory	Definition of graphs and fundamental parameters, operation on graphs, isomorphic graphs, distance in graphs, cut-vertices and bridges, trees, Eulerian graphs, planar graphs and Hamiltonian graphs. Automorphism groups of graphs, Menger's theorem, colorings, graph Ramsey theory.	MAIN	Students must be able to answer questions on: - Fundamental graph parameters - Operation on graphs, isomorphic graphs, distance in graphs, cut-vertices and bridges - Trees, Eulerian graphs, planar graphs and Hamiltonian graphs - Automorphism groups of graphs, Menger's theorem, colorings, graph Ramsey theory - Prove results in the area
MATY	6814	Asymptotic methods	Order Symbols and Operations on Order Symbols. Asymptotic Sequence and Asymptotic Power Series. Asymptotic expansion of functions defined by an integral. Methods: Integration by parts, Laplace, Watson's, Fourier type, steepest descent, stationary phase.	MAIN	Students should at the end of the course have a sound understanding of Order Symbols and Operations on Order Symbols. They should be able to analyze Asymptotic Sequences and Asymptotic Power Series. Students should be able to compute asymptotic expansion of functions defined by an integral using the following methods: Integration by parts, Laplace, Watson's, Fourier type, steepest descent, stationary phase.
MATY	6824	Asymptotic methods	Order Symbols and Operations on Order Symbols. Asymptotic Sequence and Asymptotic Power Series. Asymptotic expansion of functions defined by an integral. Methods: Integration by parts, Laplace, Watson's, Fourier type, steepest descent, stationary phase.	MAIN	Students should at the end of the course have a sound understanding of Order Symbols and Operations on Order Symbols. They should be able to analyze Asymptotic Sequences and Asymptotic Power Series. Students should be able to compute asymptotic expansion of functions defined by an integral using the following methods: Integration by parts, Laplace, Watson's, Fourier type, steepest descent, stationary phase.
MATY	7914	Asymptotic methods (Perturbation Methods)	Linear Operators. Perturbed algebraic equations. Multivariable expansion methods: Two and three variable expansions. Method of Matched Asymptotic expansions. Initial Value and Boundary Value Problems. Boundary Layer Problems.	MAIN	Students should be able to solve perturbed differential equations and associated boundary value problems. They should be able to engage in a meaningful research on problems with perturbation parameters.
MATY	7924	Asymptotic methods (Perturbation Methods)	Linear Operators. Perturbed algebraic equations. Multivariable expansion methods: Two and three variable expansions. Method of Matched Asymptotic expansions. Initial Value and Boundary Value Problems. Boundary Layer Problems.	MAIN	Students should be able to solve perturbed differential equations and associated boundary value problems. They should be able to engage in a meaningful research on problems with perturbation parameters.
MATZ	6814	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MATZ	6824	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	6834	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	6844	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	6854	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Blooms taxonomy.
MATZ	6864	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7914	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7924	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7934	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7944	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7954	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7964	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.

MICROBIOLOGY AND BIOCHEMISTRY (112)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
BLGY	1683	Introductory Biochemistry and Microbiology	This module contains fundamental knowledge, theories, principles and practices of Biochemistry and Microbiology on life in its various forms and the biochemical processes behind it including: - Water, acids and bases - Functional groups and their importance - The structure and function of large biological molecules - The cytoskeleton - Introduction to energy metabolism, enzymes and their regulation - Cellular respiration and fermentation - Basic cell structure of prokaryotic and eukaryotic cells, cell morphology, organelles, membranes and cell surface structures and their function - Evolution and Diversity of Microbial Cells - A history and the importance of Microbiology and the impact and role of microorganisms on humans and the environment - Tools to visualise microbial cells - Microbial locomotion and the phylogenetic tree of life.	MAIN	- Student will be able to: -Explain the dissociation of water, acids and bases, buffers and acidification. -Discuss the importance of functional groups. -Explore the synthesis and diversity of macromolecules. -Explore and explain free energy and know its relation to metabolism and energy coupling. -Explore and explain enzymes and their regulation. -Analyse the structure, hydrolysis and regeneration of ATP and how ATP is coupled to cellular work. -Use fundamental concepts and scientific knowledge to define the following enzymes catalyse reactions, substrate specificity, the principles of redox reactions, cellular respiration, its stages and regulation as well as its relation to other metabolic pathways, anaerobic respiration and fermentation. - Answer the question: What is Microbiology? - Explore and discuss the basic elements of cell structure - Explore and discuss the activity of microbial cells - Explore, discuss and analyse the phylogenetic tree of life - Explore, discuss and analyse the role of microorganisms in the environment - Explore, discuss and analyse the impact of microorganisms on humans - Explore, discuss and understand the History of Microbiology - Explore, discuss and analyse microbial cell structure, function and movement - Explore, discuss and analyse Cells of Bacteria and Archaea - Explore, discuss and analyse Eukaryotic cells
BOCB	2616	Biochemistry of biological compounds	This module contains fundamental knowledge, theories, principles and practices of Biochemistry, including: An introduction to the most important principles governing biochemistry. The module is designed to expand on the foundation that the student has acquired in chemistry and biology modules and to provide a biochemical framework that allows understanding of new phenomena.	MAIN	Student will be able to: - Describe the building blocks of living organisms and explain how biomolecules eventually form single cells and ultimately multi-cellular organisms; - Distinguish between prokaryotes and eukaryotes and describe in detail the differences between them; - Explain the properties of water and its importance as biological solvent; - Define and explain acids, bases, pH and buffers and use the relevant equations to calculate pH and buffer composition; - Recognise, draw, name and describe the four major types of molecules (sugars, amino acids, lipids, nucleotides) and three major types of polymers (carbohydrates, polypeptides, nucleic acids) found in all living organisms; - Describe and explain the properties and functions of these four major types of molecules and three major types of polymers; - Describe and explain the flow of genetic information in living organisms through the processes of replication, transcription and translation; - Appreciate and observe laboratory safety practices; - Perform the following tasks after acquiring the necessary problem-solving and psychomotor skills: a. calculations to prepare solutions of specified composition an pH b. titrations of amino acids and proteins. c.colorimetric assays to follow biochemical reactions. d. separation and analysis of biochemical compounds. - Have developed positive interests, attitudes and values with regard to biochemistry.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BOCE	2626	Enzymology and introductory metabolism	An introduction to the most important principles controlling enzyme action and the flow of energy through living systems. The module is designed to make students aware of the principles of Michaelis-Menten kinetics of single substrate reactions, inhibitors and activators, the regulation of allosteric enzymes, coenzymes, the theory of catalysis, enthalpy, entropy and free energy, the living cell as open thermodynamic system, coupled reactions, redox reactions, the role of ATP, introduction to metabolism, glycolysis and fermentation, gluconeogenesis, glycogen metabolism, the pentose phosphate pathway, the Krebs cycle, electron transfer and oxidative phosphorylation, glyoxylate cycle and fatty acid oxidation, fatty acid biosynthesis and catabolism, the metabolism of cholesterol and phospholipids, an overview of amino acid biosynthesis and catabolism including the urea cycle, an overview of photosynthesis.	MAIN	Student will be able to: - Explain the principles of enzyme action, including the effect of activators, inhibitors and allosteric effectors; - Interpret kinetic data for single substrate reactions; - Explain the mechanisms employed by enzymes for catalysis; - Explain the overall process and the details of the chemical changes occurring during carbohydrate and fat metabolism; - Explain the flow of energy through the metabolic pathways; - Examine and explain the control of selected metabolic processes; - explain and calculate the energy balance of the metabolic pathways; -Form an integrated view of the metabolic pathways and how it integrates with nutritional metabolism; - Explain the origin and effect of selected metabolic disorders in the context of global metabolic processes; - Explain the basic biochemical processes of photosynthesis; - Interpret enzyme kinetic data illustrating the effect of effectors; - Apply some of the techniques used in the study of metabolism; - Do different types of enzymatic assays; - Use laboratory equipment presented in practical sessions; and - Plan experiments and write a scientific report.
BOCE	3714	Advanced enzyme kinetics and metabolism	In this module the student undertakes an advanced study of mono and bisubstrate enzyme reactions, the mechanisms used to regulate enzymes, introduction to metabolism, study of several metabolic pathways, principles of the regulation of metabolic pathways, anabolism and catabolism.	MAIN	Student will be able to: - Apply the basic chemical kinetic, thermodynamic and mathematical principles used in describing enzyme kinetics with rate equations, for single-substrate and multisubstrate reactions - Incorporate the effects of regulatory compounds such as inhibitors for single substrate reactions into rate equations - Describe specific examples of regulation with respect to rate limiting enzymatic reactions and integrate this effect in metabolic outcome - Apply a variety of enzyme kinetic assays, including inhibition assays - Apply a variety of data analytical methods to obtain kinetic parameters - Discuss and explain a variety of enzyme regulation mechanisms - Explore the outcomes of specific regulatory actions of the metabolism of prokaryotes and eukaryotes - Discuss and explain some of the techniques used in the study of metabolism - Discuss and explain details regarding the integrated nature and the control of metabolism - Explain the overall process and the details of the chemical changes occurring during carbohydrate and fat metabolism - Explain the flow of energy through the metabolic pathways with respect to specific controlled reactions - Explain the flow of carbon through the metabolic pathways - Plan experiments and write a scientific report - Observe the correct use of laboratory equipment presented in practical sessions
BOCH	2614	Biochemistry for agriculture and health sciences	The role of water and salts in the cell, survey of the chemistry of carbohydrates, lipids, proteins and nucleic acids, the flow of information. Survey of the flow of energy and material through the cell, catabolic pathways, anaerobic and aerobic metabolism, anabolic pathways, integration of metabolic pathways, metabolic diseases.	MAIN	Student will be able to: - Discuss the basic structure of, and the differences between prokaryotic and eukaryotic cells; - Evaluate any chemical structure in terms of its likelihood to be soluble in water taking into account chemical groups and elements in the structure; - Perform basic calculations involving pH, pKa and buffers; - Recall and draw the general structures, properties and functions of amino acids, lipids, carbohydrates and nucleic acids; - Provide the correct nomenclature and common names of relevant amino acids, carbohydrates, lipids and nucleotides; - Discuss the role of enzymes, regarding enzyme kinetics, enzyme classes, the function and properties of enzymes in metabolism; - Discuss the main features of metabolism and the role of reducing equivalents and ATP in energy metabolism; and - Discuss how the metabolic pathways integrate and function under aerobic and anaerobic conditions.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BOCM	3714	Molecular Biology	The module focus on the "Central Dogma of Molecular Biology:" DNA replication, transcription and translation. Topics in DNA/RNA structure-function, DNA repair and regulation of gene expression in pro- and eukaryotes are discussed. In addition, an introduction into recombinant DNA technology and molecular cloning is offered and include restriction enzymes, cloning and expression vectors, recombinant protein production, an introduction into reporter genes, PCR and nucleotide sequencing.	MAIN	Student will be able to: - Discuss and explain the principles of recombinant DNA technology - Explain nucleic acid structures - Explain pro- and eukaryotic DNA replication, including DNA repair mechanisms - Evaluate and discuss transcription, including the regulation of gene expression - Explore the mechanism of translation.
BOCP	3724	Protein Biochemistry	In this module the student will be trained in protein biochemistry. Students will gain knowledge of protein properties that allow separation by liquid chromatography, the three-dimensional structure of proteins and how they fold into globular structures and the forces involved in maintaining the structural integrity of the folded state. Post-translational modifications of proteins, with a focus on glycoproteins, will be introduced together with concepts in protein sorting and trafficking through the cell. Modern and classical methods in primary structure determination of proteins will be taught, leading to concepts of protein evolution and bioinformatics. The catalytic mechanisms employed by enzyme will also be introduced. Students will be trained in technical skills through wet laboratory and computer based practical sessions.	MAIN	The student will be able to: - Describe and apply techniques of protein purification - Describe and discuss the three-dimensional structures of proteins - Describe and discuss protein folding, dynamics and structural evolution - Describe, analyze and discuss glycoproteins and other post-translational modifications - Describe and discuss protein sorting and trafficking - Describe, discuss and analyze protein primary structure determination, evolution and bioinformatics - Analyze and discuss enzymatic catalysis
BOCS	3724	Cell membranes, signal transduction and immunology	In this module the student is exposed to advanced aspects of membrane structure, compounds associated with membranes such as glycoproteins, membrane lipids, glycolipids, membrane proteins, membrane transport systems, receptors, various signal transduction systems (with emphasis on the senses and the immune system), in pro and eukaryotic cells and their role in metabolic regulation, synthesis of proteins in membranes, techniques used to study membranes and the characterisation of membrane components.	MAIN	The student will be able to: Discuss and explain and must be able to give a detailed description of listed components and be able to draw all discussed structures, unless otherwise stated: - Composition of membranes, exploiting lipids, proteins, carbohydrates and cholesterol. - Biosynthesis of membrane lipids focussing on various biosynthetic pathways. - Structure of membranes with focus on the erythrocyte membrane by looking at bilayer formation, fluidity and factors affecting structure. - Membrane proteins, focussing on all related aspects such as transport, receptors, intracellular communication, structural proteins and membrane bound enzymes - Biosynthesis of membrane proteins, appreciating the site of synthesis and translocation in membranes Explore terminology such as, receptors, ligands, antagonist, agonist, hormones, steroids, and immunity-related terms (e.g. interferons, and various lymphokines). Apply knowledge obtained to more complex systems, such as signal transduction pathways, hormonal action, control, regulation and immune systems with focus on viral infections. Compare signalling of pathways by stimulation of hormones to that of steroids. Comparisons and appreciation of various signalling pathways and apply knowledge to more complex pathways, such as the visual system, phosphoinositide system and lipolysis.
MCBC	3724	Microbial genomics, genetics and biotechnology	The module provides an overview of how microbes (e.g., bacteria, viruses and yeast) are manipulated to solve practical problems through biotechnology. Topics include the application of genomics and the different fields of functional "omics", microbial life, ecology, genetic engineering and metabolism in biotechnological processes as well as the essential tools of biotechnology to produce commercial products produced by genetically engineered microbes.. Topics that will be covered include microbial genetics and genomics, concepts of mutation and gene transfer in prokaryotic cells, microbes in drug, chemicals and enzyme production and development, microbes in alcoholic beverages and biofuels production, metagenomics, system biology, genetic manipulation of organisms and others.	MAIN	Student will be able to: -Evaluate the applications of technologies recently developed from fundamental research in microbial genetics and genomics -Understand and be able to discuss the importance of microbial genome sequences and the field of functional "omics" in modern microbiology. -Identify and describe the type and application of different "omics" technologies in the study of genomes. -Describe the technologies to study the genome of an organism including bioinformatics, annotation of genomes and functional and environmental genomics -Describe the different genomes and replication schemes of viruses in relation to the diversity and ecological activities of viruses. - Be able to discuss in detail the molecular basis of Mutations as well as genetic exchange mechanisms found in Bacteria and Archaea -Explain the application of recombinant DNA technology, synthetic biology as well as the application of genetically modified organisms in the field of synthetic biology and biotechnology -Describe/explain the application of microorganisms in biotechnology for the production of drugs, other chemicals and enzymes as well as alcoholic beverages and biofuels -Describe/explain the application of microorganisms for the production of primary and secondary metabolites.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MCBE	3714	Microbial ecology and environmental microbiology	The science of microbial ecology focuses on how microbial populations assemble to form communities and how these communities interact with each other and their environments. In microbial ecology we investigate the microorganisms present in specific habitats (biodiversity) and the activities they carry out. To study biodiversity, microorganisms must be identified and quantified in their habitats. To study microbial activity, microbial metabolic processes in habitats must be measured. This module starts with the analysis of microbial communities through culturing of microorganisms, microscopy and molecular genetic analysis. Microbial communities in different environments will then be outlined. Next the involvement of microorganisms in nutrient cycles in nature will be covered, followed by the ecology of microorganisms in man-made environments such as mining. Symbiotic associations among microorganisms and between microorganisms and higher life forms will also be studied. Finally we will consider the water and food we consume as attractive habitats for microorganisms which include dangerous pathogens.	MAIN	Student will be able to: -describe/explain/interpret the methods used in the enumeration of microorganisms and measuring their metabolic activities in their natural habitats; -describe/explain the advantages and limitations of each of these methods; -design experimental strategies for the detection of microbes and their activities in given environments; -describe/explain how microorganisms interact with each other and their terrestrial or aquatic environments; -explain why different natural environments result in different microbial populations; -describe/explain the role of microorganisms in the cycling of nutrients in nature; -describe/explain how microorganisms impact negatively on the built environment; -describe/explain how microorganisms are applied in the built environment to benefit humans; -describe/explain the symbiotic relationships among microorganisms and between microorganisms and other forms of life; -name the diseases spread through different water and food sources; -describe/explain how the spread of food and water borne diseases can be prevented; and -describe the diagnosis, treatment, epidemiology and pathology of these diseases.
MCBG	3714	Growth, nutrition and death of microoganisms	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: quantitative enumeration techniques for microorganisms, microbial growth and death, the principles of and methods for the determination of microbial concentration, growth and death and the fundamental kinetics involved, the principles of microbial nutrition and the effects of physical and chemical antimicrobial agents, enumeration methods, the construction of microbial growth and survival curves and the calculation of kinetic parameters, bacterial isolations on selective and differential media.	MAIN	Students will be able to: - Explain, appraise and apply the principles and techniques used for microbial enumeration, including the ability to select the most appropriate method; - Explain and apply the principles of microbial growth and death kinetics, including the calculation of kinetic parameters; - Demonstrate a fundamental knowledge of antimicrobial agents, their mechanisms of action and their applications; - Demonstrate and apply knowledge of the nutritional requirements for microbial growth and formulate microbial culture media; - Explain the use of selective and differential media for microbial isolations and counts; - Demonstrate skills in the use of various techniques, including microscopy, for the quantitative determination of microorganisms; - Demonstrate proficiency in the construction of growth and survival curves from experimental data and in the use of graphical and mathematical techniques for the calculation of kinetic parameters; and - Design experiments related to microbial growth and death and analyse and interpret the results.
MCBH	2614	Introduction to Microbiology for health and consumer sciences	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: a basic overview on the historical development of microbiology, including the classification, cell structure, and characteristics of bacteria, fungi and protista, microbial symbiotic relationships, basic virology, the growth and survival of microorganisms, factors affecting cell growth and death, microbial growth control and principles of immunology.	MAIN	The student will be able to: - Describe the important aspects of the development of microbiology; - Describe the groups of microorganisms and their symbiotic relationships; - Give an overview of viruses; - Carry out aseptic techniques and differentiate between important microorganisms; - Describe microbial cell growth and death; - Demonstrate insight on how to control and eliminate microbial growth; and - Describe the mechanism and principles of immunity.
MCBH	2624	Introduction to Microbial Pathogenicity for health and consumer sciences	This module contains fundamental knowledge, theories, principles and practices of pathogenicity and immunology, including: the concepts of epidemiology, nosocomial infections, immunization, immune testing and an introduction to the major groups of pathogenic microorganisms, occurrence and spread of pathogens, the mechanisms of disease transmission, control measures for application outside the body, the control of pathogens inside the body with the aid of immunization and treatment with antibiotics.	MAIN	Student will be able to: -Describe the concepts of adaptive immunity, immunization and immune testing - Describe important concepts of epidemiology and nosocomial infections; - Describe antimicrobial drugs and antimicrobial drug resistance - Describe pathogenicity and virulence - Describe infectious diseases and their transmission - Describe eukaryotic pathogens: fungal and parasitic diseases - Describe the incidence of TB, Influenza, Malaria and HIV in South Africa - Carry out aseptic techniques to investigate: normal microbiota of the human body, microbiota in the environment and food; the effect of antimicrobial drugs on the growth of different microbial species

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MCBP	2616	The basic principles of Microbiology	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: an introduction to molecular biology, transmission of genetic information, protein and RNA synthesis, the influence of nutrition and the environment on microbial growth, handling and investigating various microorganisms, preparation and sterilisation of microbiological media, isolation and cultivation of microorganisms, microscopic investigation of microorganisms, aspects of the metabolism of microorganisms, the effects of environmental conditions and inhibitors on microorganisms, metabolic regulation and signal transduction, the basic principles of virology including replication, diversity and ecology of viruses.	MAIN	Student will be able to: Explain the science of microbiology by referring to the living world of microscopic organisms and our understanding of microbial life processes for the benefit of humankind and our planet; Explain the impact of microorganisms on human affairs by referring to disease; Explain how microorganisms are studied by different microscopic methods; Describe the diversity of microorganisms as well as their respective metabolisms; Describe the morphology of cells in relation to function; Explain the integral parts of microbial cells such as membranes, cell walls, and other inclusions; Describe how microorganisms are cultivated; Explain how temperature and other environmental factors influence microbial growth; Describe how viruses differ from other microorganisms; Describe how viruses can be used for the benefit of man; Perform basic microbiological techniques; Isolate microorganisms and investigate their basic properties; Accurately carry out experiments according to instructions and collect and report data; Interpret data collected in the light of existing knowledge on the level of introductory microbiology; and Work together as member of a team.
MCBP	2626	Microbial evolution and diversity	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: the evolution of microbial life, methods for discerning evolutionary relationships and for systematic classification of organisms, major lineages of microorganisms, the diversity in energy metabolism and their functional diversity, including major habitats of microorganisms and animal-microbial and plant-microbial symbioses.	MAIN	Student will be able to: -Define and correctly use the terminology employed in microbial systematics; -Explain the different genotypic, phenotypic and phylogenetic analyses used in microbial systematics; -Explain and argue about the phylogeny of the Bacteria, Archaea and Eukarya; -Explain the origin and evolution of cellular life and how it gave rise to current microbial diversity within the Bacteria, Achaea and Eukarya; -Describe the endosymbiotic link between eukaryotic and prokaryotic cells; -Distinguish between different groups within major lineages of the Bacteria, Achaea and Eukarya based on morphology, physiology, energy metabolism, habitats, survival mechanisms and phylogeny; -Compare and contrast the lifestyles of selected groups within major lineages of the Bacteria, Achaea and Eukarya; -Describe the physiological features of selected groups within major lineages of the Bacteria, Achaea and Eukarya; -Perform basic microbiological techniques to investigate functional diversity of microorganisms -Apply knowledge of habitat and metabolism to explain influence of microbial populations on a self-constructed closed system (Winogradsky column) -Prepare and present oral presentations regarding their observations
MCBP	3724	Pathogens and immunity	One of the main problems associated with microorganisms is that they cause diseases in all living systems. This module will concentrate on animal diseases. The interaction between the pathogen and the host will be investigated as well as the requirements which a microorganism must adhere to in order to become pathogenic. The difference between the normal microbiota and pathogens will be discussed. Aspects of non-specific host defence mechanisms as well as control methods through the use of antibiotics and vaccines will be covered as well as a basic presentation of the immune system and methods of vaccine production. An introduction to epidemiology, as well as the methods used for the laboratory-based diagnosis of disease-causing agents will be presented. This will include the isolation and identification of viruses and bacteria as well as the detection of antibodies. In the last part of this module, selected important diseases of man, poultry, avian species, fish and insects will be covered as well as the role that microbiologists can play in the control of these diseases through different diagnostic approaches as well as the development of treatments. Aspects related to the protection against biological weapons will also be covered.	MAIN	Student will be able to: -Explain the differences between pathogenic and non-pathogenic microorganisms and the elements needed for pathogenicity can be transferred to the non-pathogenic organism. -Discuss the pathogenic potential of bacteria and viruses and differentiate between primary pathogens and opportunistic pathogens. -Explain the functioning of the innate and adaptive immunity in humans and animals, including definitions of antibodies and antigens, autoimmune diseases and hypersensitivity reactions. -Compare the different approaches to methods of vaccine production and the use of vaccines to stimulate the immune response.. -Discuss various disease control options, including the use of vaccines, antibiotics and antimicrobial agents and differentiate between when these different options should be used for disease control. -Work within a group in the laboratory to design experiments to isolate and identify bacteria from samples and determine antimicrobial activities, perform the experiments and communicate the results in the form of oral and written presentations. -Use fundamental concepts and scientific knowledge to define the following; pathogenicity, innate immunity, adaptive immunity, vaccine development, primary and secondary immune responses, production of polyclonal and monoclonal antibodies, antibiotics and antibiotic resistance, antiviral medications, physical control of pathogens, epidemiology and ways in which pathogens are spread.
Postgraduate					

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BOCB	6804	Bioinformatics and omics sciences	Survey and use of a variety of bioinformatics databases. Genome sequence assembly, annotation and tools. Molecular phylogenetics. Systems biology and modelling of biochemical pathways. Analysis of large phenotypic datasets such as microarrays and RNAseq	MAIN	Student will be able to: -discuss the principles involved in molecular sequence alignment and other methods employed in bioinformatics -perform a variety of database searches, selecting the best method, based on thorough understanding of the principles involved - perform molecular phylogenetics -Execute simple command-line bioinformatics programs -analyse large functional genomic datasets with computational tools, such as microarray, RNAseq, proteomics or metabolomics - use and create systems biology models of biochemical pathways and perform simulations in a graphical user interface.
BOCD	9100	Biochemistry Thesis	This module contains fundamental knowledge, theories, principles and practices of Biochemistry, General including Research project in specialized field of Biochemistry, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	the student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
BOCE	6844	Enzyme structure and catalysis	Enzyme structure and the theory of catalysis, mechanisms applied in catalysis. General principles of catalytic mechanisms employed by enzymes. Reaction mechanism of selected enzymes from defined catalytic classes. Applications of enzymes. Discovery and development of enzymes by rational design and directed evolution for specific applications.	MAIN	Students will be able to: - identify the different enzyme classes and reactions; - Describe the different types of catalysis generally found in organic chemistry; - discuss the principles behind enzyme catalysis - analyse Catalytic mechanisms of selected enzymes with structural detail; - Discuss the experimental evidence leading to the elucidation of or supporting the catalytic mechanism; - explore the effect of mutations on the catalytic properties of the enzymes; - read a published paper on any unknown enzyme and use the evidence supplied to work out a catalytic mechanism; - identify Enzymes used in biocatalysis and the developingment of a successful biocatalysis process. - explore and analyse rational design, directed evolution and immobilization. - apply the following enzymes in biocatalysis: lipases and esterases, epoxide hydrolases and haloalcohol dehalogenases; nitrilases and nitrile hydratases, reductases and dehydrogenases; monooxygenases - Conduct cofactor regeneration - Discuss kinetic resolution, kinetic dynamic resolution and desymmetrization.
BOCL	6826	Research: Literature study	Students carry out a literature survey on a topic supplied to them by a lecturer acting as mentor. This topic is generally linked to the research that will be done in BOCR6828. A literature review covering the chosen topic is written and also presented orally. The written portion of the module is evaluated by the mentor as well as an internal and external assessor and marks are allocated by all three.	MAIN	Student will be able to: - apply the principles obtained during his literature survey to answer questions; - discuss and explain the variety of approaches observed in the literature and how they relate to what has been achieved as well as the intended research; - justify and evaluate key aspects of the proposed research project from the literature; and -discuss and explain what has been observed in the literature, both orally (with the help of visual aids) and in a well compiled literature review.
BOCM	6804	Advanced Molecular Biology	In the Advanced Molecular Biology module, concepts of nucleic acid structure and the Central Dogma of Molecular Biology not addressed in the third year are discussed. Emphasis is placed on epigenetic mechanisms, RNA processing, genome editing, genome analysis, gene therapy and genetically modified organisms. Recombinant expression systems and tools for analysing gene expression are also included. Training in the evaluation and interpretation of subject specific literature is included.	MAIN	Student will be able to: -Discuss, argue, critically assess and hypothesize current concepts and models regarding the molecular basis of prokaryotic and eukaryotic cellular processes; and -Apply principles, design recombinant DNA technology experiments; and be able to interpret and evaluate published literature on related topics.
BOCM	8900	Biochemistry Dissertation	This module contains fundamental knowledge, theories, principles and practices of Biochemistry: Research project in specialized field of Biochemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	At the end of the module, the student is expected to be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BOCO	6822	Biochemistry oral examination	The oral examination is normally scheduled for November. A panel consisting of lecturers from the division of Biochemistry, including an external assessor, is convened for this purpose. The general knowledge of the student with regard to the subject area as well as aspects of the Biochemistry Honours course will be assessed during the oral examination.	MAIN	The student will be able to: - Apply general and specific knowledge obtained in undergraduate and honours Biochemistry courses; - Appreciate and observe the application of Biochemistry; - Justify key aspects of his research project; and - Discuss and explain specific techniques used as well as general trends in Biochemistry
BOCR	6828	Research Essay	Students conduct research on a topic supplied to them during the first semester by a lecturer acting as mentor (in consultation with the Departmental Chairperson). A written research report is prepared and also presented orally. The written portion of the module is evaluated by the mentor as well as an internal- and external assessor and marks are allocated by all three.	MAIN	Student will be able to: -discuss obtained during his research to answer questions. - discuss and explain the various techniques applied in the project as well as the results obtained - justify and evaluate key aspects of his research project - discuss and explain his research, both orally with the help of visual aids and in a well compiled written report
BOCT	6804	Techniques in Biochemistry	Research techniques in biochemistry and biotechnology: chromatography, spectroscopy, electrophoresis, microbial cultivation techniques, PCR, Sanger sequencing, an introduction to mass spectrometry and other analytical techniques for the analysis of biomolecules and products. Science writing skills, nature and philosophy of science, research ethics, statistics.	MAIN	Student will be able to: -Discuss and explain the theory of the various techniques; -Apply the techniques to various problems; -Collect, organize, analyze and critically evaluate information; and -Interpret, analyse and report data obtained through the use of all the various techniques.
MBBT	8900	Microbial Biotechnology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Microbial Biotechnology, including: Research project in specialized field of Microbial Biotechnology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MBBT	9100	Microbial Biotechnology Thesis	This module contains fundamental knowledge, theories, principles and practices of Microbial Biotechnology, General including Research project in specialized field of Microbial Biotechnology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MCBC (Not being presented every year)	6804	Continuous and Batch Cultivation of Microorganisms	Growth kinetics of batch cultures. Oxygen as substrate: volumetric oxygen transfer coefficient; critical dissolved oxygen concentration. Chemostat theory: material balances; Monod model; autoregulation; determination of kinetic and stoichiometric parameters. Deviations from the Monod model: maintenance energy; double substrate-limited growth; growth on mixtures of carbon substrates. Effect of growth rate on cell composition and size. Product formation: kinetics; effect of environmental factors. Complex chemostat systems and applications. Kinetics of fed-batch cultures. Degree of reduction and carbon balances.	MAIN	The student will be able to: - Discuss the growth kinetics of batch cultures; - Describe the theory and kinetics of continuous culture systems, in particular of chemostat systems, as well as a good comprehension of the fundamentals of fed-batch cultivation; - Describe the uses and applications of continuous culture and fed-batch systems in research and industry; - Use continuous culture and fed-batch systems in research and design experiments; -Use graphical and mathematical techniques for computing kinetic and stoichiometric parameters from experimental data; - Interpret the data from the above systems; - Construct and interpret carbon balances and degree of reduction balances; and - Use MS Excel for advanced spreadsheet-based data processing, manipulation and modelling of experimental data related to bioprocesses.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MCBD	6824	Microbial Diversity	Yeasts: Identification of yeasts as required for quality assurance in the biotechnology industry. Yeast taxonomy. Fungi: Ecological concepts in mycology, endophytes, ecological succession, mating types and vegetative compatibility. Taxonomy, collection, preservation and description of fungi. Mycological techniques and the use of identification keys. Bacteria: Bacterial nomenclature and classification including numerical taxonomy. Understanding of the phylogenetic and phenotypic classification systems. Training in advanced methods in serology and chemotaxonomy and nucleic acids in bacterial classification. Putative taxa of prokaryotes. Polyphasic taxonomy. Viruses: Characteristics of viruses which infect humans, animals, insects, plants, bacteria and fungi. Practical aspects of the propagation of viruses and the use of different methods for the identification of viruses.	MAIN	The student will be able to: - Identify yeasts as required for quality assurance in the biotechnology industry; - Apply taxonomic principles to the classification of yeasts; - Discuss and describe the taxonomy of yeasts, moulds, bacteria and viruses; - Demonstrate an understanding of the difference between identification and classification of bacteria; - Demonstrate a clear understanding of diversity of microbial life on earth and how they can interact with each other; - Demonstrate an understanding of how to work with viruses, particularly in the molecular era; - Describe how to isolate, purify, and identify fungi to species level; - Describe how fungi disperse in nature and relate to other living organisms; - Describe how fungi propagate and develop; and - Describe how fungi affect human, animal and plant health.
MCBL	6826	Research : Literature Study	Students carry out a literature survey on a topic supplied to them by a mentor. A literature review covering the chosen topic is written and also presented orally. The written portion of the module is evaluated by the mentor, an internal assessor as well as an external assessor.	MAIN	Student will be able to: - Collect, analyse, organise and critically evaluate information; - Compose and present research literature in written form in a scientific report and in oral form to a scientific audience; and - Communicate effectively orally, visually and in writing.
MCBM	6804	Microbial Molecular Biology	Training in the reading and interpretation of publications in molecular biology and the presentation of a seminar on a current molecular biology topic. The use of advance molecular biology techniques as well as training in computer usage that is associated with the analysis of DNA information. Students will also be expected to do self-study on selected topics that are related to molecular biology, these may include concepts of nucleic acid structure and the Central Dogma of Molecular Biology, epigenetic mechanisms, RNA processing, genome editing, genome analysis, gene therapy and genetically modified organisms. Recombinant expression systems and tools for analysing gene expression will also be included.	MAIN	Student will be able to: -Discuss, argue, critically assess and hypothesize current concepts and models regarding the molecular basis of prokaryotic and eukaryotic cellular processes; - Apply principles; -Design recombinant DNA technology experiments; and - Interpret and evaluate published literature on related topics.
MCBO	6822	Oral examination in Microbiology	The oral examination is taken in November. A panel consisting of lecturers from the Microbiology division and an external examiner is constituted for this purpose. Students are expected to answer questions about their research project (MCBR6828) as well as microbiology in general. Evaluation is not limited to completed course contents.	MAIN	Student will be able to: - Apply general and specific knowledge obtained in undergraduate and honours Microbiology courses; - Appreciate and observe the application of Microbiology; - Justify key aspects of his/her research project; and - Discuss and explain specific techniques used as well as general trends in Microbiology.
MCBP	6804	Applied Microbial Physiology	Principles and application of the metabolism of the microorganisms involved in selected commercial production processes. Metabolic regulation and its implication for microbial product formation. Industrial processes based on microbial physiological activities.	MAIN	Student will be able to: - Express familiarity with the commercial process for the production of citric acid, lysine, cephalosporin, beer and industrial ethanol; - Discuss the involvement of the relevant metabolic pathways in the commercial production these commodities; and - Solve metabolic problems related to the formation of these products.
MCBR	6828	Research Report	Students conduct research on a topic supplied to them by a mentor. A written research report is prepared and also presented orally. The written portion of the module is evaluated by the mentor, an internal assessor as well as an external assessor.	MAIN	Student will be able to: - Identify and solve problems using critical and creative thinking; - Apply appropriate theoretical and practical methods to the analysis and solution of a research problem; - Plan, organize, direct and control tasks and resources so as to accomplish set goals effectively within the allotted time; and - Compose and present research results in written form in a scientific report and in oral form to a scientific audience.
MCBT	6804	Techniques in Microbiology	Research techniques in biochemistry and microbiology: chromatography, spectroscopy, electrophoresis, microbial cultivation techniques, PCR, Sanger sequencing, an introduction to mass spectrometry and other analytical techniques for the analysis of biomolecules and products. Science writing skills, nature and philosophy of science, research ethics, statistics.	MAIN	The student will be able to: - Discuss and explain the theory of the various techniques; - Apply the techniques to various problems; - Collect, organise, analyse and critically evaluate information; and - Interpret, analyse and report data obtained through the use of various techniques.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
MCBT	8900	Microbiology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: Research project in specialized field of Microbiology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MCBT	9100	Microbiology Thesis	This module contains fundamental knowledge, theories, principles and practices of Microbiology, General including Research project in specialized field of Microbiology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

PHYSICS (113)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
PHYA	1554	Introductory Astronomy	The sky as a celestial sphere, including the visibility of stars and constellations; Cycles of the moon, the seasons and eclipses; Heliocentric universe and Kepler`s laws of planetary motion; Stars, their types, structure, spectral classification and the Hertzsprung-Russell diagram; formation, evolution and death of stars; neutron stars and black holes; Galaxies and the Milky way; The big bang and the age of the universe; Astronomical measurements and techniques applicable to multi-wavelength astronomy.	MAIN	The student will be able to: - define basic astronomical terms and explain phenomena associated with the motion of the Earth and Moon. - describe and interpret the laws governing the motion of the planets. - describe the birth, evolution and death of stars. - describe the structure and basic properties of galaxies, and the theory of the big bang, and - interpret data obtained from different wavelength observations (multi-wavelength astronomy).
PHYA	1664	Principles and Practice of Observational Astronomy	(a) Astronomical Instrumentation: Optical Telescopes and a brief introduction to Radio, Infrared, X-ray and Gamma-Ray astronomy (b) Telescope Optics (Resolving Power and Magnification), Mounts (c) Astronomical Observations and Measurements: Preparing finding charts, Light detectors, CCD Photometry, Atmospheric effects (extinction, seeing, atmospheric and galactic colour extinction), Spectroscopy, Parallax applications to determine distances to stars, Quantitative statistical interpretation of astronomical data (d) Introduction to the Celestial Sphere, Basics of spherical geometry (e) Coordinate systems: Equatorial (RA-Dec), Brief introduction to Alt-Az system, Ecliptic coordinates, Galactic Coordinates, Sidereal Time	MAIN	Student will be able to: Apply the basic principles of observational astronomy in problems and practice with astronomical instrumentation, astronomical measurements, photometry and spectroscopy and interpretation of astronomical data. - Use astronomical planetarium software like Stellarium and The Sky to explore the night sky - Use the Boyden telescopes to observe astronomical objects like the Moon, planets and stars - Observe the Moon, Identify features of the Moon`s surface - Measure the brightness of a star using CCD camera and IRAF photometry package - Determine the pulsation period of a star with CCD camera - Determine the orbital period of a binary system with CCD camera.
PHYA	2614	Astrophysics	This module provides an introduction to the physics of stars using the mathematical techniques and physics background from 1st level modules. Concepts like luminosity, inverse-square law and blackbody spectrum is used to explain the stellar photometric system and the stellar classification scheme. Thermal properties of matter, i.e. the Maxwell-Boltzmann equation and the Saha ionization equation are introduced to explain the strength of different species of spectral lines. Kepler's laws are introduced to explain binary star motion. The binary star mass function to determine the masses of starts, which leads to the well known and the mass-luminosity relation. Classification of different binary systems. Solutions to the equations of stellar structure are obtained under some simplifying assumptions. Applying these models to different stages of stars, their evolution from clouds of gas to final states such as white dwarfs or neutron stars can be traced. The Sun is studied as an example of a typical star, and the methods of classifying stars are described.	MAIN	Student will be able to: - Determine stellar data from a set of photometric data; - Discuss the time scales associated with stellar formation and evolution; - Derive equations for stellar structure and solve them under certain simplifying situations; - Derive and understand the consequences of the Virial theorem; - List and discuss the important nuclear processes at certain stages of stellar evolution; - Classify stars according to their properties like temperature and spectra; and - Describe how protostars are born in molecular clouds and their subsequent evolution into main sequence and post main sequence stars.
PHYA	2624	The structure and evolution of galaxies	This module gives an introduction to the properties of galaxies, how they evolve and the large-scale structure of the Universe. Our Solar System resides in the galaxy called the Milky Way.The components and dynamics of our Milky Way galaxy are examined as they provide a basis for the study of all other galaxies. We look at star formation rates within galaxies and how stellar populations evolve to understand how measured properties, such as the colour of a galaxy, change with time. Because the Universe is expanding, the module looks at how properties of galaxies change as we look back in time.	MAIN	Student will be able to - Recognise the various components of our Milky Way galaxy and know what their properties are; - Calculate how stars move within the Milky Way; - Distinguish morphological types for galaxies and different types of classification schemes; - Examine and discuss the evolution of galaxies; - Discuss the morphology of the large scale structure of the universe and how the distances to galaxies/galaxies clusters are determined; - Discuss the model of Active Galaxies; and - Explain how properties of the large-scale structure of the Universe are determined.
PHYA	3709	Astronomy Practical	This module exposes the student to the fundamental experimental techniques of optical astronomy (photometry and spectroscopy) as well introduces the concepts of radio, X-ray and Gamma-ray astronomy. In addition the students are introduced to practical programming, data analysis, scientific reporting and interpretation. This is a year-module which is presented modular with each of these modules (optical photometry, optical spectroscopy, multi-wavelength astronomy, data scripting and report writing) lasting approximately 5 weeks	MAIN	Student will be able to: - Explore basic and advanced methods and instruments used to collect observational data in astronomy; and - Examine and discuss the theory and methods implemented to reduce and present the data in an internationally acceptable standard format.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYA	3773	Radiative Processes in Astrophysics I	Fundamentals of radiative transport, intensity, radiative momentum and transfer, thermal radiation, the Einstein coefficients, scattering effects random walks and radiative diffusion, radiative transport, radiation force and pressure. The Eddington approach for radiation flux in stellar atmospheres. Applications of radiation transport in stellar envelopes and other astrophysical environments. A brief introduction of Maxwell's equations, plane electromagnetic waves and polarization of electromagnetic waves. The radiation of moving charges: the Larmor formula, Thomson scattering, radiation from undamped and damped harmonically bound charges. Rayleigh scattering.	MAIN	Student will be able to: -Examine and discuss the properties of the radiation field, i.e. radiation flux, intensity, energy density and radiation force and pressure. The radiation of individual charged particles, Thomson scattering, as well as radiation reaction and the radiation of harmonically bound particles as a mechanical model for the emission of bounded particles; and -Solve basic problems in this discipline, and apply basic concepts to solve problems related to radiation transport in astrophysical environments.
PHYA	3783	Radiative Processes in Astrophysics II	Lorentz transformations, invariance of the spacetime intervals, Relativistic effects on the radiation field like time dilation, length contraction, Doppler boosting and relativistic beaming, Lorentz invariants, emission of single speed electrons in the vicinity of a massive nucleus, emission of thermal Bremsstrahlung emission from a Maxwell-Boltzmann distribution of electrons, cyclotron emission, synchrotron emission from single electrons, expressions for the total emitted power, Compton and Inverse-Compton scattering, cross section. Synchrotron self-Compton scattering.	MAIN	Student will be able to: -Explain the fundamental effects of special relativity on the radiation field and emission from relativistic particles; -Explain the fundamental aspects of radiation processes of single charged particles, and be familiar with Bremsstrahlung, the basic properties of Synchrotron radiation, Compton and Inverse-Compton scattering; and -Solve basic problems in this discipline, and apply fundamental concepts introduced above to solve basic problems related to: Bremsstrahlung, Synchrotron radiation of single particles, Compton and Inverse-Compton radiation and synchrotron self-Compton applications in high energy astrophysics.
PHYC	2623	Introduction to Numerical Analysis and Quantitative Methods	Introduction to numerical analysis and quantitative methods: Students will be introduced to numerical integration and differentiation. Students will learn to implement numerical integral methods (e.g Newton-Cotes Formula, trapezoidal rule, Simpson rule) which will be used to solve numerical integrals. Improper integrals: the students will be introduced to techniques that can be used to help evaluate improper integrals. First-order differential equations: students will be introduced to the Euler method to solve for first-order differential equations. Students will be required to implement the methods in a programming language. Students are also exposed to the quantitative analysis and evaluation of experimental data, for example, basic error analysis, error propagation of measurements, significance estimation of experimentally determined quantities.	MAIN	Student will be able to: -Implement techniques of numerical differentiation and integration to solve basic problems in mechanics and dynamics; -Program and solve problems using Matlab or Python; -Determine and evaluate errors on experimental measurements as well as to know how errors propagate; and - Perform significance estimation of experimentally measured data.
PHYM	2613	Analytical mechanics for physicists and engineers	This module provides an introduction to basic analytical techniques of mechanical systems, i.e. basic vector fields, scalar fields, vector algebra and analysis, general motion of particles in three dimensions, non-inertial reference frames (rotation), gravitation and central forces, dynamics of systems of particles (collisions and scattering), Lagrange and Hamiltonian principles of solving problems related to dynamical systems, i.e. the calculus of variations, e.g. the Brachistrochrone problem.	MAIN	Students will be able to: - solve basic mechanical and dynamical problems - solve basic mechanical and dynamical problems applying Lagrange principles - solve basic mechanical and dynamical problems using the Hamiltonian approach - apply the calculus of variation to optimize mechanical and dynamical systems.
PHYS	1502	Physics for Building Science students	Mechanics: Revision of the concepts displacement, velocity, acceleration, force, work, energy, power and momentum. Addition and resolving of vectors. Equilibrium. Moment of force and equili¬brium. Equations of motion: Linear motion. Newton's second law, mass, weight. Work and energy. Elasticity and surface tension. Heat and thermodynamics: Temperature and its measurement, thermal expansion. Heat, units and transfer. Electricity: Potential, electrical current and circuits, electromagnetic introduction, electromagnetic waves, alternating currents and transformers. Light, sound and colour: Nature and propagation, optics, reflection, refraction, illumination.	MAIN	Student will be able to: -describe the basic phenomena and theory concerning mechanics, heat, sound, optics and electricity, as well as the applications thereof in the building sciences, and - solve problems, applied to the above topics.
PHYS	1512	Physics for Building Science students	Mechanics: Revision of the concepts displacement, velocity, acceleration, force, work, energy, power and momentum. Addition and resolving of vectors. Equilibrium. Moment of force and equili¬brium. Equations of motion: Linear motion. Newton's second law, mass, weight. Work and energy. Elasticity and surface tension. Heat and thermodynamics: Temperature and its measurement, thermal expansion. Heat, units and transfer. Electricity: Potential, electrical current and circuits, electromagnetic introduction, electromagnetic waves, alternating currents and transformers. Light, sound and colour: Nature and propagation, optics, reflection, refraction, illumination.	MAIN	Students will be able to: -Describe the basic phenomena and theory concerning mechanics, heat, sound, optics and electricity, as well as the applications thereof in the building sciences, and -Solve problems, applied to the above topics.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYS	1514	Mechanics, Optics and Electricity	Logical exposition of fundamental principles and the development of problem solving skills are addressed. Mechanics: Revision of the elementary concepts: displacement, velocity, acceleration, force, work, energy, power, projectile motion and rotation. In the above vector quantities and simple calculus is used wherever needed. Geometrical optics: The electromagnetic spectrum, plane mirrors, spherical mirrors, image formation, thin lenses, optical instruments. Electricity: Electrical charge, electrical field, electrical potential, current, resistance, circuits.	MAIN	Student will be able to: -Describe the basic phenomena and theory concerning mechanics, geometrical optics and electricity, and -Solve problems, applied to the above topics, as well as collect, analyse, order and critically evaluate information.
PHYS	1534	Mechanics, Optics, Electricity and Biological and Medical Relevant Topics	Applications of physics in biology and medicine are discussed in this module. Mechanics: Revision of the elementary concepts: displacement, velocity, acceleration, force, work, energy, power. Treatment of the above without calculus. Geometrical optics: The electromagnetic spectrum, plane mirrors, spherical mirrors, image formation, thin lenses, optical instruments. Electricity: Electrical charge, electrical field, electrical potential, current, resistance, circuits. Biologically and medically relevant topics: Physical principles of apparatus used in biology and medicine, some applications of physics in these fields.	MAIN	Student will be able to: -Describe the basic phenomena and theory concerning mechanics, geometrical optics and electricity as well as the applications thereof in biology and medical science; -Apply the skills to solve problems, related to the above topics; and -Collect, analyse, order and critically evaluate information.
PHYS	1543	Physics for physiotherapists	Applications of physics in biology and medicine are discussed in this module. Mechanics: Momentum, collisions, rotation, gravitation, oscillations, waves. Thermodynamics: Temperature, heat, first law of thermodynamics, kinetic theory of gases, entropy, second law of thermodynamics. Electricity and magnetism: Gauss's law, capacitance, magnetic field, Amperé's law, induction and inductance, simple alternating current circuits. Biologically and medically relevant topics: Physical principles of apparatus used in biology and medicine, some applications of physics in these fields.	MAIN	The student will be able to: Describe the basic phenomena and theory concerning mechanics, thermodynamics, electricity and magnetism, as well as the application thereof in biology and medical science, and have the skills to solve problems, applied to the above topics, as well as collect, analyse, order and critically evaluate information
PHYS	1624	Mechanics, Thermodynamics, Electricity and Magnetism	Logical exposition of fundamental principles and the development of problem solving skills are addressed. Mechanics: Momentum, collisions, rotation, gravitation, oscillations, waves. Thermodynamics: Temperature, heat, first law of thermodynamics, kinetic theory of gases, entropy, second law of thermodynamics. Electricity and magnetism: Gauss's law, capacitance, magnetic field, Ampere's law, induction and inductance, simple alternating current circuits.	MAIN	Student will be to: -Describe the basic phenomena and theory concerning mechanics, thermodynamics, electricity and magnetism; -Solve problems, applied to the above topics; and -Collect, analyse, order and critically evaluate information.
PHYS	1644	Electricity, Magnetism, Biologically and Medically Relevant Topics	Applications of physics in biology and medicine are discussed in this module. Mechanics: Momentum, collisions, rotation, gravitation, oscillations, waves. Thermodynamics: Temperature, heat, first law of thermodynamics, kinetic theory of gases, entropy, second law of thermodynamics. Electricity and magnetism: Gauss's law, capacitance, magnetic field, Amperé's law, induction and inductance, simple alternating current circuits. Biologically and medically relevant topics: Physical principles of apparatus used in biology and medicine, some applications of physics in these fields.	MAIN	Student will be able to: -Describe the basic phenomena and theory concerning mechanics, thermodynamics, electricity and magnetism, as well as the application thereof in biology and medical science; and -Solve problems, applied to the above topics, as well as collect, analyse, order and critically evaluate information
PHYS	2614	Mechanics, Waves and Optics	Much of physics and engineering demands a thorough knowledge of vibrating systems and wave behaviour. After a review of Newtonian dynamics, it is applied to systems experiencing a restoring force, leading to simple harmonic motion. This theory is generalized to the cases of damped and driven oscillators. The wave equation is derived, and standing waves, as well as the reflection and transmission of waves are explained. Polarization, interference and diffraction of light, illustrating its wave nature, are then discussed.	MAIN	Student will be able to: - solve dynamics problems for forces that are constant, time dependent, position dependent and velocity dependent, for arbitrary initial conditions; - explain the concept of a restoring force, be able to apply Hooke's Law and explain briefly its applicability to elasticity theory; - derive and apply equations describing an undamped vibrating system (simple harmonic oscillator) and describe the associated physical quantities; - derive and apply equations describing damped harmonic motion (with or without a driving force), and to explain the concept of resonance; - decompose periodic functions into Fourier series; - discuss the wave equation, standing waves and the transmission and reflection of waves; - explain superposition, coherence and Young's experiment, and perform calculations of the interference of light in a Michelson interferometer and thin films; and - derive and apply an equation for the intensity pattern as light passes through a single slit, be able to apply equations for the diffraction through a circular aperture and through a double slit, explain the Rayleigh criterion for resolving power end derive and apply equations describing the properties of a diffraction grating.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYS	2624	Electronics	Electronics: Basic concepts, theory and operation of electronic devices and circuits. Topics include the properties of semiconductors, diodes, rectifier circuits, zener diodes, power supplies, transistors, transistor amplifiers, operational amplifiers, operational amplifiers in feedback circuits, timer circuits and basic digital circuits. Practical work in electronics: Diodes, power supplies, transistors, operational amplifiers in feedback circuits, timer circuits and digital circuits. A project and seminar.	MAIN	Student will be able to: -Describe and apply the basic theory regarding semi-conductors, diodes, rectifier circuits, zener diodes, power supplies, transistors, transistor amplifiers, operational amplifiers, operational amplifiers in feedback circuits, timer circuits and digital circuits; and -Read electronic circuits and be able to know how the circuit operates; and Design smaller electronic circuit.
PHYS	2632	Practical Work: Physics	Practical work on oscillations, waves and optics: experiments with mechanical oscillations, light interference, and computer simulations of waves and Fourier analysis.	MAIN	The student will be able to: Use common experimental apparatus and measuring systems (e.g. multi-meter, oscilloscope, vernier scale, etc.); Work with apparatus; and Write a scientific report.
PHYS	2644	Classical Electromagnetism	The electromagnetic force is one of the four fundamental forces in nature. It dominates the interaction of matter on the atomic scale and governs the behaviour of the full spectrum of electromagnetic waves. This module deals with the classical theory of electromagnetism and the formulation of Maxwell’s equations.	MAIN	Student will be able to: -Practically apply vector calculus to 3D problems of differentiation and integration in Cartesian, spherical and cylindrical coordinate systems, including the fundamental theorems and basic application of the Dirac delta function; -Use linear, surface and volume charge densities to calculate charges in a region; -Calculate electrostatic fields from a charge distribution, either by direct integration following from Coulomb`s law or, in problems of sufficient symmetry, using Gauss`s law; -Calculate and interpret the divergence and curl of the electrostatic field; -Calculate electric potential and well as the energy stored in an electrostatic configuration using the electric field energy density; -Define an ideal conductor and prove its fundamental electrostatic properties; -Calculate the capacitance of a system; -Derive and work with the electrostatic fields in material, including the concepts of polarization, bound charges, the displacement field and linear dielectrics; -Use linear, surface and volume current densities to calculate currents through a region; -Calculate relationships between resistivity and resistance based on microscopic and macroscopic forms of Ohm’s law; -Prove the continuity equation for the conservation of charge; -Apply the Lorentz force law in general to moving charges and prove the magnetic fields do no work; -Calculate the magnetic field created by steady current configurations directly using the Biot-Savart law or, in problems of sufficient symmetry, using Ampere`s law; -Calculate and interpret the divergence and curl of the magnetostatic field; -Motivate the concept of the magnetic (vector) potential; -Derive the magnetostatic fields in material, including the concepts of magnetization, bound currents, the auxiliary field and linear magnetic materials;-Describe qualitatively the magnetic properties of paramagnetic, diamagnetic and ferromagnetic materials and superconductors; -Define and calculate emf, including a description of the experiments of Faraday that lead to Faraday`s law; -Explain the concept of inductance; -Identify and apply the magnetic field energy density; -Calculate the properties of RLC alternating current circuits; -Calculate the properties of electrical waves on transmission lines; -Motivate and describe the changes Maxwell made to produce the classical laws of electromagnetism; -Define the Poynting vector and its relation to the conservation of energy; -Show that Maxwell`s equations in vacuum lead directly to electromagnetic waves having a speed predicted by electromagnetic constants correlating experimentally to the speed of light, and the implication this has for the understanding of the nature of light; -Show that electromagnetic waves in vacuum are transverse waves with perpendicular electric and magnetic fields and carry energy distributed equally between the fields at the speed of light; -Derive Maxwell’s equations in matter; -Show that in lih material containing no free charges, electromagnetic waves also propagate and use their speed to determine the relationship between electromagnetic and optical material properties.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYS	2654	Ophthalmic Optics/ Visual Optics	This module starts with a brief overview of the basic properties of light and optical mediums, as well as the fundamental principles of geometrical and paraxial optics. The refraction and reflection of light by plane and spherical surfaces are investigated in detail, as well as refraction by spherical thin and thick lenses. For each type of system, the focal properties as well as the image formation properties are analyzed in detail for the paraxial region.	MAIN	Student will be able to: -Describe an optical system mathematically, predict the imaging for an optical system and calculate the properties of the system and the image;exhibit creative, critical thinking, and -Apply the theory practically in efficient problem solving. A systematic and structured approach to mathematical derivations and calculations is critical.
PHYS	2664	Special Ophthalmic Optics	Schematic eye models are discussed, including the Gullstrand model. The focal properties of emmetropic and ametropic eyes are investigated, with consideration of both spherical and astigmatic ametropia. The focal properties of contact lenses are described, whereafter the correction of ametropia with spectacle and contact lenses is analyzed. The influence of a stop in an optical system is investigated, as well as the five first-order aberrations. The optical properties and operation of a keratometer is discussed. The module concludes with a section on the quantification of luminance in radiometry and photometry.	MAIN	Student will be able to: -Derive and describe the refractive errors for the different types of spherical and astigmatic ametropia, and calculate an appropriate spectacle or contact lens prescription, as well as the associated magnification of the retinal image; -Derive the keratometer equation, and describe the optics of the keratometer mathematically; -Explain the five monochromatic aberrations according to third-order theory, as well as chromatic aberrations, and apply mathematically to solve problems; describe the effects of aperture stops and the associated field of view,and -Apply in various problems, the concepts of radiant and luminous energy, flux, intensity, radiance, luminance, irradiance, illuminance, Lambertian radiator, Weber's law, and the Airy disc.
PHYS	3714	Modern Physics	Special relativity: Galilean and Lorentz transformations, length contraction, time dilation, relativistic Doppler shift and aspects of relativistic mechanics. Particle properties of waves: Black-body radiation, photo-electric effect, Compton effect, gravitational red and blue shift, Mössbauer effect and applications. Wave properties of particles: Electron diffraction, de Broglie waves, probability waves, Heisenberg's uncertainty principle. Introductory quantum physics: Schrödinger's equation, one dimensional potential well, quantum mechanical tunnelling and its applications, hydrogen atom, orbital angular momentum and electron spin, Zeeman effect and applications. Nuclear Physics: The atomic nucleus, radioactivity, quantum mechanical treatment of alpha-decay, nuclear fission and fusion reactions, reaction rate, neutron transport in reactors.	MAIN	The student will be able to: Apply the basic aspects and theories with respect to special relativity, introductory quantum mechanics and nuclear physics, and the necessary skills to solve relevant problems in these disciplines.
PHYS	3724	Solid state physics	Structure of solids: Crystallography: crystal planes, crystal lattice, reciprocal lattice, Defects: point defects, dislocations, X-ray diffraction. Lattice dynamics: Lattice vibrations: Einstein and Debye models, normal modes and density of states, thermal properties, Brillouin zones. Free electron model: Electrical and thermal conduction, Fermi level, Hall effect. Periodic Potential: Band theory: nearly free electron and tight binding approach.	MAIN	Student will be able to: -Examine and discuss crystal structures and the interatomic forces responsible for these structures; -Examine diffraction by crystals (x-rays, electrons and neutrons); -Examine and discuss lattice vibrations and the effects on thermal, acoustic, and optical properties; -Discuss the free-electron model in metals; and -Discuss energy bands in solids.
PHYS	3732	Statistical Physics I	Phase space, distribution function, the most probable distribution, Lagrange multipliers, Boltzmann distribution, degeneracy of energy levels, the Maxwell-Boltzmann velocity distribution, the Maxwell-Boltzmann speed and energy distributions, the derivation of the equation of state of an ideal gas using the Maxwell-Boltzmann distribution, paramagnetism. Applications in terms of transport processes like effusion and diffusion, derivation of the hydrodynamic equations of motion of gases and fluids, heat conduction, propagation of sound waves, and viscosity.	MAIN	Students will be able to: -Apply the basic aspects of statistical physics and transport theory in the classical limit; and -Solve problems in kinetic theory, thermodynamics and fluid dynamics.
PHYS	3742	Statistical Physics II	Quantum statistical physics, transition from classical to quantum gases, fermion and boson gases and applications in physics and astrophysics	MAIN	The student will be able to: -Apply quantum principles to determine the transition from classical gases to quantum gases; -Examine and discuss the properties of non-relativistic and relativistic fermion gases, their equation of state and their relevance in physical and astrophysical environments; -Examine and discuss boson gases (photons and phonons) and their relevance in physical and astrophysical environments; and -Solve basic problems related to this discipline.
PHYS	3752	Practical Work: Physics	Practical work on phenomena that are explained by modern physics, as well as a few experiments in statistical physics and thermodynamics.	MAIN	The student will be able to: Use physical apparatus and measuring systems; Work with physical apparatus; and Write a scientific report.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYS	3762	Practical Work: Physics	Practical work on phenomena that are explained by solid state theory as well as a few experiments in statistical physics and thermodynamics.	MAIN	be familiar with physical apparatus and measuring systems; be confident in working with physical apparatus; and be able to write a scientific report.
NSFP	7911	Foundations of nanophysics for non-physicists	Quantum physics: atoms and nanoparticles Nanomaterials: semiconductors, fullerenes, graphene, carbon nanotubes, inorganic nanostructures, metal oxides, nano-powders, nanocomposites and quantum dots. Structural properties in nanophysics: crystallography (introduction to bonding, crystal structures and properties), reactivities of nanostructured materials, physical properties of nanoparticles and interfaces, processing of nanostructured materials. Analysis tools in nanophysics.	MAIN	Student should be able to: Classify nanomaterials identifying their various structural aggregations and applications. Explain the structural, bonding and physical properties of different classes of nanomaterials. Discuss the use of spectroscopic, microscopic and analytical techniques in structure and property elucidation.
PHYA	6808	Astrophysics Research Essay	This research essay exposes the student to the fundamental experimental techniques in Astronomy. It is comprised of 4 components: Introduction and Radio Astronomy: Introduction to Linux and LaTeX, advanced Python programming, and an introduction to radio astronomy. Photometry: Each student is given a topic, linking to research topics in the Astrophysics group, and is required to write a science case and technical justification for the project, undertake the photometric observations at the Boyden Observatory, reduce and analyse their data and present their results. Optical Spectroscopy: Using data from the Southern African Large Telescope (SALT), the student will apply spectral calibration, fits header updates, flux calibration and correction for galactic reddening, then fit the continuum and spectral lines to derive relevant parameters, and present their final results and conclusions. High Energy Astronomy: Two workshops. The first covers the reduction and spectral and timing analysis of X-ray observations of astronomical objects. The second follows the same broad outline, but focuses on gamma-ray astronomical observations, specifically Fermi-LAT data reduction and analysis procedures.	MAIN	Student will be able to: - Use tools within the Linux environment to solve astrophysical problems. - Perform data analysis and modelling by using the Python programming language. - Understand the underlying principles of radio astronomy, and do basic analyses. - Plan and write proposals for telescope observations. - Collect observational data through independent operation of research-class telescopes, as well as querying online archives. - Process and analyse photometric data to answer research questions. - Process and analyse spectroscopic data to answer research questions. - Process and analyse data from X-ray and gamma-ray satellite observatories to answer research questions. - Present scientific results in the form of PowerPoint presentations. - Present scientific results in a written, internationally acceptable standard format, by making use of the LaTeX typesetting system, and Python plotting libraries.
PHYA	6814	Astrophysics	The main aspects of this module are star formation, main sequence stars and binary stars.	MAIN	Student will be able to: -Examine the fundamentals of stellar astrophysics, e.g. star formation, stellar structure and stellar evolution (The course will also focus on some selected applications of fluid dynamics in astrophysical environments, for example stellar winds, convective instabilities in stars, stellar pulsations, accretion discs)
PHYA	6824	Astrophysics	The main aspects of this module are star formation, main sequence stars and binary stars.	MAIN	Student will be able to: -Examine the fundamentals of stellar astrophysics, e.g. star formation, stellar structure and stellar evolution (The course will also focus on some selected applications of fluid dynamics in astrophysical environments, for example stellar winds, convective instabilities in stars, stellar pulsations, accretion discs)
PHYA	6834	General Relativity and Cosmology	Introduction to SR, Tensors, Riemann-Christoffel Curvature Tensor, Stress-Energy Tensor, The Einstein Field Equations, Schwarzschild Exterior and Interior Solution, The Oppenheimer-Volkov Equation for Hydrostatic Equilibrium, Motion of Particles and Photons in a Static Spherical Replace the Course Description and Learning Outcomes of PHYA6834 with the content given in the column on the left below the screenshot. Correct content was not allocated to this module code when the module codes changed in the past. Symmetric Gravitational Field, Gravitational Collapse, Tests for GR, Rotating Black Holes (Kerr Solution), Frame Dragging (Lense-Thirring Effect), Gravitational Radiation Cosmology: Robertson-Walker Metric, Einstein-de Sitter and Friedman Models, Physics of the Early Universe	MAIN	After successful completion of the module the learner should: a) have a solid and useable background in the basic principles of general relativity and cosmology.; • Introduce learners to basic tensor calculus • Introduce the Riemann, Ricci and Stress-Energy tensors • Derive the Einstein field equations • Derive the Schwarzschild exterior and the Oppenheimer-Volkov interior solutions • Gravitational collapse • Apply Lagrangian dynamics to photon and particle orbits in the presence of a gravitating object • Derive the equations for the gravitational field in the presence of a rotating mass • Derive equations for photon and particle orbits in the presence of a rotating black hole • Introduce the Robertson-Walker metric • Derive the general equations of cosmology: The Einstein-de Sitter and Friedman equations • ntroduce the students to the physics of the early universe b) have the necessary background to solve basic problems in General relativity.; • Problem solving using Tensor analysis • Problem solving in basic gravitational dynamics using the General Relativity

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYA	6844	General Relativity and Cosmology	Introduction to SR, Tensors, Riemann-Christoffel Curvature Tensor, Stress-Energy Tensor, The Einstein Field Equations, Schwarzschild Exterior and Interior Solution, The Oppenheimer-Volkov Equation for Hydrostatic Equilibrium, Motion of Particles and Photons in a Static Spherical Replace the Course Description and Learning Outcomes of PHYA6844 with the content given in the column on the left below the screenshot. Correct content was not allocated to this module code when the module codes changed in the past. Symmetric Gravitational Field, Gravitational Collapse, Tests for GR, Rotating Black Holes (Kerr Solution), Frame Dragging (Lense-Thirring Effect), Gravitational Radiation Cosmology: Robertson-Walker Metric, Einstein-de Sitter and Friedman Models, Physics of the Early Universe	MAIN	After successful completion of the module the learner should: a) have a solid and useable background in the basic principles of general relativity and cosmology.; • Introduce learners to basic tensor calculus • Introduce the Riemann, Ricci and Stress-Energy tensors • Derive the Einstein field equations • Derive the Schwarzschild exterior and the Oppenheimer-Volkov interior solutions • Gravitational collapse • Apply Lagrangian dynamics to photon and particle orbits in the presence of a gravitating object • Derive the equations for the gravitational field in the presence of a rotating mass • Derive equations for photon and particle orbits in the presence of a rotating black hole • Introduce the Robertson-Walker metric • Derive the general equations of cosmology: The Einstein-de Sitter and Friedman equations • Introduce the students to the physics of the early universe b) have the necessary background to solve basic problems in General relativity.; • Problem solving using Tensor analysis • Problem solving in basic gravitational dynamics using the General Relativity
PHYA	6854	Astrophysical Fluid Dynamics	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: -Examine the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics. -Apply equations to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYA	6864	Astrophysical Fluid Dynamics	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: -Examine the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics -Apply equations to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYA	6874	High Energy Astrophysics	This module provides an introduction to the fundamentals of high energy astrophysics. The student is introduced to the fundamentals of the radiation processes in high energy astrophysics, as well as the physics of compact objects (white dwarfs, neutron stars and black holes), compact binaries and active galactic nuclei. The production, transport and detection methods of high energy radiation from these exotic objects are investigated in detail.	MAIN	Student will be able to: -Apply the fundamentals of the multi-wavelength production and detection of radiation in high-energy cosmic sources; and -Apply the fundamentals of the physics related to compact objects and binaries as well as active galaxies.
PHYA	6884	High Energy Astrophysics	This module provides an introduction to the fundamentals of high energy astrophysics. The student is introduced to the fundamentals of the radiation processes in high energy astrophysics as well as the physics of compact objects (white dwarfs, neutron stars and black holes), compact binaries and active galactic nuclei. The production, transport and detection methods of radiation from these exotic objects are investigated in detail.	MAIN	Student will be able to: -Apply the fundamentals of the multi-wavelength production and detection of radiation in high energy cosmic sources; and -Apply the fundamentals of the physics related to compact objects and binaries as well as active galaxies.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYA	7900	Astrophysics Mini-dissertation	This module contains fundamental knowledge, theories, principles and practices of Astrophysics: Research project in specialized field of Astrophysics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHYA	7970	Astrophysics and Space Science	Astrophysics and Space Science (NASSP MSc Theory), module content completed at the University of Cape Town.	MAIN	Theoretical course component of this MSc completed at UCT.
PHYA	8900	Astrophysics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Astrophysics, including: Research project in specialized field of Astrophysics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHYA	9100	Physics Thesis	Physics This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Physics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHYC	6814	Capita Selecta I	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: - Discuss and apply foundation principles of the fundamentals of astrophysical fluid dynamics and transport principles; and - Use basic transport theory to develop the equations of fluid dynamics. These equations will then be applied to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYC	6834	Capita Selecta II	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: -Evaluate the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics. These equations will then be applied to astrophysical environments like , e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYC	6844	Capita Selecta IV	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: -Examine and discuss the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics. -Apply equasions to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYE	6814	Electrodynamics	Time varying fields and Maxwells equations, Plane waves in vacuum, and in a conducting or dissipative medium, Polarization, Reflection and Refraction, Dispersion of a wave in a dissipative medium, Radiating systems (Antennas, dipole, and center driven linear antenna), Rayleigh scattering, Dispersion of waves through a medium , Faraday rotation, Whistlers, Relativistic electrodynamics, Relativistic eqn's of motion of particles in magnetic fields, Special Relativity, field transformations, the electromagnetic stress Tensor, covariance, Liénard-Wiechert potentials, Power radiated by accelerated charge, Larmor's formula and its relativistic generalization, angular and frequency distribution-spectrum of radiation, Thomson scattering	MAIN	Student will be able to: - Examine the basic aspects of electrodynamics and magnetohydrodynamics. - Solve basic problems in electrodynamics.
PHYE	6824	Electrodynamics	Time varying fields and Maxwells equations, Plane waves in vacuum, and in a conducting or dissipative medium, Polarization, Reflection and Refraction, Dispersion of a wave in a dissipative medium, Radiating systems (Antennas, dipole, and center driven linear antenna), Rayleigh scattering, Dispersion of waves through a medium , Faraday rotation, Whistlers, Relativistic electrodynamics, Relativistic eqn's of motion of particles in magnetic fields, Special Relativity, field transformations, the electromagnetic stress Tensor, covariance, Liénard-Wiechert potentials, Power radiated by accelerated charge, Larmor's formula and its relativistic generalization, angular and frequency distribution-spectrum of radiation, Thomson scattering	MAIN	Student will be able to: -Examine and discuss the basic aspects of electrodynamics and magnetohydrodynamics. -Solve basic problems in electrodynamics.
PHYE	6834	Electronics	Programming: Visual Basic 6.0, Open and Save data files, displaying data, RS232 communication, parallel port communication, digital to analogue and analogue to digital program. Electronics: Properties and uses of transistors, operational ampli¬fiers, multiplexers, programmable Interface, digital to analogue converters, analogue to digital converters, computers ports RS232 and parallel, sensors and transducers, optimised measurements and control systems Practical work in electronics: A project consisting of a DA/DA converter connected to a sensor and/or transducer and a control program.	MAIN	After successful completion of the module a successful learner should -be able to describe and apply the basic theory regarding, transistors, operational amplifiers, multiplexers, programmable Interface, digital to analogue converters, analogue to digital converters, computers ports RS232 and parallel, sensors and transducers, optimised measurements and control systems -have the skill to read electronic circuits and be able to know how the circuit operates. -have the skill to design smaller electronic circuit. -have the skill to interface a computer with an electronic circuit. -have the skill to write control and measure programs in Visual Basic
PHYE	6844	Electronics	Programming: Visual Basic 6.0, Open and Save data files, displaying data, RS232 communication, parallel port communication, digital to analogue and analogue to digital program. Electronics: Properties and uses of transistors, operational ampli¬fiers, multiplexers, programmable Interface, digital to analogue converters, analogue to digital converters, computers ports RS232 and parallel, sensors and transducers, optimised measurements and control systems Practical work in electronics: A project consisting of a DA/DA converter connected to a sensor and/or transducer and a control program.	MAIN	After successful completion of the module a successful learner should - be able to describe and apply the basic theory regarding, transistors, operational amplifiers, multiplexers, programmable Interface, digital to analogue converters, analogue to digital converters, computers ports RS232 and parallel, sensors and transducers, optimised measurements and control systems - have the skill to read electronic circuits and be able to know how the circuit operates. - have the skill to design smaller electronic circuit. - have the skill to interface a computer with an electronic circuit. - have the skill to write control and measure programs in Visual Basic

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYI	6814	Statistical Physics	Transport theory: Boltzmanns transport equations in the collisional and collisionless regimes. Derivation of Maxwell-Boltzmann distribution, Boltzmann's H-theorem. Incorporation of transport properties. Applications of transport theory, e.g. collision rate per unit volume in a gas, average mean-free path, collision frequency, effusion, diffusion (complete solution), heat conduction, viscosity. Derivation of the moment equation, as well as the hydrodynamical conservation properties of a fluid. Concepts like the pressure tensor which contains hydrostatic pressure and viscosity will be derived in great detail. Transport theory will be used to calculate expressions for the coefficient of heat conduction, as well as the diffusion coefficient. Pressure in an ideal gas, equipartition of energy, speed distribution, rms-speed, entropy and occupation number fluctuations. Statistical mechanics: Description of statistical mechanics using the canonical and grand canonical ensembles. Derivation of the partition function, and the derivation of thermodynamic functions using the partition function. Energy and occupation number fluctuations. Description of quantum gases in the grand canonical ensemble, pair production and occupation number fluctuations gases. Nyquist noise, Brownian motion, the Einstein theory of diffusion, Stochastic processes, Poisson and Gaussian distributions, Shot noise, Applications of classical and quantum gases, Bose condensation.	MAIN	Student will be able to: - outline the basic aspects of statistical physics and transport theory in the classical limit; and - solve basic problems in kinetic theory, thermodynamics and fluid dynamics.
PHYI	6824	Statistical Physics	Transport theory: Boltzmann's transport equations in the collisional and collisionless regimes. Derivation of Maxwell-Boltzmann distribution, Boltzmann's H-theorem. Incorporation of transport properties. Applications of transport theory, e.g. collision rate per unit volume in a gas, average mean-free path, collision frequency, effusion, diffusion (complete solution), heat conduction, viscosity. Derivation of the moment equation, as well as the hydrodynamical conservation properties of a fluid. Concepts like the pressure tensor which contains hydrostatic pressure and viscosity will be derived in great detail. Transport theory will be used to calculate expressions for the coefficient of heat conduction, as well as the diffusion coefficient. Pressure in an ideal gas, equipartition of energy, speed distribution, rms-speed, entropy and occupation number fluctuations. Statistical mechanics: Description of statistical mechanics using the canonical and grand canonical ensembles. Derivation of the partition function, and the derivation of thermodynamic functions using the partition function. Energy and occupation number fluctuations. Description of quantum gases in the grand canonical ensemble, pair production and occupation number fluctuations gases. Nyquist noise, Brownian motion, the Einstein theory of diffusion, Stochastic processes, Poisson and Gaussian distributions, Shot noise, Applications of classical and quantum gases, Bose condensation.	MAIN	Student will be able to: - outline the basic aspects of statistical physics and transport theory in the classical limit; and - solve basic problems in kinetic theory, thermodynamics and fluid dynamics.
PHYI	6834	Material Science I	This course deals with mechanical properties of materials, with an emphasis on metals. The following topics are covered: Crystal defects Diffusion Mechanical tests Hardening mechanisms Steels Nonferrous alloys Corrosion and wear Failure	MAIN	After the completion of this module, learners should be able to explain, identify, discuss and apply the following: - Crystal Imperfections: Line defects, point defects, surface defects, volume defects, general. - Mechanical testing and properties: tensile testing, bend testing, hardness testing, impact testing, fracture toughness testing, fatigue testing, creep testing. - Strain hardening and annealing - Principles of solidification strengthening and processing - Solid solution strengthening and phase equilibrium - Dispersion strengthening by solidification - Dispersion strengthening by phase transformation and heat treatment - Ferrous alloys - Nonferrous alloys - Corrosion

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYI	6844	Material Science I	This course deals with mechanical properties of materials, with an emphasis on metals. The following topics are covered: - Crystal defects - Diffusion - Mechanical tests - Hardening mechanisms - Steels - Nonferrous alloys - Corrosion and wear - Failure	MAIN	Student will be able to: Examine, discuss and apply: - Crystal Imperfections: Line defects, point defects, surface defects, volume defects, general. - Mechanical testing and properties: tensile testing, bend testing, hardness testing, impact testing, fracture toughness testing, fatigue testing, creep testing. - Strain hardening and annealing - Principles of solidification strengthening and processing - Solid solution strengthening and phase equilibrium - Dispersion strengthening by solidification - Dispersion strengthening by phase transformation and heat treatment - Ferrous alloys - Nonferrous alloys - Corrosion
PHYI	6854	Material Science II	The module `Materials Science I considered crystal defects, diffusion, mechanical tests, hardening mechanisms, steels and non-ferrous alloys, as well as corrosion, wear and failure. This module considers further applied aspects of materials science, chosen from a range of possible topics e.g. ceramics, polymers, glasses, amorphous metals, nanocrystalline materials, composite materials, magnetic materials, optical materials (e.g. for filters, lasers, phosphors etc), quasicrystals, materials for sensor applications, materials for the nuclear industry, nanomaterials, advanced semiconductor materials. Only selected topics will be discussed as time allows and, because new materials are constantly being developed, additional applied topics in materials science not listed above can be included.	MAIN	Student will be able to: -describe and do calculations on several applied topics in materials science, at a level demonstrating a sound understanding of crystal structure and the effects of atomic bonding and crystal defects, as well as the influence of microstructure on macroscopic quantities such as mechanical, optical, magnetic and electrical properties. -predict macroscopic properties of materials based on their microstructure and explain how possible changes to the microstructure may affect these macroscopic properties.
PHYI	6864	Material Science II	The module `Materials Science I considered crystal defects, diffusion, mechanical tests, hardening mechanisms, steels and non-ferrous alloys, as well as corrosion, wear and failure. This module considers further applied aspects of materials science, chosen from a range of possible topics e.g. ceramics, polymers, glasses, amorphous metals, nanocrystalline materials, composite materials, magnetic materials, optical materials (e.g. for filters, lasers, phosphors etc), quasicrystals, materials for sensor applications, materials for the nuclear industry, nanomaterials, advanced semiconductor materials. Only selected topics will be discussed as time allows and, because new materials are constantly being developed, additional applied topics in materials science not listed above can be included.	MAIN	Student will be able to: - describe and do calculations on several applied topics in materials science, at a level demonstrating a sound understanding of crystal structure and the effects of atomic bonding and crystal defects, as well as the influence of microstructure on macroscopic quantities such as mechanical, optical, magnetic and electrical properties. - predict macroscopic properties of materials based on their microstructure and explain how possible changes to the microstructure may affect these macroscopic properties.
PHYI	6874	Semi-Conductors	Studying the theory of semiconductors and describe devices.	MAIN	Student will be able to: -Describe the basic phenomena and theory concerning the basic physical properties of semiconductors; -Explore the use of these properties in the design of semiconductor devices ; and -Solve problems about semiconductor devices as outlined in the assignment.
PHYI	6884	Semi-Conductors	Studying the theory of semiconductors and describe devices.	MAIN	Student will be able to: - Describe the basic phenomena and theory concerning the basic physical properties of semiconductors; - Explore the use of these properties in the design of semiconductor devices; and - Solve problems about semiconductor devices as outlined in the assignment.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYR	6814	Research Techniques	The study, for various surface sensitive techniques, the basic principles of theory, operation, instrumentation and additional apparatus and experimental procedures necessary to operate these spectrometers.	MAIN	Student will be able to: Answer all concept questions at the end of each chapter in the study guide. Name the international accepted acronyms associated with each technique. Describe how to establish a vacuum. Your description must also cover: type of material, metal- and rubber seals, and instruments like pumps, pressure gauges and the calculation of the rate of surface contamination under certain pressure conditions. Explain the basic operation of the techniques. Draw a schematic diagram of the spectrometer of each technique to explain the operation. Describe the operation of various primary radiation sources, energy analysers and sputtering sources used with the techniques. Describe the various energy notations used in the AES and XPS techniques. Interpret a typical trend of ion yield as a result of sputtering under various conditions: like 'crystal structure of the target, primary energy, primary species, angle of incidence, scattering angle and target species. Compare the advantages and disadvantages of the techniques, referring to fields of application, sensitivity and elemental analysis. Discuss the influence of various surface defects on the energy spectrum of each technique. For each technique: plot the approximate behaviour of peaks (energy position and shape) in different chemical environments. Do a qualitative as well as a quantitative analysis of the energy spectra. Describe the analytical information that is available from the output of the spectrometer in each technique. Discuss how to accomplish composition depth profiling (constructively and destructively) in the different techniques. Predict the electron diffraction pattern for simple cubic structures as well as the effect of over structures on these patterns.
PHYR	6824	Research Techniques	The study, for various surface sensitive techniques, the basic principles of theory, operation, instrumentation and additional apparatus and experimental procedures necessary to operate these spectrometers.	MAIN	Student will be able to: Answer all concept questions at the end of each chapter in the study guide. Name the international accepted acronyms associated with each technique. Describe how to establish a vacuum. Your description must also cover: type of material, metal- and rubber seals, and instruments like pumps, pressure gauges and the calculation of the rate of surface contamination under certain pressure conditions. Explain the basic operation of the techniques. Draw a schematic diagram of the spectrometer of each technique to explain the operation. Describe the operation of various primary radiation sources, energy analysers and sputtering sources used with the techniques. Describe the various energy notations used in the AES and XPS techniques. Interpret a typical trend of ion yield as a result of sputtering under various conditions: like 'crystal structure of the target, primary energy, primary species, angle of incidence, scattering angle and target species. Compare the advantages and disadvantages of the techniques, referring to fields of application, sensitivity and elemental analysis. Discuss the influence of various surface defects on the energy spectrum of each technique. For each technique: plot the approximate behaviour of peaks (energy position and shape) in different chemical environments. Do a qualitative as well as a quantitative analysis of the energy spectra. Describe the analytical information that is available from the output of the spectrometer in each technique. Discuss how to accomplish composition depth profiling (constructively and destructively) in the different techniques. Predict the electron diffraction pattern for simple cubic structures as well as the effect of over structures on these patterns.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYS	6808	Practicals	A Practical course in Solid State Physics where the student master the principles, characterization and operation of the surface techniques AES, XPS, ISS and EDS	MAIN	Student will be able to: -formulate a research question - frame the research question in the form of a hypothesis - test the hypothesis applicable to experimental investigations using AES, XPS, ISS, EDS -describe the principle of operation of the following instruments: thickness monitor, ionization vacuum gauge, thermocouple gauge, pirani vacuum gauge, turbomolecular pump, ion pump, oil rotation pump -reach UHV conditions in the chamber -position the sample on the focal spot of the analyser - do a wide energy scan of the surface, investigating the influence of: scan rate, amplification, time constants, modulation energies, position of the sample, multiplier voltage -operate the ion gun to remove contaminants and accomplish a depth profile - do data analyses - extract concentrations and energy parameters governing a typical multicomponent segregation system - draw conclusions about the hypothesis - present the results in a written scientific report -present the results in an oral scientific report.
PHYS	6814	Quantum Mechanics	Wave-particle duality; Schrödinger equation in three dimensions; Heisenberg uncertainty principle; Square wells and barriers; The harmonic oscillator; Observables and operators; Orbital angular momentum and spin; The hydrogen atom.	MAIN	After an introductory courses in modern physics this course equips the student with an understanding of wave mechanics and a working knowledge of the formal structure of quantum mechanics. The student is skilled in operator techniques and in the practical application of quantum mechanical principles in microscopic systems like atoms and nuclei.
PHYS	6824	Quantum Mechanics	Wave-particle duality; Schrödinger equation in three dimensions; Heisenberg uncertainty principle; Square wells and barriers; The harmonic oscillator; Observables and operators; Orbital angular momentum and spin; The hydrogen atom.	MAIN	After an introductory courses in modern physics this course equips the student with an understanding of wave mechanics and a working knowledge of the formal structure of quantum mechanics. The student is skilled in operator techniques and in the practical application of quantum mechanical principles in microscopic systems like atoms and nuclei.
PHYS	6834	Solid State Physics I	Band structure, Bloch theorem, Density of states, Nearly free and Tight binding models, Effective mass, Excitons, Landau levels, Quantized Hall effect. Following on this one (or, time permitting, two) relevant topics in solid state physics such as (but not limited to): Optical/dielectric properties, Nanostructures, Group theory, Superconductivity.	MAIN	Student will be able to: - explain the origin of energy bands; - solve the Schrodinger equation for an electron in multiple connected square potential wells - show how energy level splitting occurs due to the linear combination of atomic orbitals - discuss the Kronig-Penney model - interpret band diagrams - explain various techniques used for band calculations - distinguish between metals and insulators based on band structure - comment on the effect of disorder and surface states on the energy bands - state, prove, and apply Bloch’s theorem; -state Blochs theorem (in both common forms) and prove that these forms are equivalent - prove Blochs theorem (either form) - prove the various symmetries of the Bloch states and that the energy gradient normal to a zone boundary is zero - calculate the density of electron states using appropriate boundary conditions for the Bloch states - criticize the way Drude’s model explains the origin of resistivity in metals and give a better description - explain the basic properties of solids in terms of the band theory - distinguish between the electron as a free particle and electrons and holes as quasiparticles in a band structure, and hence explain the idea of effective mass and the Umklapp process - describe and perform calculations pertaining to excitons -derive properties of solids arising from quantum confinement in lower dimensional systems; - discuss electrons trapped in a 2-D quantum well - derive the density of states for lower dimensional (2-D, 1-D) systems - discuss Bloch oscillations, including the difficulties of measuring them and how it can be done - describe quantitatively the formation of Landau levels, and describe the de Haas-van Alphen, Shubnikov-de Haas and (integer) quantum Hall effects - describe and do calculations pertaining to at least one of the myriad of further topics in solid state physics at a level based on a sound understanding of quantum and statistical physics as well as electromagnetism, for example Optical/dielectric properties of solids, Nanostructures, Group theory, Superconductivity etc.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYS	6844	Solid State Physics I	Band structure, Bloch theorem, Density of states, Nearly free and Tight binding models, Effective mass, Excitons, Landau levels, Quantized Hall effect. Following on this one (or, time permitting, two) relevant topics in solid state physics such as (but not limited to): Optical/dielectric properties, Nanostructures, Group theory, Superconductivity.	MAIN	Student will be able to: - explain the origin of energy bands; -solve the Schrodinger equation for an electron in multiple connected square potential wells -show how energy level splitting occurs due to the linear combination of atomic orbitals -discuss the Kronig-Penney model -interpret band diagrams -explain various techniques used for band calculations -distinguish between metals and insulators based on band structure -comment on the effect of disorder and surface states on the energy bands -state, prove, and apply Bloch's theorem; -state Blochs theorem (in both common forms) and prove that these forms are equivalent -prove Blochs theorem (either form) -prove the various symmetries of the Bloch states and that the energy gradient normal to a zone boundary is zero -calculate the density of electron states using appropriate boundary conditions for the Bloch states -criticize the way Drude's model explains the origin of resistivity in metals and give a better description - explain the basic properties of solids in terms of the band theory -Distinguish between the electron as a free particle and electrons and holes as quasiparticles in a band structure, and hence explain the idea of effective mass and the Umklapp process -Describe and perform calculations pertaining to excitons -derive properties of solids arising from quantum confinement in lower dimensional systems; -Discuss electrons trapped in a 2-D quantum well -Derive the density of states for lower dimensional (2-D, 1-D) systems -Discuss Bloch oscillations, including the difficulties of measuring them and how it can be done -Describe quantitatively the formation of Landau levels, and describe the de Haas-van Alphen, Shubnikov-de Haas and (integer) quantum Hall effects -describe and do calculations pertaining to at least one of the myriad of further topics in solid state physics at a level based on a sound understanding of quantum and statistical physics as well as electromagnetism, for example Optical/dielectric properties of solids, Nanostructures, Group theory, Superconductivity etc.
PHYS	6854	Computational methods of Physics	This module addresses the fundamental mathematical methods which are essential for solving a wide variety of physics problems. Computational aspects are an important aspect of undertaking research in Physics. This is important for introducing aspects of computer programming to students, demonstrating how to produce publications with good quality plots, performing simple model fits to data, including the importance of statistical interpretation of the goodness of such fits, how to interpolate or extrapolate values within data as well as demonstrate numerical techniques such as Fast Fourier Transforms, numerical integration and Monte Carlo methods. At least six of the following topics are addressed: Introduction to programming in Python, - Numerical differentiation and integration (triangular, Simpson, adaptive, Romberg, Gaussian) - Ordinary differential equations (Euler, Runga-Kutta, verlet, error estimation), - Partial differential equations (Laplace's equations, wave equations, Schrödinger's equation – density functional theory), - Fourier Transform (Fourier transform of discretely sampled data and basic introduction to FFT), - Fitting, interpolation and extrapolation (Least-square fitting, Chi-squared fitting, linear interpolation, spline interpolation, extrapolation), - Monte Carlo methods - Stochastic methods and - Machine Learning methods	MAIN	Student will be able to: -fit mathematical models to data -numerically perform differentiation and integration -perform fourier transforms of data -solve a wide variety of ordinary and partial differential equations from physics and engineering (e.g. heat equation, wave equation, electric circuits, Schrodinger equation). -solve a variety of problems using Monte Carlo Techniques

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHYS	6864	Computational methods of Physics	This module addresses the fundamental mathematical methods which are essential for solving a wide variety of physics problems. Computational aspects are an important aspect of undertaking research in Physics. This is important for introducing aspects of computer programming to students, demonstrating how to produce publications with good quality plots, performing simple model fits to data, including the importance of statistical interpretation of the goodness of such fits, how to interpolate or extrapolate values within data as well as demonstrate numerical techniques such as Fast Fourier Transforms, numerical integration and Monte Carlo methods. At least six of the following topics are addressed: Introduction to programming in Python, - Numerical differentiation and integration (triangular, Simpson, adaptive, Romberg, Gaussian) - Ordinary differential equations (Euler, Runga-Kutta, verlet, error estimation), - Partial differential equations (Laplace's equations, wave equations, Schrödinger's equation – density functional theory), - Fourier Transform (Fourier transform of discretely sampled data and basic introduction to FFT), - Fitting, interpolation and extrapolation (Least-square fitting, Chi-squared fitting, linear interpolation, spline interpolation, extrapolation), - Monte Carlo methods and - Stochastic methods - Machine Learning methods	MAIN	Student will be able to: -fit mathematical models to data -numerically perform differentiation and integration -perform fourier transforms of data -solve a wide variety of ordinary and partial differential equations from physics and engineering (e.g. heat equation, wave equation, electric circuits, Schrodinger equation). -solve a variety of problems using Monte Carlo Techniques
PHYS	6874	Solid State Physics II	The module `Solid State Physics I lists applied topics [Optical/dielectric properties, Nanostructures, Group theory, Superconductivity] from which one is studied during that module. This module considers further aspects from these applied topics. Additional applied topics in solid state physics not listed above can be included where these are relevant to the research direction of the Physics department.	MAIN	Student will be able to: -describe and do calculations on several applied topics in solid state physics, at a level demonstrating a sound understanding of quantum mechanics, statistical physics and electromagnetism.
PHYS	6884	Solid State Physics II	Brief contents: The module `Solid State Physics I lists applied topics [Optical/dielectric properties, Nanostructures, Group theory, Superconductivity] from which one is studied during that module. This module considers further aspects from these applied topics. Additional applied topics in solid state physics not listed above can be included where these are relevant to the research direction of the Physics department.	MAIN	Student will be able to: - describe and do calculations on several applied topics in solid state physics, at a level demonstrating a sound understanding of quantum mechanics, statistical physics and electromagnetism.
PHYS	8900	Physics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Physics, including: Research project in specialized field of Physics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHYS	9100	Physics Thesis	This module contains fundamental knowledge, theories, principles and practices of Physics, General including Research project in specialized field of Physics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
BLGY	1643	The interdependence of plants and life on earth	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences , including: the important role plants played during the development of life on earth. Included will be the following: -the transition from single celled water living algae to terrestrial plants with roots, stems and leaves; -the subsequent adaptation of photosynthesis with the resultant enrichment of the atmosphere with oxygen; -the influence of plants on the climate and development of habitats on land; -the diversification and domestication of plants as one of the major driving forces in the diversification of animals and humans; -the adaptations of plants to different ecological niches that allowed the colonization of the whole planet; and -the important role of plants in daily life would be emphasized in terms of the carbon footprint, human nutrition and restoration of disturbed areas. The module will include two direct applications of plants in terms of plant breeding and plant pathology.	MAIN	Student will be able to: - Analyse and discuss the results of the transition from single celled water living algae to terrestrial plants with roots, stems and leaves; -Investigate and critically discuss the subsequent adaptation of photosynthesis with the resultant enrichment of the atmosphere with oxygen; -Give a clear explanation of the influence of plants on the climate and development of habitats on land; -Critically discuss the diversification and domestication of plants as one of the major driving forces in the diversification of animals and humans; -Explain the adaptations of plants to different ecological niches that allowed the colonization of the whole planet; and -Discuss the important role of plants in daily life that would be emphasized in terms of the carbon footprint, human nutrition and restoration of disturbed areas.
BTNY	2621	Field excursion 1	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany) that will be explored during an eco-physiological field excursion, including biotic and abiotic stress and its influence on plant growth types, an introduction to various physiological survey methods, data processing and analysis. Recognition and interpretation of morphological and physiological stress indicators in plants to ensure the sustainable rehabilitation of disturbed areas are also included.	MAIN	Student will be able to: -Explore and explain the influence of stress factors on plants and discuss its relationship to other disciplines; -List, describe and apply the methods used to determine plant health and use apparatus to collect and analyse data; - Identify, analyse and address complex problems to provide solutions; - Make decisions in an ethical manner; - Develop and communicate his / her own opinions and ideas in the form of a report on the conducted experiments; and -Take full responsibility for his / her own work and decision making.
BTNY	2626	Introductory plant development and biotechnology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Understanding the factors which affect plant growth and development will enable us to manipulate plants to promote optimum production for the benefit of mankind. These factors are related to the soil, water, nutrients, atmosphere and solar environments. This knowledge is important and of practical value in the plant-related industries such as agriculture, horticulture, nurseries, forestry, nature reservation, seed and fertilizer companies, etc., as well as teaching and research professions.	MAIN	The student will be able to: - explain plant-water relations, nutrition and transport, seed dormancy, growth and development of plants, plant defence, secondary plant metabolites and explain how it relates to other disciplines; - apply methods used for hydroponic plant cultivation and manipulation of seed dormancy; - identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner; - develop and communicate his / her own opinions and ideas; - take full responsibility for his / her own work and decision making.
BTNY	3712	Field excursion 2	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Students will attend a field excursion. During the excursion students will apply practical techniques in ecological and taxonomic research. Various vegetation survey techniques will be used to analyze vegetation structure and composition in different biomes. Students will also learn to recognize the most common flowering plant families of the area and understand their relationship with more primitive plant groups like the Bryophytes, Pteridophytes and Gymnosperms. Students will gain experience in collecting herbarium specimens and management of collection data. Plant adaptations for survival, the characteristics of invasive alien plants and their impact on the indigenous vegetation will be studied in the field. The module will be assessed through three group assignments and two individual assessments. All assessments must be completed, with a minimum mark of 40% in each assessment, to pass this module.	MAIN	Student will be able to: -discuss information of key South African plant families, important invasive alien plants and morphological adaptations of plants to different habitats and understand how it relates to other disciplines; -use the correct survey technique to analyse the different vegetation types and correctly collect and manage herbarium specimens and data; -identify, analyse and address complex problems to provide solutions; -make decisions in an ethical manner and act accordingly; -develop and communicate his / her own opinions and ideas in the form of posters and oral presentations; and - take full responsibility for his / her own work and decision making.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BTNY	3714	Diversity and systematics of higher plants	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Southern Africa has 21 137 indigenous plant species, of which 80% are endemic to the region. This incredible diversity is comparable to that of the tropical rainforests. In terms of botanical diversity, southern Africa is one of the richest regions in the world. Understanding this diversity is the key to conservation and sustainable utilization of our indigenous plants. This module deals with processes through which the diversity of flowering plants originated and evolved, with specific focus on the South African flowering plants. Evidence from the fossil record will be evaluated and used to interpret the origin of flowering plants. The complex reproduction strategies of flowering plants will be investigated and students will gain experience in taxonomic applications and principles such as herbarium management, plant identification, description and nomenclature. Systematics is defined as the reconstruction of the evolutionary history of a group and is represented by a schematic diagram named a phylogenetic tree. Systematics is used in conjunction with taxonomy. The principles of systematics will be discussed, the use of DNA techniques in combination with morphology and other sources to determine a groups evolution, are investigated. A phylogenetic tree can also be linked to biogeography, which will be investigated.	MAIN	At the end of the module, the student is expected to be able to: - discuss and interpret the origin and evolution of vascular plants, flowering plants and the flower; - evaluate the different species concepts and discuss speciation; - compare the various sources of taxonomic evidence; - apply basic principles and rules of nomenclature and classification; - identify flowering plants to family and genus level using diagnostic characteristics or botanical keys based on floral and vegetative characteristics; - describe the floral and vegetative characteristics of flowering plant families; - apply the principles and methods of plant molecular systematics.
BTNY	3724	Carbon metabolism in plants	A module aimed at exposing students to the following primary metabolic pathways: 1. Plant respiration: cytosolic and mitochondrial reactions, measurement of plant respiration, fermentation, regulation of plant glycolysis with special reference to key enzymes, the physiological role of the alternative oxidation pathway in plants, role of Q-cycle in energy production, manipulation of plant respiration and the oxidative pentose phosphate pathway (OPP pathway). 2. Photosynthesis: the chloroplast and associated pigments, photochemical and non-photochemical reactions of photosynthesis, photophosphorylation (cyclic & non-cyclic), C3-reduction cycle, photorespiration, C4- and CAM- photosynthesis. The methodology in determining photosynthetic rate through fluorescent techniques.	MAIN	After the successful completion of the module the student should: - have a thorough knowledge of respiratory metabolism in plants and how it can be manipulated in food production. - be able to apply techniques to determine and manipulate the respiration rate in plants. - have a thorough knowledge of the light dependent and light independent reactions of photosynthesis, cyclic and non-cyclic photophosphorylation, role of the Q-cycle in energy production, photorespiration, C4 and CAM plants.
BTNY	3734	Vegetation science and environmental management	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Vegetation science deals with the structure and composition of plant communities. The vegetation is classified into ecologically (past to present) recognizable units. Quantitative analyses, classification and ecological interpretation techniques, bio-monitoring techniques of terrestrial and wetland ecosystems, as well as rehabilitation methods will be discussed. During the practical, identification of species and plant survey techniques will be explained and the different environmental factors, influencing vegetation, will be pointed out.	MAIN	At the end of the module, the student is expected to be able to: 1. Explain the distribution of the various biomes of South African and the environmental drivers that keep the vegetation units in place as well as relate these biomes to different World Biomes 2. Interpret the strategies plants apply to survive certain environmental factors that affect them. 3. Describe how plant communities develop and how to measure the characteristics of vegetation. 4. Demonstrate how plant communities develop over time. 5. Summarize how the environment is impacted by environmental factors as well as human induced factors and how we can manage the environment to restore and prevent destruction.
BTNY	3744	Plant defence and biotechnology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). The module deals with the defence mechanisms of plants against biotic (pathogens and insects) and abiotic (drought, heat, cold, ozone) stress factors on physiological and biochemical levels. The interaction of herbicides and plant physiology also form part of the module. Plants produce a high diversity of natural products or secondary metabolites which are used in pharmaceutical, agrochemical, flavour and aromatic industries. The accumulation of secondary metabolites in plants is also part of the defence response and plays a prominent function in the protection against predators and microbial pathogens. Plant secondary metabolites are described with the emphasis on their roles in plants, especially in the context of ecological interactions.	MAIN	The student will be able to: - explain natural plant defence mechanisms that result in resistance and explain how it relates to other disciplines; - explain techniques used for the manipulation of plant resistance as well as their suitability to solve a particular problem; - apply the gained knowledge and different techniques to identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner and act accordingly; - develop and communicate his / her own opinions and ideas; and - take full responsibility for his / her own work and decision making.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BTNY	3754	Plant molecular biotechnology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). The module focuses on the genetic analysis and transformation of plants which includes the cloning of plant genes, analysis of their roles in planta and the manipulation of plants through DNA transfer. Published research papers are used for all discussions where many different molecular techniques are described. The discussions focus on how these techniques are integrated in order to understand the roles of particular genes in plants. The cloning and analysis of the Rpg1 plant disease resistance gene is used as an example.	MAIN	The students will be able to: - explain the molecular disease resistance response of plants and explain how it relates to other disciplines; - apply techniques used for the manipulation of the defence response through genetic engineering as well as their suitability to solve a particular problem; - apply the gained knowledge and different techniques to identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner and act accordingly; - develop and communicate his / her own opinions and ideas; and - take full responsibility for his / her own work and decision making.
BTNY	3764	Ecophysiology: soil-plant-water interactions	This module contains fundamental knowledge about the influence of environmental factors, such as soil health and water availability, on plant health. Biomass production of crops is often directly proportional to the amounts of radiation intercepted, water transpired and nutrients taken up. The module content discuss how the rate of mineralization of from organic matter and the processes of nutrient loss are closely related to the availability of soil water. Soil conditions and -health, which indirectly affects nutrient supply, therefore has a large influence on the quantity of radiation intercepted and hence, biomass production and yield will be affected. Interacting effects of the carbon dioxide levels on photosynthesis and respiration metabolism, also pertaining to yield physiology, is also included.	MAIN	Student will be able to: -Analyse and discuss the interactions between soil conditions and plant metabolism; -Examine the interconnected physiology of photosynthesis, respiration, nutrient uptake and yield; -Describe the physiological consequences of under-nutrified plants will affect plant growth and yield; -Conduct an experimental trial to test nutrient uptake and test environmental factors that influence plant health. -Make use of photosynthesis measurements in order to interpret the general health of plants
PLPG	2623	Basic concepts applied in Plant Pathology and Plant Breeding	The purpose of this module is to equip students with the applied, yet fundamental, knowledge of Plant Pathology and Plant Breeding required to sustainably produce agricultural crops. This introductory module enables students to identify crucial components of the plant disease triangle, i.e., the interaction between the host plant, the pathogen, and the environment resulting in disease. Basic strategies of plant health management will be illustrated, and approaches of integrated pest management will be discussed. In the Plant Breeding component, basic seed selection, pollination and seed saving practices of ordinary food crops will be illustrated. Students will be acquainted with basic breeding principles that are crucial in breeding pure and high-quality seed.	MAIN	Students must be able to: - Distinguish between biotic and abiotic plant disease through understanding steps associated with diagnosis. - Define components of the disease triangle and critical plant breeding principles. - Distinguish between self-pollination, open-pollination and cross-pollination and their implications on seed breeding. - Illustrate strategies used to cultivate and manage production systems, through case studies, to construct practical applications for on-farm scenarios.
PLTB	2613	Theoretical principles of Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module deals with the theoretical science of plant breeding with the emphasis on genetic principles and concepts. This includes Mendelian and quantitative inheritance, mechanisms and implications of self- and cross-pollination, the study of phenotypic variation and the sources of genetic variability. The plant breeding techniques used to manipulate fertility-regulating systems as well as biotechnology methods as tools will be studied.	MAIN	Student will be able: -explain the basic theoretical concepts and techniques of plant breeding and their application.
PLTB	2623	Applied principles of Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module deals with the practical aspects of Plant Breeding. The emphasis is on conventional breeding but the student is exposed to laboratory and biotechnological techniques that serve as tools to improve breeding programmes.	MAIN	Student will able to: -discuss, explain and explore the basic concepts and techniques of plant breeding and their application.
PLTB	3714	Principles of quantitative genetics in Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module concerns the principles of selection for qualitative and quantitative traits in plants. This includes the different methods that can be used to genetically improve self-pollinating, cross-pollinating and vegetatively propagated crops. The selection procedures are compared using mathematical formulae to determine response to selection. The influence of different environments on the phenotypical expression of traits as well as the genetic basis of inbreeding and heterosis are studied.	MAIN	Students will be able to: -Explain selection principles and will be able to decide on the best selection procedure for a specific breeding aim.
PLTB	3724	Breeding for abiotic stress tolerance	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module covers important environmental factors and conditions that contribute to abiotic stress and how it reduces the plant`s performance in production. Breeding objectives and procedures for different abiotic stresses like drought, heat, cold and salinity will be addressed. Students will become familiar with key terms, concepts and principles of stress tolerance breeding.	MAIN	Student will be able to: - Apply the principles that were dealt with and will be able to select the most appropriate breeding approach for crop improvement for stress tolerance.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PLTB	3744	Advanced Breeding Techniques	Advanced Breeding Techniques This module will equip the student with knowledge on breeding techniques such as mutation breeding, tissue and anther culture, recombinant DNA-technology and plant transformation. Furthermore, legislative, labeling and ethical issues of genetically modified organisms (GMO's) are addressed.	MAIN	Student will be able to: -Discuss breeding techniques such as mutation breeding, tissue and anther culture, recombinant DNA-technology and plant transformation. -Examine legislative, labelling and ethical issues of genetically modified organisms (GMOs) are addressed.
PLTB	4806	Literature review	Students complete a literature study on a given topic under the guidance of a supervisor.	MAIN	Student will be able to: -perform literature searches, organize relevant information and compile the information according to a specified format; -integrate knowledge obtained from literature; -discuss how his / her topic fits within the larger body of Plant Breeding l literature; -communicate his / her results in the form of a PowerPoint presentation; and -self-evaluate his / her own development within Plant Breeding.
PLTB	4808	Research Project Plant Breeding	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -integrate knowledge obtained from both literature and experimental results; -outline how his / her research fit within the larger picture of Plant Breeding research; -report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialisation; -communicate his / her results in the form of a PowerPoint presentation; -assist in the preparation of the results for publication; and -self-evaluate his / her own development within Plant Breeding.
PLTB	4814	Advanced quantitative genetics in Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module consists of analysis of variance of data of different breeding techniques in early and late generations of self-pollinating plants, and in cross-pollinating and vegetatively propagated plants and calculation of variance components and heritability. The module also covers stability and genotype x environment interaction and techniques used to analyse it.	MAIN	Students will be able to: - Calculate variance components and heritability from different breeding systems; and - Analyse and interpret genotype x environment interaction and stability of genotypes.
PLTB	4824	Quality and stress tolerance breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module an in depth study will be done on the application of plant breeding techniques for the improvement of crop quality, high and low temperature and moisture stress tolerance and insect and diseases resistance.	MAIN	Student will be able to: - Initiate a breeding programme; and - Formulate strategies for quality, stress tolerance and resistance breeding.
PLPG	4814	Molecular plant breeding and plant pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding and Plant Pathology). On completion of the module, students will have a basic overview and understanding of molecular plant breeding and plant pathology approaches and techniques, their application and how the use of the various molecular biology approaches can aid in various types of plant breeding and plant pathogen studies. The course provides a basis on general and some more specialised but contemporary techniques used for molecular plant breeding and plant pathology, and how the various fields of molecular biology aid in understanding various aspects of plant breeding and plant pathology, such as DNA fingerprinting, genetic analysis of plants and pathogens, marker-assisted disease resistance breeding, construction of genetic linkage maps, population genetics, different strategies to target specific genes or genomic regions in plants and pathogens and in functional genomics and gene discovery. After completion of the practical module the student will have some experience in certain basic aspects of molecular plant breeding and plant pathology research, which is complementary to the theory.	MAIN	Students will be able to: • Select and apply the different molecular biology techniques in practical situations by understanding the principles, methodology, advantages and disadvantages of each. • Use these molecular biology approaches and examine how it aids general plant breeding and/or plant pathology studies and which of the approaches are appropriate for what type of studies and questions. • Apply these technologies in breeding programmes and/or plant disease protection programmes.
PLTB	4854	Statistics in Plant Sciences	In this module statistics relevant to Plant Sciences will be covered in both theoretical classes as well as with computer analysis. Students will learn principles related to statistical analyses and will learn how to design experiments, input data and interpret output of statistical analyses they did on different software packages.	MAIN	Students will be able: - apply principles of statistical concepts; - design experiments, input and analyse data; and - interpret the data generated from statistical software.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PPLG	2624	Principles of plant pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Pathology. The introductory module addresses the diagnosis of plant diseases, their development in time and space, interactions at cellular and molecular level and management.	MAIN	Student will be able to: - Discuss the impact, causes and diagnosis of plant diseases and the reasons why plant pathology is considered an important field of study; and - Discuss and illustrate, based on the basic concepts of infection and colonization of plant tissue, of how plant diseases arise and develop and how to approach disease problems.
PPLG	3714	Mycological plant pathology	This module addresses the taxonomy and general characteristics of fungi, with specific reference to plant pathogens. Emphasis is placed on their reproductive biology, dispersal and survival, biological control, types of diseases caused by fungal pathogens and their impact on agriculture and human and animal health.	MAIN	Student will be able to: - Discuss and apply the taxonomy and general characteristics of fungi and how to integrate this knowledge with the plant pathogenic abilities of mycelial fungi; - Describe the types of plant diseases that are caused by the main groups of fungi; - Illustrate the use and application of fungi to the benefit of humans; - Discuss and apply the additional effects of fungal plant pathogens to the health and well being of humans and animals.
PPLG	3724	Plant disease management	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). On completion of this module the student will be acquainted with concepts and strategies that underlie the management of plant diseases within the context of a sustainable and integrated pest management (IPM) system.	MAIN	Student will be able to: -Examine and discuss ecological and economic concepts that underlie the management of plant diseases within the context of a sustainable and integrated pest management system.
PPLG	3734	Bacterial and viral diseases of plants	This module addresses the morphology and classification of bacteria and viruses, symptomology, survival and transmission of these pathogens. Methods of managing diseases caused by these pathogens are dealt with.	MAIN	Student will be able to: -Discuss the morphology and physiology of bacteria and viruses; -Apply the basic principles of the taxonomy and classification. of plant bacteria and viruses; -Discuss the basic physiological processes that occur during infection of plants by bacteria and viruses; -Apply the basic principles of managing plant diseases caused by bacteria and viruses; -Examine the host ranges, distribution, epidemiology and management options for several examples of bacterial and viral diseases.
PPLG	3744	Ecology of plant pathogens	This module addresses the ecological principles relevant to disease causing organisms in plants. Emphasis is placed on interactions of plants and their pathogens with their biotic and abiotic environment and how this applies to ecological plant health management.	MAIN	Student will be able to: - Discuss and apply the ecological aspects on plant pathogens and their hosts; - Discuss and apply ecological methods used to study plant pathogens; and - Discuss and apply the role the environment plays on the pathogenic behaviour of plant pathogens.
PPLG	4806	Literature review Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology) The student compiles a review of a specific subject and delivers presentations of selected articles in plant pathology journals. On completion of this module the student is acquainted with literature searches, organizing information, the compilation of information according to a specific format, as well as in written and verbal communication skills.	MAIN	Student will be able to: -Examine principles in an area at the forefront of a selected field in Plant Pathology; -Examine the theories, research methodologies, methods and techniques relevant to the selected field; -Critically review information gathering, evaluation and management processes in specialised contexts; and -Present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	4808	Plant Pathology Research Repor	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The student completes a research project under the guidance of a supervisor and becomes skilled in problem identification, hypothesis formulation, planning, conducting and analysis of experiments as well as the interpretation and communication of results.	MAIN	Student will be able to: -Use a range of specialised skills to identify, analyse and address complex and/or abstract problems in the field of Plant Pathology; -Critically review data gathering, evaluation and management processes in specialised contexts; and -Present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	4824	Plant-pathogen interactions	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The module provides a basis for understanding the physical, biochemical and physiological effects that plant pathogens have on their hosts, particularly the methods they use to attack plants and how plants in turn defend themselves.	MAIN	Student will be able to: - Describe the physical and physiological interactions between plant pathogens and hosts; and - Discuss and apply the role that the environment plays in plant/pathogen interactions.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PPLG	4834/ 6834	Epidemiology and control of plant diseases	The final year student will have the foundational knowledge of plant disease. In this module the student will be introduced to core principles, tools and approaches to study system dynamics associated with plant disease epidemics. The learning units provided in this course will walk you through: - Discerning the how epidemics differ from plant diseases and gaining an appreciation for the historic and emerging contributions of epidemiology to society. - Recognising the importance of and how to initiate monitoring components of epidemics, i.e., environment, host, pathogen, and disease. - Application of this knowledge into understanding temporal and spatial dynamics associated with plant disease epidemiology, in order to ultimately assess crop losses and understand how to approach developing integrated pest management systems.	MAIN	The student will be able to: -Illustrate the role of plant disease epidemics in shaping society through referring to the disease triangle. Through, differentiating how and why components of plant disease epidemics are monitored and applying data collected through monitoring to explain epidemic development, progress, and management. -Compare disease management strategies which consider the initial inoculum source, rate of epidemic development and dynamic nature of agriculture to develop integrated pest management approaches. -Reflect on the status quo of plant pathology and express the value of agriculture in society to develop confidence in your heuristic learning.
~~PPLG~~	~~4844~~	~~Molecular plant pathology~~	~~This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology).~~ ~~On completion of the module, students will have a basic overview and understanding of molecular plant pathology approaches and techniques, their application and how the use of the various molecular biology approaches can aid in various types of studies of plant pathogens. The course provides a basis on the genetics of different pathogen groups, general and some more specialized but contemporary techniques used for molecular plant pathology, and how the various fields of molecular biology aid in understanding various aspects of plant pathology, such as pathogen detection or identification, genetic analysis of plant pathogens, marker-assisted breeding, population genetics and host x pathogen interactions. After completion of the practical module the student will have some experience in certain basic aspects of molecular plant pathology research, which is complementary to the theory.~~	MAIN	~~Student will be able to:~~ ~~-Examine concepts of the genetics of different pathogen groups;~~ ~~-Examine and apply principles of some of the most widely used molecular techniques used for plant pathology, and variations of these techniques;~~ ~~-Use molecular plant pathology approaches and examine how it aids general plant pathology studies and which of the approaches are appropriate for what type of studies and questions; and~~ ~~-Select and apply these approaches and techniques in practical situations by understanding the principles, methodology, advantages and disadvantages of each.~~
BIOL	1624	Plant biology	This module contains fundamental knowledge, theories, principles and practices of Biology, including: Development and reproduction of flowering plants, plant multiplication, plant taxonomic principles, biodiversity, ecology, economic importance of plants.	QWA	Student will be able to: -discuss and explain the basic principles regarding the biology of plants, their development and reproduction (plant manipulation). -discuss and explain the basic principles regarding plant identification and classification (taxonomy). -discuss and explain biodiversity (conservation biology). -discuss and explain the interactions between plants, environment and man (ecology). -discuss, explain and analyse the economic importance of plants (toxic, medicinal, industrial and food plants, plant pathology, plant molecular biology, plant biotechnology and plant breeding).
BIOL	2644	The physical environment: natural resources, ecology and sustainability	This module contains fundamental knowledge, theories, principles and practices of Biology, including an introduction to the discipline of systems ecology, including ecosystem modeling and compartment models. Biogeochemical cycles, primary production and flow of energy and matter through ecosystems. Food chains and food pyramids. Importance of water and the various aquatic habitats. Lotic and lentic waters, flow of sediment and variability in water levels. Basic principles of soil science, water flow and chemistry in soils. Basic climatology, importance of rainfall and importance of depressions and anticyclones in determining the climate. Carbon cycle and global warming. Role of biodiversity in ecosystems, competition for resources, predation and parasitism. Stress and disturbance, K and r strategists, basic population biology. Dispersal and reproduction of organisms. Human dependence on ecosystems, use of natural resources and the principle of sustainability. The link between ecology and economy and ecosystem degradation.	QWA	At the end of the module, the student is expected to be able to: 1.Outline the main principles, methods and processes underlying the field of ecology and sustainability 2.Apply key concepts, principles and theories within the ecological discipline 3.Show awareness of different schools of thought and processes generating knowledge in the discipline of ecology. 4.Take a systems approach in solving problems of natural resource management, using the appropriate procedures for assessing the sustainability of a certain process. 5.Grasp complex systems and understand how components of one system have an impact on other systems, thereby understanding the impact of ecosystem processes on the human economy. 6.Describe the responsibility of a resource manager 7.Demonstrate an ethical approach towards professional practice in resource management. 8.Function in a multidisciplinary group where each student deals with a specific aspect of natural resource management. 9.Access various sources of literature and communicate an overall essay on a specific resource by using academic writing skills.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BOTA	2654	Introduction to plant anatomy and morphology	This module contains fundamental knowledge, theories, principles and practices of Biology, including anatomy, structure and organisation of the cell wall, ergastic substances, structure and development of the ovule and embryo sac, structure, organisation and characteristics of tissues (parenchyma, collenchyma, sclerenchyma, epidermis, periderm, phloem, xylem) and secretory structures.	QWA	At the end of the module, the student is expected to be able to: 1.A basic knowledge and understanding of the internal and external organisation of the plant structure 2.Knowledge and understanding of various tissue (simple and complex) and secretory structures 3.A basic understanding of the cell wall and ergastic substances 4.Knowledge of external morphology of the various plant organs , their modification and ecological adaptations 5.Knowledge of the structure of inflorescences and flowers, pollination , fertilization, 6.The ability to construct the floral diagrams and work out floral formulae 7.Basic knowledge of structure of the ovule, embryo sac development, fertilization, simple and complex plant tissues 8.Basic understanding of the fertilization and embryo sac development 9.Basic knowledge of the secretory structures and structures of the plant organs 10.Practical experience on the use of light microspore and scanning electron microscope
BOTA	2684	Plant physiology and biotechnology	This module contains fundamental knowledge, theories, principles and practices of Biology, including physiological processes in plants, such as water balance (absorption, transpiration, transport), carbon partitioning, nutrient uptake, mineral nutrition, growth regulators, plant movement, photomorphogenesis, biological clock, photoperiodism and adaptation to extreme environments. Plant biotechnology course will look at alternative cultivation techniques of plants: plant nutrient cycles, organic and hydroponic cultivation of plants. The course will also focus on secondary products in plants, i.e. their economic and medicinal value.	QWA	At the end of the module, the student is able to: 1.Describe the functioning of key plant physiological systems; 2.Explain the fundamentals of plant water relations, mineral nutrition, integration of carbon and nutrients in growth and development; 3.Describe and assess the effect of environmental conditions (e.g. light, temperature, day length) and internal factors (e.g. growth regulators, biological clock) on the growth and development of plants; 4.Discuss alternative plant cultivation methods; 5.Describe plant growth regulators and tissue culture; and 6.Portray a basic knowledge of secondary products and their economic and medicinal value.
BOTA	3724	Plant metabolism and the environment	Plant respiration: cytosolic and mitochondria reactions, measurement of plant respirations, fermentation, regulation of plant glycolysis with special reference to key enzymes, the physiological role of the alternative oxidative pentose phosphate pathway (OPP Pathway), Photosynthesis: the chloroplast and associated pigments, photochemical and non-photochemical reaction of photosynthesis, photophosphoryylation (cyclic and non-cyclic), C3-reduction cycle, photorespiration, C4- and CAM-photosynthesis. The methodology in determining photosynthetic rate through fluorescent techniques Nitrogen metabolism: Fixation, assimilation, transamination, conversion in developmental processes and the respiratory nitrogen cycle.	QWA	Successful students will be able to: 1.Outline the respiratory metabolism in plants and the manipulations thereof for food production; 2.Apply specific techniques to determine or manipulate respiration rates in plants; 3.Explain light dependent and light independent reactions of photosynthesis, cyclic and non-cyclic photophosphorylation, role of the Q-cycle in energy production, photorespiration, C4 and CSM plants; 4.Apply fluorescent techniques to determine photosynthesis and primary productions in plants; 5.Apply fluorescent techniques to determine photosynthesis and primary productions in plants; 6.Explain nitrogen metabolism; and 7.Predict the various effects of different environmental factors on plant metabolism and the resultant effects on food production
BOTA	3734	Introduction to plant systematics	This module describes the plant kingdom and the position of angiosperms within it. Plant fossils and evolutionary history of all plant groups will be discussed, as well as the evolution of flowers, pollination, breeding systems, reproductive isolation and hybridization. Students will learn about the taxonomic system and main subdivisions within the angiosperms. They will learn to apply evolutionary theory, speciation and cladistics as method for deriving phylogenetic trees, using the appropriate rules of nomenclature. Students will learn to assess taxonomic evidence and various types of characters used in plant identification. They will be able to use molecular data in deriving phylogenetic trees. Finally, students will gain an overview of basic biogeography and the concept of biodiversity hotspots.	QWA	1.Demonstrate an integrated knowledge of plant evolution, diversity and taxonomic principles; 2.Apply this knowledge in plant identification and classification; 3.Utilize and understand various methods of plant identification to derive the evolutionary history of a group of plants; 4.Manage different information sources to solve problems in plant systematics 5.Evaluate and reflect on scientific methods that are available to them; 6.Use multiple characters in the identification of a familiar or unfamiliar plant using a dichotomous or polyclave identification key; 7.Derive a phylogenetic tree by means of a character state matrix; 8.Maintain professional standards, taking full responsibility for the choices made; 9.Direct his/ her own learning by correcting mistakes and taking new information into account; 10.Manage data analysis of plant characters in a systematic manner; and 11.Effectively communicate the results of plant systematics analysis.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BOTA	3744	Ethnobotany and Plant Defence	Basotho ethnology, ethnogeography and ethnobotany, basic traditional medicines preparations. Defence mechanism of plants against biotic and abiotic stress factors on physiological-biochemical level. Constitutive and induced defence, structural and biochemical defence, hypersensitivity, systemic and acquired resistance, signal mechanism and manipulation of resistance. Biotechnological application of plants: e g. Propagations techniques, chemical reactions to produce desired products of industrial and pharmaceutical importance. Principles, applications and economic potential of Basotho medicinal plants, algal biotechnology. Design of bioreactors, candidate species for plant and algal biotechnology, practical experience in micropropagation techniques and field trials.	QWA	At the end of the module, the student will be able to: 1.Outline the Basotho ethnology, ethnogeography and ethnobotany; 2.Describe Basotho historical background and every phase of their tradition and Cultural Revolution in terms of Basotho herbalism (curative and ameliorative) and diseases management using medicinal plants; 3.Explain the process of synthesis of different secondary compounds in plants and the role they play in plant defence and in return the medicinal potentials of these compounds; 4.Collect medicinal plants in a sustainable way and application of possible conservation mechanisms for endangered plants through field cultivation and micropropagation; 5.Collect and reserve botanical data by means of graphs, tables, etc.; 6.Use different statistical packages (GraphPad Prism 6) to analyse data; 7.Critical interpretation of data; and 8.Use and care for scientific equipment safely and ethically.
BOTA	3754	Vegetation ecology	Ecosystems and vegetation processes. Primary productivity and Biomass production. Plants and soils, water holding capacity of soils, available water capacity. Soil classification. Plant population ecology. Dispersal, recruitment and clonal growth. Plant functional types and life histories, theories of competition and other plant interactions. Responses to stresses and disturbances. The Braun-Blanquet method of vegetation sampling, plot size, cover-abundance scale. Classification and ordination. Direct and indirect gradient analysis. Development of various multivariate techniques. Vegetation dynamics, in terms of gap dynamics, fire and grazing. Spatial pattern in vegetation. Vegetation mapping. Vegetation and biogeography of plants. Species diversity and ecosystem processes. Global and South African distribution of biomes.	QWA	At the end of the module, the student will be able to: 1.Integrate knowledge of plant population ecology and plant community ecology; 2.Apply that knowledge in conservation management; 3.Evaluate complementary approaches in vegetation studies; 4.Make management decisions based on multiple criteria, for example in drawing vegetation borders; 5.Choose from several methods of vegetation sampling, and assess their suitability to gather different types of information in the field to solve complex problems; 6.Conduct vegetation sampling and analysis in different contexts, recognizing that different contexts require different strategies for problem solving; 7.Address any problem-solving complications that may arise in a self-directed manner; 8.Analyse data and communicate the most important findings and conclusions derived from a vegetation study; 9.Maintain professional and ethical standards, taking full responsibility for his/ her work; 10.Use laws and principles of science in their approach to ecosystems; 11.Show insight into the human uses of ecosystems and how this interacts with vegetation processes; and 12.Derive scientific evidence for changes or explanations that underlie complex systems such as vegetation, using appropriate statistical techniques.
Postgraduate					
BOTA	6808	Botany Research Project	The student will conduct a research project depending on the speciality of the supervisor. The research project will either be in plant sciences or zoology field or any other field related to life sciences as deemed necessary by the supervisor. The student will be expected to submit a research proposal and after its approval research will be conducted and then presented orally and finally a written research report (mini-dissertation, which may be in article format)	QWA	Student will be able to: -Critically assess the primary literature on his/her topic -Communicate intelligently with experts and laypeople on the topic, using both oral and written communication skills -Combine the appropriate evolutionary principles and analysis techniques to address his/her scientific questions central - Design and implement an independent study -Assess the success of his/her research through the use of appropriate statistical software and other relevant technologies.
BOTA	6814	Restoration ecology	Principles of green economics: valuation of natural resources and ecosystem services. Restoration planning, indicator species and restoration targets. Restoration targets as based on species, on ecosystem processes or on ecosystem services. Soil enhancement techniques and bio-engineering. Formation of erosion gullies. Hydrology and water balance in river catchments. Revegetation, ecological assembly and population viability analysis. Spatial scale and landscape context. Island biogeography in landscape management. Monitoring and ecological management, fire, herbivory, aftercare of restoration work.	QWA	1.Successful students will be able to: 2.Apply ecological knowledge, theories and research methodologies in the practice of ecological restoration 3.Draft a restoration plan to solve environmental problems on the basis of multiple sources of knowledge and integrate information from various spatial scales, while appreciating the complexities and uncertainties at each level 4.Understand the responsibilities of a restoration practitioner towards various stakeholders and, by means of critical reflection, the complexities of accountability based on a various types of ethical standards that emerge from sociological-ecological systems 5.Make decisions based on such critical 6.Effectively communicate decisions in a restoration plan towards stakeholders 7.Manage his or her learning needs in an ongoing process of critical analysis and reflection 8.Take full responsibility for the work done.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BOTA	6824	Plant ecophysiology	Plant ecophysiology is the study of how plants function in diverse environments and their physiological responses to environmental and climate change. The processes occurring in plants during instantaneous stress response, acclimation and adaptation to a stress are investigated. The course will focus on how plant growth is affected by nutrient availability and deficiency, aluminium in the soil, ecohydrology. Influence of light stress, water deficit and air pollution on plants (i.e. how physiological activities are affected by availability of light, water, nutrients and atmospheric CO2 and the consequences of growth). How respiration in roots is affected by flooding, salinity and water stress. Climate change and plant ecophysiology.	QWA	Successful students will be able to: 1.Outline concepts and principles of plant ecophysiology; 2.Link plant function and landscape carbon, water, climate change and water scarcity; 3.Identify relationships between plant structure and function; 4.Distinguish the different plant strategies for capturing light and the processes governing carbon capture by leaves and canopies; 5.Explain the processes governing movement of carbon through phloem; 6.Provide examples of plant adaptations to different environments and disturbances; 7.Apply practical skill in plant physiological techniques in addressing hypotheses about plant function and survival; 8.Apply knowledge of plant physiology and ecophysiology to media discussions about global climate change, water scarcity, carbon and water trade-offs and forest mortality; and 9.Conduct project investigating the effects of environmental stress on plants.
BOTA	6844	Plant biotechnology	This module aims to introduce students to principles, techniques and applications of plant biotechnology. The students will learn about the techniques in plant tissue culture, an introduction on recombinant DNA technology, the application of genomics and proteomics technologies in studying genes and traits of interest for transgenic plants, the different ways in which transgenic plants are produced and analysed. The regulation and biosafety of plant biotechnology as well as why transgenic plants are controversial will be briefly discussed.	QWA	Successful students will be able to: -Outline concepts and principles of plant ecophysiology; -Link plant function and landscape carbon, water, climate change and water scarcity; -Identify relationships between plant structure and function; -Distinguish the different plant strategies for capturing light and the processes governing carbon capture by leaves and canopies; -Explain the processes governing movement of carbon through phloem; -Provide examples of plant adaptations to different environments and disturbances; -Apply practical skill in plant physiological techniques in addressing hypotheses about plant function and survival; -Apply knowledge of plant physiology and ecophysiology to media discussions about global climate change, water scarcity, carbon and water trade-offs and forest mortality; and -Conduct project investigating the effects of environmental stress on plants.
BOTA	6864	Phytomedicine	Principles of Basotho ethnography, indigenous knowledge of medicinal plants, collection and identification of plants, using the herbarium, resources utilisation and implications (Underutilization and over exploitation), methods preparation of herbal remedies and scientific validation of implicated plants in terms of validation of folkloric claims.	QWA	Successful students will be able to 1.Apply ethnobotanical knowledge, principles, theories and research methodologies in medicinal plants usage; 2.Describe principles of ethnobotany as a multidisciplinary character: botanically, plants and plant usage, ecological patterns, plant dispersal, resources utilisation and conservation; 3.Collect and prepare medicinal plants; 4.Describe possible consequences of indiscriminate resources utilization; 5.Describe and apply major preliminary scientific evaluation methods to validate the folkloric use of implicated plants; 6.Make decisions based on the critical reflection; and 7.Effectively communicate decisions in a conservation plans towards stakeholders if plants are endemic or endangered.
BOTA	8900	Botany Dissertation	Research project in specialized field of Botany as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
BOTA	9100	Botany Thesis (PhD)	This module contains fundamental knowledge, theories, principles and practices of Botany, General including Research project in specialized field of Botany, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BTNY	6806	Literature review	Students complete a literature study on a given topic under the guidance of a supervisor.	MAIN	Student will be able to: -perform literature searches, organize relevant information and compile the information according to a specified format; -integrate knowledge obtained from literature; -discuss how his / her topic fits within the larger body of Botanical literature; -communicate his / her results in the form of a Powerpoint presentation; and -self-evaluate his / her own development within Botany.
BTNY	6808	Research Project Botany	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -integrate knowledge obtained from both literature and experimental results; -outline how his / her research fit within the larger picture of Botanical research; -report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialisation; -communicate his / her results in the form of a Powerpoint presentation; -assist in the preparation of the results for publication; and -self-evaluate his / her own development within Botany.
BTNA	6814	Advanced Plant Ecology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). This module deals with the nature of quantitative plant ecology and vegetation science, the description of natural vegetation, the characteristics of vegetation and environmental data, basic statistical analysis of the vegetation and environmental data, ordenation and classification methods including the method of the Zürich-Montpellier school of vegetation classification. The latest on the mapping of southern Africa's vegetation will also be discussed.	MAIN	Student will be able to: - Provide detailed descriptions of different concepts and vegetation assessment techniques; - Integrate the obtained knowledge from different sources; - Explain how each technique contributed to understanding the responses of plant species to environmental factors; - Apply gained knowledge to identify, analyse, address and solve problems within ecological niches; - Critically evaluate gathered information and published research articles; and - Self-evaluate his / her own development within Plant ecology.
BTNY	6816	Literature review Botany	Students complete a literature study on a given topic under the guidance of a supervisor.	MAIN	Student will be able to: -perform literature searches, organize relevant information and compile the information according to a specified format; -integrate knowledge obtained from literature; -discuss how his / her topic fits within the larger body of Botanical literature; -communicate his / her results in the form of a PowerPoint presentation; and -self-evaluate his / her own development within Botany.
BTNY	6818	Botany Research Project	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -Identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -Integrate knowledge obtained from both literature and experimental results; -Outline how his / her research fit within the larger picture of Botanical research; -Report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialisation; -Communicate his / her results in the form of a PowerPoint presentation; -Assist in the preparation of the results for publication; and -Self-evaluate his / her own development within Botany.
BTNA	6824	Conservation Biology	This module will cover current theories, methods and application of fundamental ecology to conservation biology. Lectures and essays will discuss the current status of biodiversity in South Africa, methods of conservation (species and habitats), genetic conservation (population genetics, phylogenetic community and phylogenetic diversity), and species distribution modelling (ecological niche theory, climate change, and paleoclimate). For each of these topics, integrated practicals will be presented for a holistic assessment of conservation prioritisation at the level of genetic, species, and ecosystem diversity.	MAIN	Students will be able to: - discuss the current status and threats to South African terrestrial and coastal biodiversity; - assess the threat status of species and ecosystems based on the IUCN Red List categories; - determine changes in habitat area of different vegetation types; - use phylogeographic analysis to determine ecological significant units (ESUs) for conservation prioritisation; and - explain ecological niche theory and apply it to determine the past, current and future distribution of plant species.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BTNY	6826	Literature review Botany	Students complete a literature study on a given topic under the guidance of a supervisor.	MAIN	Student will be able to: -Perform literature searches, organize relevant information and compile the information according to a specified format; -Integrate knowledge obtained from literature; -Discuss how his / her topic fits within the larger body of Botanical literature; -Communicate his / her results in the form of a PowerPoint presentation; and -Self-evaluate his / her own development within Botany.
BTNY	6828	Research Report Botany	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -Identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -Integrate knowledge obtained from both literature and experimental results; -Outline how his / her research fit within the larger picture of Botanical research; -Report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialisation; -Communicate his / her results in the form of a PowerPoint presentation; -Assist in the preparation of the results for publication; and -Self-evaluate his / her own development within Botany.
BTND	6804	Plant Molecular Systematics	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). This module offers the study of phylogenetic systematics where the aim is to reconstruct the evolutionary history of a plant group. Concepts of phylogenetics will be discussed. DNA extraction, PCR techniques, sequencing and gel electrophoresis will be applied. Phylogenetic methods such as Parsimony and Bayesian Inference will be discussed and applied with computer based programs using datasets to construct a phylogeny / cladogram. The measures of character fitness (CI, RI, HI) and testing support (Bootstrap, Posterior probabilities) of clades in phylograms / cladograms will be discussed and applied for the different phylogenetic methods.	MAIN	The student will be able to: - give detailed descriptions of different concepts and techniques used in molecular phylogeny and how it can be used to construct and interpret phylogenies / cladograms; - integrate the obtained knowledge from different sources; - explain, explore and discuss how each technique contributed to understanding the genetic relationships between plant taxa; - apply the knowledge to identify, analyse, address and solve problems within molecular systematics; - critically evaluate gathered information and published research articles; and - self-evaluate his / her own development within Plant molecular systematics. .
BTNY	6844	Plant Physiology II (Plant Defence and Applications)	This module contains fundamental knowledge, theories, principles and practices of Plant Science (Botany). The response of plants during pest and/or pathogen attack is studied. Resistance and susceptibility are explained in terms of defense mechanisms. The concepts are discussed using published research articles where students must prepare and present articles during discussion sessions.	MAIN	Student will be able to: - give detailed descriptions of different concepts and techniques used in biochemical plant defences and how they can be used to understand and improve the defence response; - integrate the principles obtained from different sources; -discuss how each technique contributed to understanding of the biochemical defence responses of plants against disease causing organisms; -apply information to identify, analyse, address and solve problems within an agricultural context; -critically evaluate gathered information and published research articles; and -self-evaluate his / her own development within Biochemical plant defence.
BTNB	6804	Advanced plant taxonomy	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Plant systematics (which includes taxonomy) is the basis for information on biodiversity and almost all fields of biology rely on taxonomy. This module deals with the four main components of taxonomy, namely: description, identification, classification and nomenclature. The principles and application of each of these components is investigated in terms of evolutionary research, ethnobotany, bio-prospecting and conservation planning. Students will gain practical experience in herbarium management and use of online resources for taxonomic research. The classification of flowering plants will be investigated and brought into context with South African flowering plant diversity.	MAIN	Student will be able to: -apply basic taxonomic principles in the description and nomenclature of plant species and be familiar with the management and use of the herbarium; -integrate the obtained knowledge from different sources; -evaluate and discuss the role of taxonomy in evolutionary research, ethnobotany, bio-prospecting and conservation planning; -apply principles to identify, analyse, address and solve problems within sustainable use and conservation of biodiversity; - critically evaluate gathered information and published research articles; and - self-evaluate his / her own development within Plant taxonomy.
BTNY	6864	Ecosystem management and restoration	Global warming and human overpopulation is a potential threat to existing ecosystems on the planet. Existing ecosystems should thus be managed and utilised in a sustainable manner. In cases where this much needed ecosystems are damaged or destroyed, intervention by man is required to ensure future food security and biodiversity. During this module, the causes and implications of disturbed terrestrial environments will be discussed in detail, and knowledge gained on the practical restoration of different types of disturbed environments.	MAIN	Student will be able to: -outline disturbances of terrestrial ecosystems and its influence on local communities, the challenges of rectifying these disturbances as well as the legislation applicable to ecosystem restoration; - integrate the obtained knowledge from different sources; - evaluate and discuss the challenges of ecosystem restoration and apply models to determine ecosystem health; -apply principles to identify, analyse, address and solve problems within local communities; -critically evaluate gathered information and published research articles;and - self-evaluate his / her own development within Conservation ecology.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BTNC	6804	Advanced plant molecular biotechnology	The response of plants following either a biotic or abiotic stimulus is very complex and specific. Using Rpg1 as an example, the genetic improvement of resistance of crops against fungal diseases are discussed using published research articles. Students prepare and present these articles during weekly discussion sessions. Students will also present a short report in the form of an oral presentation on selected topics within the plant defence response.	MAIN	Student will be able to: -give detailed descriptions of different molecular techniques and aspects relating to plant defences against fungal pathogens; -integrate the obtained knowledge from different sources; -outline how each technique contributed to both unravelling and improving the plant defence response; apply principles to identify, analyse, address and solve problems within the agricultural sector; -critically evaluate gathered information and published research articles; and -self-evaluate his / her own development within Plant molecular biotechnology.
BTNY	6884	Plant analytical biochemistry	An introduction to plant secondary metabolites (natural products) including an overview of plant secondary metabolism, the classes, functions and biosynthesis of terpenoids, phenolic compounds and alkaloids. Finally, an introduction to biologically active plant secondary metabolites will be given.	MAIN	Student will be able to: -give detailed descriptions of plant secondary metabolites and their ecological functions, biosynthesis, biological activity and economic significance; -integrate the obtained knowledge from different sources; -outline the endogenous role of plant secondary products and their possible application within induced plant defence; - apply principles to identify, analyse, address and solve problems within the agricultural sector; -critically evaluate gathered information and published research articles; and -self-evaluate his / her own development within Plant analytical biochemistry.
BTNE	6804	Methods in Palaeo-ecology	This module presents fundamental knowledge about principles and application of state of the art methods for resolving/reconstructing abiotic and biotic palaeo-environmental conditions. It deals with the effects of global climate changes that caused dramatic shifts in marine and terrestrial environments over time, including vegetation zones and their associated fauna. These changes also influenced the hydrology and ecology of lakes and drainage systems. This module therefore provides a background for the assessment and the role that climatic variability played in the evolutionary history of African mammalian fauna, flora and early hominids.	MAIN	Student will be able to: -Analyse how and why climate varied over time; -Assess how climate change affected ecosystems and human society in the past; -Identify and apply appropriate methods for palaeo-environmental investigations in a variety of (taphonomic) contexts; -Apply principles to identify, analyse, address and solve problems within a palaeo-ecological context; and -Critically evaluate gathered information and published research articles.
BTNY	8900	Botany Dissertation	Research project in specialized field of Botany as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
BTNY	9100	Botany Thesis	This module contains fundamental knowledge, theories, principles and practices of Botany, General including Research project in specialized field of Botany, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHEC	8900	Plant health ecology dissertation	This module contains fundamental knowledge, theories, principles and practices of Plant health ecology, including: Research project in specialized field of Plant health ecology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PHEC	9100	Plant Health Ecology Thesis	This module contains fundamental knowledge, theories, principles and practices of Plant Health Ecology, including: Research project in specialized field of Plant Health Ecology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PLTB	6806	Literature review	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module the student will do a literature review on a specific topic in plant breeding, with the use of different resources. The student will learn how to present this information in an organised and logical format, which is written as a scientific correct review article, and presented in the form of a seminar.	MAIN	Student will be able to: -Conduct research on a specific topic by using different resources, and -Write a literature review in a scientifically correct manner.
PLTB	6814	Advanced quantitative genetics in Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module consists of analysis of variance of data of different breeding techniques in early and late generations of self-pollinating plants, and in cross-pollinating and vegetatively propagated plants and calculation of variance components and heritability. The module also covers stability and genotype x environment interaction and techniques used to analyse it.	MAIN	Students will be able to: - Calculate variance components and heritability from different breeding systems; and - Analyse and interpret genotype x environment interaction and stability of genotypes.
PLTB	6816	Literature review Plant breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module the student will do a literature review on a specific topic in plant breeding, with the use of different resources. The student will learn how to present this information in an organised and logical format, which is written as a scientific correct review article, and presented in the form of a seminar.	MAIN	Student will be able to: -Conduct research on a specific topic by using different resources, and -Write a literature review in a scientifically correct manner.
PLTB	6818	Plant Breeding Research Report	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). The student will carry out a scientific project under supervision of a lecturer and will learn how to plan, and execute research, gather data, analyse and interpret the data, make conclusions from the data and write a scientific report.	MAIN	Student will be able to: - Plan and execute a research project; - Analyse data; and - Interpret data and to compile a scientific report.
PLTB	6824	Quality and stress tolerance breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module an in depth study will be done on the application of plant breeding techniques for the improvement of crop quality, high and low temperature and moisture stress tolerance and insect and diseases resistance.	MAIN	Student will be able to: -Initiate a breeding programme and formulate strategies for quality and stress tolerance and resistance breeding.
PLTB	6828	Plant Breeding Research Report	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). The student will carry out a scientific project under supervision of a lecturer and will learn how to plan, and execute research, gather data, analyse and interpret the data, make conclusions from the data and write a scientific report.	MAIN	Student will be able to: - Plan and execute a research project; - Analyse data; and - Interpret data and to compile a scientific report.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PLPG	6814	Molecular plant breeding and plant pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding and Plant Pathology). On completion of the module, students will have a basic overview and understanding of molecular plant breeding and plant pathology approaches and techniques, their application and how the use of the various molecular biology approaches can aid in various types of plant breeding and plant pathogen studies. The course provides a basis on general and some more specialised but contemporary techniques used for molecular plant breeding and plant pathology, and how the various fields of molecular biology aid in understanding various aspects of plant breeding and plant pathology, such as DNA fingerprinting, genetic analysis of plants and pathogens, marker-assisted disease resistance breeding, construction of genetic linkage maps, population genetics, different strategies to target specific genes or genomic regions in plants and pathogens and in functional genomics and gene discovery. After completion of the practical module the student will have some experience in certain basic aspects of molecular plant breeding and plant pathology research, which is complementary to the theory.	MAIN	Students will be able to: • Select and apply the different molecular biology techniques in practical situations by understanding the principles, methodology, advantages and disadvantages of each. • Use these molecular biology approaches and examine how it aids general plant breeding and/or plant pathology studies and which of the approaches are appropriate for what type of studies and questions. • Apply these technologies in breeding programmes and/or plant disease protection programmes.
PLTB	6854	Statistics in Plant Sciences	In this module statistics relevant to Plant Sciences will be covered in both theoretical classes as well as with computer analysis. Students will learn principles related to statistical analyses and will learn how to design experiments, input data and interpret output of statistical analyses they did on different software packages.	MAIN	Student will be able to: - Discuss basic statistical concepts in full; - Outline the design of an experiment; - Correctly input and analyse data in to statistical software; and - Correctly interpret data analysed.
PLTB	6874	Advanced statistics in Plant Sciences	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding) for advanced postgraduate students. In this module statistics relevant to Plant Sciences will be covered in both theoretical classes as well as with computer analysis. Students will learn all principles related to statistical analyses and will learn how to design experiments, input data and interpret output of statistical analyses they did on different software packages.	MAIN	Students will be able to: -Discuss statistical concepts; -Design experiments, input and analyse data; and -Interpret the data generated from statistical software.
PLTB	8900	Dissertation Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Breeding, including: Research project in specialized field of Plant Breeding as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PLTB	9100	Plant Breeding Thesis	This module contains fundamental knowledge, theories, principles and practices of Plant Breeding, General including Research project in specialized field of Plant Breeding, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PLTI	8900	Interdisciplinary Plant Breeding Dissertation	Students do research on an approved topic for at least four semesters in consultation with the Division Head in preparation of a dissertation that will be submitted as a requirement for obtaining the degree. Extra modules may be required for students who do not have the correct scientific background.	MAIN	Student will be able to: -apply advanced principles within his / her research field or discipline that will allow him / her to engage with current international research; - manage information to compile a comprehensive review of current and topical research within his / her research field or discipline; -evaluate and select relevant research tools to engage in research within his / her field or discipline; -use a wide range of specialised skills to identify, conceptualise, design and implement methods of inquiry to address complex issues within his / her research field or discipline; -make autonomous decisions regarding ethical aspects of his / her research; -present and defend his / her own research before a wide range of different audiences; -adjust his own learning strategies so as to sustain and improve his / her professional development;and -operate independently and take full responsibility for his /her research and implementation thereof.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PLTI	9100	Interdisciplinary Thesis Plant Breeding	Students do research on an approved topic for at least four semesters in consultation with the Division Head in preparation of a thesis that will be submitted as a requirement for obtaining the degree. Extra modules may be required for students who do not have the correct scientific background	MAIN	Student will be able to: -apply advanced principles within his / her research field or discipline that will allow him / her to engage with current international research; - manage information to compile a comprehensive review of current and topical research within his / her research field or discipline; -evaluate and select relevant research tools to engage in research within his / her field or discipline; -use a wide range of specialised skills to identify, conceptualise, design and implement methods of enquiry to address complex issues within his / her research field or discipline; -make autonomous decisions regarding ethical aspects of his / her research; -present and defend his / her own research before a wide range of different audiences; -adjust his own learning strategies so as to sustain and improve his / her professional development;and -operate independently and take full responsibility for his /her research and implementation thereof.
PPLG	6806	Literature review	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology) The student compiles a review of a specific subject and delivers presentations of selected articles in plant pathology journals. On completion of this module the student is acquainted with literature searches, organizing information, the compilation of information according to a specific format, as well as in written and verbal communication skills.	MAIN	Student will be able to: - explain information in an area at the forefront of a selected field in Plant Pathology; - identify the theories, research methodologies, methods and techniques relevant to the selected field; - critically review information gathering, evaluation and management processes in specialised contexts; and - present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	6808	Plant Pathology Research Report	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The student completes a research project under the guidance of a supervisor and becomes skilled in problem identification, hypothesis formulation, planning, conducting and analysis of experiments as well as the interpretation and communication of results.	MAIN	The student will be able to: - use a range of specialised skills to identify, analyse and address complex and/or abstract problems in the field of Plant Pathology; - critically review data gathering, evaluation and management processes in specialised contexts; and - present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	6816	Literature review Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology) The student compiles a review of a specific subject and delivers presentations of selected articles in plant pathology journals. On completion of this module the student is acquainted with literature searches, organizing information, the compilation of information according to a specific format, as well as in written and verbal communication skills.	MAIN	Student will be able to: - explain information in an area at the forefront of a selected field in Plant Pathology; - identify the theories, research methodologies, methods and techniques relevant to the selected field; - critically review information gathering, evaluation and management processes in specialised contexts; and - present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	6824	Plant-pathogen interactions	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The module provides a broad basis for understanding the physical, biochemical and physiological effects that plant pathogens have on their hosts, particularly the methods they use to attack plants and how plants in turn defend themselves.	MAIN	Student will be able to: - Describe the physical and physiological interactions between plant pathogens and hosts; and - Discuss and apply the role that the environment plays in plant/pathogen interactions.
PPLG	6826	Literature review Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology) The student compiles a review of a specific subject and delivers presentations of selected articles in plant pathology journals. On completion of this module the student is acquainted with literature searches, organizing information, the compilation of information according to a specific format, as well as in written and verbal communication skills.	MAIN	Student will be able to: - explain information in an area at the forefront of a selected field in Plant Pathology; - identify the theories, research methodologies, methods and techniques relevant to the selected field; - critically review information gathering, evaluation and management processes in specialised contexts; and - present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	6834	Epidemiology and control of plant diseases	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The course addresses temporal and spatial aspects of plant disease development. Emphasis is on measurement of host, pathogen, and environmental parameters, modelling their interactions in order to understand pathosystem behaviour, quantification of yield loss relationships and identification of effective disease management strategies.	MAIN	Student will be able to: -measure and explain the temporal and spatial aspects of plant disease development; -examine the role of environmental and host factors on disease development and how this can be integrated with disease control; and -manage the application of quantitative epidemiology.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
~~PPLG~~	~~6844~~	~~Molecular Plant Pathology~~	~~This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology).~~ ~~On completion of the module, students will have a basic overview and understanding of molecular plant pathology approaches and techniques, their application and how the use of the various molecular biology approaches can aid in various types of studies of plant pathogens. The course provides a basis on the structure and functionality of DNA and RNA genetics of different pathogen groups, general and some more specialized but contemporary techniques used for molecular plant pathology, and how the various fields of molecular biology aid in understanding various aspects of plant pathology, such as pathogen detection or identification, genetic analysis of plant pathogens, molecular marker-assisted breeding, population genetic studies, and host x pathogen interactions. After completion of the practical module the student will have some experience in certain basic aspects of molecular biology plant pathology research, which is complementary to the theory.~~	MAIN	~~Student will be able to:~~ ~~-Examine concepts of the genetics of different pathogen groups;~~ ~~-Examine and apply principles of some of the most widely used molecular techniques used for plant pathology, and variations of these techniques;~~ ~~-Use molecular plant pathology approaches and examine how it aids general plant pathology studies and which of the approaches are appropriate for what type of studies and questions; and~~ ~~-Select and apply these approaches and techniques in practical situations by understanding the principles, methodology, advantages and disadvantages of each.~~
PPLG	8900	Dissertation Plant Pathology	Students do research on an approved topic for at least two semesters in consultation with the Division Head in preparation of a dissertation that will be submitted as the only requirement for obtaining the degree.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PPLG	9100	Thesis Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Pathology, including: Research project in specialized field of Plant Pathology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Plan independently; and -Conduct in-depth research in a natural or agricultural science discipline.
PPLI	8900	Interdisciplinary Plant Pathology Dissertation	Students do research on an approved topic for at least two semesters in consultation with the Division Head in preparation of a dissertation that will be submitted as the only requirement for obtaining the degree.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PPLI	9100	Interdisciplinary Plant Pathology Thesis	This module contains fundamental knowledge, theories, principles and practices of Plant Pathology, including: Research project in specialized field of Plant Pathology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Plan independently; and -Conduct in-depth research in a natural or agricultural science discipline.

CONSTRUCTION ECONOMICS AND MANAGEMENT (115)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
ARGD	2604	Architecture	The history of architecture in respect of the art of building from antique civilisation till the 21st century. Aspects of architecture theory and philosophy which affect modern man and development. Built-up areas, city planning and design fundamentals.	MAIN	Student will be able to: - Appreciate the built environment; - Have a basic knowledge of style and character in architecture; - Identify and critically appraise different styles of architecture; - Have a good grounding in the basic philosophy of architecture; - Have knowledge and acceptance for good design and construction; - Do basic design documentation for a simple building; and - Understand design fundamentals.
BARD/ BARR	1512	Architecture	The aim of BARR1512 is to provide students with an introductory knowledge and foundational theories of the history of architecture and historical perspectives on the role of construction and related professions that affect modern man and development of civilisations. This module will introduce the connection between historical art of building, architecture, culture, environment and philosophy.	MAIN	After successful completion of this module, you should be able to understand and; - Apply the theory of architecture to the built environment from beginning to present day. - Examine the philosophy of design and architecture. - Discuss the history of architecture over centuries and apply it to architectural periods, styles and merits. - Use an appreciation of architecture and the architectural environment to be able to discuss and conduct an architectural evaluation.
BARR	1522	Architecture	The history of architecture in respect of the art of building from antique civilisation till the 21st century. Aspects of architecture theory and philosophy which affect modern man and development. Built-up areas, city planning and design fundamentals.	MAIN	Student will be able to: -Appreciate the built environment; -Discuss basic style and character in architecture; -Identify and critically appraise different styles of architecture; -Express grounding in the basic philosophy of architecture; -Apply principles and acceptance for good design and construction; and -Discuss design fundamentals.
BBED	1524	Building Economics 1	The need for buildings. The developer's motivation and needs. The principals of building cost and economics including an introduction to cash flow, cost modelling, cost data, cost planning and cost control. An overview of areas of development/construction to be managed, as well as functional requirements and cost implications of construction methods, materials and of design variables. The basics of the concepts and economical aspects associated with green building and sustainability.	MAIN	Student should be able to: - Interpret the consumer and developer needs in terms of construction and economy; - Apply basic and fundamental principles of building costs, prices, planning and control; -Identify and make recommendations regarding economical alternatives in terms of building methods, materials and design variables ; and - Embrace the concept of green building and sustainability and reflect on the economical importance thereof, in balance with the environmental importance.
BBED	2612	Building Economics	Part one: The extent and development of building economics as discipline, the structure and functioning of the building industry. General concept of building costs and the factors influencing building costs. The concepts of cost planning and cost control in relation to the RIBA plan of works. Concepts and methods of estimating. Part Two: Construction tenders as part of the construction industry. Calculation of building costs and prices including calculation of labour, material and equipment expenses of construction items, components and elements.	MAIN	Student should be able to: - Discuss and explain the basic principles of building cost and building cost factors; - Discuss and explain the principles of building price and understand building prices; - Explain the importance of the integration of cost planning and cost control with RIBS plan of works; and - Do basic elementary estimates.
BBER	1524	Building Economics 1	The need for buildings. The developer's motivation and needs. The principals of building cost and economics including an introduction to cash flow, cost modelling, cost data, cost planning and cost control. An overview of areas of development/construction to be managed, as well as functional requirements and cost implications of construction methods, materials and of design variables. The basics of the concepts and economical aspects associated with green building and sustainability.	MAIN	Student should be able to: - Interpret the consumer and developer needs in terms of construction and economy; - Apply basic and fundamental principles of building costs, prices, planning and control; -Identify and make recommendations regarding economical alternatives in terms of building methods, materials and design variables ; and - Embrace the concept of green building and sustainability and reflect on the economical importance thereof, in balance with the environmental importance.
BBER	2612	Building Economics	Part one: The extent and development of building economics as discipline, the structure and functioning of the building industry. General concept of building costs and the factors influencing building costs. The concepts of cost planning and cost control in relation to the RIBA plan of works. Concepts and methods of estimating. Part Two: Construction tenders as part of the construction industry. Calculation of building costs and prices including calculation of labour, material and equipment expenses of construction items, components and elements.	MAIN	Student should be able to: - Discuss and explain the basic principles of building cost and building cost factors; - Discuss and explain the principles of building price and understand building prices; - Explain the importance of the integration of cost planning and cost control with RIBS plan of works; and - Do basic elementary estimates.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BBER	2622	Building Economics	Part One: The extent and development of building economics as discipline, the structure and functioning of the building industry. General concept of building costs and the factors influencing building costs. The concepts of cost planning and cost control in relation to the RIBS plan of works. Concepts and methods of estimating. Part Two: Construction tenders as part of the construction industry. Calculation of building costs and prices including calculation of labour, material and equipment expenses of construction items, components and elements.	MAIN	Student will be able to: - Calculate building costs and prices; - Price elementary tender documentation; - Understand basic building economic applications; and - Understand the basic principles of building cost management.
BBSD	1504	Building Science I	The aim of Building Science I is to provide students with a basic knowledge and foundational theories of architectural drawings, design and construction related materials and methods encountered in the constructing of a simple/single storey building and enable students to carry out descriptive quantification and material analysis tasks. It also provides basic knowledge regarding the provision of services and control of the built environment in and around buildings.	MAIN	After successful completion of this module, you should be able to: - Analyse materials in terms of properties and classification including concrete, masonry and timber. - Demonstrate the correct application of these materials in the construction of a single-storey dwelling. - Outline building regulations applicable to all units of study. - Compile a detailed set of working drawings for a single-storey dwelling. - Appraise the relationship between design and structure. - Propose and communicate different construction; material usage and solutions. - Interpret architectural drawings.
BBSD	2614	Building Sciences II	Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: concrete, glass, metals, plastic, paints and building components.	MAIN	Student will be able to: - compile a detailed set of working drawings for a double-storey structure; - discuss the relationship between design and structure; - propose and communicate different construction solutions and material usage, such as glass, steel and adobe.
BBSD	3712	Building Science 3	Sanitation. Serviceability of buildings. Sanitary fittings. Water supply. Sanitary drainage. Fire Services. Storm-water run-off. Site services. Local government systems.	MAIN	Student will be able to: - Design a site drainage system; - Compare the alternative methods of dealing with sewerage; - Determine and evaluate the most appropriate method of fire protection in a building; - Evaluate the different methods/ways of water purification; - Design domestic water supply to houses; and - Calculate the sizes of storm-water outlets
BBSR	1504	Building Science I	The understanding of architectural drawings, design and construction related methods will provide a fundamental basis which will give students insight into descriptive quantification related tasks. Materials including concrete, masonry, timber and the correct application of these materials in the construction of a single-storey building. Building regulations.	MAIN	Student will be able to: - Compile a detailed set of working drawings for a single-storey building; -Understand the relationship between design and structure; -Understanding of drawing conventions; -Be able to read and interpret architectural drawings; -Have an understanding of materials and the correct application; and -Propose and communicate different construction, material usage and solutions.
BBSR	2614	Building Sciences II	Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: concrete, glass, metals, plastic, paints and building components.	MAIN	Student will be able to: - compile a detailed set of working drawings for a double-storey structure; - knowledge of the relationship between design and stucture; - propose and communicate different construction solutions and material usage, such as glass, steel and adobe.
BCCD	3712	Construction Law	Introduction to the law of contract in SA. Requirements for a valid contract. Breach and unlawfulness. Specific types of contracts, and in particular types of building contracts; structure and forms, sureties, interpretation of building contracts.	MAIN	Student will be able to: - Discuss and apply the basics of the law of contract; - Describe the fundamental theory of building contract law; - Interpret building contracts; - Lead the parties to the closure of a sensible building contract; and - Discuss and apply the principles applicable to different types of contracts.
BCCD	3722	Construction Law	Standard form of building contracts, JBCC, FIDIC, GCC and NEC. Specific clauses in certain standard building contract, construction principles and their application, construction disputes and dispute resolution.	MAIN	Student will be able to: - Lead the parties to the conclusion of a sensible building contract; - Interpret and apply the different types of building contract; and - Conduct and mange the administrative processes created in a building contract.
BCSR	2612	Construction Science	Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance. Frame analyses.	MAIN	Student should be able to: - Explain the function and importance of reinforced concrete in the construction of a building or large construction project; - Identify and quantify the elements of a reinforced concrete construction; and - Explain and analyse the principles of frame work analyses

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BCSR	2622	Construction Science 2	Mapping procedures and map series: international, national, regions and local areas. Trigonometry beacons and references. Planimetry and principles; measuring-tape measurements, levelling, plumb levels and contours.	MAIN	Student should be able to: - Perform basic site measurements and survey levels; - Discuss and explain the setting of buildings for construction work; - Calculate areas based on first principles and coordinates; - Calculate joints and polars.
BDQD	1504	Descriptive Quantification I	Descriptive quantification: Introduction to descriptive quantification; style, explanation, reference and arrangement. Dissecting of small and medium building structures in terms of sections, subsections, elements and components, specification and quantification thereof, processing and compiling of lists. Mainly focusing on estimating.	MAIN	Student will be able to: - Discuss the structure of the built environment and be able to execute an elemental estimate with component level items. -Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through dissecting, specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small and medium constructions; and - Execute all mentioned functions.
BDQR	1504	Descriptive Quantification 1	Descriptive quantification: Introduction to descriptive quantification; style, explanation, reference and arrangement. Dissecting of small and medium building structures in terms of sections, subsections, elements and components, specification and quantification thereof, processing and compiling of lists. Mainly focusing on estimating.	MAIN	Student will be able to: - Discuss the structure of the built environment and be able to execute an elemental estimate with component level items. -Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through dissecting, specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small and medium constructions; and - Execute all mentioned functions.
BDQR	2604	Descriptive Quantification	Dissecting, specification, quantification and composition of process items in terms of trade item definition with regard to foundation work, lower structures, wall constructions, roof constructions and finishes, finishes, windows, doors. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples	MAIN	Student should be able to: - Provide the underlying reasons why a quantity surveyor should execute his work in a systematic and meticulous manner and cultivate specific behavioural patterns that are characteristic of a professional quantity surveyor and construction manager; - Describe the dissecting, specification and quantification of process items in terms of trade item definition in respect of simple- and complex constructions and be able to basically execute the function.
BMQD/ BMQR	1504	Descriptive Quantification 1	Introduction to the built environment and industry role players, professional orientation and inter-professional liaison. Dissecting, composition, specification, measure, unit and quantification of a simple, single storey building.	MAIN	Student will be able to: Discuss the structure of built environment; Identify who the role players in the industry are and how professionals interact with one another and; Compose and construct a simple, single storey project through dissecting, specifying, measuring and quantifying it in trade format.
BMQD/ BMQR	2604	Descriptive Quantification 2N	Dissecting, specification, quantification and composition of process items in terms of trade item definition with regard to foundation work, lower structures, wall constructions, roof constructions and finishes, finishes, windows, doors. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples.	MAIN	Outline and apply the Price Determination Documentation process and the purpose of documentation procedures with regard to contract procurements according to good South African principles as laid out in the Standard System for Measuring Building Work published by the Association of South African Quantity Surveyors; Dissect the composition and construction of a complex, single storey building and a simple, multi storey building by means of outlining building works into section, subsection, items, and quantities; Execute abstracting and billing techniques by demonstrating the necessary skills in descriptive quantification; Demonstrate a systematic and precise manner in which he/she should approach their work as a Quantity Surveyor and; Cultivate behavioural patterns that are characteristic of the professional quantity surveyor that are required for the composition of bills of quantities. Demonstrate the follow characteristics : Cognitive abilities [mental processes of perception, memory, judgement, and reasoning] Practical capabilities [structural and mechanical understanding]Creativity [visualizing two dimensional drawings into three dimensional shapes] Dissecting and abstracting items and dimensions from two dimensional drawings Processing and compiling descriptions and specifications Ability to apply rules and guidelines Facilitate the documentation process Mastering computer programmes and applications Discipline and work ethic Precision and accuracy

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BMQD/ BMQR	3706	Descriptive Quantification 3N	Dissecting, composition, specification, measure, unit and quantification of multi storey and complex buildings.	MAIN	Student will be able to: Dissect, specify, quantify and process items; Visualize two dimensional drawings into three dimensional shapes; Dissect and abstract items and dimensions from two dimensional drawings; Process and compile descriptions and specifications; Apply rules and guidelines; Facilitate the documentation process and; Demonstrate a critical approach to the quality of information required for working drawings.
BPDD	1522	Property Development I	Introduction of project management and aimed at the building and construction industry and the property market in general. Introduction and theory of developments and settlements.	MAIN	Student should be able to: - Outline the basic principles and functions of management and project management; and - Apply the basic theory of property development.
BPDR	1522	Property Development 1	Introduction of project management and aimed at the building and construction industry and the property market in general. Introduction and theory of developments and settlements.	MAIN	Student should be able to: - Outline the basic principles and functions of management and project management; and - Apply the basic theory of property development.
BPDR	2614	Property Development Economics	Synopsis of property, the process of property development, land ownership and administration. Introduction to the theory of settlement, theory and development, government control of the development process; land ownership and administration, regional and community development. Urban morphology. Property values, the value concept, theory of emblements, property production and the economic cycle.	MAIN	Student will be able to: - Discuss and apply the broad principles associated with the property development process; - Apply the theory of settlements and broad location patterns and structures at national and local levels; - Discuss the value of concept as applicable to real estate ; - Use and apply property law, the establishment and types of tenure in real estate; and - Apply the broad principles with regard to property production and investments within the national economy.
BPDR	2624	Property Development	Introduction to the theory of investment. Financial mathematics, techniques for measuring investment return and applications. Capital, income, expenditure and the composition of simple and complex financial feasibility studies.	MAIN	Student will be able to: - Evaluate investments of several alternatives and exercise a viable selection; and - Explain and discuss the important concepts of financial property-mathematics and apply this in comparison with alternatives.
BBSD	2604	Building Science	The aim of Building Science II is to provide students with a basic knowledge and foundational theories of architectural drawings, design and construction related materials and methods encountered in the constructing of a complex multi-storey building and enable students to carry out descriptive quantification and material analysis tasks. It also provides basic knowledge regarding the provision of services and control of the built environment in and around buildings.	MAIN	After successful completion of this module, you should be able to understand and: - Analyse materials including concrete, glass, steel and earth. - Demonstrate the correct application of materials in the construction of a multi-storey building. - Outline building regulations applicable to all units of study. - Compile a detailed set of details for elements of a multi-storey building - Explain the relationship between design and structure - Evaluate and propose different construction techniques; material usage and solutions. - Interpret architectural drawings.
BSCD	3704	Building Science	Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: wood, cement, glass, metals, plastic, petro-chemicals and paints, building components..	MAIN	The student will be able to: - Compile the specification of a building project on this level.
BSSR	2604	Building Science	The complete construction of a single or multi-story building: Foundations and sub-structures for a load bearing and skeleton/framed structures; basic concrete frames; walls; flat and pitched roofs; floors, waterproofing of floors, steps; window ranges, door types; uses of locks, patented fittings and metalwork, service design for single and multi-story structures. Die volledige konstruksie van `n enkel-en meerverdieping geboue.	MAIN	Student will be able to: - compile a detailed set of working drawings for a basic building; - orientate buildings in terms of climate; - solve advanced construction problems and convey the solution through drawings and explanations; - implement more complex construction solutions; and - propose and communicate different construction- and material usage and solutions.
BSCR	3704	Building Sciences III	Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: wood, cement, glass, metals, plastic, petro-chemicals and paints, building components.	MAIN	Student will be able to: - compile the specification of a building project on this level.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CCMD	3704	Building Contracts Law	Foundations of contracts law and commercial law in the construction industry: Building contracts, leases, purchase-deeds, agencies, contracts of service. Parties to the building contract; types of building contracts; structure and forms, sureties, interpretation of building contracts, general conditions of building contracts.	MAIN	The student will be able to: - Describe the basic building contract Law; - Discuss the fundamental theory of building contract Law; - Interpret building contracts; - Lead the parties to the closure of a sensible building contract; - Implement different types of building contracts; and - Deal with the administrative process of a building contract.
CFND	3704	Construction Finance	Construction Finance	MAIN	The student will be able to: - Produce cost reports for labour, material, plant and overhead costs; - Set up his own small works enterprise and introduce the required control programmes to manage the works; - Use concept of cost control programmes to manage the works.
CFNR	3704	Construction Finance	Apply project cost control on site to achieve cost goals Develop systems for small works projects for control purposes and invoicing The concept of cost control and cost planning pertaining to construction sites	MAIN	Student will be able to: -produce cost reports for labour, material, plant and overhead costs; -set up his own small works enterprise and introduce the required control programmes to manage the works; and -apply the concept of cost control programmes to manage the works ot provided.
COED	1504	Building Economics	Three-dimensional concepts of spatial planning, con¬ceptual understanding of structure, and integration of structural techniques in the design process, form construction, management of environmental factors, and graphics. The principals of building cost and prices. The theory of cost planning cost comparisons and com¬petitiveness. Contracts and building economical basis.	MAIN	Student will be able to: - Outline the basic principles of construction and design; - Specify the basic materials for a single story building; - Interpret the consumer requirements in terms of construction and economy; - Recommend the use of different building materials; - Draw basic construction plans with construction details; and - Apply fundamental principles of building costs, prices, planning and control.
COED	2604	Building Economics	The extent and development of building economics as discipline, the structure and functioning of the building industry. General concept of building prices and their composition. Calculation of running expenses. The calculation of labour and material expenses of construction items, components and elements.	MAIN	Student will be able to: - Discuss the basic principles of building economy and the building environment; - Do basic estimates; - Price elementary bills of quantities; and - Assist in the process of building cost management.
COED	3704	Building Economics	The development, methodology and application of historical and current cost estimating methods. The practical application of cost data sources and computerized data. Contract management, payment procedures and certification. The composition of final accounts.	MAIN	The student will be able to: - Implement the different cost estimating methods; and - Utilise available data and price schedules do cost planning, cost-management, cost control certification and payment procedures
CSCD	2604	Construction Science	Mapping procedures and map series: international, national, regions and local areas. Trigonometry beacons and references. Planimetry and principles; measuring-tape measurements, levelling, plumb levels and contours. Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance.	MAIN	Student will be able to: - Do basic site measurements and survey levels; and - Set out buildings for construction work. - Explain the function and importance of reinforced concrete in the construction of a building or large construction project; and - Identify and quantify the elements of a reinforced concrete construction.
CSCD	3704	Construction Science	Part 1 Sanitation: Serviceability of buildings. Sanitary fittings. Water supply. Sanitary drainage. Fire Services: Site services. Local government systems. Part 2: Electrical and mechanical services: Lightning, power supply, circuits, telecommunication, consumption of power. Mechanical services: Natural ventilation, forced ventilation and climate control. Heating systems, transport, refrigiration.	MAIN	The student will be able to: - Develop insight into the importance of building services in the construction of projects; - Identify and quantify the elements of building services and how they fit into the building; - Develop insight into the importance of building services in the construction of projects; and - Identify and quantify the elements of building services and how they fit into the building.
CSCR	2604	Construction Science 2	Mapping procedures and map series: international, national, regions and local areas. Trigonometry beacons and references. Planimetry and principles; measuring-tape measurements, levelling, plumb levels and contours. Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance.	MAIN	Student will be able to: - Perform basic site measurements and survey levels; - Set out buildings for construction work; - Explain the function and importance of reinforced concrete in the construction of a building or large construction project; and - Identify and quantify the elements of a reinforced concrete construction

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CSCR	3704	Construction Science	Part 1 Sanitation: Serviceability of buildings. Sanitary fittings. Water supply. Sanitary drainage. Fire Services: Site services. Local government systems. Part 2: Electrical and mechanical services: Lightning, power supply, circuits, telecommunication, consumption of power. Mechanical services: Natural ventilation, forced ventilation and climate control. Heating systems, transport, refrigiration.	MAIN	The student will be able to: - Develop insight into the importance of building services in the construction of projects; - Identify and quantify the elements of building services and how they fit into the building; - Develop insight into the importance of building services in the construction of projects; and - Identify and quantify the elements of building services and how they fit into the building.
DCPD	3704	Descriptive Construction Project	During the year, on instruction by the Departmental Head, each learner must do an Integrated Construction project. Year-end evaluation is handled and applied in an integrated manner.	MAIN	The student will be able to: - Apply the necessary skills of organising, quantifying, documenting; and - Draw up final accounts.
DCPR	3704	Descriptive Construction Project	During the year, on instruction by the Departmental Head, each learner must do an Integrated Construction project. Year-end evaluation is handled and applied in an integrated manner.	MAIN	The student will be able to: - apply the necessary skills of organising, quantifying, documentation; and - draw up final accounts
DQFD	1504	Descriptive Quantification	Descriptive quantification: Introduction to descriptive quantification; style, explanation, reference and arrangement. Dissecting of small, medium and complex building structures in terms of sections, subsections, elements and components, specification and quantification thereof, processing and compiling of lists.	MAIN	Student will be able to: - Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through dissecting, specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small-, medium- and complex constructions; and Execute all mentioned functions.
DQFD	2604	Descriptive Quantification	Dissecting, specification, quantification and composition of process items in terms of trade item definition with regard to foundation work, lower structures, wall constructions, roof constructions and finishes, finishes, windows, doors. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples.	MAIN	Student will be able to: - Describe why a quantity surveyor should execute his work in a systematic and meticulous manner and cultivate specific behavioural patterns that are characteristic of a professional quantity surveyor/construction manager; and - Outline and apply the dissecting, specification and quantification of process items in terms of trade item definition in respect of simple- and complex constructions and be able to basically execute the function.
DQFD	3704	Descriptive Quantification	Dissecting, specification and quantification of process items in terms of trade item definition with regard to: foundation work on sloping sites; concrete floor slabs; complex masonry constructions, such as haunches, fins, arches, domes, special bonding, etc. and structures; long-span roofs, patent roof trusses, steel structures, special patents and non-patent fittings; sanitary fittings and complex pipe systems; etc. Processing of quantities, abstracting in trades, draft lists and integrated examples.	MAIN	The student will be able to: - apply the necessary skills in dissecting, specification and quantification of process items and have considerably broadened their understanding and approach towards the quantity surveyor; - exhibit clear behavioural patterns that are characteristic of the professional quantity surveyor; and - use a critical approach to the quality of information required for working drawings.
DQFR	3704	Descriptive Quantification	Dissecting, specification and quantification of process items in terms of trade item definition with regard to: foundation work on sloping sites; concrete floor slabs; complex masonry constructions, such as haunches, fins, arches, domes, special bonding, etc. and structures; long-span roofs, patent roof trusses, steel structures, special patents and non-patent fittings; sanitary fittings and complex pipe systems; etc. Processing of quantities, abstracting in trades, draft lists and integrated examples.	MAIN	The student will be able to: -Use the necessary skills in dissecting, specification and quantification of process items and have considerably broadened their understanding and approach towards the quantity surveyor; and -Apply behavioural patterns that are characteristic of the professional quantity surveyor and demonstrate a critical approach to the quality of information required for working drawings.
DQSD	3704	Descriptive Quantification Project	During the year, on instruction by the Departmental Head, each learner must do an Integrated Quantity Surveying project. Year-end evaluation is handled and applied in an integrated manner	MAIN	The student will be able to: - Use the necessary skills of organising, quantifying, documentation and pricing of bills of quantities for buildings; and - Draw up final accounts.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
EGSD	1504	Engineering Science	Part 1 Historical review and perspective of structures: The creation of engineering solutions such as dams, bridges, canals, silos, railway lines, roads and buildings from the earliest historical times till the 21st century, to fulfill the necessities of man in his/her natural environment. Part 2The explanation of basic structural principles as applied in the solving of complex structural problems with respect to historical cases. The use of services in buildings and other structures e.g. electricity, air, conditioners and personal goods and movement with regard to historical cases.	MAIN	Student will be able to: -Recall information and speak with insight to engineers based on his/her developed perspective of historical engineering
EGSR	1504	Engineering Science	Part 1 Historical review and perspective of structures: The creation of engineering solutions such as dams, bridges, canals, silos, railway lines, roads and buildings from the earliest historical times till the 21st century, to fulfill the necessities of man in his/her natural environment. Part 2The explanation of basic structural principles as applied in the solving of complex structural problems with respect to historical cases. The use of services in buildings and other structures e.g. electricity, air, conditioners and personal goods and movement with regard to historical cases.	MAIN	Student will be able to: Discuss with insight his/her developed perspective of historical engineering.
PDED	1504	Property development economics	Defining property, fixed property, land, land-ownership, development and the development process. The science of property development economics. The property market, composition, functioning and occupational orientation. Property development management, career opportunities, subject view and curriculum planning, study and learning methods.	MAIN	Student will be able to: - Outline the basic principles and functions of management and project management; - Apply the basic theory of property development; - Explain property as an investment alternative; - Discuss development course and role of property in previous/historical years; and - Describe the role of property for the economy.
PDED	2604	Property Development Economics	Synopsis of property, the process of property development, land ownership and administration. Introduction to the theory of settlement, theory and development, government control of the development process; land ownership and administration, regional and community development. Urban morphology. Property values, the value concept, theory of emblements, property production and the economic cycle.	MAIN	Student will be able to: - discuss the importance of property in the local and national economy; - outline the place and role of local development in the national economy; - discuss property value, return, price, investment, production, financing and functioning; - outline and apply the role of property law in the property industry; and - discuss the influence of time and planning of time on property production and returns.
PDED	3704	Property Development Economics	Introduction to the theory of investment. Financial mathematics, techniques for measuring investment return and applications. Capital, income, expenditure and the composition of simple and complex financial feasibility studies. The concept market value, types of valuations and valuation techniques	MAIN	The student will be able to: - evaluate investments of several alternatives and exercise a viable selection - apply financial property-mathematics as well as be able to compare this with alternatives.
PDER	1504	Property Development Economics	Defining property, fixed property, land, land-ownership, development and the development process. The science of property development economics. The property market, composition, functioning and occupational orientation. Property development management, career opportunities, subject view and curriculum planning, study and learning methods.	MAIN	Student will be able to: - Outline the basic principles and functions of management and project management; - Apply the basic theory of property development; - Explain property as an investment alternative; - Discuss development course and role of property in previous/historical years; and - Describe the role of property for the economy
PDER	3704	Property Development Economics	Introduction to the theory of investment. Financial mathematics, techniques for measuring investment return and applications. Capital, income, expenditure and the composition of simple and complex financial feasibility studies. The concept market value, types of valuations and valuation techniques	MAIN	The student will be able to: - Evaluate investments of several alternatives and exercise a viable selection; and - Have basic knowledge of financial property-mathematics as well as be able to apply this in comparison with alternatives.
PQMD	1504	Production and Operational Management	Introduction to the building and construction industry, structure, functioning, services, interest. Orientation within the real estate industry. Professional consultants, contractor and investor. Professional orientation and inter-professional liaison. Introduction to documentation procurement: types, purpose, compilation and methodology. Introduction to financial service. Introduction to construction management.	MAIN	Student will be able to: - Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small-, medium- and complex constructions; and - Execute all mentioned functions.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PQMD	2604	Production and Operational Management	Dissecting, specification and quantification and composition of process items in terms of trade item definition. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples	MAIN	Student will be able to: - Provide the underlying reasons why a construction manager should execute his work in a systematic and meticulous manner and cultivate specific behavioural patterns that are characteristic of a professional construction manager; and - Explain the dissecting, specification and quantification of process items in terms of trade item definition in respect of simple- and complex constructions and be able to basically execute the function.
PQMD	3704	Production and Operational Management	Introduction to construction management. Site management and organisation. Manpower application on the building site. Application of material. Span of builders quantities.	MAIN	Student will be able to: - Manage and organise a building project on site in respect of labour; material, safety and security and control; and organise the use of equipment.
PQMR	1504	Production and Operational Management	Introduction to the building and construction industry, structure, functioning, services, interest. Orientation within the real estate industry. Professional consultants, contractor and investor. Professional orientation and inter-professional liaison. Introduction to documentation procurement: types, purpose, compilation and methodology. Introduction to financial service. Introduction to construction management.	MAIN	Student will be able to: - Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small-, medium- and complex constructions; and - Execute all mentioned functions.
PQMR	2604	Production and Operational Management	Dissecting, specification and quantification and composition of process items in terms of trade item definition. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples	MAIN	Student will be able to: -Explain the underlying reasons why a construction manager should execute his work in a systematic and meticulous manner and cultivate specific behavioural patterns that are characteristic of a professional construction manager; and - Discuss the dissecting, specification and quantification of process items in terms of trade item definition in respect of simple- and complex constructions and be able to basically execute the function.
PQMR	3704	Production and Operational Management	Introduction to construction management. Site management and organisation. Manpower application on the building site. Application of material. Span of builders quantities	MAIN	Student will be able to: - Manage and organise a building project on site in respect of; labour; material; safety and security and control; and organise the use of equipment.
SURV	2622	Land Surveying	Mapping procedures and map series: international, national, regions and local areas. Trigonometry beacons and references. Planimetry and principles; measuring-tape measurements, levelling, plumb levels and contours. Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance. Frameworks.	MAIN	Student will be able to: - Do basic site measurements and survey levels; - Set out buildings for construction work; - Take levels on site and reduce levels; - Calculate areas base on first principles and coordinates; and - Calculate joints and polars.
Postgraduate					
ANDC	7904	Property Development	Part 1: Property Development and Infrastructure Part 2: The Real Estate Property development overview -Site identification and acquisition -Appointment of professionals -Financing a development -Feasibility studies and analysis -Viability of property -Property construction and management -Risks and opportunities associated with property development -The property market analysis -Property sustainability -Property investment -Marketing of property	MAIN	The student will be able to: -Explain the influence of infrastructure on property development. -Discuss the challenges in infrastructure development. -Apply the principles of property development. -Identify site and acquire site for development. -Know the suitable professionals needed at various stages of property development. -Conduct viability studies and analyse the result to make informed decisions. -Develop a property development plan including market research and feasibility studies. -Manage property construction processes. -Discuss and analyse the property market. -Apply techniques to maintain and sustain properties and their values. -Discuss and explain the principles of investing in the property market.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
APMD	6803	Advanced Project Management	Project management functions and principles. Management of time, time scheduling and programming, time management techniques and time controlling systems. Management of project costs cost report rendering and cost planning and control. The representation of quality norms, quality management, communication and communication techniques in respect of advanced project management.	MAIN	Student will be able to: - interpret and be able to implement project management theory from inspection to completion of the project - interpret and co-ordinate the role of different functions in a project development - interpret and understand the management functions in respect of successful project outcomes - do risk analysis for a project proposal and especially in respect of dimension, time, price, return, resources, relative quality, construction techniques and procurement methods implement project manager practical limits
APMR	6803	Advanced Project Management	Project management functions and principles. Management of time, time scheduling and programming, time management techniques and time controlling systems. Management of project costs cost report rendering and cost planning and control. The representation of quality norms, quality management, communication and communication techniques in respect of advanced project management.	MAIN	Student will be able to: -Interpret and be able to implement project management theory from inspection to completion of the project -Interpret and co-ordinate the role of different functions in a project development -Interpret and understand the management functions in respect of successful project outcomes -Do risk analysis for a project proposal and especially in respect of dimension, time , price, return, resources, relative quality, construction techniques and procurement methods -Implement project manager practical limits
BCFD	6822	Construction Finance	Cost control systems, general and specific cost control, standard cost and control systems. Preparation of income claims, contract price adjustment clauses, certification and income control statements. Cost statements and project costs, income and cost reconciliation, cost and cash budgets and control. Capital budgeting, earned value management, investment decision-making in construction companies and discounted cash flow modules.	MAIN	Student will be able to: -Discuss the basic function of annual reports, balance sheets, income statements and cash flow statements and how they relate to construction companies. -Discuss a construction project`s finances relate to the financial statements. -Compile valuations of construction work from a Bill of Quantities. -Compile basic statements of comprehensive income, cash flow and balance sheets from bill of quantities` valuations. -Produce an allowable cost budget after award of a construction project. -Produce day-to-day costing and monitoring of the budget -Describe how projects can be assessed within a construction company using simple payback, NPV and IRR calculations. -Discuss and apply the concepts of Earned Value Management and other cost control techniques used in the industry. -Monitor and control the actual cost against the budget during the execution phase of a construction project. -Use capital budgeting and discuss the role it plays in the strategic positioning of a company for future business -Evaluate capital expenditure by using the discounted cash flow model. -Select the best spending option between mutually exclusive projects. -Calculate the net project cash flows on a project or within a company
BCFR	6822	Construction Finance	Cost control systems, general and specific cost control, standard cost and control systems. Preparation of income claims, contract price adjustment clauses, certification and income control statements. Cost statements and project costs, income and cost reconciliation, cost and cash budgets and control. Capital budgeting, earned value management, investment decision-making in construction companies and discounted cash flow modules.	MAIN	Student will be able to: -Discuss the basic function of annual reports, balance sheets, income statements and cash flow statements and how they relate to construction companies. -Discuss a construction project`s finances relate to the financial statements. -Compile valuations of construction work from a Bill of Quantities. -Compile basic statements of comprehensive income, cash flow and balance sheets from bill of quantities` valuations. -Produce an allowable cost budget after award of a construction project. -Produce day-to-day costing and monitoring of the budget -Describe how projects can be assessed within a construction company using simple payback, NPV and IRR calculations. -Discuss and apply the concepts of Earned Value Management and other cost control techniques used in the industry. -Monitor and control the actual cost against the budget during the execution phase of a construction project. -Use capital budgeting and discuss the role it plays in the strategic positioning of a company for future business -Evaluate capital expenditure by using the discounted cash flow model. -Select the best spending option between mutually exclusive projects. -Calculate the net project cash flows on a project or within a company

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BIPD	6804	Integrated Project Quantity Surveying and Construction Management	A development proposal (year assignment) consisting of the following aspects: Site identification and analysis, drawings of the proposed project, estimate of the proposed project, health and safety specification/plan, bill of quantities/builders quantities, construction- and development programmes, viability s tudy, cost reports, methods study and contractual documentation.	MAIN	Student will be able to: - use skills in the full spectrum of Quantity Surveying/Construction management -act at a professional level in his/her understanding and approach to the full spectrum of property development
BIPR	6804	Integrated Project Quantity Surveying and Construction Management	A development proposal (year assignment) consisting of the following aspects: Site identification and analysis, drawings of the proposed project, estimate of the proposed project, health and safety specification/plan, bill of quantities/builders quantities, construction- and development programmes, viability study, cost reports, methods study and contractual documentation.	MAIN	Student will be able to: - Master advanced skills in the full spectrum of Quantity Surveying/Construction management -Achieve a definite professional level in his/her understanding and approach to the full spectrum of property development
BOEC	7902	Building Economics for MProp	Building and construction economics, cost design and cost planning of physical developmental projects. Estimating techniques and quantification of elements of structures and projects.	MAIN	The student will be able to: - Implement advanced cost estimates and cost controls; - Execute design economy and cost behaviour of building elements; and - Interpret normative planning.
BPCD	6822	Professional Practice	The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice including professional ethics.	MAIN	Student will be able to: -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; -Outline the practice of a professional firm; -Be attuned to professionalism, personal conduct and the principles of good practise and ethics; -Understand the principles and role of communication in the industry; -Participate in strategic planning an be able to implement strategies; -Understand and be able to demonstrate ethical behaviour; and -Realise the importance and understand risk management with in the professional practise.
BPCR	6822	Professional Practice	The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice including professional ethics.	MAIN	Student will be able to: -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; -Outline the practice of a professional firm; -Be attuned to professionalism, personal conduct and the principles of good practise and ethics; -Understand the principles and role of communication in the industry; -Participate in strategic planning an be able to implement strategies; -Understand and be able to demonstrate ethical behaviour; and -Realise the importance and understand risk management with in the professional practise.
BPDD	6812	Property Development IV	Scope of development economics. Purpose, types methodology and application of viability studies. Planning studies, stages and procedures. Risk identification, calculation and management. Negotiation as an integral part of property development. Development characteristics, procedures, and techniques. The role of external factors on viability studies.	MAIN	Student will be able to: -calculate and document the financial viability of projects and make an informed decision based on the assessment; -discuss the property development process; and -differentiate between the different commercial property prospects and the difference between commercial and non-commercial development possibilities -show an understanding of the economical and political influences on viability studies; -understand the importance of negotiation - explain the importance of risk identification, quantification and management of property development; and -application of ethical and professional principals.
BPDR	6812	Property Development IV	Scope of development economics. Purpose, types methodology and application of viability studies. Planning studies, stages and procedures. Risk identification, calculation and management. Negotiation as an integral part of property development. Development characteristics, procedures, and techniques. The role of external factors on viability studies.	MAIN	Student will be able to: -calculate and document the financial viability of projects and make an informed decision based on the assessment; -discuss the property development process; -differentiate between the different commercial property prospects and the difference between commercial and non-commercial development possibilities; -show an understanding of the economical and political influences on viability studies; -discuss the importance of negotiation; -explain the importance of risk identification, quantification and management of property development; and -application of ethical and professional principals.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BPKR	7914	Professional Practice	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes. The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice. Communication theory and principles.	MAIN	Student will be able to: -Examine and apply the role of procedural law in the building industry -Advise clients on the procedures in respect of disputes and differences -Discuss and apply the process of mediation -Contribute to the successful administration and management of a firm -Keep record of, collect data and administrate a professional office -Examine the practice of a professional firm -Discuss the principle of joint-ownership -Apply time-planning; and -Handle the schedule from a professionals point of view
BPMD	6804	Project Management	Project management functions and principles. Management of time, time scheduling and programming, time management techniques and time controlling systems. Management of project costs, cost report rendering and cost planning and control. Auditing of cost results. The representation of quality norms, quality management, communication and communication techniques in respect of project management and project administration. Human resources, procurement, risk, health and safety, claims management, environmental management, stakeholder management, financial management and integration of all project areas form part of the programme.	MAIN	Student will be able to: -Interpret and be able to implement project management theory from inspection to completion of the project -Interpret and co-ordinate the role of different functions in a project development -Interpret and understand the management functions in respect of successful project outcomes -Do analysis for a project proposal and especially in respect of dimension, time, scope, price/cost, return, resources, risk, quality and procurement -Manage the CMBOK and PMBOK areas during project execution -Co-ordinate construction projects and manage a project as project manager
BPMR	6804	Project Management	Project management functions and principles. Management of time, time scheduling and programming, time management techniques and time controlling systems. Management of project costs, cost report rendering and cost planning and control. Auditing of cost results. The representation of quality norms, quality management, communication and communication techniques in respect of project management and project administration. Human resources, procurement, risk, health and safety, claims management, environmental management, stakeholder management, financial management and integration of all project areas form part of the programme.	MAIN	Student will be able to: -Interpret and be able to implement project management theory from inspection to completion of the project -Interpret and co-ordinate the role of different functions in a project development -Interpret and understand the management functions in respect of successful project outcomes -Do analysis for a project proposal and especially in respect of dimension, time, scope, price/cost, return, resources, risk, quality and procurement -Manage the CMBOK and PMBOK areas during project execution -Co-ordinate construction projects and manage a project as project manager
BPPD	6812	Professional Practice IV	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes.	MAIN	Student will be able to: -Discuss the role of procedural law in the building industry; -Advise clients on the procedures in respect of disputes and differences; -Outline the process of mediation; -Realise the importance of arbitration, mediation, conciliation and adjudication regarding building contracts; and -Develop a working knowledge of law processes and the role of different courts.
BPPR	6812	Professional Practice	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes.	MAIN	Student will be able to: -Discuss the role of procedural law in the building industry; -Advise clients on the procedures in respect of disputes and differences; -Outline the process of mediation; -Realise the importance of arbitration, mediation, conciliation and adjudication regarding building contracts; and -Develop a working knowledge of law processes and the role of different courts.
BPQD	6822	Professional Practice	The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice including professional ethics.	MAIN	Student will be able to: -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; -Outline the practice of a professional firm; -Be attuned to professionalism, personal conduct and the principles of good practise and ethics; -Understand the principles and role of communication in the industry; -Participate in strategic planning an be able to implement strategies; -Understand and be able to demonstrate ethical behaviour; and -Realise the importance and understand risk management with in the professional practise.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BPQR	6822	Professional Practice	The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice including professional ethics.	MAIN	Student will be able to: -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; -Outline the practice of a professional firm; -Be attuned to professionalism, personal conduct and the principles of good practise and ethics; -Understand the principles and role of communication in the industry; -Participate in strategic planning an be able to implement strategies; -Understand and be able to demonstrate ethical behaviour; and -Realise the importance and understand risk management with in the professional practise.
CFND	6804	Construction Finance	Cost control systems, general and specific cost control, standard cost and control systems. Preparation of income claims, contract price adjustment clauses, certification and income control statements. Cost statements and project costs, income and cost reconciliation, cost and cash budgets and control.	MAIN	Student will be able to: - implement a suitable cost planning and control system on a construction site; and - handle the financial administration of a project during the construction phase and manage cash flow.
CFNR	6804	Construction Finance	Cost control systems, general and specific cost control, standard cost and control systems. Preparation of income claims, contract price adjustment clauses, certification and income control statements. Cost statements and project costs, income and cost reconciliation, cost and cash budgets and control.	MAIN	Student will be able to: - Implement a suitable cost planning and control system on a construction site; and - Handle the financial administration of a project during the construction phase and manage cash flow
COED	6804	Building Economics	Cost studies of building morphology. Building cost analysis and the cost-spread between building elements and components. Normative planning and implementation of the principles of economical design. Life cycle cost and building cost, the execution of comparing cost studies of design alternatives through life cycle cost analysis. The analysis, planning, management and monetary value of risk.	MAIN	Student will be able to: - Examine the purpose and implement normative planning and be able to use this to create an economical designs; and - Apply and discuss the necessity of life cycle cost analysis (whole life appraisal) and apply this to improve the objectivity in the decision making process.
COER	6804	Building Economics	- Cost studies of building morphology. Building cost analysis and the cost-spread between building elements and components. Normative planning and implementation of the principles of economical design. Life cycle cost and building cost, the execution of comparing cost studies of design alternatives through life cycle cost analysis. The analysis, planning, management and monetary value of risk.	MAIN	Student will be able to: - Examine the purpose and implement normative planning and be able to use this to create an economical designs; and - Apply and discuss the necessity of life cycle cost analysis (whole life appraisal) and apply this to improve the objectivity in the decision making process
COMD	6804	Construction Management	Nature, structure and role of construction, construction industry development. External organisational environment. Construction products. Leadership and management of theories, functions, practices and organisational structures. Staff management. Contemporary and global trends in construction.	MAIN	The student should be able to: -Formulate policies and strategies for a construction project; - Manage organisational culture and change; - Design organisational structures; and - Develop business objectives and strategies for a construction firm.
COMR	6804	Construction Management	Nature, structure and role of construction, construction industry development. External organisational environment. Construction products. Leadership and management of theories, functions, practices and organisational structures. Staff management. Contemporary and global trends in construction.	MAIN	The student should be able to: -Formulate policies and strategies for a construction project; - Manage organisational culture and change; - Design organisational structures; and - Develop business objectives and strategies for a construction firm.
CPOD	6804	Production and Operational Management IV	Production and operational management in construction. Construction management as a profession. Performance objectives of operations. Operation strategies. Planning and control in construction firms. Project procurement and bid strategies. Construction productivity and quality management. Planning and managing labour. Plant, equipment and transport management. New trends in construction industry. Tutorial and practicals.	MAIN	Student will be able to: -Manage a construction firm in respect of production and operations -Apply the forms of business in the building and construction industry strategically -Handle the purchase and administration of labour, material and equipment -To be able to act as a Construction Manger in the building industry
CPOR	6804	Production and Operational Management	Production and operational management in construction. Construction management as a profession. Performance objectives of operations. Operation strategies. Planning and control in construction firms. Project procurement and bid strategies. Construction productivity and quality management. Planning and managing labour. Plant, equipment and transport management. New trends in construction industry. Tutorial and practicals.	MAIN	Student will be able to: -Manage a construction firm in respect of production and operations -Apply the forms of business in the building and construction industry strategically -Handle the purchase and administration of labour, material and equipment -To be able to act as a Construction Manger in the building industry

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CRPD	6808	Construction Management Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate built environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -select a research topic -define the research problem -formulate a hypothesis / research question -develop a research proposal -appraise the literature and use the Harvard referencing method and write a literature review -design and justify an appropriate research methodology to address the problem -conduct an empirical study -analysis and interpret empirical data -draw up conclusions and make recommendations -compile a research project report (treatise) -produce a summary paper of the study (article) Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
CRPR	6808	Construction Management Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate built environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -select a research topic -define the research problem -formulate a hypothesis / research question -develop a research proposal -appraise the literature and use the Harvard referencing method and write a literature review -design and justify an appropriate research methodology to address the problem -conduct an empirical study -analysis and interpret empirical data -draw up conclusions and make recommendations -compile a research project report (treatise) -produce a summary paper of the study (article) Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
CSCD	6803	Construction Science	General principles of construction and design procedures, applied material science and drawings of heavy engineering construction and procedures. Civil: Road, bridges, railway lines, dams, harbour walls, tunnel and shaft construction, sewage and water plants, construction works at mines. Mechanical: Pipe ‘plants, shaft work and supporting structures, installation for handling materials.	MAIN	Student will be able to: -Compile the necessary contract documents for engineering projects and evaluate engineering contract costs in all the engineering disciplines; -Analyse large engineering projects in terms of elements in order to compose a cost estimate for large projects; and -Manage the administrative processes of an engineering project.
CSCR	6803	Construction Science	General principles of construction and design procedures, applied material science and drawings of heavy engineering construction and procedures. Civil: Road, bridges, railway lines, dams, harbour walls, tunnel and shaft construction, sewage and water plants, construction works at mines. Mechanical: Pipe plants, shaft work and supporting structures, installation for handling materials	MAIN	Student will be able to: -Compile the necessary contract documents for engineering projects and evaluate engineering contract costs in all the engineering disciplines; -Analyse large engineering projects in terms of elements in order to compose a cost estimate for large projects; and -Manage the administrative processes of an engineering project.
CTID	6822	Construction Technology and Innovation	Advanced materials and systems Computers in building construction and management	MAIN	The student should be able to: - Develop innovative and cutting edge building materials and systems - Examine the increasing role of information technology in construction and managing buildings
CTIR	6822	Construction Technology and Innovation	Advanced materials and systems Computers in building construction and management	MAIN	The student should be able to: - Develop innovative and cutting edge building materials and systems - Examine the increasing role of information technology in construction and managing buildings

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
DPRP	7902	Dispute Resolution	Clauses that handle breach of contract and are aimed at dispute resolution as object. Different dispute-settlement methods, courts, arbitration, mediation, peace-making, communication and management of disputes.	MAIN	The student will be able to: - Executing as arbitrator, mediator and dispute administrator and revolutionists; - Implementing and interpreting clauses that address disputes; and - Advising institutions locked in contract disputes.
DQFD	6804	Descriptive Quantification	Dissect, specify and quantify complex items in terms of trade item definition regarding alterations, piling, ground anchoring, special foundation constructions, false ground floor constructions of wood and concrete, complex basement constructions, underpinning and shoring, compound long-span structures of in situ concrete.	MAIN	Student will be able to: - Independently implement research and investigate problems with the aim of solving them; - Compose a research report, make findings known and suggest recommendation; - Administer and manage a data base; and - Use different facilities in a professional manner for effective communication purposes.
DQFR	8900	Quantity Surveying Dissertation	This module contains fundamental knowledge, theories, principles and practices of Quantity Surveying, including: Research project in specialized field of Quantity Surveying as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	1. Incorporate, through research, a systematic understanding of in-depth knowledge and a critical awareness of current problems and new insights, informed by and at the forefront of Quantity Surveying research and its related area of professional practice. 2. Integrate originality in the application and command of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret new knowledge in the discipline. 3. Develop a conceptual understanding that enables the student to critically evaluate current research and advanced scholarship in the field of Quantity Surveying, to evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses. 4. Demonstrate an advanced scholarship in the field of Quantity Surveying . 5. Develop an ability to use a wide range of specialised skills in identifying, conceptualising, designing and implementing methods of enquiry to address complex and challenging problems within the area of Quantity Surveying . 6. Utilise the resources of academic and professional discourses to communicate and defend substantial ideas that are the products of research.
DQFR	9100	Quantity Surveying Thesis	This module contains fundamental knowledge, theories, principles and practices of Quantity Surveying, including: Research project in specialized field of Quantity Surveying as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ENDR	7900	Research Essay : Property Development	An integrate research study, including an article of the student choice focusing on the area of specialisation (project management or valuation)	MAIN	The student will be able to: - Generate independent research and investigate problems with the aim to solve them; - Implement the correct way of reference; - Implement the correct way of drawing up a bibliography; - Generate statistical data to be able to draw tables and diagrams; - Explain what research is and the identification of a research topic; - Examine the planning of the research, qualitative and quantitative methodologies; - Generate and the compilation of questionnaires; - Classify and Implement sampling methods; - Justify and evaluate a research problem and to plan, to address and to execute it; and - Produce a research report, make findings and suggest recommendations.
INDR	7902	Introduction to Research	Principles and theories, Understanding research, nature and purpose of research, types of research, research process, Formulating the research problem, identifying a topic, formulating the problem statement, research questions, hypotheses, objectives, Reviewing the literature, using Harvard referencing, developing a conceptual framework, Research design/plan, different research paradigms and associated methodologies, data collection and analysis methods including ethical considerations and Writing the proposal and presenting it.	MAIN	The student will be able to: - Demonstrate ability to select a relevant research topic and identify a research problem; - Formulate clear research question(s), hypothesis, objectives and relevance of the study; - Design and write critical literature reviews; - Design an appropriate research plan/design and methodology; - Design a conceptual or theoretical framework to underpin the study; and - Design a research proposal as the basis for undertaking the mini-dissertation.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
INPD	6803	Integrated Project	An integrated project should be done during the year by the learner on the instruction of the Departmental Head. End of the year evaluation is handled on a integrated manner.	MAIN	Student will be able to: -Apply skills from the full spectrum of Quantity Surveying/Construction Management; and -Use a professional approach to the full spectrum of Quantity Surveying/Construction Management
INPR	6803	Integrated Project	An integrated project should be done during the year by the learner on the instruction of the Departmental Head. End of the year evaluation is handled on a integrated manner.	MAIN	Student will be able to: -Implement advanced skills in the full spectrum of Quantity Surveying/Construction Management -Manage a professional approach to the full spectrum of Quantity Surveying/ Construction Management
IPMP	7903	Integrated Project	A development proposal (year assignment) consisting of the following aspects: - Site identification and analysis - Concept proposal and development including drawings of the proposed project - Cost estimation and cost planning - Compilation and evaluation of contract documentation - Construction- and development programmes including critical path analysis - Feasibility/Viability study including life cycle cost analysis - Environmental and sustainability reporting - Project management areas - Power Point presentations		The student will be able to: - Develop a complete project plan from inception to completion. - Apply advanced skills in the full spectrum of Project Management discipline. - Explain what a professional level in their understanding and approach to the full spectrum of property development.
LSFP	7902	Life Cycle Cost , Facility Evaluation and Management	The theory of life cycle costing. Calculation in respect of life cycle costing, evaluation and analysis of cost- and price determinants. The management of the effect of operating cost and financing cost on the life cycle of a property project. Facility evaluation, planning, management and control in respect of all property facilities. The influence of maintenance, labour, material and resources.	MAIN	The student will be able to: - Interpreting and execute maintenance inspection reports and comparing maintenance programs for different buildings; and - Be able to implement life-cycle cost analyses as a tool for effective design and maintenance planning.
MCID	6808	Management of Information and Communication Systems	Field of research, role and place of research, types of research, research methodology, sources and reports. Information, data and data communication. Theory and principles of communication.	MAIN	Student will be able to: - implement research and investigate problems with the aim of solving them; - compose a research report, make findings known and suggest recommendation; - administer and manage a data base; and - use different facilities in a professional manner for effective communication purposes.
PDED	6802	Property Development Economics	Scope of development economics. Purpose, types methodology and application of viability studies. Planning studies, stages and procedures with regard to project planning. Scope, organisation functions and techniques of project management. Development characteristics, procedures, techniques and risks. Development economic perspective.	MAIN	Student will be able to: -Calculate and document the financial viability of projects and make an informed decision based on the assessment; -Discuss the property development process -Differentiate between the different commercial property prospects and the difference between commercial and non-commercial development possibilities.
PFMD	6804	Property Facilities Management	Financial previews and budgets. Leases, lessee composition, valuations and market evaluation. Re-developments, capital application and trusts, risks, valuations and trusts, risks, valuations and evaluation.	MAIN	Student will be able to: -interpret facilities management in respect of scope, function , techniques and procedures; -develop and control financial budgets; -interpret lease contracts, tenants and rental mix, valuations and market valuation; and -interpret redevelopments and capital utilisation.
PMCM	7904	Construction Management principles and practices	- Overview of the construction industry - Role of various players in the construction industry - Overview of construction contracts and procurement process - Construction health and safety issues - Project claim management - Sustainable construction - Project closeout management		The student will be able to: - Design organisational structures in the built environment. - Evaluate the roles and responsibilities of different players in the built environment. - Differentiate contractors, subcontractors and special contractors. - Analyse different contracts and procurement processes. - Assess health and safety requirements in the construction industry and develop health and safety plans and guidelines. - Analyse the compilation and management of project claims. - Appraise the processes of closing out project. - Apply sustainable construction principles and practices in project planning and design

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PMCM	7905	Construction Management Principles and Practices	This module includes: Overview of the construction industry Role of various players in the construction industry Overview of construction contracts and procurement process Construction health and safety issues Project claim management Sustainable construction Project closeout management"	MAIN	- Students will be able to: - Design organisational structures in the built environment; - Evaluate the roles and responsibilities of different players in the built environment; - Differentiate contractors, subcontractors and special contractors; - Analyse different contracts and procurement processes; - Assess health and safety requirements in the construction industry and develop health and safety plans and guidelines; - Analyse the compilation and management of project claims; - Appraise the processes of closing out project; and - Apply sustainable construction principles and practices in project planning and design.
PMMD	7900	Mini Dissertation: Project Management	- Understanding research: nature and purpose - Formulating the research problem - Reviewing the literature - Research design / plan - Conducting the empirical study - Writing the mini-dissertation - Writing the article		The student will be able to: - Select a researchable topic. - Identify and define a research problem. - Formulate a hypothesis and research question(s). - Formulate the aim and objectives. - Motivate the proposed study. - Appraise and write literature reviews and apply the Harvard referencing. - Design a conceptual or theoretical framework. - Select appropriate research methodologies and methods. - Conduct empirical research and analyse the data. - Write up a well-structured and argued mini dissertation. - Write up a publishable article.
PPMO	7904	Project Management I	Nature of the project and project management Project life cycle and Phases Project integration management Project control and communication management Project scope management Project cost management Project time management Project risk management		The student will be able to: - Explain the evolution of project management and the importance of project management. - Conceptualize the phases and life cycle of projects. - Understand the organizational structure in a project environment. - Formulate a project scope statement. - Apply tools and techniques to manage project scope to achieve desired results. - Assign responsibilities to project team members. - Breakdown project into tasks. - Apply tools and techniques to manage project time in order to complete project within schedule. - Manage communication and information in a project environment. - Understand risk management processes. - Apply various techniques to identify, manage and quantify identified risk events in a project environment. - Prioritize risk and develop effective risk responses to important risk event.
PFMR	6804	Property Facilities Management	Financial previews and budgets. Leases, lessee composition, valuations and market evaluation. Re-developments, capital application and trusts, risks, valuations and trusts, risks, valuations and evaluation.	MAIN	Student will be able to: -interpret facilities management in respect of scope, function , techniques and procedures; -develop and control financial budgets; -interpret lease contracts, tenants and rental mix, valuations and market valuation; and -interpret redevelopments and capital utilisation.
PPMT	7904	Project Management II	•Project human resource management •Project procurement management •South African procurement systems •Project quality management Project stakeholder management		Student should to be able to: Describe the project environment and people involved. Determine environmental influences and their impact on projects. Describe project development and motivation to achieve optimum performance. Manage diversity and individual differences in a project environment. Assess effective and efficient leadership in a project environment. Appraise the importance of culture in project settings. Evaluate alternative procurement processes and systems in the built environment. Categorise contract types and contractual risk management approaches. Explain quality management in an organizational context. Measure and monitor quality in a project environment. Assess the various roles and contributions of project stakeholders to successful project implementation.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PPRD	6802	Professional Practice	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes. The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice.	MAIN	Student will be able to: -Discuss the role of procedural law in the building industry; -Advise clients on the procedures in respect of disputes and differences; -Outline the process of mediation; -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; - Outline the practice of a professional firm; -Outline the principle of joint-ownership; and - Apply time-planning and handle the schedule from a professional's point of view
PPRR	6802	Professional Practice	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes. The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice	MAIN	Student will be able to: -Discuss the role of procedural law in the building industry; -Advise clients on the procedures in respect of disputes and differences; -Outline the process of mediation; -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; - Outline the practice of a professional firm; -Outline the principle of joint-ownership; and - Apply time-planning and handle the schedule from a professional's point of view
PVMD	7900	Mini dissertation: Property Valuation	•Understanding research: nature and purpose •Formulating the research problem •Reviewing the literature •Research design / plan •Conducting the empirical study •Writing the mini-dissertation Writing the article		The student will be able to: Identify a research problem, design a research plan, conduct research and write up the mini dissertation as well as the article. Select a researchable topic. Identify and define a research problem. Formulate a hypothesis and research question(s). Formulate the aim and objectives. Motivate the proposed study. Appraise and write literature reviews and apply the Harvard referencing. Design a conceptual or theoretical framework. Select appropriate research methodologies and methods. Conduct empirical research and analyse the data. Write up a well-structured and argued mini dissertation. Write up a publishable article.
PVPL	7902	Property Law	Distinction between movable and immovable property Improvements to land and fixtures Distinctions between real right and personal rights Options and pre-emptive rights Resolution and suspensive conditions Validity of contracts: requirements Prescription Deprivation and expropriation Consumer protection Lease agreements •Sale and purchase agreements •Hire-purchase Agreement/Instalment Sale Transactions •Specific relevant legislation: •National Credit Act •Consumer Protection Act •Alienation Land Act •Housing Consumer Protection Measures Act •Auctions •Estate Agency •Estate Agency Affairs Act Commission		Student will be able to: - Distinguish between movable and immovable property. - Understand, conceptualise and/or apply principles relating to improvements to land. - Compare and contrast between a real right and a personal right. - Distinguish between options and pre-emptive rights. - Differentiate between resolutive and suspensive conditions. - Identify characteristics and/or apply the principles relating to the validity of contracts. - Identify and apply the requirements for the establishment of a valid agreement. - Identify and apply the requirements for Prescription. - Explain the concepts of ownership, deprivation and expropriation. - Distinguish between a sale agreement and a lease agreement. - Identify and apply the relevant legislation pertaining to immovable property. - Explain and apply the principles set out in the Estate Agency Affairs Act.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PVPO	7904	Property Valuation I	•The Nature of Value, the Valuation Process and Property Ownership. •The Real Estate Market and Economy. •Valuation Methods or Approaches and Property Inspections. •Valuation Processes and Valuation Report The property Valuation Industry, Registration as Valuers and the role of the SACPVP		The student will be able to: - Explain property value. - Appraise and apply different valuation processes. - Interpret and apply the concepts of the real estate, money and capital markets. - Evaluate property ownership and interests. - Analyse land and site characteristics of property. - Apply the direct comparable approach to property valuation. - Determine highest and best use of property. - Compile a valuation report. - Evaluate the property market and compile a marketability analysis. - Compile a comparative analysis of properties. - Discuss the requirements and map the professional registration processes for a valuer. - Examine the role of SACPVP. - Explain the code of conduct for a valuer.
PVPO	7905	Property Valuation 1	The following topics are included in this module: The nature of value, the valuation process and property ownership. The real estate market and economy. Valuation methods or approaches and property inspections. Valuation processes and valuation report The property valuation industry, registration as valuers and the role of the SACPVP.	MAIN	Students will be able to: - explain property value; - appraise and apply different valuation processes; - interpret and apply the concepts of the real estate, money and capital markets; - evaluate property ownership and interests; - analyse land and site characteristics of property; - apply the direct comparable approach to property valuation; - determine highest and best use of property; - compile a valuation report; - evaluate the property market and compile a marketability analysis; - compile a comparative analysis of properties; - discuss the requirements and map the professional registration processes for a valuer; - examine the role of the South African Council for the Property Valuers Profession (SACPVP); and - explain the code of conduct for a valuer.
URLM	7902	Planning Management	Unit 1: Definitions and purpose of land use management Legal basis for planning management Unit 2: The spatial planning system Spatial planning and land use management act The IDP The SDF Unit 3: Planning Management. The purpose and critiques of land use management Types of and use management systems Unit 4: SA Planning Legislation. Unit 5: Land use management schemes. Class notes Land zoning Development controls Change processes Constitution of South Africa, 108 of 1996 Spatial Planning and Land Use Management Act, 16 of 2013		The student will be able to: - Evaluate the basis of planning and development legislation in South Africa. - Analyse and compare the relationship between the various rights in the Constitution, land development and administrative justice. - Assess the spatial planning system including the relationship between the integrated development plan, spatial plans and land use management. - Assess the land development process by recommending and evaluating the relevant legislation that enables or informs the process. - Discuss the development controls in land use schemes.
PVPT	7905	Property Valuation II	•Valuation Methods and Approaches: Cost Approach; Income Capitalization Approach; Discounted Cash Flow Analysis. •The valuation report. •Real Property and its valuation; the valuation processes; Land and site analysis; Highest and best use. •Valuation Legislation and case law; The functions of a valuer; Valuation of Partial Interest; Valuation for Financial Reporting		The student will be able to: Conduct property valuations by applying different suitable methods including cost approach, income capitalization and discounted cash flow analysis. Assess the characteristics of real property and the valuation thereof. Appraise the different valuation processes. Conduct a land and site analysis. Determine highest and best use of property. Determine the value of partial interest in property. Conduct a valuation for financial reporting purposes. Compile a valuation report. Apply valuation legislation and case law to case studies. Explain valuation processes used in different valuation methods Motivate the appropriateness of the selection of a valuation method for a particular purpose.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PPYC	7901	Professional Practice	Professional service as a business. Law and regulations that affect the profession. Ethics and codes of conduct, communication between professionals, the client and the society. Advanced project procurement methods and procurement management. Alternative procedures and processes in respect of contract documentation. The qualification, compilation and management of documentation. Different contract forms. Construction contract analysis.	MAIN	The student will be able to: - Execute professionally and interpret the role of professional practice in society; - Exemplify practice forms; - Design a proposal to clients on the most acceptable method of procurement; - Co-ordinate a complete contract procurement process and procedure; - Analyse and interpret advanced construction contracts; - Exemplify the role of professional acts and constitutions; and - Implementing with inter-professional and institutional communication and participate in respect of professional interaction
PQMD	6804	Production and Operational Management	Organisation of the construction industry, employer organisation, restrictive and stimulating practices organisation of the construction enterprise. Project selection and market evaluation. Purchase and control of material and equipment. Personnel management and administration within a contractors enterprise.	MAIN	Student will be able to: -manage a construction firm in respect of production and operations -apply the forms of business in the building and construction industry -handle the purchase and administration of labour, material and equipment
PQMR	8900	Construction Management Dissertation	This module contains fundamental knowledge, theories, principles and practices of Construction Management, including: Research project in specialized field of Construction Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PQMR	9100	Construction Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Construction Management, including: Research project in specialized field of Construction Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: Identify the problem; Formulate a hypothesis; Do independent planning and then conduct the experiments; Analyse and interpret the results; Discuss the results comprehensively; Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PROP	8900	Property Sciences Dissetation	This module contains fundamental knowledge, theories, principles and practices of Property Sciences, including: Research project in specialized field of Property Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PROP	9100	Property development Thesis	Land and Property development This module contains fundamental knowledge, theories, principles and practices of including: Research project in specialized field of Property development as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PVPD	6804	Property Valuation Practice	Types of evaluation and how they can be applied in practice. Method of compiling each type valuation, law toward registration, methods of properties. The theory of valuations, valuation practices and techniques	MAIN	Student will be able to: -value property by using different methods; -interpret and understand the legal aspects of determining property value; -interpret and understand the theory of valuation; and -interpret and be able to use the information sources in respect of valuation in valuation practice.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
PVPR	6804	Property Valuation Practice	Types of evaluation and how they can be applied in practice. Method of compiling each type valuation, law toward registration, methods of properties. The theory of valuations, valuation practices and techniques.	MAIN	Student will be able to: -value property by using different methods; -interpret and discuss the legal aspects of determining property value; -interpret and understand the theory of valuation; and -interpret and be able to use the information sources in respect of valuation in valuation practice.
QBED	6812	Building Economics	The economic design and planning of structures and the influence of the site of effective cost planning. Planning according to norms and evaluation of design effectiveness within set parameters. Calculation of professional fees (all consultants, with specific reference to the QS).	MAIN	Student will be able to: - Examine the purpose and implement normative planning and be able to use this to create an economical designs; - Make proposals on building shape, plan and building size; -Utilise available data and price schedules to analyse; and -Analyse and calculate professional fees of all consultants.
QBED	6822	Building Economics	Life cycle cost and building cost, the execution of comparing cost studies of design alternatives through life cycle cost analysis. The analysis, planning, management and monetary value of buildings. The different application of indices, with specific reference to escalation and inflation calculations.	MAIN	Student will be able to: - Apply and discuss the necessity of life cycle cost analysis (whole life appraisal) and apply this to improve the objectivity in the decision making process; - Use available indices to predict new trends; and - Use indices to calculate escalation and inflation estimates.
QBER	6812	Building Economics	The economic design and planning of structures and the influence of the site of effective cost planning. Planning according to norms and evaluation of design effectiveness within set parameters. Calculation of professional fees (all consultants, with specific reference to the QS).	MAIN	Student will be able to: - Examine the purpose and implement normative planning and be able to use this to create an economical designs; - Make proposals on building shape, plan and building size; -Utilise available data and price schedules to analyse; and -Analyse and calculate professional fees of all consultants.
QBER	6822	Building Economics	Life cycle cost and building cost, the execution of comparing cost studies of design alternatives through life cycle cost analysis. The analysis, planning, management and monetary value of buildings. The different application of indices, with specific reference to escalation and inflation calculations.	MAIN	Student will be able to: - Apply and discuss the necessity of life cycle cost analysis (whole life appraisal) and apply this to improve the objectivity in the decision making process; - Use available indices to predict new trends; and - Use indices to calculate escalation and inflation estimates.
QDQD	6804	Descriptive Quantification IV	Dissect, specify and quantify complex items in terms of trade item definition regarding alterations, piling, ground anchoring, special foundation constructions, false ground floor constructions concrete, complex basement constructions, underpinning and shoring, compound long-span structures of in situ concrete and masonry. Overview of electrical and mechanical trade.	MAIN	Student will be able to: - Develop critical and innovative thinking as well as skills and competences regarding the above modules and manage a quantity surveying firm; - Manage effective utilisation of resources required by a firm to conduct these activities successfully; and - Examine and apply the Bill of Quantities on all above modules.
QDQR	6804	Descriptive Quantification IV	Dissect, specify and quantify complex items in terms of trade item definition regarding alterations, piling, ground anchoring, special foundation constructions, false ground floor constructions concrete, complex basement constructions, underpinning and shoring, compound long-span structures of in situ concrete and masonry. Overview of electrical and mechanical trade.	MAIN	Student will be able to: - Develop critical and innovative thinking as well as skills and competences regarding the above modules and manage a quantity surveying firm; - Manage effective utilisation of resources required by a firm to conduct these activities successfully; and - Examine and apply the Bill of Quantities on all above modules.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
QRPD	6808	Quantity Surveying Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate built environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -select a research topic -define the research problem -formulate a hypothesis / research question -develop a research proposal -appraise the literature and use the Harvard referencing method and write a literature review -design and justify an appropriate research methodology to address the problem -conduct an empirical study -analysis and interpret empirical data -draw up conclusions and make recommendations -compile a research project report (treatise) -produce a summary paper of the study (article) Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
QRPR	6808	Quantity Surveying Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate built environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -select a research topic -define the research problem -formulate a hypothesis / research question -develop a research proposal -appraise the literature and use the Harvard referencing method and write a literature review -design and justify an appropriate research methodology to address the problem -conduct an empirical study -analysis and interpret empirical data -draw up conclusions and make recommendations -compile a research project report (treatise) -produce a summary paper of the study (article) Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
TRBP	7904	Applied Project Management	Introduction to project management; Deal with PMBOK areas: Scope; Time; Cost; Quality; Human resources; Procurement; Risks; Communications; Integration; Stakeholder management, as well as CMBOK areas: Health and Safety management; Claims management; Environmental management; Financial management.	MAIN	The student will be able to: - Summarising and classifying the phases of projects from inceptions to completion; - Interpreting and executing project management function and apply the functions integrated; - Classifying and implementing contract procurement methods; - Exemplify, interpret and implement all the elements of project management; and - Executing as a project manager, within practical limits
URDT	6804	Human Settlement Development Management	The theoretical and practical identification, analysis and procurement of suitable land for the development of human settlements. Conseptualising human settlement projects, inclusive of the relevant sub-disciplines. Structuring of various types of housing projects. An introduction to property development management functions and principles, inclusive of programme management; basic project management, costings , budgeting, cash flow and risk management.	MAIN	Student will be able to: - Identify , analyse and procure land suitable for human settlement projects; -Conceptualise various human settlement projects; -Define the roles and functions of the related sub-disciplines; -Programme the development and implementation of a housing project; -Apply basic project management principles; -Do a cost estimate, budget and cash flow for a housing project; -Compile a project proposal; -Do a risk analysis of a project proposal -Manage the implementation of a housing project.

SOIL, CROP AND CLIMATE SCIENCES (116)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
AGEG	2624	Engineering principles in Agriculture Practices	This module contains fundamental knowledge, theories, principles and practices of Agricultural Engineering including: Engineering skills in aspects of soil and water conservation. The design of waterways, terraces, contours in conservation farming practices. The learning of how to determine flow and the protection of soil conservation works, weirs and farm dams. Recovery of erosion trenches with the help of mechanical control measures. Basic hydraulics and the practical design of stock-watering systems and pipelines.Practical work: The development of designer skills and the application of calculations. Measurements and standardisation with specific application in the agriculture.	MAIN	Student will be able to: • Discuss and explain concepts, principles and theories, and an understanding of Soil conservation and the prosses of soil erosion. • Recognise the reasons soil erosion occur.Assess the available methods of reclaiming eroded lands and differentiate between their engineering applications to select the most appropriate method. • Depict the mechanism in the designing of soil dams and stock watering systems and waterways to rehabilitate land. -Solve problems in unfamiliar context, through the evaluation, selection and application of appropriate methods and procedures in processes of investigation, and to find solutions based on gathered evidence: • Understand and apply the basic principles of Open Channel Flow Hydraulics. • Evaluate existing and compile new Mechanization Plans for efficient farming practices. • Understand the basic performance of a diesel engine. • Understand the importance of weight distribution during cultivation practices and evaluate various tractor performance criteria.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGEG	3714	Hydraulics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Engineering including: • Knowledge of basic hydraulics and the solving of problems. Applications of hydraulics in the instalment of agricultural networks, pumps and electrical motors. • The student must be familiar with the practical implementation and application of Eskom networks and tariffs. • Practical work: Introduction with irrigation systems, solving of hydraulic problems, determining of HQ curves of pumps, deciding on pumps and the power requirements of pumps. • Practical calculations of electricity tariffs.	MAIN	Student will be able to: • Apply the key concepts, principles and theories, and an understanding of pump design and HQ curves: • Understand and select appropriate design approaches taking relevant industry norms and standards into account. • Assess the available pumps and electrical motors and differentiate between their engineering applications to select the most appropriate pump or motor. • Understand and depict the mechanism and operation of centrifugal and positive displacement pumps. • Identify, evaluate and solve problems in unfamiliar context, through the evaluation, selection and application of appropriate methods and procedures in pump design, and to find solutions based on gathered evidence: • Apply suitable criteria and perform basic design of pump components.information, to apply well-developed processes of analysis and evaluation to make decisions, act appropriately, and understand relationships and impacts between Ruraflex and Landrate systems in familiar and new contexts: • Collect and analyse data to select the appropriate ESCOM tariff and determine the suitable electrical power costs for an application. • Identify the factors affecting the lifespan of pump components and choose the appropriate type of maintenance program required. • Compile, communicate and present complex information reliably and coherently using existing irrigation systems: • Promote and support learning, work effectively in a team, identify and address task-specific learning, evaluate team performance against criteria provided, take responsibility for all decisions and team actions, and responsible use of resources: • Analyse and subdivide assignments into manageable identified learning tasks for each team member to ensure effective teamwork. • Use available resources correctly and responsibly to execute assignments. • Appraise the team performance for compliance with the criteria provided, and take responsibility for own designs. • Select appropriate pumps under various loading and operating conditions. • Illustrate proficient communication of irrigation system solutions and transformer information, presented through written, verbal, or practical demonstration, reflecting awareness and understanding of the implications resulting from decisions and actions. • Correctly identify the appropriate irrigation system for a wide variety of conditions and parameters. • Understand the conservation laws in fluid mechanics and be able to apply these laws to typical hydraulic problems. • Be able to explain the affect that the properties of fluids have on fluid flow.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
AGEG	3724	Irrigation Systems and Irrigation Surveying	This module contains fundamental knowledge, theories, principles and practices of Agricultural Engineering including: • Ability to determine the use of the relevant irrigation systems in specific circumstances and conditions. Practical experience in the basic planning and design of irrigation systems. • Practical work: The learning of methods in the selection of the correct irrigation systems and the determining of the cost effectiveness of the different systems. • Practical surveying and design.	MAIN	Student should be able to: -Apply the key concepts, principles and theories, and an understanding of irrigation design: -Select appropriate design approaches taking relevant SABI norms and standards into account. -Recognise the reasons for specific design methods. -Assess the available information to determine which irrigation system is best suited for the application. -Understand and depict the SABI irrigation design method. -Assess the different irrigation methods and their application in engineering situations. -Identify, evaluate and solve problems in unfamiliar context- -Apply suitable criteria and perform basic irrigation designs of main pipelines and manifolds. -Calculate and correlate internal friction and pressures within allowable limits to determine suitable pipe sizes. -Select and design different electrical motors under various loading and operating conditions. -Evaluate and select different irrigation systems and and to make decisions, act appropriately, and understand relationships and impacts between the different irrigation systems in familiar and new contexts: -Compile, communicate and present complex irrigation information and to be aware and understand the decisions and actions. - Design of an appropriate Irrigation System for a set of conditions using the knowledge gained from AGEG2624, AGEG3714 and AGEG3724.
AGRI	1534	Chemical Principles in Agricultural	Student will be equipped with simple chemical principles, concepts, processes and calculations that are important in agriculture sciences, especially with respect to soils, plants, animals and food. Practical work: Student will acquire laboratory skills, which will be used to do simple chemical experiments that bear reference to soils, plants, animals and food. Reports of these experiments will be submitted for evaluation.	MAIN	Student will be able to: -Explain, explore, discuss, and display skills, qualities and other attributes in simple chemical principles in agriculture., concepts, processes and calculations that are important in agricultural sciences, especially with respect to soils, plants, animals and food; in simple
AGRI	1554	Physical and mechanised principles in agriculture	Student will be equipped to apply the basic physical concepts with respect to mechanics, hydrodynamics and hydrostatics, electricity, energy and the application of the gas laws in agriculture and agricultural sciences. This knowledge will be used to explain the influence of these processes on the behaviour of animals, plants and the natural resources. The Student will be familiar with the SI-system and unit conversion. Practical work: The Student will gain practical experience by performing laboratory experiments and calculations will be done to illustrate some of the key concepts mentioned above.	MAIN	Student will be able to: - explain and use the SI-system and perform unit conversions; - apply the basic physical concepts with respect to mechanics, hydrostatics and hydrodynamics, energy and heat, the gas laws; electricity and waves in agriculture and agricultural sciences; - describe and discuss the influence of physical processes on the behaviour of animals, plants and the natural resources; and - solve problems using practical experience and doing calculations involving the above-mentioned subjects.
CLIM	3734	Micro Metereology (only BSc Agric)	This module focuses on the various types and sources of climatological data, the quality control and representativeness of such data, as well as its statistical analysis for the purpose of research or extracting information for agrometeorological advisories or bulletins. Student receive training in the basic principles of statistical analysis and hypothesis testing, as well as in more advanced tools for data analyses such as regression and multi-variate analyses. Practical Work Weekly assignments enable Student to apply a range of statistical procedures to agrometeorological data.	MAIN	Student will be able to: - prepare a climatological data set for statistical analysis; - design hypotheses and statistically test them; - use a range of methods to present data; - test for significance, homogeneity and normality; - perform simple and multiple linear regression; - derive climate indices for agriculture; and - evaluate early warning systems for farmers.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CLIM	3724/ 3764	Climate Change and Variability	The following aspects are dealt with: The global climate system; natural climate variability; natural and anthropogenic climate forcing; climate feedbacks; proxy data; recently observed changes in the climate; climate prediction and climate change projections; climate change impacts and adaptation strategies. Practical work Weekly assignments focus on the use of 1- and 2-dimensional models to evaluate climate feedbacks and interactions; the use of proxy data in order to describe climates of the past; obtaining the latest climate change projections for a specific area and assessing the potential impacts to agriculture and adaptation strategies; determining a carbon footprint and monitoring those systems responsible for natural variability within the climate system.	MAIN	Student will be able to: - Describe the major causes and characteristics of internal climate variability and externally forced climate change; - Explain the concepts of radiative forcing and climate feedback; - Evaluate recently observed changes in climate relative to changes that have occurred in the past; - Describe the formulation of climate models and evaluate their strengths and weaknesses; - Discuss the basis, methods and limitations of climate prediction; - Assess the impact of agricultural activities on climate by calculating a carbon footprint; and - Review the latest climate change projections and how this will affect the agricultural sector together with adaptation options.
CLIM	4874	Advanced Instrumentation in Agrometereology	The following aspects are dealt with: Radiation, temperature, humidity, wind, turbulence and profiles of heat, momentum and mass transfer within plant communities over a diurnal and seasonal cycle; the Monin-Obukhov similarity principle; the microclimate of urban areas, forests, greenhouses and crops. Practical work: Practical skills will be acquired in the calibration and set-up of instruments used for observation of environmental variables within and above plant communities and soil surfaces.	MAIN	Student will be able to: - Measure and describe the radiation, temperature, humidity, wind, turbulence and profiles of momentum and mass transfer within plant communities over a diurnal and seasonal cycle; - Apply the Monin-Obukhov similarity principle; - Evaluate the influence of the environment on plant processes such as photosynthesis, transpiration, leaf temperature and the leaf energy balance; and - Analyse the microclimate of urban areas, forests, greenhouses and crops using models and meteorological data.
SCCS	4824	Modelling Soil Crop and Climate Interaction	The influence of various climatic and growth factors on photosynthesis and crop growth, and how these processes are depicted by crop growth models are dealt with. The necessary background to test crop growth models by means of sensitivity analysis and statistical verification before these models can be applied in agriculture, will be provided. Practical work: Student will obtain practical experience with crop growth models and sensitivity analysis.	MAIN	Student will be able to: -Be familiar with the principles of dynamic modelling -Understand how different types of models in soil, crop and climate sciences can be applied in different contexts -Gain extensive skills in the application of models in Excel, R, and through model interfaces. -Parametrise and calibrate models, and verify model outcomes by means of sensitivity analysis and statistical verification -Apply simulation models in the soil-crop-climate continuum in a research or advisory setting
CLIM	4834	Physics and dynamics of the atmosphere	After completion of this module the Student will be able to describe the atmospheric composition and structure; derive the various forces which are at work in the atmosphere, and apply them in wind calculations; explain the physical processes involved in cloud formation and precipitation; assess the possibility of thunderstorm development with the use of thermodynamic diagrams and certain stability indices and explain various atmospheric phenomena such as hail and lightning as well as pollution dispersal. Calculation of atmospheric forces and wind components using basic numerical modelling; plotting and analysing of thermodynamic diagrams in weather forecasting.	MAIN	Student will be able to: - describe the atmospheric composition and structure; - derive the various forces which are at work in the atmosphere; - apply this information in wind calculations; - explain the physical processes involved in cloud formation and precipitation; - assess the possibility of thunderstorm development with the use of thermodynamic diagrams and certain stability indices; and - explain various atmospheric phenomena such as hail and lightning as well as pollution dispersal patterns.
CLIM	4844	Weather analysis and forecasting	The content will focus on synoptic climatology and the large-scale tropical and extra-tropical weather systems that may affect southern Africa. Various theoretical models are introduced and explained with the aid of numerical models. Skills are developed in the decoding of surface observations and the interpretation of satellite and radar imagery. Different weather forecasting techniques are dealt with. Practical work: Various forecasting techniques are used to compile a five-day weather forecast on a weekly basis. Such a forecast is based on theoretical knowledge as well as the analysis and interpretation of synoptic weather charts, meteorological observations, numerical model outputs and remotely sensed imagery.	MAIN	Student will be able to: - Decode surface observations and plot synoptic weather charts; - Explain the development, propagation and weather associated with various large-scale systems; - Interpret remotely sensed imagery and numerical weather prediction model output; and - Integrate all of the above in order to compile a short-term weather forecast.
CROP	2614	Concepts in crop production	During this module students will gain greater knowledge about the basic agronomic production practices such as soil tillage, fertilisation/plant nutrition, irrigation and pest control. During practicals students will obtain sufficient practical knowledge, skills and experience to understand the functioning of implements, and be able to evaluate soil tillage operations. They will also gain a basic understanding on the use of fertilisers, irrigation systems and herbicides.	MAIN	The student will be able to: - List and describe the soil tillage implements and practices used in crop production; - Explain the crop nutritional requirements and solve basic fertilization problems; - List and describe the types of irrigation systems used, as well as explain basic irrigation scheduling methods; - State, and describe the pest control methods that can be used; - Describe and assess basic on-farm production decisions, and explain them using appropriate formats and technologies; and - Explain the effects of production decisions on the agricultural and natural environments, be able to solve issues of concern and recommend possible solutions

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CROP	3744/ 3764	Winter grain, industrial and diverse crops	Cultivation practices concerning the most important winter grain, industrial and diverse crops of South Africa. The Student will also be able to apply the theoretical and practical aspects of soil tillage, seedbed preparation, planting techniques, plant nutrition, pest control, harvesting and grading as it relates to these crops on a higher level. During practical sessions the Student will study the morphology of these crops in detail and skills concerning the practical aspects of crop cultivation will be developed and practised by the student.	MAIN	Student will be able to: - Identify and list the most important morphological characteristics of the crops dealt with in this module - Identify development stages, and explain the importance of crop development. - Analyse and interpret soil, crop and climate interactions. - Explain and assess cultivation practices for crops covered in this module. - Explain, assess, and be able to make recommendations, on both a theoretical and practical level, on the following principles related to these crops: -soil tillage and field preparation -planting techniques -crop nutrition -weed control - Identify and explain how to control of the main pests and diseases of each crop - Describe the grading and uses of the crops - Assess the suitability of a crop for production in any area, given a set of climatic and soil data, as well as being able to estimate/calculate the approximate yield that can be expected under those conditions. - Accurately identify and calculate inputs required for these crops under given circumstances and be able to assess the decisions and actions of others.
CROP	3714/ 3754	Summer grain, oil and protein-rich crops	Cultivation practices concerning the most important summer grain, oil and protein-rich crops of South Africa. The student will also be able to apply the theoretical and practical aspects of soil tillage, seedbed preparation, planting techniques, plant nutrition and pest control, harvesting and grading as it relates to these crops on a higher level. During practical sessions the Student will study the morphology of these crops in detail and skills concerning the practical aspects of crop cultivation will be developed and practised by the student.	MAIN	Student will be able to: - Identify and list the most important morphological characteristics of the crops dealt with in this module; - Identify crop development stages, and explain the importance of crop development; - Analyse and interpret soil, crop and climate interactions. - Explain and assess cultivation practices for crops covered in this module; - Explain, assess, and be able to make recommendations, on both a theoretical and practical level, on the following principles related to these crops: soil tillage and field preparation; planting techniques; crop nutrition; weed control; - Identify and explain how to control of the main pests and diseases of each crop - Describe the grading and uses of the crops. - Assess the suitability of a crop for production in any area, given a set of climatic and soil data, as well as being able to estimate/calculate the approximate yield that can be expected under those conditions. - Accurately identify and calculate inputs required for these crops under given circumstances and be able to assess the decisions and actions of others.
CROP	4814	Crop Physiology	World food security and the place of crop physiology in crop production. Physiology and biochemistry of plants will be dealt with, including membrane, enzyme and energy systems, together with regulatory mechanisms and signalling. The reactions of the primary and secondary metabolic pathways will be dealt with, as well as their regulation under normal and abnormal environmental conditions. Plant physiology and biochemistry will be placed into perspective for agricultural production, with emphasis on the potential of external manipulation to increase yields. Practicals are presented on a weekly basis in order to a) develop skills of Student to apply standard methodology and techniques as well as to obtain data and b) develop the ability to present data in graphic or table format and interpret data in a scientifically correct manner.	MAIN	Student will be able to: - Describe the current state of affairs concerning food security on the planet as well as make recommendations for the future; - Illustrate an understanding of enzymes by being able to explain how they work, the dynamics of endo- and exothermic reactions in terms of energy transfer and the coupling phenomenon; - Explain, summarize and discuss root, shoot and leaf anatomy, cytology of living cells, membrane structure and the endomembrane concept; - Discuss the physiological role of macro and micro plant nutrients; - Explain the terms regulation' and manipulation of metabolism as ways and means to influence crops externally with the aim of improving yields in light of predicted food shortages. - Explain primary and secondary metabolic pathways and how they inter relate as well as its association with gene expression under normal and stress conditions; - Summarize the effect of abiotic stress on normal physiological processes including means to induce systemic acquired resistance and the involvement of membranes, ABA and free radicals; - Explain the mechanisms of action involved in both normal and stress physiology by applying the broad knowledge of physiology and biochemistry, together with the acquired research skills.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CROP	4824	Role of nutrition in Crop development	Advanced knowledge and insight of selected plant nutrients on their supply, uptake and physiological functions in crop manipulation. Aspects of plant analysis, crop requirements, interpretation of plant and soil analysis, nutrient application and organic fertilization as part of the holistic approach to crop nutrition will also be studied. On completion of this module Student should have acquired sound knowledge of root growth and nutrient uptake, nutrient use by crops, and plant response to fertilization. Tutorials will be used to teach Student to interpret soil and plant analyses reports, and how to compile crop nutrition programs from these analysis reports.	MAIN	Student will be able to: - List and explain the classification and function of nutrient elements. - List, explain and discuss all concepts of macro- (N, P, K, Ca, Mg and S) and micro-elements (B, Cu, Fe, Mo and Zn) in crop nutrition. - Discuss the effect of soil pH and its effect on crop nutrition and growth. - Describe and explain crop reaction to fertilization. - Describe and assess fertilizer applications. - Assess and interpret fertilization under given soil conditions (saline soils, acetic soils and certain soil moisture regimes). - Illustrate how to set up hydroponic nutrient solutions. - Describe the role of plant nutrition in crop development
CROP	4834	Water dynamics in Crop production	Equip Student to integrate, theoretically and with basic crop modelling, the causes and processes that govern water movement through the soil-plant-atmosphere continuum for agricultural crops. Water flow and exchange processes that take place as crops grow and the responses to a decline in water supply are studied, which are both essential for exploring soil and crop management strategies that enhance efficient water use in both irrigated and rain-fed production systems. Practical classes will be used to teach Student basic scientific soil and crop water measurements and crop-modelling that allow for yield response to water, i.e. water as a limiting factor in crop production. On completion of this module Student should have acquired sound knowledge of root growth and water uptake, the water balance of the plant, water use by crops, measurements of soil water and plant water status, plant response to water deficit and the need, concerns and problems of irrigation.	MAIN	Student will be able to: - Explain, illustrate, analyse and / or synthesize topics such as the role of water in plant life, properties and energy state of water, water storage and movement in soil, the root as an organ for water uptake, plant water balance, the plant as a link between soil and atmosphere, crop water use, radiation and dry matter production, water use and dry matter production, influence of nutrient supply on water use, yield formation under inadequate water supply, water stress in plants and soil, and crop management to ensure efficient water use in rain-fed and irrigated production systems. - Describe and discuss research findings presented in tables and figures to understand and analyse the above-mentioned topics. - Identify and explain the complexities and uncertainties of applying appropriate scientific soil and crop measurements in order to analyse water as a limiting factor in crop production - Demonstrate the use of a range of specialised computer skills to identify, analyse and address water flow in the soil-plant-atmosphere system and subsequent yield response, drawing systematically on research and basic crop modelling knowledge. - Present and communicate crop water relation problems and issues academically and professionally in order to offer creative water management insights and solutions. - Explain the role of water in crop development.
CROP	4844	Weed control	Student will learn about the laws which govern weed control in South Africa, as well as how the biology of weeds affects control strategies. The concepts of herbicide selectivity, absorption, translocation, mode of action and residual activity will be dealt with at an advanced level. Various classification systems used for herbicides, and the safe use of these products will also be dealt with. Student will also learn about the occurrence, prevention and management of weed resistance to herbicides, as well as the use of genetically engineered herbicide resistant plants and their consequences for weed management. The registration process followed for new herbicides will addressed, and the procedure to be followed to diagnose of herbicide problems. During practicals Student will learn to identify the most common agricultural weeds, how to calibrate sprayers and conduct a research project into an aspect of chemical weed control. Student will be expected to follow standard scientific procedures in both the conduct and reporting of the research project.	MAIN	Student will be able to: - List and discuss the laws governing weeds and agricultural remedies - Describe the biology and ecology of weeds and explain how this affects the competitive ability of weeds, as well as their control. - List the principles of weed control using mechanical, biological and chemical methods, and assess their application. - Describe and analyse the factors affecting the activity, selectivity and residual activity of herbicides in the environment. - Describe and compare the classification, use and mode of action of commonly used herbicides. - Identify the most common weeds in croplands. - Explain the causes, prevention and management of herbicide resistance. - Demonstrate the ability to integrate the knowledge obtained to design weed management programmes to deal with practical weed control problems.
SCCS	1624	Introduction to Soil, Crop and Climate sciences	This module will build on a number of fundamental and applied sciences to introduce the complex and integrated nature of soil, crop and climate production ecosystems.	MAIN	Student will be able to: -Define terminology and concepts of soil, crop and climate sciences. Knowledge of the main areas of the disciplines and practices, including an understanding of and an ability to apply the key terms, concepts and facts; -integrate their new knowledge of soil, crop and climate sciences and explain how the knowledge of each field relates to the other fields; -identify, evaluate and solve problems in unfamiliar contexts, gathering evidence and applying solutions based on evidence and procedure appropriate to the soil, crop and climate sciences; -evaluate different sources of information; select information during practical demonstrations and investigations, and apply well-developed processes of analysis, synthesis and evaluation during practical work demonstrations; and -present and communicate complex information reliably and coherently using appropriate academic formats and technologies.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
SOIL	3774/ 3754	Soil classification, evaluation, and land use planning	Classification of South African soils; the behaviour and function of these soils under natural, agricultural and urban ecosystems; soil survey and application in land-use change.	MAIN	Student will be able to: -outline and apply skills, qualities and other attributes in the following animal breeding areas, oil morphology, horizons, pedons and soilscapes of South Africa -classify soil morphology, horizons, pedons and soilscapes of South Africa; -judge and prediction of the response of South Africa soils under natural, agricultural and urban conditions; and -apply professional ethics of soil evaluation and predicted response to land-use change.
SCCS	2684	Sustainable soil and water management	Natural resources soil and water; physical aspects such as soil compaction; erosion; soil water; soil water potential; gas content and composition; soil temperature; tillage methods and approaches; irrigation scheduling; salinity management. Practical work consists of a field visit, an essay on the sustainable use of natural resources and tutorials.	MAIN	Student will be able to: -describe principles of soil and water as basis to manage agricultural systems, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and theories of soil and water; -outline principles as contested and an ability to evaluate types of knowledge and explanations typical within the area of soil and water management in agriculture; -evaluate, select and apply appropriate methods, procedures and/or techniques in processes of investigation or application within soil and water management; and -make decisions and act appropriately in familiar and new contexts, demonstrating an understanding of the relationships between dry land and irrigation systems, and of how actions, ideas or developments in one system impact on other environment.
SOIL	2674/ 2754	Soil fertility and fertilization	Soil-plant relationships, soil acidity and liming, functions of all essential plant nutrients in soils, including consequences of insufficient and excessive supply; nature, dynamics and availability of all essential plant nutrients in soils; methods used for evaluation of soil fertility status; plant nutrient management, including precision agriculture. Practical work consists of tutorials on the interpretation of soil analyses and the compiling of liming and fertilization programs.	MAIN	Student will be able to: -Outline the functions of all nutrients essential for plants, including consequences of insufficient and excessive supply; -Integrate principles of environmental conditions and soil properties controlling the nature, dynamics and availability of all essential plant nutrients in soil; -Outline and apply the characteristics and hence behaviour of the various limes and fertilizers used in enhancing crop productivity; -Apply a suit of methods in evaluating the fertility status of cropped soils; -Interpret soil analysis reports, and compiling liming and fertilization programmes for cropping; and -Develop sustainable plant nutrient management practices for agro-ecosystems.
SOIL	3724/ 3744	Soil contaminants and management	Sources and nature of major contaminants added to soils through agricultural, municipal, industrial, nuclear and other wastes; reactions of inorganic (e.g. heavy metals) and organic (e.g. pesticides) contaminants with soils and soil components; factors affecting the mobility and degradation of contaminants in soils; effects of contaminants on soil, water and atmosphere; management and amelioration of contaminated soils. Practical work consists of tutorials on soil contamination and amelioration of contaminated soils based on case studies.	MAIN	Student will be able to: -apply principles on the source and nature of major contaminants added to soils through agricultural, municipal, industrial, nuclear and other wastes; -integrate principles of environmental conditions and soil properties controlling the behaviour of major contaminants in soil; -outline the effects of contaminants on soil, water and atmosphere; -apply a suit of methods in determining the contamination status of soils; -interpret soil analysis reports, and compiling amelioration programs for contaminated soils; and -develop sustainable waste management practices for natural, agricultural, and urban ecosystems.
SOIL	4814	Soil chemical principles and applications	Soil solution chemistry, colloidal chemistry, adsorption phenomena, ion exchange reactions, precipitation, soil reaction, redox equilibria, and the environmental significance thereof. Practical work consists of laboratory measurements of chemical properties, reactions and processes in soils.	MAIN	Student will be able to: -apply principles at the forefront of soil chemical principles and applications; -outline the theories and techniques in soil chemical analyses. -interrogate multiple sources to integrate the current state of soil chemical knowledge; -identify, analyse and address complex soil chemical problems; -critically gather information and evaluate these to develop creative responses to soil chemical problems; -compile and present academic insights, interpretations to soil chemical problems and issues; and -take responsibility for own work, decision making and use of resources.
SOIL	4824	Soil physical principles and applications	Who knew that by playing in the dirt as a kid, you already had your first learning experience in soil science? In this engaging module, we'll dive deep into the intricate realm of soil physics, uncovering its pivotal role in addressing urgent local and global challenges. Through a blend of theory and hands-on application, you'll gain insights into how soil physics can address critical issues such as food security, water scarcity, environmental degradation, and climate change adaptation.	MAIN	On successful completion of the module, student will be able to: • Explain water flow and solute transport into, within and out of the soil. • Apply soil physics principles to past and possible future real-world scenarios. • Gain proficiency using mathematical models (software) and theoretical and laboratory techniques to solve soil physics problems. • Present and communicate soil physics problems and solutions academically and professionally. • Make traditional and mechanised soil management recommendations about controlling the soil water balance.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
SOIL	4834	Soil classification principles and applications	Principles in soil classification; relationships between soil properties, processes and expected behaviour; global soil classification systems. Practical work consists of skills training in the gathering of soil systems (i.e. soil survey, soil profile, soilscape) data and analysis of data from soil systems.	MAIN	Student will be able to: -evaluate soil properties on an advanced level; -apply advanced principles of the nature of South Africa soils; -predict the response of soils under general natural, agricultural and urban conditions; -responsibility asses the functions of the soils of South Africa in different ecosystems; and -show accountability towards impact of development and land-use change on the functions of soils in these ecosystems.
SOIL	4844	Soil biological principles and applications	Activity and role of macro- and micro-organisms in soil. Interaction between plant roots and micro-organisms in soil. Chemical changes of biological residues in soil. Composition of humus and the fractionation thereof. Properties of humus and the effect thereof on the biological, chemical and physical properties of soils. Maintenance and improvement of biological soil quality. Practical work consists of isolation of bacteria, fungi, algae, actinomycete and nematodes from soil. Extraction of humus from soil and its fractionation.	MAIN	Student will be able to: - discuss the activities and role of organisms in soil, their decomposition of organic material, and the effect this has on the biological, chemical and physical properties of soil; - apply the latest methods and techniques in determining soil biological indicators in an agricultural and environmental context; - review and interpret soil biological evaluation techniques, in order to make critical decisions on management practices for different ecosystems; - present and communicate complex soil biological concepts reliably and coherently using appropriate formats and technologies available; - responsibly make decisions on soil biological aspects, while considering the effect on the agricultural and natural environment; creatively respond to soil biological issues in different ecosystems; and - work independently as well as in a group, making use of resources in order to make responsible decisions on soil biological problems facing different ecosystems.
SCCS	3724	Research methodologies in soil, crop and climate sciences	In this course student learn about the characteristics of different experimental designs, data collection and representativeness, data presentation, data processing, and descriptive and inferential statistical analyses. The course focuses on research topics and issues typical for soil, crop and climate sciences. The course will make use of software programmes Excel and SPSS to present and analyse data. The course will provide students an understanding of the processes in involved in data collection, quality control and analyses, and will provide means to critically assess research outcomes. This course provides important skills to B.Sc. students to prepare them for a research project in the 4th year B.Sc. Agric / Honours of Science.	MAIN	Student will be able to: -Comprehend different aspects of data collection and representativeness in soil, crop and climate sciences -Prepare a dataset for analyses. -Use a range of methods to present data -Apply appropriate frequency distributions to data sets in soil, crop and climate sciences -Test data for normality and homogeneity -Design research hypotheses and statistically test them -Recognise different experimental designs and adjust statistical analyses accordingly -Assess data associations through correlation and regression analyses -Use SPSS software and Excel to process and analyse data sets
SCCS	2624	Crop Development	In this course the student will learn about the different aspects of crop growth, development and physiology and how this is influence by various abiotic and biotic components. This course provides important skills to both B.Agric and B.Sc. students by laying the necessary foundation for further studies in Soil, Crop and Climate Sciences.	MAIN	The student will be able to: -Distinguish between plant growth and development -Distinguish between plant physiology and crop physiology -Describe the uptake, transport and utilisation of water and nutrients within the plant -Explain the processes of photosynthesis and respiration -Climatic indices used to modelling growth development stages -Discuss specific pests and diseases triggered by weather -Evaluate the impacts of frost and drought on crops, and discuss some of the mitigation strategies
SCCS	4824	Modelling soil, crop and climate interactions	In this module, students will learn about the theoretical background and practical application of models simulating interactions in the soil-crop-climate continuum. Students will be taught skills needed to parametrise, validate and run models and to provide an interpretation of model outputs. Students will earn to apply models in Excel, R and with the use of interfaces. A range of models will be applied to answer questions in different production systems at field and watershed scale. Emphasis is given to crop yields as affected by weather conditions and climate change, water and nutrient limitations, and salt stress, as well as water, nutrient and sediment fluxes in watersheds.	MAIN	Students will: Be familiar with the principles of dynamic modelling Understand how different types of models in soil, crop and climate sciences can be applied in different contexts Gain extensive skills in the application of models in Excel, R, and through model interfaces. Parametrise and calibrate models, and verify model outcomes by means of sensitivity analysis and statistical verification Apply simulation models in the soil-crop-climate continuum in a research or advisory setting

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
HORT	3774/ 3734	Fruit Production	Introduction and overview regarding the history, development, extent and marketing channels of deciduous, citrus, sub-tropical fruit and table grapes. Botanical classification, morphology, biology and phenology of the different fruits, pollination, fertilization and fruit set, climate requirements, soil requirements, principals of manipulation: pruning, trellising, fruit thinning and post-harvest physiology.	MAIN	Student will be able to: -Identify and classify the different fruit crops. -Describe and identify the different morphological parts and phenological growth stages of the different fruit crops. -Explain and describe the pollination, fertilization and fruit set requirements of the different fruit crops. -Analyse and interpret soil, crop and climate interaction. -Describe and demonstrate the principals of fruit tree manipulation: pruning, trellising, fruit thinning. -Describe the principals of post-harvest physiology of fruit crops. -Explain, assess and be able to make recommendations on both a theoretical and practical level on the suitability of a fruit crop for a specific situation.
HORT	3754/ 3714	Vegetable production	The cultivation and use of the most important vegetable crops in South Africa. Aspects such as classification, morphology, cultivation and establishment of seedlings, soil and climatic requirements, fertilization, irrigation, crop rotation, pest control, harvesting, handling and storage, as well as the principles involved in the cultivation of vegetables under protection will be dealt with. The production, acclimatization and establishment of seedlings, together with other cultivation techniques will be practiced in both glasshouse and field will be dealt with during practical sessions.	MAIN	Student will be able: - Explain the cultivation practices used for the vegetable crops covered in this module in detail; - Describe, and demonstrate the application of both theoretical and practical aspects of seedling propagation, seedbed preparation, planting techniques, plant nutrition, irrigation, pest control, harvesting, handling and storage of the vegetable crops covered in this module; - Identify the various growth stages of the vegetable crops; - Use soil and climatic data to assess the suitability of an area for the production of a vegetable crop; - List, and calculate the amounts of inputs required for specific vegetable crops under given circumstances; and - Interpret research data and write a basic research report on a simple trial conducted in the field or in the glasshouse with a vegetable crop.
HORT	3724/ 3764	Applied Fruit Production	Orchard layout, soil preparation and tree establishment, cultivar and rootstock characteristics and adaptability, plant propagation, orchard/ vineyard cultivation, nutrition and irrigation, plant spacing, cold requirement, manipulation: pruning, trellising and thinning, girdling. Weed, insect and disease control, physiological disorders and fruit maturity indexes. Harvesting, handling, grading, packing and storage of fruit.	MAIN	Student will be able to: -Explain the propagation of different fruit trees. -Assess and recommend cultivar/ rootstock combinations for a specific situation. -Describe the different orchard layouts with the associated spacing and trellising systems for fruit crops. -Explain and be able to make recommendations regarding planting process, soil preparation, nutrition and irrigation requirements of fruit crops. -Describe and demonstrate the tree manipulation practices pruning, trellising, fruit thinning. girdling. -Identify and explain on how to control weeds, insects and diseases and physiological disorders. -Explain maturity indexes, harvesting, handling, grading packing and storage of different fruit assess and be able to make recommendations on both a theoretical and practical level on the suitability of a fruit crop for a specific situation.
CLIM	3754/ 3774	Micrometeorology	This course examines contemporary bio- and micro-meteorological theories, models, and data related to the quantification of mass and energy between the biosphere and atmosphere. It includes methods for measuring mass and energy flux densities and biosphere/atmosphere interactions. The course also includes models for integrating leaf scale fluxes to the canopy and landscape scales. This is accomplished by describing the physical environment (light, wind, temperature, humidity) of plants and the soil, by understanding how the physical environment affects plants' physiological status and how the status and capacity of plants and the underlying soil affect their physical environment. This course accomplishes its goals by examining the physical, biological and chemical processes that affect the transfer of momentum, energy, and mass (water, CO2, and atmospheric trace gases) between vegetation and the atmosphere. Instrumentation and measurements associated with the study of plant biometeorology are also discussed. In addition, the module will highlight animal-environment interactions.	MAIN	Students will obtain a knowledge of micrometeorology – evapotranspiration, temperature, wind, radiation, turbulence, momentum, heat and air moisture. Be familiar with mass and momentum transfer, exchange processes in plant communities in connection with radiation, energy and surface/canopy evaporation. Determine the influence of the environment on plant processes: photosynthesis, transpiration, leaf temperature and the leaf energy balance. Be able to analyze the use of microclimate manipulation to test the effect of mulches, shelterbelts, etc. on the crop.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CLIM	4854	Advanced Micrometeorological Instrumentation	This module introduces the instrumentation used for meteorological measurements aimed at undergraduate and graduate students in meteorology and the atmospheric, soil and crop sciences. Emphasis is placed on flux measurements, with widely used methods and inverse numerical approaches that permit estimation of source emissions based on sparse concentration measurements. It examines the types of observing systems available to measure temperature, pressure, humidity, trace gases, clouds and aerosols, winds, precipitation, radiation, evapotranspiration, soil moisture and crop water use. This module explores the performance characteristics of instrumentation used for meteorological measurements. The module provides information about the effects of representativeness and regional homogeneity on measurements and describes processes for obtaining quantitative estimates of uncertainty.	MAIN	-Learn about the measurement of traditional agrometeorological weather variables, the surface energy balance components, relevant plant properties and processes, trace gases, particulates, and various specialised measurements. Students will learn a compendium of micrometeorological equations as a valuable reference source for students and field scientists. -Enhance the understanding of the response of crop plants to their physical environment permitting the development of improved agronomic practices aimed at achieving more efficient use of water and more economical production of crops.
IRRI	4808	Research project in Irrigation management	A subject specific project will be completed under the guidance of a supervisor. The Student will be introduced to problem identification, hypothesis formulation, planning, conducting and analysis of scientific experiments and/or research, as well as the interpretation and communication of results. Student have to submit a scientific research report in the form of a scientific publication and have to prepare and orally present the results in the form required by scientific conferences. The independence and scientific insight developed in this module provides a background for further postgraduate study.	MAIN	Student will be able to: -Discuss the importance of a comprehensive literature survey; -Conduct a literature study and familiarity with the various databases that can be used; -Evaluate a scientific paper and identify the key points; -Apply the writing style and terminology of the discipline; -Examine information from a variety of sources, and combine it in a logical manner; - Present information in accordance with the requirements of a scientific journal; -Create a visual presentation using the information obtained from the literature study; and -Present the information in a succinct form in front of an audience.
SCCS	4808	Research project in soil, crop and climate sciences	A subject specific (Soil Science, Agronomy or Agricultural Meteorology) project will be completed under the guidance of a supervisor. The Student will be introduced to problem identification, hypothesis formulation, planning, conducting and analysis of scientific experiments and/or research, as well as the interpretation and communication of results. Student have to submit a scientific research report in the form of a scientific publication and have to prepare and orally present the results in the form required by scientific conferences. The independence and scientific insight developed in this module provides a background for further postgraduate study.	MAIN	Student will be able to: - Discuss the importance of a comprehensive literature survey; - Conduct a literature study and familiarity with the various databases that can be used; - Evaluate a scientific paper and identify the key points; - Apply with the writing style and terminology of the discipline; - Source knowledge from a variety of sources, and combine it in a logical manner; - Present information in accordance with the requirements of a scientific journal; - Create a visual presentation using the information obtained from the literature study; and - Present the information in a succinct form in front of an audience.
Postgraduate					
CLIM	6814	Micrometeorology and Specialised Instrumentation	The following aspects are dealt with: Radiation, temperature, humidity, wind, turbulence and profiles of heat, momentum and mass transfer within plant communities over a diurnal and seasonal cycle; the Monin-Obukhov similarity principle; the microclimate of urban areas, forests, greenhouses and crops. Practical work Practical skills will be acquired in the calibration and set-up of instruments used for observation of environmental variables within and above plant communities and soil surfaces.	MAIN	Student will be able to: - Measure and describe the radiation, temperature, humidity, wind, turbulence and profiles of momentum and mass transfer within plant communities over a diurnal and seasonal cycle; - Apply the Monin-Obukhov similarity principle; - Evaluate the influence of the environment on plant processes such as photosynthesis, transpiration, leaf temperature and the leaf energy balance; and - Analyse the microclimate of urban areas, forests, greenhouses and crops using models and meteorological data.
CLIM	6824	Simulating biophysical interactions	The influence of various climatic and growth factors on photosynthesis and crop growth, and how these processes are depicted by crop growth models are dealt with. The necessary background to test crop growth models by means of sensitivity analysis and statistical verification before these models can be applied in agriculture, will be provided. Practical work Student will obtain practical experience with crop growth models and sensitivity analysis.	MAIN	Student will be able to: - Evaluate the influence of various climatic and growth factors on photosynthesis and crop growth; - Test crop growth models by means of sensitivity analysis and statistical verification; and - Apply these models in agricultural research settings.
CLIM	6834	Physics and dynamics of the atmosphere	After completion of this module the Student will be able to describe the atmospheric composition and structure; derive the various forces which are at work in the atmosphere, and apply them in wind calculations; explain the physical processes involved in cloud formation and precipitation; assess the possibility of thunderstorm development with the use of thermodynamic diagrams and certain stability indices and explain various atmospheric phenomena such as hail and lightning as well as pollution dispersal patterns. Calculation of atmospheric forces and wind components using basic numerical modelling; plotting and analysing of thermodynamic diagrams in weather forecasting.	MAIN	Student will be able to: - describe the atmospheric composition and structure; - derive the various forces which are at work in the atmosphere, - apply this information in wind calculations; - explain the physical processes involved in cloud formation and precipitation; - assess the possibility of thunderstorm development with the use of thermodynamic diagrams and certain stability indices; and - explain various atmospheric phenomena such as hail, lightning and pollution dispersal patterns.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CLIM	6844	Weather analysis and forecasting	The content will focus on synoptic climatology and the large-scale tropical and extra-tropical weather systems that may affect southern Africa. Various theoretical models are introduced and explained with the aid of numerical models. Skills are developed in the decoding of surface observations and the interpretation of satellite and radar imagery. Different weather forecasting techniques are dealt with. Practical work Various forecasting techniques are used to compile a five-day weather forecast on a weekly basis. Such a forecast is based on theoretical knowledge as well as the analysis and interpretation of synoptic weather charts, meteorological observations, numerical weather prediction model outputs and remotely sensed imagery.	MAIN	Student will be able to: - Decode surface observations and plot synoptic weather charts; - Explain the development, propagation and weather associated with various large-scale systems; - Interpret remotely sensed imagery and numerical weather prediction model output; and - Integrate all of the above in order to compile a short-term weather forecast.
CLIM	6854	Agrometeorological Services for Extension	This module will focus on the various communication channels and methods of technology transfer with specific emphasis on qualitative vs. quantitative research, participatory rural appraisal, farming systems research and extension, grounded theory, action research method, monitoring and evaluation method, communication models, dissemination models, early warning systems, agrometeorological intermediaries, use of models in the community, FARMSCAPES and the Florida Consortium example.	MAIN	Student will be able to: - Explore the various communication channels and methods of technology transfer with specific emphasis on weather bulletins and advisories (for the whole range of temporal and spatial scales) for use by farmers, extension officers and policy makes; and - Conduct a participatory needs assessment survey to determine end-user needs; and - Demonstrate how to develop new products from available forecasts and information obtained from meteorologists or climatologists.
CLIM	6864	Tropical meteorology	The content focuses on the general climatology and conceptual models related to several tropical circulation features across a range of spatial and temporal scales, including thermally-forced circulations, mesoscale convective systems, tropical waves, tropical cyclones, subtropical cyclones, tropical upper-tropospheric troughs, monsoon phenomena, tropical-temperate troughs and large-scale modes of climate variability in the tropics. Practical work Case studies will introduce different types of observations and afford Student the opportunity to evaluate analysis techniques used by tropical forecasters. Online modules and quizzes will also be used to increase the student` understanding of key concepts.	MAIN	Student will be able to: - describe and explain the formation, evolution and characteristics (including extreme or hazardous weather conditions) of synoptic-scale weather systems in tropical regions, and assess the limitations of theories and conceptual models about these weather systems; - describe and explain the formation, evolution and characteristics (including extreme or hazardous weather conditions) of convective and mesoscale phenomena and assess the limitations of theories and conceptual models about these phenomena; - monitor the weather situation in the tropics, and use real-time or historic data along with numerical weather prediction model output to prepare analyses and basic forecasts.
CLIM	8900	Agrometeorology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Agrometeorology, including: Research project in specialized field of Agrometeorology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CLMI	8900	Agrometeorology Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of Agrometeorology, including: Research project in specialized field of Agrometeorology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CLIM	9100	Agrometeorology Thesis	This module contains fundamental knowledge, theories, principles and practices of Agrometeorology , including: Research project in specialized field of Agrometeorology is discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CLMI	9100	Agrometeorology Interdisciplinary Thesis	This module contains fundamental knowledge, theories, principles and practices of Agrometeorology , including: Research project in specialized field of Agrometeorology is discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CROI	8900	Agronomy Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of Agronomy, including: Research project in specialized field of Agronomy as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CROI	9100	Agronomy Thesis (Interdisciplinary)	This module contains fundamental knowledge, theories, principles and practices of Agronomy, including: Research project in specialized field of Agronomy as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Evaluate agronomic principles; -Plan independently; and -Manage in-depth research of agronomy interdisciplinary field
CROP	6814	Crop Physiology	World food security and the place of crop physiology in crop production. Physiology and biochemistry of plants will be dealt with, including membrane, enzyme and energy systems, together with regulatory mechanisms and signalling. The reactions of the primary and secondary metabolic pathways will be dealt with, as well as their regulation under normal and abnormal environmental conditions. Plant physiology and biochemistry will be placed into perspective for agricultural production, with emphasis on the potential of external manipulation to increase yields. Practicals are presented on a weekly basis in order to a) develop skills of Student to apply standard methodology and techniques as well as to obtain data and b) develop the ability to present data in graphic or table format and interpret data in a scientifically correct manner.	MAIN	Student will be able to: - Describe the current state of affairs concerning food security on the planet as well as make recommendations for the future; - Illustrate an understanding of enzymes by being able to explain how they work, the dynamics of endo- and exothermic reactions in terms of energy transfer and the coupling phenomenon; - Explain, summarize and discuss root, shoot and leaf anatomy, cytology of living cells, membrane structure and the endomembrane concept; - Discuss the physiological role of macro and micro plant nutrients; - Explain the terms regulation and manipulation of metabolism as ways and means to influence crops externally with the aim of improving yields in light of predicted food shortages. - Explain primary and secondary metabolic pathways and how they inter relate as well as its association with gene expression under normal and stress conditions; - Summarize the effect of abiotic stress on normal physiological processes including means to induce systemic acquired resistance and the involvement of membranes, ABA and free radicals; - Explain the mechanisms of action involved in both normal and stress physiology by applying the broad knowledge of physiology and biochemistry, together with the acquired research skills.
CROP	6824	Role of nutrition in crop development	Advanced knowledge and insight of selected plant nutrients on their supply, uptake and physiological functions in crop manipulation. Aspects of plant analysis, crop requirements, interpretation of plant and soil analysis, nutrient application and organic fertilization as part of the holistic approach to crop nutrition will also be studied. On completion of this module Student should have acquired sound knowledge of root growth and nutrient uptake, nutrient use by crops, and plant response to fertilization. Tutorials will be used to teach Student to interpret soil and plant analyses reports, and how to compile crop nutrition programs from these analysis reports.	MAIN	Student will be able to: - List and explain the classification and function of nutrient elements. - List, explain and discuss all concepts of macro- (N, P, K, Ca, Mg and S) and micro-elements (B, Cu, Fe, Mo and Zn) in crop nutrition. - Discuss the effect of soil pH and its effect on crop nutrition and growth. - Describe and explain crop reaction to fertilization. - Describe and assess fertilizer applications. - Assess and interpret fertilization under given soil conditions (saline soils, acetic soils and certain soil moisture regimes). - Illustrate how to set up hydroponic nutrient solutions. - Describe the role of plant nutrition in crop development

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CROP	6834	Water dynamics in crop production	Equip Student to integrate, theoretically and with basic crop modelling, the causes and processes that govern water movement through the soil-plant-atmosphere continuum for agricultural crops. Water flow and exchange processes that take place as crops grow and the responses to a decline in water supply are studied, which are both essential for exploring soil and crop management strategies that enhance efficient water use in both irrigated and rain-fed production systems. Practical classes will be used to teach Student basic scientific soil and crop water measurements and crop-modelling that allow for yield response to water, i.e. water as a limiting factor in crop production. On completion of this module Student should have acquired sound knowledge of root growth and water uptake, the water balance of the plant, water use by crops, measurements of soil water and plant water status, plant response to water deficit and the need, concerns and problems of irrigation.	MAIN	Student will be able to: - Explain, illustrate, analyse and / or synthesize topics such as the role of water in plant life, properties and energy state of water, water storage and movement in soil, the root as an organ for water uptake, plant water balance, the plant as a link between soil and atmosphere, crop water use, radiation and dry matter production, water use and dry matter production, influence of nutrient supply on water use, yield formation under inadequate water supply, water stress in plants and soil, and crop management to ensure efficient water use in rain-fed and irrigated production systems. - Describe and discuss research findings presented in tables and figures to understand and analyse the above-mentioned topics. - Identify and explain the complexities and uncertainties of applying appropriate scientific soil and crop measurements in order to analyse water as a limiting factor in crop production - Demonstrate the use of a range of specialised computer skills to identify, analyse and address water flow in the soil-plant-atmosphere system and subsequent yield response, drawing systematically on research and basic crop modelling knowledge. - Present and communicate crop water relation problems and issues academically and professionally in order to offer creative water management insights and solutions. - Explain the role of water in crop development.
CROP	6844	Weed control	Student will learn about the laws which govern weed control in South Africa, as well as how the biology of weeds affects control strategies. The concepts of herbicide selectivity, absorption, translocation, mode of action and residual activity will be dealt with at an advanced level. Various classification systems used for herbicides, and the safe use of these products will also be dealt with. Student will also learn about the occurrence, prevention and management of weed resistance to herbicides, as well as the use of genetically engineered herbicide resistant plants and their consequences for weed management. The registration process followed for new herbicides will addressed, and the procedure to be followed to diagnose of herbicide problems. During practicals Student will learn to identify the most common agricultural weeds, how to calibrate sprayers and conduct a research project into an aspect of chemical weed control. Student will be expected to follow standard scientific procedures in both the conduct and reporting of the research project.	MAIN	Student will be able to: - List and discuss the laws governing weeds and agricultural remedies - Describe the biology and ecology of weeds and explain how this affects the competitive ability of weeds, as well as their control. - List the principles of weed control using mechanical, biological and chemical methods, and assess their application. - Describe and analyse the factors affecting the activity, selectivity and residual activity of herbicides in the environment. - Describe and compare the classification, use and mode of action of commonly used herbicides. - Identify the most common weeds in croplands. - Explain the causes, prevention and management of herbicide resistance. - Demonstrate the ability to integrate the knowledge obtained to design weed management programmes to deal with practical weed control problems.
CROP	8900	Agronomy Dissertation	This module contains fundamental knowledge, theories, principles and practices of Agronomy, including: Research project in specialized field of Agronomy as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CROP	9100	Agronomy Thesis	This module contains fundamental knowledge, theories, principles and practices of Agronomy, including: Research project in specialized field of Agronomy as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Evaluate agronomic principles; -Plan independently; and -Manage in-depth research of agronomy.
IRRI	6808	Research project in Irrigation management	A subject specific project will be completed under the guidance of a supervisor. The Student will be introduced to problem identification, hypothesis formulation, planning, conducting and analysis of scientific experiments and/or research, as well as the interpretation and communication of results. Student have to submit a scientific research report in the form of a scientific publication and have to prepare and orally present the results in the form required by scientific conferences. The independence and scientific insight developed in this module provides a background for further postgraduate study.	MAIN	Student will be able to: -Discuss the importance of a comprehensive literature survey; -Conduct a literature study and familiarity with the various databases that can be used; -Evaluate a scientific paper and identify the key points; -Apply the writing style and terminology of the discipline; -Examine information from a variety of sources, and combine it in a logical manner; - Present information in accordance with the requirements of a scientific journal; -Create a visual presentation using the information obtained from the literature study; and -Present the information in a succinct form in front of an audience.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
IRRI	6816	Evaluation of Soil and Water for Irrigation suitability	Producing the world's food requires an astonishing 200 million litres of water, equivalent to consuming the Amazon River, 80 km wide, daily. This staggering demand underscores the pivotal role of irrigation in maintaining the delicate equilibrium between crop water needs and the erratic nature of rainfall. With a keen emphasis on quantitative assessment, students will delve into methods and learn how to use tools and technology to evaluate soil and water suitability for irrigation meticulously. They will be equipped to implement irrigation strategies that amplify crop productivity and champion environmental preservation.	MAIN	On successful completion of the module, student will be able to: you will be able to: • Utilize instruments to quantify soil water content. • Apply knowledge of soil water instrumentation, soil physical and hydraulic properties, crop water requirements and irrigation water quality to past and possible future real-world scenarios. • Gain proficiency in using pedotransfer functions and mathematical models (software) to assess soil and water suitability for irrigation. • Present and communicate irrigation-related problems and solutions academically and professionally. • Make traditional and mechanised irrigation decisions to control the soil water and salt balance.
IRRI	6826	Evaluation of Soil fertility and Pest control	Knowledge on the maintenance of soil fertility, integrated pest control and rotation of crops under irrigation. Quantification of water requirements and usage of irrigated crops and the identification of methods for irrigation scheduling.	MAIN	Student will be able to: -Examine soil fertility and fertilization with regard to irrigation farming; -Discuss the principles and advantages of crop succession and the disadvantages of monoculture under irrigation; -Assess the water requirements of crops under irrigation; -Examine the stress effects of too much or too little water on crop production; and -Use weather data for irrigation scheduling; be able to advise on irrigation scheduling methods based on the soil water balance.
IRRI	6846	Irrigation design	The Student will be familiar with making choices, design, installation, evaluation and management of irrigation systems. Analysis and evaluation of electrical motors and electrical usage of irrigation systems.	MAIN	Student will be able to: • Discuss and apply the design principles and hydraulics of pumps and mainlines; • Optimize the different electricity usage options of the irrigation systems; • Advise on the costs of different irrigation systems and the choice of the most economical system • Use different computer design methods; advise on the different methods of fertiliser application and usage through irrigation systems. • Ability to apply the design methods, key concepts, principles and theories, and an understanding of micro and drip irrigation. Select appropriate design approaches taking relevant industry norms and standards into account. • Calculate and correlate internal friction and pressure within allowable limits to determine suitable pipe diameters. • Compile, communicate and present irrigation design information reliably and coherently using conventions appropriate to the context, to be aware and understand the implications of decisions and actions.
IRRI	8900	Irrigation Science Dissertation	(This module contains fundamental knowledge, theories, principles and practices of Irrigation Science including: Research project in specialized field of Irrigation Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
IRRI	9100	Irrigation Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Irrigation Science, including: Research project in specialized field of Irrigation Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
SCCS	6808	Research project in soil, crop and climate sciences	A subject specific (Soil Science, Agronomy or Agricultural Meteorology) project will be completed under the guidance of a supervisor. The Student will be introduced to problem identification, hypothesis formulation, planning, conducting and analysis of scientific experiments and/or research, as well as the interpretation and communication of results. Student have to submit a scientific research report in the form of a scientific publication and have to prepare and orally present the results in the form required by scientific conferences. The independence and scientific insight developed in this module provides a background for further postgraduate study.	MAIN	Student will be able to: - Discuss the importance of a comprehensive literature survey; - Conduct a literature study and familiarity with the various databases that can be used; - Evaluate a scientific paper and identify the key points; - Apply with the writing style and terminology of the discipline; - Source knowledge from a variety of sources, and combine it in a logical manner; - Present information in accordance with the requirements of a scientific journal; - Create a visual presentation using the information obtained from the literature study; and - Present the information in a succinct form in front of an audience.
SCCS	6824	Research Project	Students will acquire data from various literature sources, interpret it and report it using scientific writing style. During the preparation, writing and presentation on an approved subject-related topic, students will develop the necessary evaluation and communication skills required to succeed as a research scientist. Weekly assignments will lead students through the process of data collection, analysis and presentation, as well as writing, discussions and conclusions in the form and style of scientific articles	MAIN	Student will be able to: -Be familiar with the principles of dynamic modelling -Understand how different types of models in soil, crop and climate sciences can be applied in different contexts -Gain extensive skills in the application of models in Excel, R, and through model interfaces. -Parametrise and calibrate models, and verify model outcomes by means of sensitivity analysis and statistical verification -Apply simulation models in the soil-crop-climate continuum in a research or advisory setting
SOII	8900	Soil Science Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of Soil Science, including: Research project in specialized field of Soil Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing..
SOII	9100	Soil Science Interdisciplinary Thesis	This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Soil Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
SOIL	6814	Soil chemical principles and applications	Soil solution chemistry, colloidal chemistry, adsorption phenomena, ion exchange reactions, precipitation, soil reaction, redox equilibria, and the environmental significance thereof. Practical work consists of laboratory measurements of chemical properties, reactions and processes in soils.	MAIN	Student will be able to: -apply principles at the forefront of soil chemical principles and applications; -outline the theories and techniques in soil chemical analyses. -interrogate multiple sources to integrate the current state of soil chemical knowledge; -identify, analyse and address complex soil chemical problems; -critically gather information and evaluate these to develop creative responses to soil chemical problems; -compile and present academic insights, interpretations to soil chemical problems and issues; and -take responsibility for own work, decision making and use of resources.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
SOIL	6824	Soil physical principles and applications	Water flow in saturated and unsaturated soil conditions. Movement and exchange of air, heat and solutes in soils. Theory, measurement, and application of the soil water balance, viz. runoff, drainage, evaporation, and transpiration. Practical work consists of field and laboratory investigations in soils of different physical, hydraulic and mechanic properties.	MAIN	Student will be able to: -Examine the theories, research methodologies, methods and techniques relevant to soil physics; and an understanding of how to apply this knowledge in natural and agricultural ecosystems; -Discuss the complexities and uncertainties of selecting, applying or transferring appropriate standard procedures, processes or techniques to unfamiliar problems in soil physics; -Use a range of specialised skills to identify, analyse and address complex and/or abstract problems drawing systematically on the body of knowledge and methods appropriate to soil physics; and -Operate effectively within natural and agricultural ecosystems, or manage the system based on an understanding of the roles and relationships between elements within the in natural and agricultural ecosystems.
SOIL	6834	Soil classification principles and applications	Principles in soil classification; relationships between soil properties, processes and expected behaviour; global soil classification systems. Practical work consists of skills training in the gathering of soil systems (i.e. soil survey, soil profile, soilscape) data and analysis of data from soil systems.	MAIN	Student will be able to: -evaluate soil properties on an advanced level; -apply advanced principles of the nature of South Africa soils; -predict the response of soils under general natural, agricultural and urban conditions; -responsibility asses the functions of the soils of South Africa in different ecosystems; and -show accountability towards impact of development and land-use change on the functions of soils in these ecosystems.
SOIL	6844	Soil biological principles and applications	Activity and role of macro- and micro-organisms in soil. Interaction between plant roots and micro-organisms in soil. Chemical changes of biological residues in soil. Composition of humus and the fractionation thereof. Properties of humus and the effect thereof on the biological, chemical and physical properties of soils. Maintenance and improvement of biological soil quality. Practical work consists of isolation of bacteria, fungi, algae, actinomycete and nematodes from soil. Extraction of humus from soil and its fractionation.	MAIN	Student will be able to: - discuss the activities and role of organisms in soil, their decomposition of organic material, and the effect this has on the biological, chemical and physical properties of soil; - apply the latest methods and techniques in determining soil biological indicators in an agricultural and environmental context; - review and interpret soil biological evaluation techniques, in order to make critical decisions on management practices for different ecosystems; - present and communicate complex soil biological concepts reliably and coherently using appropriate formats and technologies available; - responsibly make decisions on soil biological aspects, while considering the effect on the agricultural and natural environment; creatively respond to soil biological issues in different ecosystems; - work independently as well as in a group, making use of resources in order to make responsible decisions on soil biological problems facing different ecosystems.
SOIL	7904	Land Evaluation	Soil and climate plays an important role in the environment. The quality, pollution and classification of soil and climate. Climatic regions and indices (including ENSO). Impact of urban activities on the quality of the soil and atmosphere. Urban agriculture. Evaluation of the environment (soil and climate). Data bases (maps, reports and memoirs).	MAIN	Student will be able to: - assess the soils, soil distribution patterns and climate of a location; - match the soil, terrain and climate assessment with requirements of different types of property development; and - evaluate the suitability of the physical environment soil, terrain and climate, of assessable locations using reports, and distant locations, using web available data only.
SOIL	8900	Soil Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Soil Science, including: Research project in specialized field of Soil Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
SOIL	9100	Soil Science Thesis	This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Soil Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CCSA	7910	Climate change and variability	The following aspects are dealt with: The global climate system; natural climate variability; natural and anthropogenic climate forcing; climate feedbacks; proxy data; recently observed changes in the climate; climate change impacts; climate prediction and climate change projections.	MAIN	Student will be able to: - Describe the major causes and characteristics of internal climate variability and externally forced climate change; - Explain the concepts of radiative forcing and climate feedback; Evaluate recently observed changes in climate relative to changes that have occurred in the past; - Describe the formulation of climate models and evaluate their strengths and weaknesses; - Discuss the basis, methods and limitations of climate prediction; and - Provide a review of the latest climate change projections and how this will affect the particular sectors.
CLIM	7905	Research methodologies	The module aims at developing the research knowledge and skills of students to do quantitative and qualitative research. Plan, design and manage practical research. Compile and present a proposal for a project and mini dissertation.	MAIN	Student will be able to: - Explain some basic concepts of research; - Identify appropriate research topics; - Identify the components of a literature review process; - Critically analyse published research; - Apply the ethical principles of research, ethnical challenges and approval processes; - Prepare a project proposal; - Organize and conduct research in a more appropriate manner; and - Write a research report.
CLIM	7908	Sustainability and climate change adaptation of agricultural systems	The following aspects are dealt with: Impacts of climate change on agro-ecological systems, sustainability, and possibilities for mitigation and adaptation in different farming systems.	MAIN	Student will be able to: - Distinguish between climate change mitigation and adaptation; - Discuss some of the impacts of climate change on agriculture; - Understand the different approaches and the uncertainties to assess the impact of climate change on future agricultural productivityEvaluate the carbon footprint of selected agricultural activities; - Discuss the different processes through which agriculture contributes to climate change - Discuss some of the potential adaptation strategies available to agriculture; - Explore the sustainability of some of the proposed mitigation and adaptation strategies with respect to different farming systems.
CCSD	7900	Policy, educational and economic aspects of climate change	In this module, broader aspects of climate change are discussed. This includes the state of the art of global efforts and policies to curb greenhouse gas emissions, and the socio-economic impacts of both climate change and climate change mitigation measures	MAIN	Student will be able to: - Evaluate historical and recent policies addressing the global climate; - Discuss some of the potential adaptation strategies available to agriculture; - Explore the effect of policy on greenhouse gas emissions and the welfare of communities; - Discuss the effect of policies to curb greenhouse gas emission and the effect of climate change on economic activities. - Analyse the role of research and education in informing policy and decision-making.
CCSC	7900	Climate modelling and quantitative analysis	The following aspects are dealt with: Climate modelling and climate projections, sources and popular formats of reanalysis and simulated climate datasets; scripting for manipulating large datasets; and calculating and displaying various climate change metrics.	MAIN	Student will be able to: - Explain the fundamental differences between climate projections and weather predictions; - Distinguish between different types of climate data; - Identify appropriate formats and sources of climate; - Manipulate climate data with appropriate scripts and software; - Apply statistical tests; and - Calculate popular climate change metrics.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CLIM	7900	Mini dissertation in Climate Change	Mini dissertation in specialised field of climate variability or change as agreed on by study leader(s), Academic Departmental Head and student. The mini dissertation includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent research.	MAIN	The student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

MATHEMATICAL STATISTICS AND ACTUARIAL SCIENCE (117)

Module code	Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate				
ACSF1613	Actuarial Financial Management	The aim of this module is to introduce the following topics to students wishing to study actuarial science: The key principles of finance; Company ownership; Taxation; Introduction to accounts; The main accounts; Group accounts and insurance company accounts; Interpretation of accounts; Limitations of accounts; Financial institutions.	MAIN	Student will be able to: - understand and recall the principal terms in use in investment and asset management, - be aware of the key principles of finance, - describe the structure of a joint stock company and the different methods by which it may be financed, - list and apply the basic principles of personal and corporate taxation, - demonstrate a knowledge and understanding of the characteristics of the principal forms of financial instruments issued or used by companies and the ways in which they may be issued, - describe the major types of financial institution operating in the financial markets, - interpret the accounts of a company or a group of companies and discuss the limitations of such interpretation, and - describe and calculate basic depreciation.
ACSF1623	Actuarial Financial Reporting	The aim of this module is to introduce the following topics to students wishing to study actuarial science: Business structures; Alternative funding; Use of derivatives; Capital and debt structure and dividend policy; Weighted average cost of capital; Capital fund and project appraisal.	MAIN	Students will be able to: - Compare different forms of business structures - discuss the factors to be considered by a company when deciding on its capital structure and dividend policy; - describe the various forms of alternative financing and recommend applicable financing solutions for various situations; - calculate returns for basic derivatives; - define what is meant by a company's cost of capital and discuss how its cost of capital interacts with the nature of the investment projects it undertakes; and - show how financial techniques can be used in the assessment of capital investment projects.
ACSF2716	Introductory Financial Mathematics	The aim of the Introductory Financial Mathematics subject is to provide grounding in financial mathematics and its applications, including: introductory interest calculations; discounting and accumulating; annuities; loans; and cash flow schemes and funds.	MAIN	Students will be able to: - apply the concepts behind basic financial problems, cash flow models and interest rates; and - investigate and solve problems relating to discounting and accumulating, annuities, loans and cash flow schemes (including funds), presenting the underlying assumptions and interpreting the results of the investigation.
ACSF2746	Advanced Financial Mathematics	The aim of the advanced Financial Mathematics subject is to provide grounding in: the theory of investment instruments and actuarial modelling; the mathematics of annuities, loans, financial projects, funds and basic fixed-interest security valuation; interest rate sensitivity analysis; forward contract valuation; the term structure of interest rates; and stochastic interest rate models.	MAIN	Students will be able to: - describe the principles of actuarial modelling and apply the concepts behind basic and complex financial problems, cash flow models and interest rates; - investigate and solve problems relating to discounting and accumulating, annuities, loans and cash flow schemes, interpreting the results of the investigation; - be confident in appraising projects, valuing investments, and the solving of complicated simple-rate and compound-rate problems; - discuss and apply the term structure of interest rates and interest rate models in the context of investment valuation; and - use basic stochastic interest rate models in investment valuation.
ACSS3708	Actuarial Statistics II	1. Random variables and distributions for risk modelling (20%) 2. Time series (20%) 3. Stochastic processes (25%) 4. Survival models (25%) 5. Machine learning (10%)	MAIN	Student will be able to: - describe and use statistical distributions for risk modelling. - describe and apply the main concepts underlying the analysis of time series models. - describe, apply and evaluate Markov chains and processes. - describe, apply and evaluate techniques of survival analysis. - describe, apply and evaluate basic principles of machine learning . - implement actuarial models in appropriate software
ACSM3708	Actuarial Mathematics II	1. Theories of financial market behaviour (15%) 2. Measures of investment risk (15%) 3. Stochastic investment return models (10%) 4. Asset valuations (20%) 5. Liability valuations (20%) 6. Option theory (20%)	MAIN	Student will be able to: - describe, interpret and discuss the theories on the behaviour of financial markets. - discuss the advantages and disadvantages of different measures of investment risk. - describe, construct, interpret and discuss the models underlying asset valuations. - describe, construct, interpret and discuss the models underlying liability valuations. - describe, construct, interpret and discuss the models underlying option pricing. - implement actuarial models in appropriate software.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ACSG	1614	Introduction to Actuarial Science	The aim of this module is to introduce the following topics to students wishing to study Actuarial Science: • Professionalism in practice • Actuarial control cycle • Life insurance • Life contingencies • Market value adjustment compensation • Pensions • General Insurance • Investments • Health care	MAIN	Students should be able to: - Recount aspects of professionalism in risk analysis and insurance businesses, - Discuss the actuarial control cycle, - Outline and apply topics in life insurance, contingencies, pensions, general insurance, investments and healthcare, and - Calculate present value, future value and expected values in the presence of uncertainty.
EBCS	1514	Business Calculations	Business calculations are an introductory module, which enables the students to understand the basic calculation practices used.	MAIN	Students should be able to: - understand what statistics are; - organise, categorise and describe data from questionnaires, calculating measures of location and dispersion; - understand the basic probability rules and make probability calculations using standard; continuous and discrete distributions (including probability calculations for sample statistics); - calculate and interpret index numbers; and, - solve basic simple and compound interest financial problems, including annuities.
EBCS	1524	Business Calculations	Business calculations are an introductory module, which focusses on the organising and describing data, measurement of central tendency and dispersion, basic probability and probability distributions, confidence intervals, hypothesis testing, Chi-squared tests as well as regression - and correlation analysis.	MAIN	Students should be able to: - determine confidence intervals and perform hypothesis tests, - construct an analysis of variance test for a randomised block design, - analyse the linear relationship between variables, both categorical and continuous, interpret the relationship, and - perform different non-parametric hypothesis tests.
ECPM	1514/ 2514	Calculations for Public Managers	Arithmetic of whole numbers, Fractions, Decimal fractions, Percentage and ratio, Algebra Indices, Simplifying algebraic expressions, Factorisation, Algebraic Fractions, Transposing formulae, Solving equations, Sequences and series, Sets, Number bases, Functions, Graphs of functions, The straight line, The exponential function, The logarithmic function.	MAIN	Students should be able to: - Use the rules for adding, subtracting, multiplying and dividing positive and negative numbers - Define proper, improper and mixed fractions; be able to convert fractions and decimals - Perform calculations using percentages and ratios, use square roots, cube roots and fractional exponents - simplify quadratic expressions - express a fraction as the sum of its partial fractions - Solve linear, quadratic and simultaneous equation - Calculate the given term in an arithmetic or geometric series - Solve equations using laws of logarithms - Write out the complement, intersection and union of sets
EFBC	1514	Business Calculations	In this module the following topics are addressed:Introduction to Statistics, Organizing and describing data, Measure of central tendency and dispersion, Basic Probability, Discrete Probability distributions,The Normal distributions, Straight lines Exponential lines and Logarithm line and Financial Mathematics	MAIN	Students will be able to: -perform the basic mathematical operations, -calculate the different types of interest and annuities, -calculate and interpret index numbers, -interpret time series graphically and analyse the data to predict future values, -understand what statistics are, -collect data by means of different techniques and design a questionnaire to collect data, and -solve statistical problems: use mathematical calculations, distinguish between different types of data, collect data, make decisions regarding the methods used to collect data, and be familiar with the different steps in the research process.
EFBC	2514	Business Calculations	Business calculations are an introductory module, which enables the students to understand the basic calculation practices used.	QWA	Student will be able to: - Perform basic mathematical calculations confidently; - Apply mathematical concepts and calculations in the context of economic and management sciences; and - Apply statistical concepts and calculations in the context of economic and management sciences.
EFBC	2524	Business Calculations	Business calculations are an introductory module, which focusses on the organising and describing data, measurement of central tendency and dispersion, basic probability and probability distributions, confidence intervals, hypothesis testing, Chi-squared tests as well as regression - and correlation analysis.	QWA	Student will be able to: - Apply mathematical concepts and calculations in the context of economic and management sciences; and - Apply statistical concepts and calculations in the context of economic and management sciences.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
STSA	1624	Introduction to Statistics	The aim of this module is to introduce the following topics: • Descriptive biometry • Probability models • Biometrical inference • Linear-regression-and correlation. • Contingency tables • Analysis of variance.	MAIN	Students should be able to: - organise, analyse and interpret data by means of various statistical techniques, - calculate probabilities, determine inferences in connection with means, variances and proportions, - determine and interpret the relationship between variables, - perform analysis of variance, and - solve statistical problems: follow the steps of the research process, make decisions regarding the methods to be applied, analyse data by means of various methods, and interpret results.
STSA	2616	Simple and Multiple Regression	Simple linear regression and correlation; Matrix notation and matrix calculations; Multiple regression, multiple coefficient of determination, nested models, and stepwise regression; PRESS and Mallows' Cp-statistic; Model building with quantitative and qualitative independent variables.	MAIN	After the successful completion of the module the student should: (a) understand and apply the basic principles of linear regression; (b) select models by means of stepwise regression, AIC criteria; (c) use and interpret computer printouts from statistical analysis packages; (d) select models by means of stepwise regression, the Cp-statistic and the PRESS statistic, and (e) build and report on first-order and second-order models with different numbers of quantitative independent variables, build models with different numbers of qualitative independent variables, and build models with both quantitative and qualitative independent variables.
STSA	2626	Regression II	Tests for influential observations and outliers; Multicollinearity, data transformations, and residual analysis; Time series analysis and forecasting; Autoregression models; Two-factor factorial experiments and more complex factorial designs	MAIN	Students will be able to: • Understand and use linear regression models • Understand the theoretical foundations of time series analysis • Understand logistic regression models • Understand the experimental design • Understand generalised linear models.
STSA	3716	Probability I	Introduction to probability, probability distributions and probability densities. Mathematical expectation and special probability distributions.	MAIN	Students will be able to: - utilise, manipulate, and compare discrete random variables, probability distributions, continuous random variables, probability density functions, multivariate-, marginal- and conditional distributions; - determine expected values and moments of a random variable; - understand the concepts of moment-generating functions, product moments, moments of linear combinations of random variables, and conditional expectations, and derive and manipulate these functions; and - understand and apply the most prominently occurring probability distributions in statistical theory.
STSA	3726	Probability II	The aim of this module is to introduce the following topics: Probability densities; Functions of random variables; Sampling distributions; Estimation theory	MAIN	Students should be able to: - utilise and manipulate the probability densities that figure most prominently in statistical theory, - evaluate functions of random variables, - understand sampling theory, and utilise and manipulate the Chi-square, t– and F– distributions, and - understand and apply estimation theory and methods.
STSA	3732	Applied Statistics I	The aim of this module is to give successful candidates the skills needed to: Be proficient in the use of statistical programming packages such as SAS and R; Program, apply, and evaluate basic statistical methods within a data analysis procedure.	MAIN	Students will be able to: - utilise statistical software packages, such as SAS and R, in order to input, transform, summarise, and visually present univariate and multivariate data; - understand, program, and apply descriptive statistics and basic statistical analysis models (for example regression and hypothesis testing) within the selected statistical software packages; - analyse and interpret the results of the statistical output; and - evaluate the validity of the statistical methods applied, based on the analyses.
STSA	3742	Applied Statistics II	The aim of this module is to give successful candidates the skills needed to: Be proficient in the use of statistical programming packages such as SAS and R; Program, apply, and evaluate both basic and more advanced statistical methods within a data analysis procedure; Create detailed data analysis reports.	MAIN	Students will be able to: - show proficiency in utilising statistical software packages, such as SAS and R, to the extent that students are encouraged to enrol in the first SAS certification course; - understand, program, and apply basic and advanced statistical analysis models within the selected statistical software packages; - analyse and interpret the results of the statistical output; - evaluate the validity of the statistical methods applied, based on the analyses; and - create statistical reports on the analysis of a given data set, and the application and evaluation of a statistical method, in a manner simple enough to be understood by the lay person, but technical enough to interest a field expert.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
STSM	1614	Introductory Statistics	Descriptive statistics and data visualisation; introduction to probability theory; Discrete and continuous random variables; manipulation, use and interpretation of probability distributions (Uniform, Normal, Exponential, Bernoulli, Binomial, Geometric, Negative Binomial, Hypergeometric and Poisson).	MAIN	Students must be able to: - Understand and apply descriptive statistics: distinguish between qualitative and quantitative data; organise and present data; calculate the mean, mode, median, range, standard deviation, and quantiles for grouped and ungrouped data. - Understand and apply probability principles: formulate a sample space and apply the laws of set theory; calculate probabilities using counting methods, including the multiplication principle, permutations and combinations; apply the laws of conditional probability, including the multiplication law, the law of total probability and Bayes' rule; apply the notion of independent events. - Understand the theory behind random variables and make use of it: apply general properties of a distribution function and a cumulative distribution function; define, identify and use the different types of random variables (Bernoulli, Binomial, Geometric, Negative Binomial, Hypergeometric, Poisson, Uniform, Exponential, Gamma, and Normal); derive, describe, interpret, and use simple functions of random variables.
STSM	1624	Introductory Probability Theory	Joint-, marginal- and conditional probability distribution theory and applications; Functions of probability distributions; Expected value, variance and covariance; Moment-generating functions.	MAIN	Students must be able to: - Express an understanding of how random variables interact to form joint distributions. - Construct and deconstruct joint and conditional distributions. - Calculate complex probabilities on multiple variables. - Combine random variables in simple ways like sums, differences, products, quotients, minimums and maximums. - Calculate the expectations of functions of random variables. - Expand the concept of an expected value to the concepts of variance, covariance; and combine their properties to solve problems. - Apply the theory of expected values to conditional distributions. - Develop a basic understanding of Moment Generating Functions.
STSM	2616	Sample distribution theory and inference	Limit theorems; Chi-Square-, t- and F- distributions; Sampling theory; Estimation of parameters; Properties of good estimates; Basic interval estimation	MAIN	Students will be able to: - Discuss and use convergence to a point and convergence to a distribution, including the central limit theorem; - Clarify the relationships between the sampling distributions derived from the Normal distribution; - Describe the processes behind simple and stratified random sampling, as well the distinctions between finite and large population sampling - Estimate parameters from various distributions using the method of moments and the method of maximum likelihood; and - Calculate basic confidence intervals using the calculated estimates.
STSM	2626	Bayesian inference	Introduction to decision theory and Bayesian statistics; Prior distributions, likelihoods and posterior distributions; Bayes estimates; credibility intervals; credibility theory	MAIN	Students should be able to: - understand and apply decision theory and Bayesian inference - derive posterior distributions for the parameters of various distributions, and use these to find credibility intervals, determine Bayes estimates, and perform probability calculations - understand and apply credibility theory.
STSM	2634	Statistical Programming	1. Data set manipulation using both simple and complex criteria 2. Descriptive statistics of grouped and ungrouped data, and data visualisation. 3. R programming components and problem solving methods 4. Distribution fitting, fit-checking, and use.	MAIN	Students will be able to: - import or construct vectors, matrices, and data sets; then manipulate parts or subsets and store them for later use - calculate descriptive statistics for numeric fields and summarise categorical variables, both individually and in groups. - draw scatterplots, bar charts, and histograms as appropriate to illustrate data visually - solve statistical problems using tools such as online help and basic programming constructs - fit standard distributions, performing visual checks of distribution fit, and calculate probabilities - write and optimise functions that solve particular realistic statistical problems - build an electronic portfolio of evidence of statistical programming knowledge.
STSM	3714	Hypothesis Testing and Interval Estimation	Theory of hypothesis testing; Derivation of tests and the properties of tests; Approximate tests; Tests for categorical data; Contingency tables; Theory of confidence intervals and the properties of good confidence intervals; Pivotal quantities and the derivation of confidence intervals; Approximate confidence intervals.	MAIN	Students will be able to: - derive properties of the standard distributions in statistics; - perform classical hypothesis testing under a variety of circumstances; - derive tests and confidence intervals for the parameters of most standard distributions; - use statistical software to build hypothesis tests and confidence intervals; and - apply statistical tests and confidence intervals in practice and interpret the results.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
STSM	3764	Generalised Linear Models	1. Generalising the linear model 2. Estimation 3. Inference 4. Binary data and logistic regression 5. Poisson regression and log-linear models 6. Additional models (e.g. ordinal, multinomial, and constant coefficient of variation)	MAIN	Student will be able to: - demonstrate knowledge of the theory of generalised linear models, - formulate models with the appropriate choice of error distribution, link function and variance function for particular data sets, - reflect on the merits of alternative model formulations for relevant data sets, - compare generalised linear models, linear models and contingency table methods, - demonstrate knowledge of maximum likelihood (ML) estimation for generalised linear models, - perform hypothesis testing and interval estimation in generalised models, - apply and analyse goodness of fit statistics for generalised linear models, - evaluate relevant data sets by fitting generalised linear models using statistical software, and interpret the results.
STSM	3734	Causal inference: ANOVA, regression, and the potential outcomes approach	This module introduces methods for causal inference, including analysis of variance (ANOVA) for designed experiments, regression for observational studies, and the potential outcomes approach that attempts to bridge the divide between the former two methods. 1. Analysis of variance (ANOVA) and design of experiments 2. Simple and multiple regression, including regression diagnostics 3. Basic Bayesian linear regression, multiple imputation, and potential outcomes for causal inference.	MAIN	Students should be able to: - Apply, analyse and interpret one-way and two-way ANOVA for designed experiments and causal inference. - Apply, analyse and interpret simple and multiple linear regression for causal inference and exploratory studies. - Formulate algorithms for implementing Bayesian linear regression, and sequential Normal regression multiple imputation, and explain how these methods are used for the potential outcomes approach to causal inference. - Discuss the similarities and differences, defend the strengths, and criticise the weaknesses of the ANOVA, regression, and potential outcomes approaches for causal inference.
STSM	3744	Time Series Analysis	-Ordinary Least Squares (OLS) regression -Variable and Model Selection using Information Criterion -Spectral Analysis of a time series -Analysis of mean and variance to determine stationarity -Time series decomposition -Removal of non-stationarity through transformation -Autocorrelation analyses (multiple types) -Identification and fitting of -Autoregressive and Moving Average time series models -Order of Integration analysis of a time series -Box-Jenkins analysis -ARCH/GARCH modelling -Diagnostic analyses	MAIN	Student will be able to: - Perform each of the following types of statistical analysis using appropriate statistical software (for example, R) in a thorough and well-reasoned manner: - OLS estimation method - Maximum likelihood and method of moments estimation - variable and model selection using information criteria, - spectral analysis of a time series, - stationarity and integration order analysis (and removal of stationarity), - time series decomposition, - autocorrelation analyses, - identification and fitting of AR and MA models, - Box-Jenkins analysis, - ARCH/GARCH models, and - diagnostic analyses; - +list and test the assumptions underlying each analysis, as well as theoretically justify each action performed; and - +report results in both scientific language and layman's terms.
ACSD	7900	Dissertation	Topic is chosen in consultation with the supervisor and department.	MAIN	Students will be able to: - write a dissertation on a topic of interest to the actuarial community; - outline and implement the structure of a dissertation; and - show acquisition of a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.
ACSG	6800	Actuarial Asset and Liability Management	The aim of this module is to examine the following actuarial science topics in detail: The actuarial control cycle and its applications on assets, liabilities and the management thereof; Asset-liability-management (ALM) of various financial products in the short term and long term insurance space, as well as the banking and general financial environment; Recognition and management of risks, surplus, liquidity and solvency management.	MAIN	Student will be able to: 1. demonstrate how the Actuarial Control Cycle can be applied in a variety of practical commercial situations, 2. describe the functions of the clients and potential clients that actuaries can and may advise and the types of advice that actuaries might give their clients, 3. analyse the cashflows of simple financial products, schemes, contracts and transactions, and discuss the need to invest appropriately to provide for benefits on future financial events, 4. examine credit risk, liquidity risk, and the use of credit ratings, 5. assess the implications of the regulatory environment in which the business is written for provisioning and capital, 6. describe how actuarial techniques can be used in the assessment of capital investment projects, 7. explain how the results of the monitoring process in the Actuarial Control Cycle are used to update the financial planning in a subsequent period, and 8. given a practical situation, select appropriate asset/liability management procedures, implement them (theoretically), and evaluate the possible results.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ACSG	6890	Introduction to Actuarial Asset and Liability Management	The aim of this module is to introduce the following actuarial science topics: the actuarial control cycle; actuarial advice for clients; cashflow recognition and appropriate investment; financial risks and credit ratings; actuarial regulatory environment; capital investing; and financial planning	MAIN	Student will be able to: -explain how the Actuarial Control Cycle is applied in practice, -describe the advising role of actuaries, - analyse the cashflows of various financial products, and discuss the need to invest appropriately to provide for benefits on future financial events, -outline the concepts of credit risk, liquidity risk, and credit ratings, -assess the implications of the regulatory environment in which the business is written for provisioning and capital, and -describe how actuarial techniques can be used in the assessment of capital investment projects.
ACSG	8900	Actuarial Science	This module contains fundamental knowledge, theories, principles and practices of Actuarial Science, including: Research project in specialized field of Actuarial Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments;; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ACSR	6808	Actuarial Modelling and Literature Study	Topic is chosen in consultation with the supervisor and department.	MAIN	Student will be able to: - write and present a short research essay on a topic of interest to the statistical community; - outline and implement the structure of a dissertation; and - show acquisition of a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.
ACST	8900	Actuarial Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Actuarial Science, including: Research project in specialized field of Actuarial Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments;; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ACST	9100	Actuarial Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Actuarial Science, General including Research project in specialized field of Actuarial Science, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ACSL	6816	Actuarial Contingencies	The aim of the module is to provide a grounding in the mathematical techniques which can be used to model and evaluate cash-flows dependent on death, survival, or other uncertain risks. Topics include: Life assurance, life annuity contracts, and pension funds; Life tables and commutation functions; Calculation and evaluation of premiums and reserves; With-profit policies, variable-benefit contracts, and two-life annuities; Contingent and reversionary benefits; Profit testing; Competing risks; Multiple decrement tables; Mortality selection.		Student will be able to: 1. recall and compare life assurance contracts and life annuity contracts, 2. construct, apply and evaluate the life tables], 3. evaluate assurances and annuities, 4. calculate net premiums and reserves, and evaluate the results, 5. calculate variable benefits and with-profit policies, and gross premiums and reserves for fixed- and variable-benefit contracts, 6. solve and analyse various problems related to simple annuities and assurances involving two lives, 7. formulate and interpret contingent and reversionary benefits, 8. construct a profit testing spreadsheet, 9. solve for reserves, profit and premiums using a profit testing calculation, 10. recognise and analyse competing risks, 11. construct and apply multiple decrement tables, 12. explain the working of pension funds by formulating commutation functions , and 13. interpret mortality selection and solve standardisation questions.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
RSAN	8900	Risk Analysis Dissertation	This module contains fundamental knowledge, theories, principles and practices of Risk Analysis , including: Research project in specialized field of Risk Analysis as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
RSAN	9100	Risk Analysis Thesis	This module contains fundamental knowledge, theories, principles and practices of Risk Analysis, General including Research project in specialized field of Risk Analysis, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSA	6823	Multivariate Methods	1. Canonical correlation analysis 2. Cluster analysis 3. Principal component analysis and factor analysis 4. Multidimensional scaling, correspondence analysis and multiple correspondence analysis	MAIN	Students should be able to: - perform canonical correlation analysis and interpret the results, selecting appropriate components in the process - perform principal component analysis and interpret the results, selecting appropriate components in the process - perform factor analysis and interpret the results, selecting appropriate factors, and possibly rotating the results in the process - apply and interpret multidimensional scaling, correspondence analysis and multiple correspondence analysis
STSA	8900	Statistics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Statistics , including: Research project in specialized field of Statistics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSA	9100	Statistics Thesis	This module contains fundamental knowledge, theories, principles and practices of Statistics, General including Research project in specialized field of Statistics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSB	6816	Bayes Analysis	This course equips the student to be able to implement the Bayesian paradigm. First, the Bayesian paradigm is introduced and all the standard terms and concepts are studied, both in general and via basic examples. These concepts include subjective priors and their derivation, objective priors and their derivation, posterior derivation and predictive posterior derivation. Related concepts that are studied include parameter estimation and interval construction. Second, the student will learn and practice simulation techniques that are useful in Bayesian analysis. Third, students will use both R and STAN to implement a variety of Bayesian models, including hierarchical models. They will learn to program the input and interpret the output. They will learn about answering statistical research questions and about doing diagnostic checking to add credibility to their answers.	MAIN	Student will be able to: - explain standard Bayesian concepts and apply them to problems - derive, and simulate samples from, prior, posterior and predictive densities, for both simple and complex Bayesian hierarchical models - calculate probabilities, parameter estimates and credibility intervals, for both simple and complex Bayesian hierarchical models - test their results for internal consistency and perform appropriate inference based on those results - approach statistical analysis as would be done in the workplace

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
STSE	6813	Modelling Extremal Events	Modelling Extremal Events -Introduction on Extremes -Tools for analysing data containing Extremes -Tail estimation under Pareto type models -Tail estimation for all maximal domains of attraction -Bayesian prediction on high quantiles	MAIN	Student will be able to -explain and discuss the notion of Extremes, -apply tools for analysing data containing extremes, -model such data and perform goodness of fit tests, -estimate the Extreme Value Index (EVI), -estimate tail probabilities and high quantiles, -predict high quantiles using a Bayesian approach, and -perform analyses and simulations through computer programming.
STSF	6813	Financial Times Series	Financial Times Series Autocorrelation: The nature and detection of autocorrelation, estimation in the presence of autocorrelation. Remedial measures in regression problems. Dynamic Models: Autoregressive and Distributed-Lag Models The role and reasons for lags in Economics. Estimation of Distributed-Lag Models: Ad hoc estimation, the Koyck and the Almon approach. Causality Stationarity, Unit Roots and Cointegration: Stationary Stochastic Processes, White Noise, Linear Time Series, Unit Root tests and Random walks. Tests based on the correlogram. Cointegration and the Engle-Granger test. Forecasting with ARIMA and VAR models: Approaches to Forecasting. AR, MA, ARMA and ARIMA models and the Box-Jenkins Methodology. Conditional Heteroscedastic Models: Financial Time Series and Their Characteristics. ARCH and GARCH Models, Integrated and Exponential Garch Models, Garch-M and Stochastic Volatility Models.	MAIN	- Student will be able to: know and understand the basic concepts, terminology, definitions and models commonly encountered in time series, - identify and test for specific models and recognise possible complications, - investigate causality and create distributed lag models using explanatory variables, - create models for general time series, estimate parameters, analyse the models and perform forecasting, and - design models of volatility by using ARIMA and GARCH methodology.
STSF	6823	Risk Analysis	Risk Analysis An introduction to risk analysis An overview of financial risks An in-depth look into the statistical tools needed to apply risk analysis in the banking, investment and insurance industries, including: Frequency functions Loss distributions Alpha-stable distributions Extreme value theory Value-at-Risk Robust statistics Dependence modelling	MAIN	Student will be able to: - discuss the historical development of risk analysis and the effect of globalisation on risk exposures, - compare the various types of risks encountered in the financial world, - criticise or defend the Basel Capital Accord and its implementation, - reconstruct and apply the statistical techniques often utilised in risk analysis: frequency functions, loss distributions, alpha-stable distributions, and extreme value theory, - evaluate the Value-at-Risk measure, and - examine various risk analysis complications and how to solve them: robust statistics and modelling of dependence.
STSM	8900	Mathematical Statistics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Mathematical Statistics , including: Research project in specialized field of Mathematical Statistics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSM	9100	Mathematical Statistics Thesis	This module contains fundamental knowledge, theories, principles and practices of Mathematical Statistics, General including Research project in specialized field of Mathematical Statistics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
STSP	6813	Stochastic Processes	This course deals with the theory and applications of stochastic processes. The main topics that are covered are: Preliminaries and necessary facts from probability theory; Poisson processes; Generalisations of Poisson processes; Renewal processes; Discrete and continuous Markov chains; Brownian motion and other processes with independent increments; Martingales; Stochastic ordering. The main applications and examples are from reliability and electrical engineering, demography and actuarial science.	MAIN	Student will be able to: - discuss different types of stochastic processes and compare the corresponding assumptions defining these processes, - analyse the homogeneous and non-homogeneous Poisson processes, distributions for inter-arrival and waiting times, and apply the theory to the train depot example, - define and analyse renewal processes, alternating renewal, processes, renewal-type processes with quality functions, - prove the main theorems of renewal theory and apply them to obtaining reliability characteristics of repairable systems, - outline and utilise Markov chains with discrete and continuous time, - implement the Markov chain approach to redundant repairable systems with exponential distributions of lifetimes of components, - consider the birth and death processes and justify the transition probabilities for this case, - justify Kolmogorov`s forward equations and apply these equations to the two-state Markov chain, - define and analyse standard Brownian motion and Brownian motion with drift, and - point out and compare different stochastic orders (ordinary stochastic order with failure rate ordering and with likelihood ratio ordering).
STSR	6808	Statistical Modelling en Literature Study	Statistical Modelling and Literature Study Topic is chosen in consultation with the supervisor and department.	MAIN	Students should be able to: - write a short research essay on a topic of interest to the statistical community, - outline and implement the structure of a dissertation, and - acquire a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.
STSS	6813	Stochastic Simulation	Stochastic Simulation Introduction to stochastic simulation Inverse theorem for continuous and discrete cases Simulating from discrete distributions Simulating from continuous distributions Goodness of fit criteria Acceptance-rejection method Other Monte Carlo methods especially in the Bayesian field	MAIN	Student will be able to: -Generate data from any continuous or discrete distributions, -Inspect the goodness of fit of the simulations, -Analyse the simulated data on compare inferences with the true values, -Apply different Monte Carlo simulation methods, -Perform simulations through computer programming, and -Recognise good simulations
STSS	6833	Sampling Techniques	This course deals with the theory and applications of sampling. The main topics that are covered are: 1.Probability sampling techniques: simple random, stratified, systematic, cluster and complex. 2.Sample size and designing a sample. 3.Estimation of means, totals, proportions and their variances. 4.Weighting of survey data. 5.Dealing with non-response. 6.Statistical inference for survey data.	MAIN	Students should be able to: -Know the theory and usage of probability sampling techniques and be able to apply it to real problems. -Prove the main theorems of sampling. -Derive formulae for estimators, the variance of the estimators and apply them to survey data. -Determine the sample size of a survey. -Design and draw a sample. -Calculate weights and apply it to real problems. -Describe unit and item non-response techniques and deal with it in survey data. -Analyse survey data and apply statistical inferential techniques.
STSX	6823	Capita Selecta	As per selected module	MAIN	As per selected module
STSD	6823	Big Data	This module encompasses the basic data mining techniques incorporated in mining software. 1. Linear regression and model selection; 2. Classification methods; 3. Resampling methods; 4. Tree-based methods; 5. Support vector machines; 6. Unsupervised learning.	MAIN	Student will be able to: -Comprehend statistical learning, supervised and unsupervised learning; -Apply and evaluate classification methods; -Apply and evaluate resampling methods; -Examine linear model selection and regularisation; -Investigate tree-based methods; -Apply and evaluate support vector machines approaches; -Perform unsupervised learning methods
STSD	6843	Spatial Statistics	1. The context and relevance of spatial analysis 2. Scientific observations and measurements made in spatial analysis 3. Statistical measures used to analyse data distributions 4. Exploratory data analysis, visualisation and hypothesis testing 5. Spatial statistics relationships 6. Point pattern analysis 7. Area pattern analysis using global and local statistics 8. Geostatistical analysis 9. Data science: computing systems and analysis for big data	MAIN	Student will be able to: -Recall the context and relevance of spatial analysis, and recognise spatial data. -Perform and evaluate exploratory spatial data analysis, visualisation, hypothesis testing, and point pattern, area pattern and geostatistical analysis. -Evaluate spatial statistics relationships -Discuss the use of computing systems for analysis of big (spatial) data

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
STSA	6816	Multivariate Analysis	This module aims to provide students with a grounding in several multivariate analysis methods, with a focus on the interpretation of analysis results. Methods include: Summarising multivariate data - Testing for univariate and multivariate Normality - Mean and covariance testing, including profile analysis and growth curve analysis - Discriminant analysis and classification - Multivariate Regression	MAIN	Student will be able to: -summarise multivariate data, -test for univariate and multivariate Normality in data, -perform a variety of mean and covariance tests on multivariate data, and interpret the results, -analyse discriminant functions, -apply linear, quadratic, or k-nearest neighbour classification, -perform multivariate regression and interpret the results, and -comprehend the assumptions and procedures behind any of the above multivariate analysis methods

URBAN AND REGIONAL PLANNING (118)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Postgraduate					
URTP	7912	Transportation planning for planners	Understanding of the application of transport impact studies, the role of trip generation and land use on traffic patterns. Focus on transport policy, automobile travel, pedestrians, public transport and transport applications.	MAIN	Student will be able to: -Interpret and apply the nature, extent and necessity of transport planning; -Assess impacts, risks and benefits of transport development and policy proposals; -Examine the relationship between regional, national and global transportation trends and development; and -Apply the role of trip generation and land use on traffic patterns.
UMRD	8900	Urban and Regional Planning Dissertation	This module contains fundamental knowledge, theories, principles and practices of Urban and Regional Planning , including: Research project in specialized field of Urban and Regional Planning as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
URBP	6805	Basic Practice in Urban and Regional Planning	Site analysis, site planning, layout planning and township establishment, zoning, floor area, coverage, height, building restriction area, title deeds and general plans, informal settlement upgrading, infrastructure planning process.	MAIN	Student will be able to: -Conduct a thorough site analysis; -Prepare a site layout plan/site development plan for various land uses, including basic infrastructure planning; -Prepare an effective township layout plan; and -Prepare an informal settlement-upgrading plan.
URBP	6806	Basic Practice in Urban and Regional Planning	Site analysis, site planning, layout planning and township establishment, zoning, floor area, coverage, height, building restriction area, title deeds and general plans, informal settlement upgrading, infrastructure planning process.	MAIN	Student will be able to: -Conduct a thorough site analysis; -Prepare a site layout plan/site development plan for various land uses, including basic infrastructure planning; -Prepare an effective township layout plan; and -Prepare an informal settlement-upgrading plan.
URCS	6812	Capita Selecta in Planning	Further research in any Spatial Planning (Hons) subject already taken, or complementary work.	MAIN	Student will be able to: -Design, conduct and write up a research project in urban and regional Planning.
URCS	6814	Capita Selecta in Planning	Further research in any Spatial Planning (Hons) subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7912	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7913	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7914	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	At the end of the module, the student is expected to be able to design, conduct and write up a research project in urban and regional Planning.
URCS	7916	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7922	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7924	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
URDP	7912	Research proposal	Research proposal	MAIN	Student will be able to: -Ability to conceptualise a research topic, formulate appropriate research questions and prepare a research proposal
URDP	7922	Dissertation Proposal in Urban and Regional Planning	After completion of the module: Research methodologies. Research proposal.	MAIN	Student will be able to: -Prepare research proposals -Plan a research project
UREP	6813	Research in Environmental Planning	Environmental awareness, Sustainable development, Planning with the environment, Sustainable Planning, Environmental impact assessment, disaster risk management, environmental management plans.	MAIN	Student will be able to: -Apply the concepts of sustainable development in planning; -Evaluate development from an environmental management perspective; and -Conduct research into environmental aspects of planning.
UREP	6814	Research in Environmental Planning	Environmental awareness, Sustainable development, Planning with the environment, Sustainable Planning, Environmental impact assessment, disaster risk management, environmental management plans.	MAIN	Student will be able to: -Apply the concepts of sustainable development in planning -Evaluate development from an environmental management perspective -Conduct research into environmental aspects of planning
UREP	6823	Research in Environmental Planning	Environmental awareness, Sustainable development, Planning with the environment, Sustainable Planning, Environmental impact assessment, disaster risk management, environmental management plans.	MAIN	Student will be able to: -Apply the concepts of sustainable development in planning; -Evaluate development from an environmental management perspective; and -Conduct research into environmental aspects of planning.
URFP	7912	Futurology for Planning	A theoretical approach as to what the future is and how planners must handle the uncertainty, the quantitative and the qualitative aspects of spatial ordering in a world of different future scenario's and the application on South Africa.	MAIN	Student will be able to: -Examine and discuss the main factors that influence future planning; and -Make projections and built future scenarios
URFP	7922	Futurology for Planning	A theoretical approach as to what the future is and how planners must handle the uncertainty, the quantitative and the qualitative aspects of spatial ordering in a world of different future scenarios and the application on South Africa.	MAIN	Student will be able to: -Examine and discuss the main factors that influence future planning; and -Make projections and built future scenarios.
URGI	7904	Geographic Information Systems for Planners	Basic theory, methods and techniques regarding the use of GIS in planning, preparation of plans, spatial analysis.	MAIN	Student will be able to: -Use GIS methods and techniques to prepare plans and undertake spatial analysis
URHA	6804	Human Settlement Management and Administration	An introduction to the practical management and administration of human settlements within the South African legislative and policy framework, building capacity and developing skills primarily for the South African human settlement sector but also aimed at needs of the developing world	MAIN	Student will be able to: -Manage the implementation of human settlement projects implemented in terms of government policies within the different spheres of Government; -Execute the administration of the housing delivery process; -Administer the housing procurement and allocation policy in an equitable, efficient, transparent and accountable manner; -Interpret and manage innovate initiatives in settlement planning and design which seek to respond to the current development imperatives in South Africa. -Establish the links between the regulatory framework and planning issues within the context of intergovernmental relations. -Critically evaluate the administration of housing in South Africa within the current legislative and co-operative governance context.
URHS	6813	Housing for Planners	Role of housing, planning for housing, legal framework.	MAIN	Student will be able to: -Discuss and explain the role of housing in human settlements; -Determine housing demand; and -Prepare a housing plan.
URHS	6814	Human Settlements Planning	Application of Urban and Regional Planning to Human Settlements planning and delivery	MAIN	Student will be able to: -Examine various theories of human settlements; -Identify various policies of human settlements; -Appreciate various theories and policies using relevant case studies of human settlements; - Analyse and apply different types of housing policies for human settlements; and -Evaluate and synthesis human settlements' policies with an appreciation of a Southern African perspective and experiences

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
URHS	7913	Housing for Planners	Role of housing, planning for housing, legal framework.	MAIN	Student will be able to: -Discuss and explain the role of housing in human settlements -Determine housing demand -Prepare a housing plan
URHS	7923	Housing for Planners	Role of housing, planning for housing, legal framework.	MAIN	At the end of the module students must be able to: 1.discuss and explain the role of housing in human settlements 2.determine housing demand 3.prepare a housing plan
URHS	8900	Dissertation in Housing	Dissertation	MAIN	Student will be able to: -Manage supervised planning and execution of a research project in the discipline.
URHS	9100	Urban and Regional Planning Thesis	Urban and Regional Planning This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Urban and Regional Planning as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
URHT	6804	Human Settlements Theory	An introduction to the major national and international human settlement theories; policies; discourses and approaches, dealing with, in amongst others: Aspects of enablement; sustainability; collaborative approaches; social justice; gender equality; disabled housing; housing for the aged; informal settlement upgrading; rental housing; consumer education; ownership; and housing finance.	MAIN	Student will be able to: -Identify trends in housing/ human settlement policies in relation to national and international theories. -Contribute towards the formulation of a housing policy. -Contextualise a human settlement development within existing theories and policies. -Describe and apply enablement policies; -Apply sustainability principles to human settlements. -Implement collaborative approaches in the delivery of human settlements. -Apply social justice and gender equality to human settlement policies and projects. -Apply the unique requirements of housing for the aged and disabled in a human settlement policy. -Implement sound theories and policies in the upgrading of informal settlements. -Contribute towards the structuring and implementation of a rental housing policy. -Facilitate, structure and manage a housing consumer education programme. -Apply the principles of home ownership in a housing project. -Be familiar with housing development finance and end user finance options.
URID	7912	Integrated Development Planning	The principles of the integrated Planning (IDP) process, strategic planning processes, development paradigms and implications for planning.	MAIN	Student will be able to: -Critically evaluate strategic planning processes in South Africa and internationally; -Examine the of application of strategic planning methods and techniques ; and -Draw up, evaluate and review Integrated Development Plans.
URID	7922	Integrated Development Planning	The principles of the integrated Planning (IDP) process, strategic planning processes, development paradigms and implications for planning	MAIN	Student will be able to: -Critically evaluate strategic planning processes in South Africa and internationally; -Examine the of application of strategic planning methods and techniques ; and -Draw up, evaluate and review Integrated Development Plans.
URLM	6813	Land Use Management	What is land use management, planning legislation, zoning schemes, development applications, land development.	MAIN	Student will be able to: -Explain concepts and important issues related to spatial planning and land use management legislation; -Describe and discuss basic terms and concepts related to land development processes and application systems; -Prepare a land development application; and -Evaluate a land development application.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
URLM	6814	Land Use Management	What is land use management, planning legislation, zoning schemes, development applications, land development.	MAIN	Student will be able to: -Explain concepts and important issues related to spatial planning and land use management legislation -Describe and discuss basic terms and concepts related to land development processes and application systems -Pprepare a land development application -Eevaluate a land development application
URLM	6824	Land Use Management	What is land use management, planning legislation, zoning schemes, development applications, land development.	MAIN	Student will be able to: -Explain concepts and important issues related to spatial planning and land use management legislation -Describe and discuss basic terms and concepts related to land development processes and application systems -Pprepare a land development applicatinso -Eevaluate a land development application
URLM	7912	Planning Management	Planning law and related legislation, the spatial planning system, development applications	MAIN	Student will be able to: -Discuss the spatial planning system in South Africa including spatial plans and land use management; -Examine and apply policies, plans, and statutory control measures applicable to land use and its management in order to provide sustainable development; and - evaluate development applications.
URLM	7922	Planning Management	Planning law and related legislation, the spatial planning system, development applications	MAIN	Student will be able to: - Discuss the spatial planning system in South Africa including spatial plans and land use management; - Examine and apply policies, plans, and statutory control measures applicable to land use and its management in order to provide sustainable development; and - Evaluate development applications.
URMD	6808	Urban and Regional Planning Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate Urban and Regional planning environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -Select a research topic; -Define the research problem; -Formulate a hypothesis / research question; -Develop a research proposal; -Appraise the literature and use the Harvard referencing method and write a literature review; -Design and justify an appropriate research methodology to address the problem; -Conduct an empirical study; -Analysis and interpret empirical data; -Draw up conclusions and make recommendations; -Compile a research project report (treatise); and -Produce a summary paper of the study (article). Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
URMD	7900	Extended Research Essay	Extended Research Essay	MAIN	Student will be able to: -Conduct independent research and present results in a well written, logical, manner, with a sound argument
URMD	8900	Dissertation	A dissertation in the field of Urban and Regional Planning	MAIN	Student will be able to: -Conduct independent research and present results in a well written, logical, manner; and -Compile a sound argument.
URPD	9100	Philosophiae Doctor	Thesis or interrelated, publishable manuscripts/published articles	MAIN	Student will be able to: -Research on an approved topic for at least four semesters in consultation with the Division Head in preparation for a thesis that will be submitted as the only requirement for obtaining the degree.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
URPP	7914	Professional Practice in Urban and Regional Planning	Project management, planning office management (budgeting, personnel management, leadership), tender processes, stakeholder management.	MAIN	The student will be able to: - Run a professional planning office; - Prepare a tender; - Work with multiple stakeholders; and - Manage a planning project
URPP	7924	Professional Practice in Urban and Regional Planning	Project management, planning office management (budgeting, personnel management, leadership), tender processes, stakeholder management.	MAIN	The student will be able to: - Run a professional planning office; - Prepare a tender; - Work with multiple stakeholders; and - Manage a planning project
URPT	6804	Research in Theory of Planning	Values, ethics for planners, planning processes and techniques, strategie planning, systems thinking development of planning thought, public participation / actor collaboration and the right to the city.	MAIN	Student will be able to: - Appreciation of the role of values and ethics in planning - The ability to critically evaluate planning processes from an ethical and normative perspective - Knowledge of, and the ability to apply various planning processes - Appreciation of the role of community participation in planning
URPT	7904	Research in Theory of Planning	Values, ethics for planners, planning processes and techniques, strategie planning, systems thinking development of planning thought, public participation / actor collaboration and the right to the city.	MAIN	Student will be able to: - Rule on the role of values and ethics in planning; - Critically evaluate planning processes from an ethical and normative perspective; - Apply various planning processes; and - Appreciation of the role of community participation in planning
URRA	7912	Planning for Rural Areas	Professional rendering of service as business law and regulations that affect the profession. Ethics and code of conduct, communication between professional, the client and the society.	MAIN	Student will be able to: -Apply rural development theories to rural areas; -Develop a rural development strategy; and -Critically evaluate rural development policy.
URRA	7922	Planning for Rural Areas	Professional rendering of service as business law and regulations that affect the profession. Ethics and code of conduct, communication between professional, the client and the society.	MAIN	Student will be able to: -Apply rural development theories to rural areas; -Develop a rural development strategy; and -Critically evaluate rural development policy.
URRE	6813	Research in Economics for Planners	Research with a urban and regional planning focus in topics such as economic theory, economics, contemporary economic realities, entrepreneurship, informal economy, subsistence economy, globalisation, developmental economics, rethinking economic development, local economic development and sustainable livelihoods.	MAIN	Student will be able to: -Discuss and apply the basic knowledge of economics; -Explain and analyse the impact of globalisation on communities; -Explain the dynamics of the informal economy, indigenous knowledge and entrepreneurship and apply these concepts in local economic development planning; -Prepare Local Economic Development plan/programme or project; and -Conduct a research project on economic aspects of planning.
URRE	6814	Research in Economics for Planners	Research with a urban and regional planning focus in topics such as economic theory, economics, contemporary economic realities, entrepreneurship, informal economy, subsistence economy, globalisation, developmental economics, rethinking economic development, local economic development and sustainable livelihoods.	MAIN	At the end of the module students will be able to -Discuss and apply the basic knowledge of economics -Explain and analyse the impact of globalisation on communities -Explain the dynamics of the informal economy, indigenous knowledge and entrepreneurship and apply these concepts in local economic development planning -Pprepare Local Economic Development plan/programme or project -Cconduct a research project on economic aspects of planning
URRE	6823	Research in Economics for Planners	Research with a urban and regional planning focus in topics such as economic theory, economics, contemporary economic realities, entrepreneurship, informal economy, subsistence economy, globalisation, developmental economics, rethinking economic development, local economic development and sustainable livelihoods.	MAIN	Student will be able to: - Discuss and apply the basic knowledge of economics; - Explain and analyse the impact of globalisation on communities; - Explain the dynamics of the informal economy, indigenous knowledge and entrepreneurship and apply these concepts in local economic development planning; - Prepare Local Economic Development plan/programme or project; and - Conduct a research project on economic aspects of planning.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
URRE	6824	Research in Economics for Planners	Research with a urban and regional planning focus in topics such as economic theory, economics, contemporary economic realities, entrepreneurship, informal economy, subsistence economy, globalisation, developmental economics, rethinking economic development, local economic development and sustainable livelihoods.	MAIN	At the end of the module students will be able to -Discuss and apply the basic knowledge of economics -Explain and analyse the impact of globalisation on communities -Explain the dynamics of the informal economy, indigenous knowledge and entrepreneurship and apply these concepts in local economic development planning -Pprepare Local Economic Development plan/programme or project -Conduct a research project on economic aspects of planning
URRM	7914	Research Methodologies for Planners	Research Methodologies for Planners	MAIN	At the end of the module students will have the ability to: -Outline various research methods; -Use basic statistics in research; -Prepare a research proposal; and -Conduct independent research
URRM	7924	Research Methodologies for Planners	Research Methodologies for Planners	MAIN	At the end of the module students will have the ability to: -Outline various research methods; -Use basic statistics in research; -Prepare a research proposal; and -Conduct independent research
URRP	7902	Introductory Studies in Regional Planning	Introductory Studies in Regional Planning	MAIN	Student must be able to: Examine and discuss regional development initiatives and have the ability to apply this knowledge in a variety of settings.
URRP	7906	Applied Regional Planning Project	Regional Planning processes and IDP, legal framework, applied regional development project.	MAIN	Student will be able to: -Prepare a spatial development framework; and -Conduct a regional development research project in a team
URRR	6800	Research Reports in Human Settlements	This module contains fundamental knowledge, theories, principles and practices of Human Settlements, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination.		The students will be able to: -Conduct independent research and present results in a well written, logical, manner, with a sound argument.
URRT	6803	Research in Regional Planning Theory	Research with a regional planning focus in topics such as regional context, classical regional planning theories, planning policy and legislation timeline, rural realities and rural development, small towns, rural-urban linkage, city regions, mega-city regions, polycentric regions, regional blocks. Regionalism. New regionalism, globalisation, industrial spaces, competitiveness and innovation, innovative spaces, regional planning process, development plans, systems thinking in regional planning, regional scenario planning, regional project management, rural resilience and rural self sufficiency.	MAIN	Student will be able to: -Outline the development of regional planning and development theories; -Critically evaluate the implications of globalisation, competitiveness and resource depletion on development in regions; and -Prepare a spatial development framework.
URRT	6805	Research in Regional Planning Theory	Research with a regional planning focus in topics such as regional context, classical regional planning theories, planning policy and legislation timeline, rural realities and rural development, small towns, rural-urban linkage, city regions, mega-city regions, polycentric regions, regional blocks. Regionalism. New regionalism, globalisation, industrial spaces, competitiveness and innovation, innovative spaces, regional planning process, development plans, systems thinking in regional planning, regional scenario planning, regional project management, rural resilience and rural self sufficiency.	MAIN	Student will be able to: -Outline the development of regional planning and development theories; -Critically evaluate the implications of globalisation, competitiveness and resource depletion on development in regions; and -Prepare a spatial development framework
URSC	6813	Research in Socio-Cultural Aspects in Planning	Research with urban and regional planning focus in topics such as cultures and traditions, social factors influencing planning, e.g. migration, demography, culture of poverty, indigenous knowledge, gender, housing as a verb, social context, contemporary society, impact of HIV/AIDS and disease.	MAIN	Student will be able to: -Examine and show appreciation of different cultures and traditions; -Explain of theories of community and social development, demographic change, disease, poverty and gender; -Describe the factors influencing population change; and -Prepare a research project on socio-cultural aspects in planning.
URSC	6814	Research in Socio-Cultural Aspects in Planning	Research with urban and regional planning focus in topics such as cultures and traditions, social factors influencing planning, e.g. migration, demography, culture of poverty, indigenous knowledge, gender, housing as a verb, social context, contemporary society, impact of HIV/AIDS and disease.	MAIN	Student will be able to: -Appreciation of different cultures and traditions -Explain of theories of community and social development, demographic change, disease, poverty and gender -Describe the factors influencing population change -Pprepare a research project on socio-cultural aspects in planning

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
URSC	6823	Research in Socio-Cultural Aspects in Planning	Research with urban and regional planning focus in topics such as cultures and traditions, social factors influencing planning, e.g. migration, demography, culture of poverty, indigenous knowledge, gender, housing as a verb, social context, contemporary society, impact of HIV/AIDS and disease.	MAIN	Student will be able to: -Appreciation of different cultures and traditions; -Explain of theories of community and social development, demographic change, disease, poverty and gender; -Describe the factors influencing population change; and -prepare a research project on socio-cultural aspects in planning.
URSC	6824	Research in Socio-Cultural Aspects in Planning	Research with urban and regional planning focus in topics such as cultures and traditions, social factors influencing planning, e.g. migration, demography, culture of poverty, indigenous knowledge, gender, housing as a verb, social context, contemporary society, impact of HIV/AIDS and disease.	MAIN	At the end of the module students will be able to -Appreciation of different cultures and traditions -Explain of theories of community and social development, demographic change, disease, poverty and gender -Describe the factors influencing population change -Pprepare a research project on socio-cultural aspects in planning
URTD	7912	Planning for Tourism	Introduction to the definitions, components and impacts of tourism. New forms of tourism (sustainable, alternative, soft, green and eco-tourism). General tourism development and policy. General tourism planning concepts and instruments. National, regional and local tourism planning on national, regional and local level	MAIN	Student will be able to: -interpret the character, extent and necessity of planning for tourism; as well as tourism in global context and new tourism forms; -assess the impacts, risks and benefits of tourism development proposals; -outline the interpersonal and personal needs in terms of investment, sociological, social, cultural values and other requirements of all those associated with the creation of the tourism environment; and -examine the relationship between regional, national and global tourism development and to evaluate how philosophical and theoretical values influence it.
URTD	7922	Planning for Tourism	Introduction to the definitions, components and impacts of tourism. New forms of tourism (sustainable, alternative, soft, green and eco-tourism). General tourism development and policy. General tourism planning concepts and instruments. National, regional and local tourism planning on national, regional and local level.	MAIN	Student will be able to: -interpret the character, extent and necessity of planning for tourism; as well as tourism in global context and new tourism forms; -assess the impacts, risks and benefits of tourism development proposals; -outline the interpersonal and personal needs in terms of investment, sociological, social, cultural values and other requirements of all those associated with the creation of the tourism environment; and -examine the relationship between regional, national and global tourism development and to evaluate how philosophical and theoretical values influence it
URTP	7922	Transportation planning for planners	Understanding of the application of transport impact studies, the role of trip generation and land use on traffic patterns. Focus on transport policy, automobile travel, pedestrians, public transport and transport applications	MAIN	Student will be able to: -Interpret and apply the nature, extent and necessity of transport planning; -Assess impacts, risks and benefits of transport development and policy proposals; -Examine the relationship between regional, national and global transportation trends and development; and -Apply the role of trip generation and land use on traffic patterns.
URUP	7906	Urban Research Project	Spatial planning processes and legal framework, spatial analysis, planning techniques, public participation, applied urban development project.	MAIN	Student will be able to: -undertake an urban development and research project in a group
URUT	6803	Research in Urban Development Theory	Research with an urban planning focus in topics such as the urban context, the ideal city, urban functionality, urban form, urban transportation, urban economy, urban sustainability and self-sufficiency, urban resilience, safe and healthy cities, Western urban realities, African urban realities, urban management and governance and Right to the City.	MAIN	Student will be able to: -Examine and discuss historical and current urban development processes in western and African cities; -Show appreciation of the issues and challenges facing urban areas; -Critically evaluate the policy and action programmes implemented to address the challenges of modern urban areas; and -Prepare an urban development framework.
URUT	6804	Research in Urban Development Theory	Research with an urban planning focus in topics such as the urban context, the ideal city, urban functionality, urban form, urban transportation, urban economy, urban sustainability and self-sufficiency, urban resilience, safe and healthy cities, Western urban realities, African urban realities, urban management and governance and Right to the City.	MAIN	At the end of the module, the student is expected to be able to have: -Knowledge and understanding of historical and current urban development processes in western and African cities -Appreciation of the issues and challenges facing urban areas -Ability to critically evaluate the policy and action programmes implemented to address the challenges of modern urban areas -Ability to prepare an urban development framework

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
URUT	7912	Geography for Planners	Urban Geography: Physiographic stand factors, functional user occupations, the Central Business District, urban service areas, problems of urban pollution and climatic factors. Mapping and surveying techniques important to planners. Case studies.	MAIN	Student will be able to: - Examine the functions of urban areas; - Discuss urban morphology; - Examine the economic role of the different parts of a city and its impact on the functioning of cities effectively; and - Assess the impact of policies on the structure and to determine the operation of the city.
URUT	7922	Geography for Planners	Urban Geography: Physiographic stand factors, functional user occupations, the Central Business District, urban service areas, problems of urban pollution and climatic factors. Mapping and surveying techniques important to planners. Case studies.	MAIN	Student will be able to: - Outline principles of the functions of urban areas; - Examine urban morphology; - Discuss the economic role of the different parts of a city and its impact on the functioning of cities effectively; and - Assess the impact of policies on the structure and to determine the operation of the city.

ZOOLOGY AND ENTOMOLOGY (119)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
BLGY	1663	Introduction to Zoology and Entomology	This module contains fundamental knowledge, theories, principles and practices of Zoology and Entomology, including the paradigm of Zoological sciences followed by an overview of taxonomy, systematics and evolution. The second part will be a functional approach to the organ systems of invertebrate as well as vertebrate animals and will include the following systems: Body cover, body support systems, movement and locomotion, feeding, digestion and absorption, gas exchange, homeostasis, osmoregulation and excretion, reproduction, nervous control and coordination. The third section will deal with principles of ecology: ecosystems and interaction in communities.	MAIN	Student will be able to -Explain and describe the basic classification of vertebrates and invertebrates -Display a basic knowledge of vertebrate and invertebrate (including the Class: Insecta) organ systems; and -Describe the principles of biogeography as it applies to the animal kingdom, the basic driving forces of evolution, and the ecological influences on animal behaviour.
ENTO	2614	Introduction to Morphology, Anatomy and Bio-ecology of Insects	This module contains fundamental knowledge, theories, principles and practices of Entomology, which includes an introduction to entomology; morphology of the body wall, head, thorax and abdomen; types of mouth parts; internal anatomy of organ systems; growth and metamorphosis; insect orders with examples and life cycles; identification of the most important pests of agricultural and veterinary importance; the damage and diseases caused by them and integrated pest management practices.	MAIN	Student will be able to: - Discuss the basic morphology, anatomy and functioning of the insect body; - Identify the most important pest insects and discuss their impact in relation to the agricultural environment; and - Explore different control mechanisms to reduce the negative impact of insect pests.
ENTO	2616	Functional Morphology and Evolutionary Biology of Insects	This module contains fundamental knowledge on the characteristics of arthropods, in particular those of hexapods (insect-like organisms). Morphology of the head, thorax and abdomen, locomotory organs, mouth parts and reproductive organs form the basis of the module. In addition segmentation, growth and metamorphosis; anatomy of internal organs; characteristics to differentiate between insect orders; insect systematics and insect biology according to evolutionary form and function, processes and patterns, and time, space and scale are also dealt with. In separate practical sessions microscope and key identification of all developmental stages of insects up to family level; morphological and anatomical dissections of adult insects; elementary comparative morphology; basic classification of invertebrates and arthropods also receive attention.	MAIN	Student will be able to: - Apply basic morphology, anatomy and functioning of the insect body in a comparative sense within the Invertebrata; - Identify insects to order level and discuss their role in the environment; and - Use evolutionary biology of insects to explore their development in time.
ENTO	2626	Ecophysiology of Insects	Module contains fundamental knowledge on respiration, feeding and feeding habits, digestion, physiology of body wall, blood system, reproduction, metamorphosis, excretion and water regulation, thermoregulation, exo- and endocrine glands and pheromones, nervous system, light-, mechanical- and chemical reception, chemical defence, and bioluminescence of insects under variable environmental conditions. Laboratory trials concerning feeding and digestion, blood circulation and haemocytes, alimentary canal symbionts, growth and metamorphosis are conducted. Scientific writing and basic statistical analysis is also treated.	MAIN	Student will be able to: - Outline the structure and physiological functioning of the organ systems and sensory structures of insects; - Explain how insects interact with food sources and other organisms in their environments; - Explain the different mechanisms involved in chemical communication in insects, and their functional and physiological importance; and - Write scientific papers and reports at an acceptable standard.
ENTO	3714	Advanced Insect Ecology	This module contains advanced knowledge on the main components of and basic processes in ecosystems; influences of environmental forces; insect-plant relationships; prey-predator interactions; parasite-host interactions; population dynamics; mutualism; pollination ecology; energy flow; characteristics of populations and communities; the niche concept; impacts of anthropogenic factors on insect assemblages. Practical determination of ecosystem functioning; habitat differentiation; biotic and abiotic components of a habitat; importance of environmental factors; species richness; life strategies; host relationships; guild structure and interaction; niche structure; population composition; morphological form and function; quantitative and qualitative analysis is also dealt with.	MAIN	Student will be able to: - Apply basic and advanced ecological analysis of the different functional groups of insects in practice; - Interpret insect behaviour in an applied sense; and - Recommend management practices based on ecological principles.
ENTO	3724	Applied Insect Pest Management	This module contains fundamental knowledge on the following aspects of insect pest management. Identifying and defining pests; use of economical threshold values; pest prediction- and monitoring techniques; ecological principles; pest management and the environment; chemical control and all aspects thereof; integrated pest management and pesticide application. The biology, ecology and life cycles of pest species; the physical damage indices on agricultural crops; practical field applications of pest management.	MAIN	Student will be able to: - Identify insects of agricultural importance; - Evaluate and assess pest injury levels using predictive models and bio-monitoring; - Identify and evaluate damage and disease symptoms caused by insect vectors and pests; - Execute handling and application of pesticides in a safe and responsible manner; and - Compile pest management activity calendars.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ENTO	3734	Advanced Medical, and Veterinary Entomology	This module contains intermediate knowledge, theories, principles and practices of Entomology, including the identification of medical and veterinary important insects; identification of the diseases they transmit; insects as vectors of diseases of man and animals; biology and life cycles; ecological preferences and host specificity.	MAIN	Student will be able to: Identify insects of medical and veterinary importance; - List the diseases spread by insects; - Describe the role of insects in disease transmission; and - Review and explore the control measures against insect vectors.
ENTO	3744	Applied Insect Biochemistry and Pharmacology	This module contains integrated knowledge, theories, principles and practices of Entomology, including: Metabolism of carbohydrates, lipids, amino acids and proteins by insects to provide adequate energy for flight and general insect activities. Biochemistry of flight muscles, growth and development, the nervous system, pharmacological detoxification and defensive excretions as well as application in chemical control also receive attention.	MAIN	Student will be able to: -Evaluate metabolic pathways and adaptations necessary for insect energy production between different insect orders, families and even species; -Interrelate different biochemical processes such as nerve stimulation, hormonal excretions and haemolymph carrier proteins to obtain successful insect energy production for different activity levels; -Justify pharmacological action for insect control on biochemical knowledge of the mode of action of pharmacological substances and insect detoxification and defensive excretions; and -Validate information gathered to develop methodology for insect enzyme extractions and pharmacological inhibition.
ZLGY	2636	Invertebrate diversity	This module provides students with a deeper understanding of invertebrate diversity focusing on classification, morphology, general biology, and life cycles of selected invertebrate groups that have medical and veterinary importance in Africa.	MAIN	Student will be able to: -Identify various invertebrate taxa based on morphology and life-cycles; -Describe the ecology and benefits of selected invertebrate taxa and; -Understand the importance of medical and veterinary invertebrate groups and their human impact.
ZLGY	2626	Vertebrate Life and Evolution	This module incorporates a detailed approach to the evolution and diversity of vertebrate fauna with emphasis on the endemic fauna of the southern African subregion. The foundations of vertebrate phylogenetic systematics; the unifying characteristics of major groups with a focus on evolutionary, functional and physiological adaptations; ecology; utilisation and emerging conservation issues are explored. The practical component focuses on comparative anatomy and morphology of representative vertebrate groups, to reinforce lecture themes.	MAIN	Student will be able to: -Differentiate between major groups of extant and extinct vertebrates through a demonstrated understanding of their origin, diversity and distinctive traits; -Demonstrate comprehensive insight into the major events in vertebrate evolution; -Identify and classify various indigenous vertebrates; and -Illustrate the principles that underline sustaining vertebrate biodiversity in southern Africa. Extensive laboratory work will provide the Student with practical knowledge on vertebrate form and function as to evaluate the relationships between morphological features and functional significance in a comparative context.
ZLGY	3714	Marine and Freshwater Ecology	This module gives students an in-depth knowledge of marine and freshwater ecosystems with particular reference to African Aquatic systems. In marine ecology we take a look at the South African coast, which is unique largely as a result of ocean currents dividing our coastline into three distinct regions, each hosting a unique intertidal fauna. The composition of the Marine ecosystems are studied with reference to sandy beaches, rocky shores, kelp beds and estuaries. In freshwater ecology, lentic and lotic environments are discussed, with special mention being made of dams and water schemes. Basic limnological techniques will be demonstrated during practical sessions, which include mapping of small impoundments and determining water quality parameters. Techniques for collection, identification and quantification of aquatic organisms such as plankton, benthos, epibionts and fishes are demonstrated. The practical component of this module includes a field excursion during the autumn recess, as well as shorter excursions in the Mangaung area.	MAIN	Student will be able to: -Identify, analyse and address the main functions and interactions of intertidal and freshwater ecology by applying evidence based solutions and theory driven arguments; -Identify vertebrates and invertebrates which are typically found associated with intertidal zones and freshwater environments of South Africa; -Use robust techniques to assess the health of lotic freshwater systems according to South African Standards (SASS scoring system); - Determine physical and chemical parameters of water in order to manage and interpret results in ecosystem processes; and -Recognise the value of aquatic ecosystems to mankind and how anthropogenic influences can negatively impact these ecosystems.
ZLGY	3724	Life Strategies in Arid Environment	This module focuses on life strategies that enable animals to survive under arid conditions. Behavioural, morphological and physiological adaptations are discussed in detail using relevant examples. Special reference is made to thermoregulation, respiration, water balance, bioenergetics and reproduction.	MAIN	Student will be able to: -Integrate the knowledge of the themes covered and discuss it using relevant examples of morphological, physiological and behavioral adaptations; -Identify and explain why animals are able to successfully survive in arid environments; -Independently perform practical experiments and write scientific reports; and -Communicate findings by presenting seminars.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ZLGY	3734	Conservation Ecology	The influence of human activities on ecosystems and biodiversity is critically reviewed. Where do humans come from and how did we become so successful that our ecological footprint is now threatening the survival of our planet. In 2018, we surpassed the 7,6 billion mark, is this sustainable? We start by exploring the ecological processes underlying the evolution of biodiversity. How did biodiversity originate and what are the specifications for life? How did life evolve, and how does evolution work? Here we will detour to the impacts of Charles Darwin's theory of natural selection on our understanding of evolution and the mechanism that resulted in the enormous biodiversity we know today, which represents only 1% of all the life that previously existed on Earth. We review what happened to the other 99%, how they became extinct due to natural processes of evolution, but also in five mass extinction events caused by global catastrophes. And today in the 21st century it is happening again but this time its humans causing the mass extinction event. What are the reasons and can we survive it? To find solutions, we study the dynamics of, and approaches to, the ecology of populations and communities. In the final section, we conclude on a positive note; how to care for biodiversity for our own survival.	MAIN	Student will be able to: -Critically reflect on how life evolved and how evolution works; -Understand and study how populations, communities, and ecosystems are structured and how they function dynamically as units; --Explore and discuss the local and global impact of the invasive expansion of human populations into all natural ecosystems; -Explain how human activities are changing environments, expelling species from their natural habitats and translocating alien species; and -Apply ecological knowledge to develop and manage populations, communities, and ecosystems responsibly and sustainably.
ZLGY	3744	Animal Behaviour	This module contains integrated knowledge, theories, principles and practices of Animal Behaviour. Themes covered include: the history of ethology, concepts, ecology of behaviour, evolution of behaviour, social spacing, group advantage and play behaviour.	MAIN	Student will be able to: -Use the theory of natural selection and understand the levels of natural selection -Interpret the major aspects of behaviour using current ideas -Develop hypotheses about behaviour and design experiments or sampling programmes to test them -Use basic statistical methods in behavioural studies; and -Write concise and accurate reports of practical work.
BIOL	1504	Lower life and molecular biology	This module contains fundamental knowledge, theories, principles and practices of Biology, including conditions on early earth, chemical evolution, appearance of cells, origin of metabolism, self-replicating systems, origin of pro and eukaryotic cells, origin of membranes and organelles, cell division, energy harvesting pathways: photosynthesis. The Flow of genetic information: mitosis and meiosis, DNA replication and patterns of inheritance and the application are included. The following are also covered: bacteria and viruses, protists, single celled algae and fungi.	QWA	Student will be able to: -Explain the current theories w.r.t. the origins of life and how it unfolds in nature -Explain the structures of living cells and how complex molecules in cells interact with each other to make the flow of energy, material and information possible in the cell -Explain the transfer of genetic information and how it influences the patterns of inheritance between generations of organisms -Understand the fundamental principles regarding the biology of the different levels of organization in living organisms from viruses to eukaryotic micro-organisms
BIOL	1514	Lower life and molecular biology	This module contains fundamental knowledge, theories, principles and practices of Biology, including conditions on early earth, chemical evolution, appearance of cells, origin of metabolism, self-replicating systems, origin of pro and eukaryotic cells, origin of membranes and organelles, cell division, energy harvesting pathways: photosynthesis. The Flow of genetic information: mitosis and meiosis, DNA replication and patterns of inheritance and the application are included. The following are also covered: bacteria and viruses, protists, single celled algae and fungi.	QWA	Student will be able to: -Explain the current theories w.r.t. the origins of life and how it unfolds in nature -Explain the structures of living cells and how complex molecules in cells interact with each other to make the flow of energy, material and information possible in the cell -Explain the transfer of genetic information and how it influences the patterns of inheritance between generations of organisms -Understand the fundamental principles regarding the biology of the different levels of organization in living organisms from viruses to eukaryotic micro-organisms
BIOL	1644	Animal Biology	This module contains fundamental knowledge, theories, principles and practices of Biology, including higher levels of the kingdom Animalia, a thorough briefing on Invertebrata and an introduction to Vertebrata. Topics covered include an introduction to invertebrate classification and bio-ecology, insect morphology, anatomy and metamorphosis, basic entomology and its application, including insect plant relationships, medical, veterinary and forensic entomology, insect physiology and pest control. Finally, students will learn about mammalian zoogeography, evolution and etho-ecology.	QWA	Student will be able to: -Explain and describe the basic classification of the invertebrates, including insects. -Display a basic knowledge of entomology: class Insecta. -Describe the principles of biogeography as it applies to the animal kingdom, the basic driving forces of evolution, and the ecological influences on animal behaviour.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BIOL	2614	Evolution, genetics and diversity	This module contains fundamental knowledge, theories, principles and practices of Biology, including Students will be introduced to the principles of evolutionary theory, including the following key concepts: species concepts, scientific names, binomial and sub-specific ranks, Darwin's theory of evolution, Mendelian genetics, the modern synthesis, variability in populations: population genetics and Hardy-Weinberg equilibrium, natural selection and genetic drift, molecular genetics, the genetic code, distribution ranges, dispersal, biogeography and reproductive isolation. Students will receive a practical introduction to methods such as Polymerase Chain Reaction, gene sequencing, deriving phylogenetic trees, phenetics and phylogenetics.	QWA	Student will be able to: -Demonstrate knowledge on genetic variability and its consequences for population genetics and speciation as well. -Apply this knowledge in analyzing gene frequencies in populations to predict the changes in population genetics over generations. -Apply the principles of distributions and chance to solve problems of population genetics in an unfamiliar context. -Evaluate and use different types of population data and conform to ethical standards while engaging in population genetic questions. -Understand the connection between genetic variability on a molecular level and a population level and make connections between both levels. -Select appropriate methods and analyses in dealing with genetic or molecular data -Communicate the findings of genetic and molecular analyses in an appropriate manner. -Recognize the criteria of assessment and accurately assess his/her own learning needs and those of others.
BIOL	3714	Human ecological footprint	The influence of human activities on ecosystems is critically reviewed, which includes man's ecological footprint, biodiversity, speciation, extinction and Africa's natural history. Several conservation issues are analysed, including an evaluation of the state of our natural resources, translocation and introduction of organisms, threats to biodiversity with a focus on southern African species, an introduction to conservational areas in southern Africa, environmental management, climate change and an exploration of alternative, sustainable sources of energy. After successfully completing this module, the student will be able to critically evaluate human impact on the environment and will be able to provide practical solutions for environmental problems.	QWA	Student will be able to: -Outline the principles of ecology and conservation; -Apply and evaluate the key terms, concepts, facts, principles, rules and theories associated with conservation ecology; -Indicate how conservation ecology relates to other fields or disciplines; -Evaluate types of explanations and information typical of conservation ecology; -Outline the range of inquiry in this field and their suitability to specific investigations; -Apply a range of methods to resolve problems in the discipline; -Identify, analyse, critically reflect on and address complex ecological problems, applying theory-driven ecological arguments; -Develop appropriate processes of information gathering for a given assignment/topic, and independently evaluate and manage this information; -Create and communicate his/ her ideas and opinions in well-formulated arguments, using appropriate academic discourse; and -Take responsibility for his/her decisions and actions, whether it is individually or as part of a group, including the responsibility for the use of resources where appropriate and limited accountability for the decisions and actions of others in varied contexts.
BIOL	3724	Macroevolution and speciation	This module describes the history of life, focusing on the phenomena of natural selection and adaptation, as originally postulated by Darwin. A broad perspective will be taken, encompassing evidence from plate tectonics, fossil records, evolutionary genomics, homologies, embryology and modern-day biodiversity. Important concepts such as inheritance of characteristics, stochastic mutations, and the various processes that drive speciation will be addressed. Students will gain an invaluable, scientific perspective on the abundance and origins of life on Earth.	QWA	Student will be able to: -Competently conduct phylogenetic analyses using morphological and molecular data -Understand and employ an array of scientific approaches to phylogenetic reconstruction -Apply these techniques in evolutionary comparisons -Explain the coalescent model of gene-genealogies within species -Accurately estimate population size and migration rates from DNA sequence data
UNIR	2624	Insect ecophysiology	This module contains fundamental knowledge, theories, principles and practices of Biology, including insect physiology within an ecological framework. Upon completion of this module, students will have acquired skills in lab based insect experiments, and understand the composition of the diverse variation in form and structure of the insect body, as well as how insects are able to survive under diverse conditions. Topics include respiration, feeding habits, digestion, physiology of body wall, blood system, reproduction, metamorphosis, excretion and water regulation, thermoregulation, exo- and endocrine glands and pheromones, nervous system and light, mechanical and chemical reception of insects under variable environmental conditions.	QWA	Student will be able to: -Answer familiar and unfamiliar questions about insect ecology -Argue various viewpoints related to insect ecological theories -Provide South African examples of insect ecological theory -Formulate independent opinions around various debates of insect ecological theories -Conduct relevant statistical analysis used within ecological studies -Design an experiment based on a Student-initiated hypothesis and write a scientific article based on calculated results.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
UNIR	3724	Applied entomology	This module will teach students to apply their knowledge of entomology to manage pest species or to use insects beneficially. The theoretical aspect will be divided into four main modules: chemical control of pests, biological control of pests, additional methods of controlling pests, and beneficial uses of insects. The practical side of the course will look at the major pests of fruit, vegetable, wood and livestock practices. Students will identify major pests, calculate thresholds, and recommend treatment plans. Topics will include: basic entomological practices in the agricultural environment, insects as pests, intergraded pest management, thresholds, insecticides, insecticide toxicity and environmental fate, host plant resistance, transgenic crops, storage and transport pest management, vectors and vector control, biological control, nematology, forest, tree, and garden pest management, bee keeping, decomposers, biomonitoring, insect conservation and trade markets, urban and public health entomology, the role of insects in aesthetics, art, culture and leisure practices	QWA	Student will be able to: -Apply knowledge of entomology to control insect pests through chemical control, and alternative methods; -Demonstrate the beneficial use of insects; -Monitor the level of infestation of a pest insect; -Calculate thresholds and crop damage predictions; -Create a treatment plan when presented with novel pest scenarios; and -Obtain information from various sources based on a specific pest species and report on this species through professional PowerPoint presentations
UNIR	3734	Medical, veterinary and forensic entomology	This is a practical and theoretical course significantly expanding on students' basic knowledge of entomology. Topics covered in this course include the identification of medically and veterinary important insects, identification of the diseases they transmit, insects as vectors of diseases of man and animals, insect biology and life cycles, ecological preferences and host specificity, identification of forensically important insects, and the role of insects in forensic medicine.	QWA	1.Identify insects of medical and veterinary importance 2.Demonstrate and apply knowledge of economically important diseases transmitted by insect vectors. 3.Identify insects of forensic importance 4.Relate the role of insects in the decomposition process of carcasses and their importance in solving criminal cases.
UNIR	3744	Insect biochemistry and pharmacology	This course is an advanced investigation of insect physiology and morphology as well as biochemical processes relevant to insect survival and biological control. Topics covered in this course include: the biochemistry of flight muscles; metabolism of carbohydrates, lipids, amino acids, proteins and nucleic acids; biochemistry of growth and development; insect nervous systems; pharmacology; detoxification and defensive excretions and application in chemical control.	QWA	Upon successful completion of the module Student will be able to: 1.Appropriately interpret scientific notation and apply their knowledge to solve scientific problems involving scientific notation 2.Read, recall, discuss, clarify and organise information of the physiological and biochemical processes of insects 3.Present relevant topics in different graphical or diagrammatic formats and relate concepts of general insect physiology and specific biochemistry aspects. 4.Criticize and argue about data, ideas and concepts of insect physiology, biochemistry and pharmacology. 5.Set up and conduct laboratory experiments on biochemical and pharmacological aspects of a.insect metabolism and key enzyme inhibition b.pesticide identification and c.pesticide development.
ZOOL	2614	Basic entomology	This module consists of both theoretical and practical units, giving students a broad introduction to the study of insects. Topics covered include insect physiology, evolution, and taxonomy. Students will be given practical tools to start in the field of entomology, within a sound scientific, hypothesis-based framework. Upon completion of this module, students will have acquired skills in insect taxonomy that will enable them to identify insects to order and family level. Students will also understand the composition of the diverse variation in form and structure of the insect body. Students will learn how insects are able to survive under diverse conditions. Students will also have insight into where insects fit into the animal kingdom and be able to describe the unique entomological fauna of southern Africa.	QWA	Student will be able to: -Demonstrate a proficiency in academic and scientific literacy that enables them to read, recall, recognize, draw, describe, discuss, clarify, criticize, and write about the variety of different forms and functions of the insect body. -Construct diagrams and notations that illustrate scientific thinking about entomological concepts and investigations. -Design, plan and conduct scientific investigations to compare and record observations of the local insect fauna. -Present the results of their own scientific studies verbally and in writing. -Demonstrate confidence in using scientific knowledge to debate investigations, practices, issues and popular articles in terms of their scientific validity and credibility -Use critical thinking and problem solving skills to propose and recommend scientific solutions to every day, real life problems. -Investigate and appreciate the unique diversity of biomes in southern Africa and the importance of conservation and sustainable living -Demonstrate through discussion and critical reflection the knowledge developed about the variation in physiological systems in insects.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ZOOL	2634	Invertebate biodiversity	This module contains fundamental knowledge, theories, principles and practices of Biology, including an overview of upper classification through all invertebrate phyla. This will include the general taxonomy, anatomy, morphology, physiology, ecology, evolution and benefits to humans. In practical sessions the students will be introduced to all phyla and taught how to identify invertebrates from phylum to order level. Phyla included in course are: Porifera, Placozoa, Cnidaria, Ctenophora, Mesozoa, Plathelminthes, Nemertea, Rotifera, Acanthocephala, Gnathostomulida, Micrognathozoa, Nematoda, Nematomorpha, Priapulida, Kinorhyncha, Loricifera, Annelida, Mollusca, Arthropoda, Tardigrada, Onychophora, Gastrotricha, Chatognatha, Cycliophora, Phoronida, Brachiopoda, Bryozoa, Entoprocta, Echionodermata, Hemichordata, Xenoturbellida, Chordata (the non vertebrate specimens).	QWA	Student will be able to: -Understand the upper taxonomic relationships and evolutionary trends within the invertebrate phyla. -Describe the ecology and benefits of each invertebrate taxon. -Identify specimens from phylum to order level for all invertebrates. -Illustrate scientific drawings correctly for publication. -Use and create dichotomous keys as aid for taxonomic identification purposes.
ZOOL	2664	African vertebrates	This module contains fundamental knowledge, theories, principles and practices of Zoology, including several aspects and principles of the study of African vertebrates, including the principles of vertebrate systematics, physiology, morphology, anatomy, ecology and ethology, as well as key terms, concepts, facts, principles, rules and theories associated with vertebrates. Students will undergo both theoretical and practical training, acquiring a grasp of laboratory and field-based research techniques. After successful completion of this course a student will be able to identify African vertebrates and be well informed on the basic concepts of vertebrate ecology in the southern African sub-region.	QWA	Student will be able to: -Demonstrate a detailed knowledge of the principles of vertebrate systematics, physiology, morphology, anatomy, ecology and ethology. -Apply the key terms, concepts, facts, principles, rules and theories associated with vertebrate studies. -Systematically identify most African vertebrates. -Evaluate and solve ecological questions posed concerning African vertebrates, with special emphasis on endemic species occurring in the southern African sub-region. -Understand and communicate complex systematic, physiological, morphological, anatomical and ecological information in a reliable, coherent manner, using the appropriate academic decorum and professional formats and technologies such as written essays and PowerPoint presentations. -Access library and online resources, select information appropriate to the topics of given assignments and projects and synthesise relevant information. -Work effectively in a group and take responsibility for his/her decisions and actions, whether it is individually or as part of the group, including the responsibility for the use of resources where appropriate.
ZOOL	2684	Introduction to Parasitology	This module introduces students to the practical and theoretical aspects of studying parasites. Topics include taxonomic classification of parasites, host spectrum, geographical distribution, morphology, life cycles, epidemiology, parthenogenesis, control measures and public significance and vectors of medical and veterinary importance.	QWA	Student will be able to: -Discuss how important parasites can be classified according to kingdom and phylum; -Describe how parasitic infections affect the communities in poor countries and that the knowledge of their life cycle is important for effective prevention and control; -Outline the central facts and the experimental basis of modern parasitology; -Solve problems in the context of this understanding; -Describe the relationship of parasitic infections to symptoms, relapse and the accompanying pathology; -Arrange factors that determine endemicity of the parasite infection; -State the distribution and epidemiology of the parasites; -Explain the methods of parasite control; -Recall the basic terms in parasitology and appropriately describe basic life cycles; -Identify different types of parasites namely, hemoparasites, gastro-intestinal parasites and ectoparasites; -Describe major diseases caused by parasites and their epidemiology; -Collect, identify, and conduct laboratory diagnosis of parasite infections in hosts and vectors; -Identify medically and veterinary important parasites and vectors; and -Conduct appropriate diagnostic techniques.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ZOOL	3714	Introduction to Animal Behaviour	This course introduces students to the scientific study of animal behaviour through an evolutionary lens, including aspects of human behavioural ecology. Tinbergens four questions will be applied to the study of animal behaviour, i.e., the functional, phylogenetic, mechanistic and developmental aspects of behaviour. This course will also introduce principles of optimal foraging theory, predator-prey interactions, social behaviour, decision-making theory, learning, communication, cognition, and the physiological control of behaviour. Successful students will be prepared for the advanced course in Behavioural Ecology (ZOO614) and will be able to apply their knowledge of behavioural ecology to biodiversity conservation, wildlife management, animal husbandry, and the more theoretical field of biological psychology.	QWA	Student will be able to: -Use scientifically robust techniques to assess and describe behaviour, based on the principles of Tinbergen's four questions; -Communicate scientific results competently through written and oral argument; -Apply evolutionary principles to the naturally observed behaviours of animals (including humans); -Apply principles of behavioural ecology to the management of animal welfare and conservation, when presented with novel problems; -Distinguish between proximate and ultimate causes of given behavioural patterns; -Critically assess and formulate arguments on the origins and expression of animal behaviour; -Discuss the evolutionary ties between all animals as evident from behavioural ecology; and -Design and assess critical scientific studies in behavioural ecology.
ZOOL	3724	Ecotoxicology	This course is aimed at undergraduate students who have completed basic chemistry and biology courses. It provides a general introduction to the field of ecotoxicology and covers topics such as environmental contamination, major classes of contaminants and acute/chronic effects of contaminants on individuals, populations, communities and ecosystems. Through an accompanying practical program, emphasis is also given on the assessment of the toxicity of potential environmental contaminants in the laboratory.	QWA	Student will be able to: - design and conduct research projects in ecotoxicology - analyzing, interpreting and communicating their findings in report and article forms
ZOOL	3734	Insect ecophysiology	This module contains fundamental knowledge, theories, principles and practices of Entomology, including class discussions based around insect ecology and various ecological concepts from the interaction between insects and their abiotic environment, insects and other individuals within the same species as well as between specimens of different species. Students will investigate symbiotic relationships, as well as their evolutionary development. The course is designed around the creation of hypotheses and experimental design to test these ecological theories. Students are expected to find South African examples for various ecological concepts, and be able to design experiments around South African conditions. Furthermore, students are taught to argue various statements, as well as formulate their own opinions around various ecological topics. Students are also expected to find additional literature in the form of articles to justify their arguments. Students will be taught various ecological statistical analyses and calculations used during environmental evaluation and related ecological studies.	QWA	Student will be able to: -Answer familiar and unfamiliar questions about insect ecology -Argue various viewpoints related to insect ecological theories -Provide South African examples of insect ecological theory -Formulate independent opinions around various debates of insect ecological theories -Conduct relevant statistical analysis used within ecological studies -Design an experiment based on a Student-initiated hypothesis and write a scientific article based on calculated results.
ZOOL	3744	Molecular parasitology	This module introduces students to parasite genomics whereby the identity and functions of important genes and proteins of selected parasites will be studied. Practical techniques of parasite diagnostics, such as PCR and LAMP, will be demonstrated and practiced. These techniques are used for diagnosis of parasite infections targeting specifically expressed genes or unique sequences on non-specific genes. Further techniques will also be practiced, such as ELISA, in which recombinant proteins are used as antigens in serological assays. Students will understand the basic functions of the immune system and different types of the immune system (innate and adaptive). This study will include in-depth coverage of molecules used by immune system to combat parasite infections. Lastly, the course details antigenic variation, a common strategy used by parasites to evade immune systems.	QWA	Student will be able to: -Correctly explain the molecular biology of selected parasites of medical and veterinary importance; -Factually recall and describe specific parasitological genes and proteins that play important roles in the survival of the parasite (i.e., virulence); -Apply modern molecular techniques used to diagnose parasites targeting particular genes; -Describe immunology, the host immune system and how it combats parasite infections; and -Describe the methods by which parasites evade the host immune system.
ZOOL	3754	Freshwater and marine ecology	This course gives students an in-depth knowledge of marine and freshwater ecosystems, with a particular emphasis on African aquatic systems. In freshwater ecology basic limnological techniques are demonstrated. These include mapping of small dams, determining pH, conductivity, dissolved oxygen, etc., as well as techniques for collection, identification and quantification of aquatic organisms. Students will learn about the costs and benefits of living in freshwater, and how to preserve our planet's dwindling water supplies. The techniques practiced in this course will enable them to monitor the health of freshwater ecosystems using rigorous national standards of assessment. The South African coast is unique largely as a result of ocean currents, which result in dividing our coastline into three distinct regions, each hosting a unique intertidal fauna. The composition of these ecosystems will be studied with special reference to sandy beaches, rocky shores, kelp beds and estuaries. The practical component of the marine ecology sub-module is a marine field excursion during the autumn recess.	QWA	Student will be able to: -Use scientifically robust techniques to assess the health of lotic freshwater systems according to South African standards (the SASS and DBI scoring systems); -Communicate scientific results competently in written presentations; -Distinguish between zones of different coastal areas as well as lentic systems; -Identify invertebrates and vertebrates typical of South African freshwater and marine environments; -Discuss and describe aquatic ecosystem dynamics, including the river continuum concept and abiotic factors impacting the living environment; -.Appraise anthropogenic impacts on the aquatic environment; -Recognize the specific and vital reliance of mankind on healthy aquatic ecosystems. -Outline global and local relationships between the aquatic environment and geographic factors; and -Evaluate the unique aspects of South Africa's living waters.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Postgraduate					
ENTO	6808	Research Report Entomology	A year project that involves protocol planning, field work, data analysis, writing up of results and oral presentation of results on a topic determined by a selected field within the discipline.	MAIN	Student will be able to: - Present and discuss a selected topic in front of an audience; and - Demonstrate independent research skills and processes from beginning to end by submitting a research project written in article format.
ENTO	6814	Research Techniques, Scientific Methodology and Communication	This module consists of techniques applicable in Entomology, accessing scientific literature, organising and evaluating scientific information, broad techniques in systematic analysis, compilation of information according to scientific standards and format, and written and oral communication skills.	MAIN	Student will be able to: - Examine and apply the methodologies and techniques in accessing scientific literature; - Present and communicate academic ideas effectively to various audiences; - Use various computer programmes to prepare presentations; - Apply systematic analysis; and - Prepare and submit reports and standard operating procedures for research projects.
ENTO	6834	Chemical Ecology	This module contains foundational theories, principles and practices of chemical ecology, dealing with chemically mediated interactions within and across species primarily in terrestrial systems. The course will primarily cover the coevolution of plant- insect interactions with a focus on offensive and defensive chemical basis of antagonistic relationships (insect herbivory & plant counter defence) together with the chemical basis of mutual relationships (e.g. flowers and pollinators). The role of chemical communication in tri-trophic interactions and also in the group dynamics of social insects will also be discussed. Methods for detecting such compounds and their subsequent impact on insect behaviour will also be discussed in line with their potential application in agriculture, conservation and the built environment.	MAIN	Student will be able to: -Describe insect sensory system for olfactory based navigation, settlement and gustatory perception; -Appreciate the key plant defence mechanisms and insect offensive strategies and their evolutionary contribution to biodiversity; -Understand the importance of chemical communication in group dynamics of social insects; -Understand the role of chemical communication in insect reproduction; -Identify applications of knowledge of chemically based interactions in sustainable pest management and biodiversity conservation; and -Understand and apply various experimental techniques and analytical tools to evaluate the impact of chemical compounds on insect behaviour.
ENTO	6842	The Environment	The main assignment for this module is to present a seminar and then to write an appropriate article and executive summary for the South Africa Journal of Science in which a topical issue concerning the global and/or South African environment is critically discussed.	MAIN	Student will be able to: - Argue issues relating to environmental management in front of an audience; and - Recommend practices and strategies that will realistically contribute towards environmental conservation.
ENTO	6844	Capita selecta in Entomology	This is a Capita selecta module where students can choose from the following three topics i.e. Arachnology, Dipterology & Nematology. Taxonomy, phylogeny and identification of families; biodiversity (including species richness and Afrotropical endemics); role in agroecosystems and medically and veterinary important species are themes covered in this module.	MAIN	Student will be able to: - Identify families in the selected groups; and - Show how families of the selected groups can be used in agricultural, medical and veterinary fields.
ENTB	6802	Quantitative Ecology	This module explores the application of intermediate quantitative methods to ecological questions in Entomology. We review the principles of the scientific method, how data are collected, the construction of biological hypotheses, and the statistical approaches to testing those hypotheses.	MAIN	Student will be able to: -Design studies and data collection protocols for answering specific ecological questions; -Predict the appropriate statistical method to use when confronted with most questions and data types; -Recognise the assumptions underlying these methods; -Describe and use software for applying the methods; and -Offer a basic interpretation of results provided.
ENTO	6854	Insect-Plant Interactions	Based on ecological and evolutionary principles the role and impact (positive and negative) of insects associated with plants in natural and synthetic (agricultural) environments are discussed and demonstrated with relevant case studies. This is approached in an above ground and below ground context.	MAIN	Student will be able to: - Provide advice relating to insects affecting plant health in forestry, horticultural, agricultural and natural environment settings; and - Consider strategies to facilitate the interpretation of insect activity on plants in general.
ENTO	6862	Biodiversity, Evolution & Biogeography	This module investigates biodiversity, taxonomy, systematics, biogeography and evolution as fundamental components of the biological sciences. A sound knowledge of these topics is developed during this course and this is achieved by discussing the principals of the mentioned components, as well as by debating various cutting-edge issues.	MAIN	Student will be able to: - Present and discuss relevant topics regarding the existence of organisms in time and space; and - Interpret and debate issues regarding the origin of species diversity.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ENTO	6864	Medical and Veterinary Entomology	This module contains high-order knowledge, theories, principles and practices of Entomology, in terms of the bio-ecology, vector potential, disease transmission and parasite-host relationships of insects of medical and veterinary importance.	MAIN	Student will be able to: - Integrate the following aspects of the vector, host and pathogen / parasite in terms of (i) characteristics, (ii) life cycle & transmission routes, (iii) the range of vectors and hosts infected, (iv) bio-ecology, (v) susceptibility of the vector and hosts, (vi) disease / symptoms, (vii) overwinter mechanism / survival of the pathogen / parasite, (viii) ecological / economic consequences, (ix) vector and disease control measures, (x) landscape epidemiology, (xi) distribution patterns; and - Evaluate critically the evolutionary aspects driving the host / vector / disease interaction and association.
ENTO	6884	Advanced Pest Management	A broad and in-depth approach to all facets of modern insect pest management on plants and animals. New management techniques; cultural and environmental aspects of a holistic integrated pest management program; alternatives to chemical control as well as the environmental impact of pest control are covered in this module	MAIN	Student will be able to: - Research, present and discuss relevant topics regarding insect pest management; and - Evaluate and apply different insect management strategies forming part of an integrated pest management system.
ENTO	8900	Entomology Dissertation	This is a research based dissertation and contains fundamental knowledge, theories, principles and practices of Entomology. A Research project in a specialised field of Entomology is chosen and discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem and formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing; and - Provide specialist knowledge in a particular field of Entomology.
ENTO	9100	Entomology Thesis	This is a research based thesis and contains fundamental knowledge, theories, principles and practices of Entomology. A Research project in a specialised field of Entomology is chosen and discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified thesis structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Show high-level expertise and critical knowledge in an area at the forefront of the field, discipline or practice; and - Conceptualise new research initiatives and create new knowledge or practices.
ZLGY	6808	Zoology Research Report	A year project that involves protocol planning, field work, data analysis, writing up of results and oral presentation of results on a topic determined by a selected field within the discipline.	MAIN	Student will be able to: -Independently design and carry out experimental and correlational research that yields valid results; and -Present and discuss their research findings in front of an audience.
ZLGY	6814	Research Techniques, Scientific Methodology and Communication	The module consists of techniques applicable in Zoology, accessing scientific literature, organising and evaluating scientific information, broad techniques in systematic analysis, compilation of information according to scientific standards and format, and written and oral communication skills.	MAIN	Student will be able to: -Demonstrate methodologies and techniques used in accessing scientific literature -Present and communicate academic ideas effectively to various audiences -Master skills such as various computer programmes to prepare presentations -Show a broad comprehension of systematic analysis; and -Prepare and submit reports and standard operating procedures for research projects.
ZLGY	6824	Conservation Ecology	Concepts in population ecology as tools for guiding responsible and sustainable species conservation strategies: regulation and limitation of animal populations; threats, causes and frequency of population extinction; population viability analysis.	MAIN	Student will be able to: -Discuss the status of animal populations, and the factors threatening their survival; -Understand how phenomenological models are used to understand population dynamics, and, in particular, how to construct a population viability analysis; and - Reflect critically on management and conservation plans for single- and multi-species systems.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ZLGY	6834	Wetland Ecology	Wetlands in southern Africa, chemical and physical conditions in wetlands, biotic community of wetlands, wetlands as biological filters, threats to wetlands, production and productivity, as well as wetlands in arid environments are topics covered during this module. This course includes class work, presentations by students, practical work, seminars and an open book examination.	MAIN	Student will be able to: -Determine the conservation status of wetlands based on chemical, physical and biological information -Collect and analyse the data referred to above and be able to provide a professional opinion on management of wetlands with the aim of environmental conservation -Relate the experience gained during the module to analyse unfamiliar wetlands; and -Identify alien species and present practical measures for their control.
ZLGY	6842	The Environment	The main assignment for this module is to present a seminar and then to write an appropriate article and executive summary on a topical issue concerning the global and/or South African environment.	MAIN	Student will be able to: -Argue issues relating to environmental management in front of an audience; and -Recommend practices and strategies that will realistically contribute towards environmental conservation.
ZLGY	6844	Capita Selecta in Zoology	This is a Capita selecta module where students can choose from one of the following four topics i.e. , Palaeontology, Nematology, Herpetology and Arachnology.	MAIN	Student will be able to: -Discuss various theories, research methodologies and techniques relevant to these four fields; -Use a range of skills to identify, analyse and address problems in these fields; and -Apply strategies in a self-critical manner.
ZLGC	6802	Quantitative Ecology	This module explores the application of intermediate quantitative methods to ecological questions in Zoology. We review the principles of the scientific method, how data are collected, the construction of biological hypotheses, and the statistical approaches to testing those hypotheses.	MAIN	Student will be able to: -Design studies and data collection protocols for answering specific ecological questions; -Predict the appropriate statistical method to use when confronted with most questions and data types; -Recognise the assumptions underlying these methods; -Describe and use software for applying the methods; and -Offer a basic interpretation of results provided.
ZLGY	6854	Veterinary Ectoparasitology	This module concentrates on the occurrence and control of selected ectoparasites of economic importance associated with domesticated animals. Specific attention is given to taxonomy, evolutionary development of life strategies, interaction with habitat and hosts, disease transmission, management practices for control and resistance development of parasites to chemical control.	MAIN	Student will be able to; - Discuss where tick species fit into the taxonomic system and be able to allocate a tick specie to one of the three families in the suborder Ixodida; - Identify the different life strategies of different tick species and its evolutionary importance for tick survival; - Have knowledge of tick host interactions within a habitat, the sensory basis of tick feeding as well as tick adaptations to ensure an adequate water balance for survival during on and off host periods; - Discuss different tick transmitted diseases and their economic impact on cattle production; - Compare the two major tick families, Argasidae (soft ticks) and Ixodidae (hard ticks), with regards to differences and similarities in morphological, biological and ecological features to ensure successful survival in a hostile environment; - Make recommendations on tick control and the management strategies on the development of tick resistance against chemical tick control; and - Identify other ecto- parasites of veterinary importance such as fleas (Ctenocephalides felis) and sheep scab (Psoroptes ovis) and their interaction with their hosts and the environment.
ZLGY	6862	Biodiversity, Evolution & Biogeography	This module investigates biodiversity, taxonomy, systematics, biogeography and evolution as fundamental components of the biological sciences. A sound knowledge of these topics is developed during this course and this is achieved by discussing the principals of the mentioned components, as well as by debating various cutting-edge issues.	MAIN	Student will be able to: -Research, present and discuss relevant topics regarding the existence if organisms in time and space; and -Interpret and debate issues regarding the origin of species diversity.
ZLGY	6864	Animal Behaviour	This module focuses on advanced principles of animal behaviour with the emphasis on reproductive behaviour and sexual selection. Aspects of social learning and cultural transmission on this topic are also addressed.	MAIN	Student will be able to: - Conceptualise and recognise the evolutionary advantages as well as the influences of social learning and cultural transmission of certain mating behaviours on the fitness of animals in a process of natural selection.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ZLGY	6874	Aquatic Parasitology	This module concentrates on water borne parasites, which spend at least part of their life cycle in water. Aspects that are covered include: Taxonomy, ecology, pathology, parasite/host associations, epizootology and control of parasites	MAIN	Student will be able to: - Outline and apply the theories and research methodologies in the broad field of parasitology; - Identify the various parasites encountered on/in fish based on their morphology, life cycle, ecology and pathology caused to the host; - Use a range of methods and laboratory techniques to identify and process various fish parasites from different taxonomic groups; and - Address various ethical issues when determining the specific methods for treating hosts for parasites.
ZLGY	8900	Zoology Dissertation	This module is a research based dissertation. A research project in a specialised field of Zoology is chosen and discussed with study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ZLGY	9100	Zoology Thesis	This module contains fundamental knowledge, theories, principles and practices of Zoology. A Research project in a specialised zoological field is chosen and discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified thesis structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified thesis structure; and -Write two manuscript, adhering to the grammatical and technical aspects of scientific writing.
ZOOL	8900	Zoology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of Zoology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
BIOL	6808	Research essay	The student will conduct a research project depending on the speciality of the supervisor. The research project will either be in plant sciences or zoology field or any other field related to life sciences as deemed necessary by the supervisor. The student will be expected to submit a research proposal and after its approval research will be conducted and then presented orally and finally a written research report (mini-dissertation, which may be in article format). The student will be introduced to research whereby he/she will be given a mini project that will be conducted for a period of 8 months	QWA	Student will be able to: -Critically assess the primary literature on his/her topic -Communicate intelligently with experts and laypeople on the topic, using both oral and written communication skills -Combine the appropriate evolutionary principles and analysis techniques to address his/her scientific questions central - Design and implement an independent study - Assess the success of his/her research through the use of appropriate statistical software and other relevant technologies.
BIOL	6814	Scientific methodology and communication	Description of five principles of science. Description of hypothesis. Description of theory with discussions on world`s popular theories. Definition of research, its significance and discussions on practical products of research available in our daily life. A breakdown on how to write a research proposal including literature review, justification, objectives, materials and methods, milestones/time frames, budget, data analysis and references. What is plagiarism, why do people plagiarize and how to avoid plagiarism. Step by step protocols of searching and downloading articles, genes, amino acids, alignment of sequences on online databases with practical at the library. Different laboratory techniques depending on students research specialty such as microscopy and molecular techniques. Field research techniques, application for permits, animal ethics, sample collection (animal and plant).	QWA	Student will be able to: -Describe the principles of science. -Apply basic methodologies which have to be followed when conducting research, how to write a research proposal and research report (dissertation/thesis) as well as publication articles. -Avoid plagiarism and understand its implications on ones scientific career. -Search for scientific articles, resources and programs on internet databases. -Distinguish the value of different basic laboratory techniques and field based research techniques for both animal and plant research. -Understand the value of communicating scientifically with different audiences, including a hands-on knowledge of “science communication.”

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
BIOL	6824	Current events in science	Each student will choose a topic relevant to events from the previous year on a global scale. Regular topic fall into the main categories of: natural disasters, accidents due to human error, exploitation of natural resources; disease outbreaks; new ground braking findings within biology and relative fields; conservation practices & malpractices; and governmental policies. Each student must then gather information around the event, history that lead up to the event, the consequences of the event, the management of the event, and future plans for restoration. Furthermore, they have to bring it into perspective and find out how the event affected our country, and how our government and relative associated management would have dealt with a similar event. Each student will also report on interesting media stories, or statements of famous people and their opinions of the event as well as providing their own opinion and solution to the problem or how they would have dealt with the problem differently. The student would have a better understanding of the impact of humanity on the environment as well as being able to debate various relative environmental issues taking inconsideration the view points of all parties involved.	QWA	Student will be able to: - Obtain information on a specific event, and evaluate how these events have affected the environment -Create an opinion on a relative topic under discussion and debate an given argument taking in consideration all view points -Present an report on a relative topic -Write a scientific article base on a relative topic, that look at all the perspectives so that the Student can learn from this event to be able to identify potential problems that might affect the environment and plan to prevent a similar disaster
BIOL	6834	Advanced biostatistics	Exploratory data analysis. Multiple regression and Multi-factor ANOVA. Principal Components Analysis, Factor analysis. Cluster analysis. Correspondence Analysis, Canonical Correspondence Analysis, Multidimensional Scaling. PerMANOVA. Discriminant analysis. Presentation of data and interpretation of results. Relevance for community ecology.	QWA	Student will be able to: -Demonstrate knowledge and engagement in the analysis of multivariate datasets -Apply this knowledge to various biological questions -Evaluate the processes of knowledge production in complex biological and ecological questions. -Select the right method applicable to any question involving multivariate data -Understand the complexities and limitations of each of these methods when solving biological or ecological problems -Obtain and manage relevant data for multivariate analysis and operate within a statistical framework to analyze such data in a creative manner. -Demonstrate accountability and ethical standards in guiding his or her own learning process in a self-critical manner.
BIOL	6844	Advanced biostatistics	Exploratory data analysis. Multiple regression and Multi-factor ANOVA. Principal Components Analysis, Factor analysis. Cluster analysis. Correspondence Analysis, Canonical Correspondence Analysis, Multidimensional Scaling. PerMANOVA. Discriminant analysis. Presentation of data and interpretation of results. Relevance for community ecology.	QWA	Student will be able to: -Use the analysis of multivariate datasets; -Apply this knowledge to various biological questions; - Evaluate the processes of knowledge production in complex biological and ecological questions; -Select the right method applicable to any question involving multivariate data; -Discuss the complexities and limitations of each of these methods when solving biological or ecological problems; -Obtain and manage relevant data for multivariate analysis and operate within a statistical framework to analyze such data in a creative manner; and -Demonstrate accountability and ethical standards in guiding his or her own learning process in a self-critical manner.
LFSC	8900	Life Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Life Science, including: Research project in specialized field of Life Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
LFSC	9100	Life Sciences Thesis	This module contains fundamental knowledge, theories, principles and practices of Life Sciences, including: Research project in specialized field of Life Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
UNIR	6808	Entomology Research Project	The student will conduct a research project depending on the speciality of the supervisor. The research project will be in Entomology field or any other field related to life sciences as deemed necessary by the supervisor. The student will be expected to submit a research proposal and after its approval research will be conducted and then presented orally and finally a written research report (mini-dissertation, which may be in article format)	QWA	Student will be able to: -Critically assess the primary literature on his/her topic - Communicate intelligently with experts and laypeople on the topic, using both oral and written communication skills -Combine the appropriate evolutionary principles and analysis techniques to address his/her scientific questions central - Design and implement an independent study -Assess the success of his/her research through the use of appropriate statistical software and other relevant technologies.
UNIR	6814	Science reading course	The students will choose a main entomological field and plan a short course around this topic (number of lectures is dependent on number of students, but no more than 5). They will have to gather topics and background information from textbooks and relative literature, and logically arrange a course layout. Furthermore, the student has to create classes and teaching aids on this topic and present these lectures. Each student also has to design a project for an additional practical class as well as evaluation criteria. Each student will then also have to create a test of 100 marks, with complete memo. The remainder of the students within the class will have to take this short course and be evaluated according to the lecturing student criteria. (In the case of only one student, the lecturer will provide at least two additional short courses, that the student will be evaluated on in test format)	QWA	Student will be able to: -Obtain knowledge of a specialized entomological topic and being tested on it; -Gather information around a given topic and arranging it in a logical order, through a course layout, study aids, between 3-5 classes, as well as tests and memos; -Learn the skills in preparation for a presentation, making use of various educational aids, as well as skills to present a class, and answering questions around a given topic; -Prepare for a practical class with an assignment; and -Prepare methods for evaluating assignments and tests
UNIR	8900	Entomology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Entomology, including: Research project in specialized field of Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
UNIR	9100	Entomology Thesis	This module contains fundamental knowledge, theories, principles and practices of Entomology, including: Research project in specialized field of Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ZOOL	6804	Science of Society	This is a yearlong module in which students have to combine skills from both natural and social sciences to address real problems in the community. Students will work in small groups to find creative yet practical ways to start addressing problems in the community (that can be solved through science), or to develop ways of using science to improve conditions in the local community. Stakeholders from the local community will be involved from the start of the year, to give their views on issues they feel scientists may address; and at the end of the year, their feedback on the success of the intervention(s) will be obtained. Through a process of iterative action research, students will develop and assess new interventions and learn about the process of socially responsible science. This module is seen as a vehicle for students to gain interdisciplinary research abilities, group-work and project-management skills.	QWA	The students will be able to: -Plan and design questionnaires, surveys, or interviews to guide interactions with participants from the local community -Assess and evaluate qualitative and/or quantitative data collected using social science research methodologies -Creatively develop an evidence-based solution or aide to address problems or questions pertinent to the local community -Formulate and implement a data-collection schedule, working in a group of peers -Conduct research that will go beyond academic training, but will include the “grey” literature and non-traditional sources of information -Communicate research findings accurately to lay people -Apply and appreciate the principles of “design thinking” to solve societal problems

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
ZOOL	6808	Zoology Research Report	The student will conduct a research project depending on the speciality of the supervisor. The research project will either be zoology field or any other field related to zoology as deemed necessary by the supervisor. The student will be expected to submit a research proposal and after its approval research will be conducted and then presented orally and finally a written research report (mini-dissertation, which may be in article format)	QWA	Student will be able to: -Critically assess the primary literature on his/her topic - Communicate intelligently with experts and laypeople on the topic, using both oral and written communication skills -Combine the appropriate evolutionary principles and analysis techniques to address his/her scientific questions central - Design and implement an independent study -Assess the success of his/her research through the use of appropriate statistical software and other relevant technologies.
ZOOL	6814	Applied behavioural ecology	Description of five principles of science. Description of hypothesis. Description of theory with discussions on world's popular theories. Definition of research, its significance and discussions on practical products of research available in our daily life. A breakdown on how to write a research proposal including literature review, justification, objectives, materials and methods, milestones/time frames, budget, data analysis and references. What is plagiarism, why do people plagiarize and how to avoid plagiarism. Step by step protocols of searching and downloading articles, genes, amino acids, alignment of sequences on online databases with practical at the library. Different laboratory techniques depending on students research specialty such as microscopy and molecular techniques. Field research techniques, application for permits, animal ethics, sample collection (animal and plant).	QWA	Student will be able to: -Describe the principles of science; -Apply basic methodologies which have to be followed when conducting research, how to write a research proposal and research report (dissertation/ thesis) as well as publication articles; -Avoid plagiarism and understand its implications on one's scientific career; -Search for scientific articles, resources and programs on internet databases; and -Distinguish the value of different basic laboratory techniques and field based research techniques for both animal and plant research.
ZOOL	6824	Veterinary parasitology	Students will learn about the different habitats of vectors, their adaptations to habitats, feeding behaviour and host preferences. They will acquire advanced knowledge on the life cycle stages of endoparasites in and outside the host. Factors conducive to propagation of parasites including temperature, vegetation, soil, rainfall will also be covered in this module.	QWA	Student will be able to: -Describe the ecology of the ectoparasites and endoparasites in high detail -Apply control methods for ectoparasites and endoparasites
ZOOL	6844	Biosystematics	Biosistematiek Curriculum review. This module forms an integral part of the BSc curriculum offered at the University of the Free State's Qwaqwa campus, in particular the new BSc with specialisation in Life Sciences Each student will choose an invertebrate taxonomic group whose taxonomy they will re-evaluate according to recent academic literature. They are required to write a scientific review of this taxonomic group with basic descriptions of classification within this taxon, general information available on the biology, ecology, physiology, biochemistry and conservation status of the chosen taxon. Additionally each student have to create a dichotomous key for the species within a given area (South Africa, Free State, or Qwaqwa region) that have been described, as well as design a poster around the taxonomy of the chosen group. This course will give students interested in other taxa not dealt with in detail within the department the opportunity to study them for academic credits. Additionally students must make a reference collection of the chosen taxon for the region. It will be recommended for students to take a taxon relative to their main honours research project.	QWA	Student will be able to: -Write a scientific review that illustrates the Student's knowledge on the taxonomic relationship and classification of a chosen taxon, as well as the Student's ability to review and find literature around a specific taxon -Designing a taxon specific catching method for capturing the chosen taxon -Identify a specimen of a chosen taxon -Preserve and display a reference collection -Using morphological characteristics to design a dichotomous key for the identification of specimens in a given area -Illustrate morphological important characteristics around the identification of the chosen taxon
ZOOL	6854	Immunology	The objective of this course is to learn about the structural features of the components of the immune system as well as their functions and to attain a working knowledge of current immunological principles as they relate to the cells and molecules of the immune system, how they interact in defending the body against invading microorganisms, how they develop and acquire the ability to recognize antigens, and finally how they malfunction in autoimmune diseases and how they become inadequate in immune deficiency states. Furthermore, students will extend and solidify their understanding of the presented principles through critical readings from the primary research literature. Reading of research papers will help introduce students to research techniques and also help them appreciate the value of scientific research.	QWA	Student will be able to: -Demonstrate a comprehensive and practical understanding of basic immunological principles involved in research and clinical/applied science. -Differentiate between innate and adaptive immunity. -Explain the mechanisms and differences between primary and secondary responses and their relevance to immunizations. -Identify the role of antigen presenting cells, lymphocytes, and phagocytic cells in immune responses. -Differentiate between humoral and cell mediated immunity. -Discuss current immunology news and issues.
ZOOL	9100	Zoology Thesis	A research-based thesis only This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of Zoology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Postgraduate					
DIMD	7910	Ecosystem-Based Disaster Risk Reduction And Climate Change Adaptation (Eco-DRR)	This highly interactive and problem-based course provides students with theoretical concepts and Practical tools in understanding environment and disaster linkages and applications of ecosystem-based disaster risk management. This module contains fundamental knowledge, theories, principles and practices relevant to Eco-DRR/CCA including the approaches and tools of mainstreaming the environment into disaster risk reduction and climate change adaptation	MAIN	At the end of the module, the students should be able: • Have a full understanding and use of common concepts and terminologies that cut across three disciplines: Environmental Management, Climate Science, Disaster Risk Reduction and development. • Understand the meaning and working of an ecosystem, the various types and functioning of ecosystems, what factors drive an ecosystem and the various ecosystem services to the local community. • Have an advanced mastering of climate change, factors that influence climate change, climate change projections, international discussions on climate change, the impacts of climate change and how to mitigate and adapt to climate change. • Understand and appreciate the linkages between Ecosystems, DRR and CCA • Authoritatively establish the link between DRR, CCA and SDGs and the role the natural environment plays in achieving the SDGs or Agenda 2030 • Confidently discuss the role and place of Eco-DRR/CCA in the broader practice and application of Nature-based Solutions • Conceptualise; design and execute Eco-DRR/CCA project that improves local resilience and supports the SDGs. • Begin to think strategically using a system-thinking Lense in their DRR and CCA planning processes.
DIME	7910	Ethnic, Cultural Conduct and Indigenous Knowledge	Ethnic and cultural conduct in disaster management is about the socio-political complexities of societies involved in risk situations. The subject further illustrates how the advantages of anthropology and social science are explored to address those risk situations. Contemporary theories in social sciences related to risk management in urban and rural context are also explored.	MAIN	Candidates will display the capacity to: - Develop a critical, reflective and holistic approach to human settlements conducive to risk management solutions; - Familiarise themselves with how social scientists conceptualise risk in relation to broader historical, societal and economic shifts; - To distinguish the pitfalls of technocratic approaches (e.g. states, NGOs) to urban and rural risk situations; - Understand how concepts such as resilience and vulnerability are contingent on changing communities situated in particular temporal, epistemic and political realms; - Develop a critique of risk governance by institutions and how it is affecting societies targeted; - Understand the political interplay between informal settlements and governments in minimising risks; - Evaluate desertification from a holistic perspective that is sensitive to history and indigenous knowledge; - To re-evaluate literature on 'under-developed' subjects which have tended to consider the environmental histories of African landscapes as primarily human-induced, leading its people to become both the perpetrators and victims of risks in rural African environments. - To develop a critical understanding of social and natural resilience in cities and rural areas.
DIMG	7900	Information Management Disaster Management	Geographic information systems (GIS) are an important entry point into fields where location in geographic space is critical. Any decision maker normally using a map will therefore find that information analyzed by a GIS gives more flexibility and a wider range of possibilities to the presentation of the information. The aim of the module is to introduce learners to the various possibilities of spatial information technology to prepare contingency plans for disaster management.	MAIN	At the end of the module, the students should be able: • explain the fundamental principles of remote sensing. • understand and describe the functions of the remote sensing system. • differentiate between the coverage and application of aerial imageries and satellite imageries to disaster management. • highlight the basic properties and vital consideration required during the selection of satellite imageries for decision making. • distinguish between the passive-active and the optical-SAradar sensor satellites and their influence on the stages of disaster management. • highlights the advantages of space-based disaster management solution using remote sensing tools. • apply the remote sensing tools and perform basic spatial analysis using the satellite imageries. • develop and interpret hazard, vulnerability, risk, and suitability maps as early warning, disaster preparedness, and disaster risk reduction tools. • apply the remote sensing platforms as aids for disaster response, recovery, and reconstruction. • choose between satellite products such as the DEM, landsat, and Modis, for disaster planning and intervention.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
DIMH	7910	Crisis Intervention and Trauma Management	To equip professionals involved with crisis intervention and trauma management with skills to enable them to empower and support victims of traumatic incidents. It also aims to empower employees of disaster management centers to overcome the symptoms of posttraumatic stress and burn-out that result from their long-term exposure to traumatic incidents and the victims of trauma.	MAIN	The student will be able to: - Define a crisis, victim and victim empowerment; - Discuss the basic principles involved trauma intervention; - Compare different action-oriented models of crisis intervention; - Discuss the basic tasks involved with the process of empowering and supporting victims; - Apply the basic principles of crisis intervention to case studies and a person to person interview; - Describe the symptoms of Posttraumatic-Stress-Disorder; - Discuss Acute Stress Disorder; - Describe Burnout in professional and voluntary crisis workers; - Discuss assessment techniques used to determine the impact of traumatic experiences on survivors; - Discuss the psychological consequences, coping strategies and management of principle of • Natural disasters • Man-made disasters • Family and sexual violence • Injury, chronic and life threatening illness; - Analyse the case studies involving crisis intervention processes with victims of above-mentioned disasters and to make suggestions regarding the implementation of effective crisis intervention strategies; - Outline and appraise the strengths perspective and resiliency enhancing model as point of departure to empower individuals, families, groups and communities during crisis intervention by means of describing and distinguishing the philosophy, concepts, principles and language of the strengths perspective and resiliency enhancing model; - Outline and appraise the ecological perspective as point departure to explore and describe the reciprocal impact of individuals, families, groups and communities and environmental systems by means of: • Elucidating the foundations of the perspective • Distinguishing the levels of the ecological model and the implications thereof for victim empowerment • Evaluating the value of an ecological approach; - Outline and appraise the process of participatory action as point of departure in trauma management; • Comprehend the philosophy of participatory action in empowering the individual, family, group and community • Formulate a definition of participatory action • Outline the process of participatory action • Explain the principles of participatory action as a vehicle for planning prevention, intervention and postvention programs so that those concerned will take responsibility and ownership of it; - Outline and appraise the shattered assumption theory as point of departure in trauma management: • Comprehend the philosophy of the shattered assumption theory in the healing process of the individual, family, group and community • Explain the impact of the features of a traumatic event on planning prevention, intervention and postvention programs; - Distinguish reactions a child may experience during loss and trauma; - Apply and discuss the named conceptual frameworks to bereaved and traumatized children in planning services on a prevention, intervention and postvention level in trauma management; - Outline children¿s rights as spelled out by the South African Constitution Act 108 of 1996 Section 2 and the African charter on the Rights and Welfare of the African Child (www.soulcity.org.za/publications/9childrens_rights_booklet.pdf); - Outline the family processes in coping with loss and trauma during childhood and adolescence; - Develop a training programme focusing on learning essential coping strategies for the prevention of victimization and for the promotion of resilience and well-being of community members; and - Debriefing of emergency services/human services personnel to counteract burnout and compassion fatigue.
DIMI	5810	Introduction to Disaster Management	The subject is about the understanding of basic terminology and concepts in disaster management. Focus will be on the disaster management continuum or cycle, the activities in both the pre and post phase of a disaster will be discussed in detail. International trends in disaster management with more emphasis on disaster risk reduction will also be discussed.	MAIN	The subject has two parts, module 1 and Module 2, which both carry seperate learning outcomes. Module 1 is about, Overview of disaster management and Module 2 about, Practical application of the disaster management cycle. Briefly the general outcome of the subject is that the student should be able to understand the basic principles and practices of disaster management and be able to apply the disaster management cycle to a real life disaster management project.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
DIMI	7910	Disaster Risk and Impact Assessment	The main aim of this course is to introduce students to the risks and impacts of disasters. Focus will be on social, economic and environmental effects of disasters, it will teach them the techniques for identifying, evaluating and quantifying the different forms of risks and impact damages to the environment.	MAIN	Student will be able to: - assess the social impacts and facilitate the development of plans to prevent or mitigate such environmental risks and damages as: Drought risks and drought impacts on food security, Health hazards and disease epidemics (cholera, malaria, HIV/AIDS). Human conflicts, refugee crises, human settlements, and their impacts on the environment. Water pollution and related impacts on humans and aquatic lives Common property utilization and the effects on the environment. -Assess the amount of damage that could be inflicted on the environment by any form of disaster, on: Humans lives, Farm and range lands, Water, Forests, Fisheries Real Estate, etc.In performing the tasks, they should make use of the following economic and conventional tools of valuation and assessment. Cost benefit analysis (CBA), Environmental impact assessment (EIA), Discounting and compounding techniques, Risk and uncertainty analysis, Travel Cost, Hedonic and Contingent Valuation Methods. -Analyse the macroeconomic effects of disasters at both national and international levels. -Assess the environmental impacts of disasters and facilitate the development of plans to prevent or mitigate the impacts caused by disasters. -Assess the risk of disasters in a specific community through the application of the necessary participatory risk assessment activities. Construct and interpret probability density functions for empirical and other commonly used distributions; Discuss the relationship between probability density functions and cumulative probability distributions; Construct cumulative distribution functions from probability density functions and to interpret these distributions; Choose between risky alternatives based on efficiency criteria;
DIML	5810	Legal and institutional arrangements for disaster managers	The disaster management fraternity is under the mandate of various statutes, statutes enacted at both national and international levels. This subject entails a discussion of all the various statutes relevant to humanitarian work as well as ethical conducts binding humanitarian workers. Areas of focus will be on national and international Disaster Management Legislations, key factors, principles and ethics consideration for effective planning, controlling, co-ordinating, monitoring and implementing Disaster Management strategies.	MAIN	Student will be able to: -Outline the historical development of Disaster Management in RSA; -Examine legislation relevant to Disaster Management; -Discuss the need for disaster management policy; -Apply the key aspects of policy necessary for the effective application of Disaster Management; -Discuss future developments in the legislative and related field; -Discuss the five principles of ethical power. How can it be made applicable on the individual and the manager; -Integrate and apply these principles during all phases of disaster management i.e. prevention, mitigation, response, recovery and reconstruction; -Examine the Code of Conduct of the International Red Cross and apply those during disaster operations; -Arguments for why certain ethics are not applicable, define them, identify when is it not applicable; and discuss the impact of ethics; and -Discuss the development of ethics.
DIMM	5810	Theoretical Models for disaster risk reduction	This module deals with the morphology of disasters and the application of theoretical models and frameworks for DRR and more specifically disaster risk assessment. The interaction between hazards and economic, social and environmental vulnerability as well as resiliency is the core of this module. These include (i) probability and intensity of hazards, (ii) demarcation of hazards, (iii) the use of vulnerability and resiliency indicators and (iv) the integration thereof in the disaster risk equations.	MAIN	Student will be able to: -Examine the difference between a hazard and vulnerability; -Discuss the principles of the various vulnerability models; -Apply insight into strategies to reduce disaster risks; -Evaluate the difference between experimental and non experimental data; -Outline the different types of statistical variables; -Discuss the data generation process; -Use examples of probability density functions; -Calculate the mean of a normal population; -Estimate the variance of a normal population; -Predict the value of a normal random variable; -Use rational expectations; -Apply the economic factors to be considered in disaster management; -Discuss and apply basic economic terms and terminologies used in disaster risk reduction and disaster assessments; -Discuss the macro-economic impact of disasters; and -Determine the potential direct tangible damages of any disaster in monetary value.
DIMM	7910	Management of Media Relations	The management of media relations in a crisis entails much more than the dissemination of information. The focus in media liaison should be on the management of public perceptions, support, cooperation, and goodwill. Therefore the aim is to provide learners with a deeper understanding of mass media operations and a functional framework of reference that could assist disaster management media liaison practitioners in using and managing the media more effectively.	MAIN	On completion of the module, the learner should be able to: • Proactively identify possible barriers to sound communication. • Understand, select and apply the appropriate mass media platforms in order to increase the likelihood of message acceptance and retention. • Initiate and maintain sound media relations. • Prepare content for a variety of mass media platforms. • Identify and apply communication strategies to all phases of disaster management. • Apply and evaluate communication theories or other theories to a disaster management project to enhance the project implementation. • Formulate a strategic communication plan that is aligned to an organisation’s strategic intent. • Develop a crisis communication plan which should be informed by the organisation’s strategic communication plan.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
DIMW	7910	Water related disasters	Management of Disasters (Natural and Human Made)	MAIN	No outcomes provided
DIMN	5820	Management of Natural and Human-Made Disasters	Understanding of the critical factors in average response to disasters. Demonstrate the principles of management of at least four natural and four artificial disasters. Determination of disasters and risk. Resilience Analysis. Determination of the potential impact of disasters. Socio-economic and environmental impact. formulation of dangers and risikoverminderingstrategie¿. Formulation of prevention and mitigation strategies.	MAIN	Student will be able to: - Identify appropriate flood mitigation measures to mitigate the negative consequences of floods; - Determine the costs involved implementing the identified mitigation measures - Calculating the net present value (NPV) and the benefit cost ratio; - Execute a benefit cost analysis to determine the economic feasibility of identified mitigation measures; - Implement a phased remedial programme work; - Formulate a cost-effective mitigation strategy; - Discuss drought as a natural hazard; - Assess the impact of drought; - Apply the methodology for drought planning; - Develop a drought plan; -Evaluate the role and impact of fire on the vegetation, fauna and soil properties; -Examine the impact of accidental and controlled fires; -Discuss fire behaviour; -Evaluate fire as a management tool; -Determine the damage to the environment caused by fire; -Discuss fire management; - Discuss Climatology and the products used in common operations; -Characterise typical weather patterns for winter and summer seasons over South Africa and relate them to the long-term mean rainfall and temperature values of various regions; -Identify different types of Chemical Hazards and its possible effects on the environment and human safety and to evaluate these hazards scientifically by looking at: - structural, material and operational sources of hazards - toxicity and dose-response relationships (LD50) - environmental transport and transformation of chemicals -Evaluate potential chemical hazards with special reference to industrial fires, chemical pollution, explosive materials, nuclear disasters and chemical terrorism. -Evaluate the technical aspects of managing these different types of hazards and to apply this knowledge on different real-life examples; -Discuss the mitigation of chemical hazards by -minimising exposure -inventory control -monitoring of potential hazards -Evaluate the basic objectives of site decontamination, the methods used to do so and the prevention of contamination of Clean Areas; -Apply and adjust basic knowledge of disaster management to Chemical Hazards with special reference to the following: -Incident Command System (ICS) and Hierarchy -Scope of Emergency Planning (health, safety and environment (HSE)) -Assessment of Hazards and Risk (assessment, phases of decision making, techniques) -Authority and Responsibility -Communication and information (handling and processing) -Contents of Emergency Plan (Incident Action Plan including location of data/info, chemical inventory. MDS¿s, haz. Chemicals, etc.) -Personal Protective clothing/equipment (PPC & PCE), (selection and criteria, vendors) -Hazard and Risk Reduction Strategies (minimize number and magnitude of incidents, mitigation of chemical hazards) -Decontamination (plan, incompatible and synergistic chemical contaminants) -Prevention of contamination of clean areas -Discuss the different agents which can be used in biological weapons (from previous course DIM 607); -Differentiate between biological weapons and chemical weapons. -Evaluate different potential targets of biological warfare (i.e. the population directly, or the food and water sources of a population); -Discuss control methods for the different groups of biological weapons once these weapons have been used; and -Develop a strategy for the control, limitation of spread and treatment after exposure to a selected biological weapon.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
DIMP	5820	Public Health in Disaster Managament	Understanding concepts related to Public Health with regard to biological, community health and psycho-social and certain mental health implications of disasters. Biological warfare, Veterinary risks; Epidemiology: Community assessment, infection control and prevention disease. Handling and management of health risks during disasters and/or conflict. Psycho-social aspect of HIV/AIDS and Mental health burnout.	MAIN	Student will be able to: -Define, explain, indicate, outline, discuss and appraise the socio-economic and psycho-social impact of HIV/AIDS as a man-made disaster by means of: - Recognizing that HIV/AIDS can be defined as a pandemic in the category of man-made disasters, implying that different sectors of society and professionals have a contribution to make. -Elucidating the concepts of HIV/AIDS and other relevant concepts in the field of public and mental health. -Describing the epidemiology of HIV/AIDS. -Outlining the susceptibility of society regarding HIV/AIDS. - Describing, discussing and evaluating from a systemic perspective the vulnerability and impact of HIV/AIDS on: Individuals - households (families) ,-communities, vulnerable groups (e.g. children) rural areas, private sector, government, development -Distinguishing and discussing the importance of the tasks of the different role players in the field in order to comprehend the necessity of a multi-professional approach. -Designing measures in the field of HIV/AIDS for the managing of the pandemic. -Distinguish between stress, post-traumatic stress, post-traumatic stress disorder,
DIMP	7900	Political Strategic Planning	The aim of this module is related to an explanation of the nature of political governance and its application on times of change and fundamental change (with reference to the evolving nature of security thinking and practice). Specific attention will be given to strategic conflict analysis, political risk analysis as well as scenario development as techniques of forecasting. These tools must be applied in the context of conflict and post-conflict situations, with specific reference to Africa. Lastly, we will also explore the steps associated with developing a risk management strategy.	MAIN	The student will be able to: - Collect and systematise information; - Provide standpoints and views; - Provide insight into phenomena / problems; - Reflect on the above; and - Write papers and takes part in class discussions for broader and deeper understanding.
DIMR	5800	Research design and methodology	The module aims at developing the research knowledge and skills of students to doe quantitative and qualitative research. Plan, design and manage practical research. Compile and present a proposal for a project and mini-dissertation	MAIN	By the end of the unit the students should be able to : • explain the nature of what is described as qualitative research and how qualitative studies differ from quantitative studies; • understand the notions of objectivity and validity in qualitative research; • explain the designs or types of studies that are normally included under the broad umbrella of qualitative research, such as ethnographic studies, case studies, and life histories; • explain the principle of sampling in the qualitative paradigm; • apply the different methods of gathering qualitative data; • illustrate the use of qualitative research; • summarise the principles (main characteristics) of participatory action research; • illustrate how different research methods and techniques are used and adapted within the PAR paradigm; • construct a project proposal for a mini-dissertation, which will be executable practically; and • present the proposal convincingly to a scientific audience. • explain the concepts of survey sampling, random sampling, statistical inference and sample size; • statistically determine the sample size of large populations from • tables and formulae; • determine sample size using simple random sampling from Microsoft Excel; • do descriptive statistics in Microsoft Excel (pivot tables); • determine instrument reliability using Cronbach's alpha coefficient; • run and interpret Analysis of Variance (ANOVA) tests using any statistical software programme; • perform multiple regression analysis among dependent and independent variables using any statistical software programme; and • carry out a survey and apply all the concepts learnt
DIMR	7900	Disaster Management Mini-Dissertation	Mini -dissertation in specialised field of Disaster Management as discussed by study leader(s), Academic Departmental Head and student. The mini-dissertation includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a mini-dissertation, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
DIMS	5825	Strategic Disaster Management	The focus of this module is on management principles and concepts such as strategic planning, strategic management, leadership, resource planning and management including financial management, human resource management, logistics and administration. The project cycle, project development and project planning form an important element of this module. Sector specific plans such as the disaster management plan with its sub-plans such as the disaster risk reduction plan, disaster response plan, preparation plan and contingency plan are covered in this module.	MAIN	On completion of the module, the learner should be able to: • Understand and analyse the term strategy in the context of disaster management; • Develop and apply strategic management processes such as, situation analysis; strategy formulation; strategy implementation; and strategy monitoring and evaluation. • Develop strategic management statements for strategic plans, which are vision, mission, goals, and objectives. • Evaluate and apply strategic management models in developing a strategic disaster management plan and; • Incorporate disaster management legislation and policies in the formulation of a strategic plan as a foundation for disaster management projects. • Comprehend the difference between finance and accounting, on the one hand, and financial management and financial accounting, on the other hand; • Synthesis basic financial management decisions and the role of the financial manager. • Analyse the basic principles and layout of key financial statements. • Apply basic budgetary planning and control of disaster risk reduction and management projects; • Have knowledge of a range of forecasting techniques that can be applied to financial data to reduce future uncertainty and facilitate planning; • Evaluate a range of techniques that can be used in managerial decision-making long-term as well as short-term; • Compute and interpret important financial ratios; • Explain the basic concepts of time value of money and methods of investment appraisal in the context of disaster risk reduction; and • Demonstrate how to manage net working capital and liquidity. • Analyse a Business Continuity Plan as a component in the disaster management continuum; • Comprehend critical business functions essential for continued services or production; • Conduct a risk analysis that determines the hazards that can adversely affect the organisation; • Identify and apply the impacts that result from a disaster that can affect the organisation; • Understand critical business functions; • Develop testing criteria and procedures; • Coordinate, test, and evaluate the plan and document all results; Develop processes to keep the plan up to date with reviews and tests completed at a maximum of 12-month intervals; and ensure the plan is in line with the strategic direction of the organisation.
DIMT	5820	Information Technology in Disaster Management	The focus of this module is on the various Information Technology aspects utilised in the Disaster Management discipline.		Student will be able to: -Discuss the theory of information; -Outline computer-based information systems and information technology; -Recognize information systems vulnerabilities and identify possible disasters and risks that pose a threat to information systems; and -Evaluate the importance of information and information systems as an integral part of Disaster Risk Reduction.
DSMT	9100	Disaster Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Disaster Management, General including: Research project in specialized field of Disaster Management, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

GENETICS (124)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
BLGY	1623	Introduction to Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: a introduction to the fundamental principles within Genetics. This module covers the basic principles of inheritance and starts with a study of meiosis, since a good understanding of the fundamental genetic mechanisms of reproduction is necessary to understand the principles of heredity. The work of Gregor Mendel, the father of Genetics, will also be studied. Both the chromosomal and molecular foundations of inheritance will be investigated as well as the way in which genes are expressed when protein synthesis is covered. Finally, the fast growing field of Biotechnology, a very practical application of the science of Genetics will receive attention.	MAIN	Student will be able to: -Explain the mechanism and reason for meiosis; -Describe the origins of genetic variation among offspring; -Recount the impact of the environment on the genotype; -Apply the principles of Mendelian genetics; -Determine recessively and dominantly inherited disorders; -Explain how linkage affects inheritance; -Depict human disorders due to chromosomal alterations; -Specify the basic principles of transcription and translation; -Describe the different types of point mutations; and -Outline selected practical applications of DNA technology, including PCR, forensics and cloning.
FORS	2616	Introductory Forensic Science	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences as an applied science that covers an array of disciplines. The aim of the module is to recognise, identify and evaluate physical evidence by applying all the different fields of science.	MAIN	Student will be able to: -Outline the areas of knowledge that are essential to forensic science; -Apply basic forensic science concepts to problem solving; -Explain how the multi-disciplinary aspects, of forensic science, can be used to solve criminal cases; and -Identify, evaluate and interpret different types of forensic evidence in relation to criminal investigations.
FORS	2626	Crime Scene Management	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including the interaction between crime scene investigation, the criminal law and the science involved. Various investigating techniques and procedures applied in CSI will be demonstrated and the impact it has in the legal system of South Africa will be addressed.	MAIN	Student will be able to: -describe how to preserve and process a crime scene in the South African context; -discuss the criminal justice system in South Africa; -explain law/science interface in Forensic Sciences; -discuss the ethical and professional responsibilities of a forensic scientist; and -discuss forensic photography.
FORS	3714	Trace and impression evidence	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, specifically insights into the forensic aspects of organic trace elements and anatomical impressions found at a crime scene. This is linked to various types of assaults and homicides as well as legal aspects. Detail is provided about pattern analysis, microscopic as well as other instrumental analysis of evidence.	MAIN	Student will be able to: - Identify and interpret patterns and impressions; - Determine the presence of various evidence types; - Discuss factors which affect the interpretation of evidence types (fiber, hair, teeth and lip impressions, soil, bloodstains and toxicology) in relation to assault and homicides; - Interpret and report results as well as comment on the evidential value of these evidence types
FORS	3724	Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the disciplines of drugs of abuse, the chemistry of Gun Shot Residue and statistics for Analytical Chemistry.	MAIN	Student will be able to: - Identify various controlled substances using presumptive and confirmatory methods; - Analyse ammunition and its by-products; - Calculate of bullet trajectories based on evidence found at the crime scene; and - Apply the statistics of Analytical Chemistry.
FORS	3734	Forensic Entomology	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including an introduction to entomology; morphology of body wall, head, thorax and abdomen; mouth parts; appendages, internal anatomy of organ systems; growth and metamorphosis; ecological preferences and life cycles; characteristics used to differentiate between insect orders; identification of forensic important insects and their role in forensic medicine.	MAIN	Student will be able to: - Describe the basic morphology, anatomy and functioning of the insect body; - Identify insects to order level and insects of forensic importance to more detailed levels - Discuss and apply the role of insects in the decomposition process of carcasses.
FORS	3744	Forensic Genetics	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the detailed study of various marker systems used in forensic genetics. The application of other molecular techniques, such as epigenetic and mRNA analysis, in the field of forensic genetics will also be examined. The interpretation of DNA profiles is demonstrated and the practical application of DNA profiles in the identification and parentage analysis process are explained.	MAIN	Student will be able to: - Describe and differentiate between the various techniques and marker systems used in forensic genetics, - Explain how these profiles can be applied in DNA forensics, - Discuss how STR technology is used for individual and parentage analysis - Discuss and apply the use of epigentics for identification purposes, with a specific focus on identical twins - Discuss and analyse the application of mRNA analysis in the field of forensic genetics

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
FORS	3774	Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the disciplines of drugs of abuse, toxicology, fires and explosions and forensic ballistics.	MAIN	Student will be able to: - Identify various controlled substances using presumptive and confirmatory methods - Explain the role of toxins in human death - Understand the investigation of an arson scene in terms of observation, sampling and packaging - Discuss the analysis and interpretation of samples taken from an arson scene - Analyse ammunition and its by-products - Calculate of bullet trajectories based on evidence found at the crime scene
GENE	2616	Human Genetics	This module contains fundamental knowledge, theories, principles and practices of Human Genetics, including the cellular, chromosomal and molecular basis of human traits and disorders; the involvement of meiosis; prenatal development; patterns of Mendelian, non-Mendelian and sex-linked inheritance; gene and environmental factors influencing traits and genetic disorders; genetic risk calculation using human pedigrees; types of genetic studies; cytogenetic theory; techniques used in diagnostics and molecular mechanisms involved in human disorders.	MAIN	Student will be able to: -Gain factual and conceptual knowledge of the basic scientific background of human genetics -Define, list and explain the cellular, chromosomal and molecular factors involved in human traits and disorders -Describe the molecular mechanisms involved in human traits and disorders -Discuss and distinguish between Mendelian, non-Mendelian and sex-linked inheritance -Analyse and interpret family pedigrees to indicate the modes of inheritance, assign genotypes and calculate genetic risk
GENE	2626	Molecular Genetics	This module contains fundamental knowledge, theories, principles and practices of molecular genetics with DNA as the blueprint of life. The central dogma of molecular biology will be studied, which includes the transcription of DNA to RNA, followed by the translation of RNA to proteins; DNA replication and organization into chromosomes; DNA mutations and mechanisms for repairing mutations; and the basis of gene regulation and expression in prokaryotes and eukaryotes. The theory and applications of studying entire genomes of organisms will be touched. Various key technologies and applications used in molecular genetics are studied.	MAIN	Student will be able to: --Explain the basis of DNA as genetic material, including the structure and function thereof in the cell --Discuss the link between DNA, RNA and proteins as well as the processes of synthesis --Describe the different mechanisms controlling the genetic integrity between individuals of different generations --Discuss the basis of gene regulation and expression in prokaryotes and eukaryotes --Comprehend the implications and impact of genomics --Examine the theory and applications of the selected molecular tools.
GENE	3713	Genomics	The advent of high-throughput DNA sequencing has enabled the study of genomes from virtually all life forms. Specifically, comparative genomics offers insights into the evolution of different prokaryotic and eukaryotic genomes. In addition, genome-wide analysis of gene expression can be engaged to unravel the influence of candidate genes toward the development of specific traits. Given that, this module aims to introduce fundamental concepts and techniques that are applicable to the field of genomics.	MAIN	At the end of the module, the student is expected to be able to: 1. conceptualize the methods applied in genome sequencing studies 2. navigate and acquire specific sequences from different sequence databases 3. apply in silico methods to comparatively analyse and interpret sequence data 4. differentiate between discernible prokaryotic and eukaryotic genomic features 5. deduce gene expression data gathered using genome-wide analysis techniques
GENE	3733	Behavioural Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: an introduction to patterns of inheritance and pedigree analysis as applied in genetic counselling, prenatal diagnosis, the potential contribution of genotype and/or environment on behavioural studies, quantitative studies, twin and adoption studies, identifying genes contributing to human behaviour, deeper study of human behaviour, including memory and learning, cognitive disabilities, psychopathology, anxiety disorders and addiction.	MAIN	Student will be able to: - Describe and apply the basic scientific background on human and medical genetics; - Outline chromosomal disorders and mechanisms of ethiology; - Interpret pedigrees; - Describe the effect of different genetic techniques on society; - Evaluate the boundaries of ethical research; - Apply the various research types when studying behaviour; and - Plan an experiment to determine if a certain behavioural trade is inherited or influenced by the environment.
GENE	3743	Population and Conservation Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: the importance of genetic diversity; the effects of genetic drift, selection, mutation, migration and fragmentation on allele frequencies in large and small populations; inbreeding depression; population genetic principles applied in nature conservation and the need for genetic management; and the use of appropriate molecular and statistical measures to describe the preceding processes.	MAIN	Student will be able to: -Describe the influence of various evolutionary and population-genetic processes on populations and species; -Discuss how these factors may change populations; -Use suitable statistical measures to quantify and demonstrate the effects of the above processes; and -Recommend strategies for the conservation of genetic diversity in wild and artificially managed populations.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GENE	3703	Applied Genetics	This modules presents molecular genetic techniques applied in the laboratory. The module start with the procedure of DNA isolation used as the basis of most molecular DNA studies. Downstream techniques that follow include; DNA quantification and quality assessment, primer design and validation along with PCR amplification and visualization. Enzyme digestion follows the PCR process. Finally, the module allow students to set up Sanger sequencing reactions with analysis of eletropherograms.	MAIN	At the end of the module, the student is expected to be able to: 1. Isolate DNA Successfully. 2. Quantify isolated DNA using gel electrophoresis and nanodrop technology, with this the student should be able to analyze and interpret DNA quality and quantity for downstream applications. 3. Design primers for PCR and perform virtual validation of primers. 4. Amplify DNA with designed primers on isolated DNA. 5. Perform enzyme digestion and visualize results on a gel. 6. Set up a Sanger sequencing reaction, including initial PCR, reaction cleanup, PCR forward and reverse strand setup with final cleaning. 7. Analyze electropherograms.
GENE	3764	Genetics in Practice	This module contains fundamental and applied knowledge, theories, principles and practices of Genetics, including: - The application of Genetic research in Industry - Use of genetic resources: considerations relating to the use of human, animal and plant genetic resources for research or commercial purposes, with special reference to indigenous genetic resources and knowledge systems - The implications of Genetically Modified Organisms in industry and society - Basic fundamentals of Good clinical Practice (GCP) - Practical aspects of Good Clinical Laboratory Practice (GCLP) - The application of GCP and GCLP in Genetic research - Ethical requirements for genetic material	MAIN	At the end of the semester, you will be able to: - Evaluate the role of genetically modified organisms in industry and society. (GMO) - Identify errors and safety risks in a laboratory according to good laboratory practice (GLP) standards. - Share the production process of genetically developed pharmaceuticals. (GCP) - Audit a genetic a contract research study according to the national and international standards of good clinical practice principles (GCP). - Recognize the value of ethical research principles in clinical trials and vertebrate research (Ethics) - Identify form a case study the basic concepts of coding on big data handling. (DATA)
HMBG	2614	Human Molecular Biology of Dietetics	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: - Composition of the human genome - Gene inheritance of metabolic disorders - The interaction of complex nutritional disorders and pharmacogenetics.	MAIN	Student will be able to: -Examine and discuss the composition of the human genome; -Discuss gene inheritance resulting in syndromes and diseases; -Discuss the genes associated with carbohydrate related disorders; -Discuss the genes associated with amino acid related disorders; and -Apply basic principles on Nutrigenomics
HMBG	3744	Human Molecular Biology of Immunology and Haemostasis	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Molecular basis of the immune system, antigen structure, recognition and function, as well as applications in forensics -The molecular basis of haemostasis, inherited bleeding tendencies, thrombosis and platelet disorders.	MAIN	Student will be able to: - Discuss and apply molecular basis of the immune system; - Describe antigen structure, recognition and function; - Discuss the application of immunogenetics in forensics; - Outline the molecular basis of haemostasis; and - Discuss and apply molecular basis of inherited bleeding tendencies, thrombosis and platelet disorders.
Postgraduate					
CONB	8900	Conservation Biology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Conservation Biology, including: Research project in specialised fields of Conservation Biology as discussed by study leader(s), Academic Departmental Head and student, that include aspects of biological and genetic diversity; and may cover genes, species, communities and ecosystems. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.		Student will be able to: Identify the problem Formulate a hypothesis Do independent planning and then conduct the experiments Analyse and interpret the results Discuss the results comprehensively Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CONB	9100	Conservation Biology Thesis	This module contains fundamental knowledge, theories, principles and practices of Conservation Biology, including: Research project in specialized fields of Conservation Biology as discussed by study leader(s), Academic Departmental Head and student, that include aspects of biological and genetic diversity; and may cover genes, species, communities and ecosystems. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing		Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
FORC	6808	Research Essay: Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Chemistry, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: - Problem identification -Hypothesis formulation -Planning and conducting of experiments -Analysis and interpretation of results -Discussion of results -Compiling the information according to a specified structure -Technical aspects of scientific writing -Practical presentation skills.
FORC	6824	Advanced forensic techniques	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: insight into techniques and instrumentation used in forensic science. These include infrared, chromatography and microscopy, which can be applied to a variety of evidential types. Theoretical and practical elements of these methodologies are covered.	MAIN	Student will be able to: -Apply and discuss numerous analytical techniques and their applications in forensic science; and -Apply both theoretical and practical applications of techniques used in forensic science.
FORC	6804	Sport Doping	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences. It explores various methods used for doping by athletes and the analytical techniques used for their detection. Also included is sample collection and preparation, the chain of custody process and legal aspects related to doping in sports.		The student will be able to: - Explain, describe, analyse and evaluate theoretical and practical aspects of doping methods used in sports. - Evaluate the analytical and legal challenges with regard to interpretation of results in sport doping. - Outline different analytical methods used in anti-doping control.
FORC	8900	Forensic Chemistry Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Chemistry, including: Research project in specialized field of Forensic Chemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORC	9100	Forensic Chemistry Thesis	Forensic Chemistry Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORE	8900	Forensic Entomology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Entomology , including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORE	9100	Forensic Entomology Thesis	Forensic Entomology Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
FORG	6808	Research Essay	This module contains fundamental knowledge, theories, principles and practices of Forensic Genetics, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Plan and conduct experiments; -Analyse and interpret results; -Discuss results; -Compile the information according to a specified structure; -Apply technical aspects of scientific writing; and -Apply practical presentation skills.
FORX	6804	Research: Literature Study	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: -Search and access literature on a particular topic, -Organise and integrating the information, -Draw conclusions from the available body of literature, -Compile the information according to a specified format, -Apply technical aspects of scientific writing, -Demonstrate practical presentation skills.
FORG	6806	Research Techniques	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Theory behind techniques such as extraction, quantification, PCR and analysis. Students should be familiar with all laboratory equipment (centrifuges, heating blocks, water baths, pipettes, autoclave, vortexes, PCR machines, pH-meter, magnetic stirrers and the NanoDrop) and save laboratory practices. Students should be able to prepare chemicals and to perform techniques such as DNA extraction, gel electrophoresis and PCR reactions.	MAIN	Student will be able to: - apply formal logic and evaluate the logic of scientific writing; - write and present a paper at a conference; - create and present a poster at a conference; -write a scientific paper; - write and present a press release; - handle a TV/radio interview; - construct a CV and handle a job interview; - use appropriate statistical measures and associated software to analyze data; - apply safe laboratory practise; - set centrifuges, heating blocks, water baths, pipettes and the autoclave according to protocols given to them; - write programs on the different PCR machines in the department; and - extract DNA from different sources, visualize it on an agarose gel and amplify a specific region using appropriate primers and a PCR reaction.
FORZ	6804	Forensic DNA typing and quality assurance	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Quality control, quality assurance and accreditation of Forensic Laboratories.	MAIN	The student will be able to: - Compare analytical methods used in DNA forensic analysis; and - Evaluate the management and maintenance of a forensic laboratory based on quality assurance, quality control and accreditation guidelines.
FORG	6804	Crime Scene Investigation and the Juctice system	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Crime scene analysis; Presumptive test done at the crime scene including (blood, saliva, semen samples); Chain of custody of evidence samples; Collecting reference samples; Chain of custody in the Forensic laboratories; Compiling a DNA evidence report for court; Presenting DNA evidence in court.	MAIN	Student will be able to: -Perform presumptive tests of various types of forensic evidence samples -Explain the different procedures that take place at a crime scene -Evaluate evidence found at a crime scene -Compile a forensic report that can be presented in the court of law in South Africa -Defend and justify results in a court of law under cross examination.
FORG	6874	Capita Selecta in Forensic Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Forensic Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	None provided-Depends on the student's choice.
FORG	8900	Forensic Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Genetics, including: Research project in specialized field of Forensic Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. as discussed by study leader(s), Academic Departmental Head and student.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
FORG	9100	Forensic Genetics Thesis	Forensic Genetics Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified thesis structure (the department recommend that theses be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORI	8900	Forensic Sciences Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including: Research project in specialized field of Forensic Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORI	9100	Forensic Sciences Interdisciplinary	Forensic Sciences Interdisciplinary	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.
FORS	6808	Research Report	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: -Examine and discuss the nature of a crime scene and the `continuity of evidence process. -Evaluate, record, collect, interpret and present forensically-relevant material. -Plan and develop crime scene evaluation and laboratory analysis strategies.
FORS	6804	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: - Search and access literature on a particular topic; - Organise and integrate the information; - Draw conclusions from the available body of literature; - Compile the information according to a specified format; - Apply technical aspects of scientific writing; and - Use practical presentation skills.
FORS	6806	Research Techniques Forensic Science	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Students should be able to prepare chemicals and to perform techniques. Subject specific practical experience includes: packaging and labelling; principle examinations: search and recovery; searching, preliminary testing, recovery, lab notes and case files.	MAIN	Student will be able to: - apply formal logic and evaluate the logic of scientific writing; - write and present a paper at a conference; - create and present a poster at a conference; - write a scientific paper; - write and present a press release; - handle a TV/radio interview; - construct a CV and handle a job interview; - use appropriate statistical measures and associated software to analyse data; - apply safe laboratory practice; - implementing the appropriate packaging and labeling as required by forensic laboratories; and - plan and use appropriate techniques and technology in the searching, preliminary testing and recovery in principle examinations.
FORS	6804	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: - Locate and examine literature on a particular topic, - Organise and intergrate the information, - Draw conclusions from the available body of literature, - Compile the information according to a specified format, - Apply the technical aspects of scientific writing,and - Apply presentation skills.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
FORS	6874	Capita Selecta in Forensic Sciences	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Capita Selecta of advanced aspects of Forensic Sciences, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	The student will be able to: Outline the fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Capita Selecta of advanced aspects of Forensic Sciences.
FORS	8900	Forensic Sciences Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including: Research project in specialized field of Forensic Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORS	9100	Forensic Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.
GENB	6814	Advanced Behavioural Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Determination of the inheritance of behaviour; monogenic vs. polygenic inheritance; allelism; Pleiotropy; epistasis; quantitative studies and analysis; experimental design; bioethics; statistical analyses.	MAIN	Student will be able to: - Plan and execute a behavioural genetic study; - Identify and judge factors influencing behaviour; - Identify bioethical considerations to be made when studying behaviour; and - Apply basic statistical analysis to behavioural genetic quantitative data.
GENB	8900	Behavioural Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Human or Behavioural Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENB	9100	Behavioural Genetics Thesis	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Human or Behavioural Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENE	6808	Research Report Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	The student will be able to: - Problem identification; - Hypothesis formulation; - Planning and conducting of experiments; - Analysis and interpretation of results; - Discussion of results; - Compiling the information according to a specified structure; - Technical aspects of scientific writing; and - Practical presentation skills.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GENE	6804	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	The student will be able to: - Search and access literature on a particular topic; - Organise and integrate he information; - Draw conclusions from the available body of literature; - Compile information according to a specified format; - Use technical aspects od scientific writing and - Practical presentation skills.
GENE	6806	Research Techniques	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Theory behind techniques such as extraction, quantification, PCR and analysis. Students should be familiar with all laboratory equipment (centrifuges, heating blocks, water baths, pipettes, autoclave, vortexes, PCR machines, pH-meter, magnetic stirrers and the NanoDrop) and save laboratory practices. Students should be able to prepare chemicals and to perform techniques such as DNA extraction, gel electrophoresis and PCR reactions.	MAIN	Student will be able to: -apply formal logic and evaluate the logic of scientific writing -write and present a paper at a conference -create and present a poster at a conference -write a scientific paper -write and present a press release -handle a TV/radio interview -construct a CV and handle a job interview -use appropriate statistical measures and associated software to analyze data -know safe laboratory practise -set centrifuges, heating blocks, water baths, pipettes and the autoclave according to protocols given to them. -write programs on the different PCR machines in the department. -extract DNA from different sources, visualize it on an agarose gel and amplify a specific region using appropriate primers and a PCR reaction.
GENE	6834	Capita Selecta: Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	Student will be able to: - Examine and discuss principles of chosen topic.
GENE	6844	Capita Selecta: Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	Student will be able to: - Examine and discuss principles of chosen topic.
GENE	8900	Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENE	9100	Genetics Thesis	Genetics Thesis This module contains fundamental knowledge, theories, principles and practices: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENH	6814	Advanced Human Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: a background on the concepts of human genetic, a study of genetic disorders at molecular and cytogenetic level, diagnostic practices in genetics, strategies and techniques to conduct research and identify susceptibility loci, utilize public databases in research.	MAIN	Student will be able to: - Discuss and apply the molecular and chromosomal basis and mechanisms involved in common and complex human genetic disorders; - Discuss molecular and cytogenetic techniques used in research and diagnostics; and - Design a human genetics research protocol.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GENH	8900	Human Molecular Genetics Disseration	This module contains fundamental knowledge, theories, principles and practices of Human Genetics , including: Research project in specialized field of Human Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENH	9100	Human Molecular Genetics Thesis	This module contains fundamental knowledge, theories, principles including: Research project in specialized field of Human Molecular Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENI	8900	Genetics Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of Zoology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. as discussed by study leader(s), Academic Departmental Head and student.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENI	9100	Genetics Interdisciplinary Thesis	Genetics Interdisciplinary Thesis This module contains fundamental knowledge, theories, principles and practices: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENM	6814	Recombinant DNA technology	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Recombinant DNA technology provides a powerful platform that enables the study of any gene isolated from virtually any organism. Central to this technology is the cloning of nucleic acid fragments (for example, DNA) into cloning vectors, a process simplified by the Polymerase Chain Reaction (PCR) technique. Subsequently, recombinant vectors used to transform competent bacterial cells and the sequence information of the cloned gene can be determined by DNA sequencing. This course aims to introduce basic tools and techniques utilized in recombinant DNA technology.	MAIN	Student will be able to: - apply various laboratory procedures to isolate DNA and RNA from cellular and/or eukaryotic tissues - plan and perform experiments on complementary DNA (cDNA) synthesis - design, implement and evaluate experiments based on the Polymerase Chain Reaction (PCR) technique - create recombinant DNA molecules by cloning DNA fragments into cloning vectors - use laboratory protocols to transform recombinant cloning vectors into bacteria; and - analyse and compare cloned DNA fragments using sequencing and various computer-based sequence analysis programmes.
GENP	6824	Applied Conservation Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: the use of molecular markers and appropriate statistical coefficients to determine levels of diversity, detect historic bottlenecks, measure drift and differentiation, describe population structure, detect hybridization, apply assignment methods, and perform forensic investigations relating to wildlife. These outcomes are reached using appropriate statistical approaches and suitable contemporary software.	MAIN	Student will be able to: - analyse molecular data with various statistical coefficients and appropriate software, - implement molecular data results in such a way that it can contribute to the conservation of biodiversity, and - examine and describe the contribution of genetics to conservation and ecology.
GENP	6804	Applied Conservation Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: the use of molecular markers and appropriate statistical coefficients to determine levels of diversity, detect historic bottlenecks, measure drift and differentiation, describe population structure, detect hybridization, apply assignment methods, and perform forensic innvestigations relating to wildlife. These outcomes are reached using appropriate statistical approaches and suitable contemporary software.	MAIN	The student will be able to: - analyse molecular data with various statistical coefficients and appropriate software; - implement molecular data results in such a way that it can contribute to the conservation of biodiversity; and - describe the contribution of genetics to conservation and ecology.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
GENS	6814	Molecular Biosystematics	This module presents fundamental knowledge, theories, principles and practices of Biosystematics. It also introduces aspects of evolution needed to understand the content and applications. The content compliments population biology principles taught in undergraduate and honours level. It is a hands-on course teaching the use of key computer programs while principles and a level of theory on phylogenetics and evolution are presented. Aspects include nomenclatural rules, taxonomic description and revision of species, uses of biosystematics, molecular data preparation, sequence alignment, genetic distances and nucleotide substitution models, distance methods, maximum likelihood methods, Bayesian phylogenetic analysis, parsimony methods, selecting models of evolution, and testing tree topologies.	MAIN	At the end of the module, the student is expected to be able to: - Interpret biosystematics papers - Teach himself/herself programs and new concepts - Understand the uses of biosystematics - Plan a biosystematics study - Be able to use bioinformatics programs, specifically MEGA - Generate and develop a dataset from raw sequence data - Apply the different tree and network drawing methods and models in analyses - Briefly interpret the evolutionary history of organisms and identify them
GENS	6824	Molecular Biosystematics	This module presents fundamental knowledge, theories, principles and practices of Biosystematics. It also introduces aspects of evolution needed to understand the content and applications. The content compliments population biology principles taught in undergraduate and honours level. It is a hands-on course teaching the use of key computer programs while principles and a level of theory on phylogenetics and evolution are presented. Aspects include nomenclatural rules, taxonomic description and revision of species, uses of biosystematics, molecular data preparation, sequence alignment, genetic distances and nucleotide substitution models, distance methods, maximum likelihood methods, Bayesian phylogenetic analysis, parsimony methods, selecting models of evolution, and testing tree topologies.	MAIN	At the end of the module, the student is expected to be able to: - Interpret biosystematics papers - Teach himself/herself programs and new concepts - Understand the uses of biosystematics - Plan a biosystematics study - Be able to use bioinformatics programs, specifically MEGA - Generate and develop a dataset from raw sequence data - Apply the different tree and network drawing methods and models in analyses - Briefly interpret the evolutionary history of organisms and identify them

SUSTAINABLE FOOD SYSTEMS AND DEVELOPMENT (102)

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Undergraduate					
CNCC	1612	Clothing construction I	Pattern alterations. Implementation and evaluation of basic construction techniques. Use of a commercial pattern. Fashion development: The role of the designer, technology and world trends. Fashion cycles: Introduction, acceptance and rejection. Fashion forecast: Designer, manufacturer, merchandise and the media. Fashion research sources.	MAIN	Student will be able to: -Outline fashion development, fashion designers, fashion technology, fashion cycles, fashion forecasting and fashion resources, patterns and pattern alterations; -Select and apply suitable pattern alterations and construction techniques in garment construction; -Accurately and coherently, write notes on the factors that influence fashion cycles; -Apply techniques in basic construction and pattern alterations; and - Take responsibility of the use of material and energy resources in construction of a garment.
CNCC	1622	Clothing construction II	Children's clothing: classification, needs and requirements. Implementation of principles in construction and trimming of children's clothing. Wardrobe planning: implementation of design elements and principles, personality and figure types, personal style and good taste.	MAIN	Student will be able to: -Outline the requirements for children's and baby clothing as well as the principles for the selection; -Define the principles for wardrobe planning; -Integrate figure irregularities, elements and principles of design to plan suitable outfits, taking personality, figure type as well as the occasion into account; -Identify clothing needs of elderly people; - Construct a list of textile fabrics required for specific occasions and its use. -Distinguish between clothing needs and different textile fabrics for the use in sports clothing. -Explore the necessity of clothing for people with sensory disorders. -Use the gathered information to identify gaps in the market.
CNCC	2612	Clothing construction III	Origin and functions of clothing. Interrelationship between clothing and cultural patterns, national habits and customs. Clothing expectations regarding social role, status and mobility. Fashion as a social phenomenon. Special fabrics: Principles and guidelines for the handling of special fabrics. Application of principles for the handling of special fabrics. Application of principles for the handling of special fabrics when planning and constructing of articles (sleepwear, bras and panties).	MAIN	Student will be able to: -Outline the functions of clothing and the inter-relationship of clothing and cultural patterns; -Explain clothing expectations in the depicting of social role, status and social mobility; - Describe the relationship between the environment, clothing and health; - Identify and describe special fabrics; and - Construct shirt and skirt with bags.
CNCC	2622	Clothing construction IV	This module deals with fashion and all the facet regarding it. From the development of fashion, the role that the designers play, up to the apparel industry, marketing and quality control.	MAIN	Student will be able to: - Explain the development of fashion; - Identify the role of fashion designers; - Analyze the world conditions regarding fashion; - Interpret the impact of technology; - Define and compare fashion cycles, deflections and fore casts; - Understand and explain the apparel industry and fashion centers; - Interpret whole sale and retail in marketing of fashion; - Evaluate the effect of globalization on apparel production and sourcing; and - Identify the role of the consumer in sustainable fashion.
CNCC	3712	Clothing construction V	This module will address the relationship of human beings and dress; the influence of culture and society on dress; interdisciplinary sources of dress; physical similarities and difference and prescriptive and proscriptive interpretations.	MAIN	Student will be able to: - Define dress and its relationship to human beings as biological, social, and aesthetic beings; - Differentiate between culture and society's influence on dress; - Define and state examples of ethnocentrism and dress; - Define, compare and contrast world dress, and dress varieties from culture to culture; - Discuss the interdisciplinary sources of dress; - Compare physical similarities and differences including appearance; - Relate between body, dress and the environment; and - Define and explain moralistic essays, satire, and prescriptive interpretations.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CNCC	3722	Clothing construction VI	This module the deal with ethnicity in clothing; nutrition, disease, growth and age as influences on dress; cultural adaption, sex differentiation and human development; abilities of the human body; environment and socio-cultural systems.	MAIN	Student will be able to: - Explain why the concept of race is not objective scientific terminology, but the concept of ethnicity is; - Explain how nutrition, disease, growth and age influence decisions of dress; - Apply the concept of cultural adaption, ethnicity, sex differentiation and human development to a research topic; - Explain how dress extends the abilities of the human body; - Conceptualize how dress intervenes between the body and environment; - Apply the concept of dress as a cultural adaption to the environment for a research topic; - Compare the roles that word dress, national costume and ethnic dress play in commercial socio-cultural systems; and - Describe how dress interacts with the senses to produce and aesthetic response.
CNCD	3732	Community development	Module1: The communication process. Method of presentation. Teaching aids. Evaluation. Module 2: Community development with regard to individuals, families and groups. Program and project planning	MAIN	Student will be able to: -Discuss and apply the communication process; -Apply different presentation methods; -Compile and apply teaching aids; -Assess the quality of different products and articles; -Distinguish the factors that must be taken in account in community development and program planning; -Develop and implement a successful project; and -Evaluate the success of an completed project, and recommend adjustments.
CNCR	3704	Research Methodology Consumer Science	This module is intended for all students who are pursuing studies on an honours level. Students will be exposed to the research process and all its facets in order to equip them to participate in and contribute to research projects in the work environment. It will thus address scientific research, ethical principles and behaviour in research, and the nature, methods and process of conducting quantitative and qualitative research. They will write a report under the supervision of their lecturer and in the end evaluate the finished products for adherence to standards and specifications in their specific field of study.	MAIN	Student will be able to: - Explain some basic concepts of research and other methodologies; - Discuss the explain research terminology; - Identify appropriate reseach topics; - Apply the ethical principles of research, ethnical challenges and approval processes; - Prepare a project proposal; - Describe quantitative, qualitative and mixed methods approaches to research; - Identify the components of a literature review process; - Critically analyse published research; - Organize and conduct research in a more appropriate manner; and - Write an research report.
CNSF	1614	Introductory food I	This module will be a introduction for food students to food principles and applications. The student will do food preparation basics; menus and recipes; meal management; food selection; food evaluation and cereals. The theory will be applied during the practical classes.	MAIN	Student will be able to: - Discuss how heat is transferred to foods through conduction, convection and radiation; - Describe how heat affects food; - Discuss the basic principles of various cooking methods; - Measure ingredients and select the correct measuring utensil; - Apply the correct mixing techniques; - Standardized recipes; - Calculate unit cost and recipe costs; - Control food costs; - Describe the different food service organizations; - Do meal management; - Reduce waste and save cost; - Manage time; - Do healthy food selections; - Evaluate food by using sensory and objective evaluation; - Identify a variety of grains; and - Apply various cooking methods to grains and finishes.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CNSF	1624	Introductory food II	This module the follow the introduction of food to the first year student. It will complete their basic knowledge of food principles and applications. The module will include chemistry of food composition; food safety; flours; starches; quick breads and yeast breads. It also include practical classes as an application for the theory.	MAIN	Student will be able to: - Identify categories of nutrients and explain their chemical structure; - Discuss the different components of food and their purposes; - Identify the causes of food-borne illnesses; - Handle food in a safe manner; - Explain and follow a HACCP system; - Take appropriate actions to create and maintain a safe and sanitary working environment; - Recognize and classify sauces; - Use thickening agents properly; - Control the development of gluten; - Discuss the baking process; - Use chemical leavening agents properly; - Prepare a variety of quick breads; and - Select and use yeast properly.
CNFS	2613	Food security I	Food security is a complex concept and the interpretation thereof subjective to context specific and specialist perspectives. The construct is multidimensional, therefore an overview of multiple disciplines are necessary.	MAIN	Students will be able to: - Define and classify the pillars of food security. - Analyse the global food security situation. - Interpret available data and report on the south African food security situation. - Identify the role that global and local agriculture sectors plays in food security. - Define the role of modern agricultural practises, aqua-culture, agro-forestry and permaculture in food security. - Evaluate how crop losses and food wastage affects global food security. - Interpret the impact of advances in science and technology in relation to food security. - Critique the emergence of genetically modified organisms in the food system as aid to attaining food security. - Understand and explain the influences of: urbanisation, poverty, education and employment, human development, gender equality' coping strategies in emergencies and crises on food security
CNFS	2623	Food security II	Food security is a complex concept and the interpretation thereof subjective to context specific and specialist perspectives. The construct is multidimensional, therefore an overview of multiple disciplines are necessary.	MAIN	Students should be able to: - Explain the correlation between food security and nutrition, disease and mortality. - Identify and interpret the influence of HIV/AIDS on food security. - Identify the role that non-food inputs such as safe water and sanitation plays in food security. - Evaluate how the usage of non-renewable resources impacts provision and food security. - Define and differentiate between the water-and ecological foot prints. - Analyse and compare the concepts of sustainability and environmentalism. - Discuss the effect of the type of governance on food security policies. - Identify the role that international humanitarian aid plays in relation to a food security/ insecurity status. - Distinguish between the different classification and monitoring systems for measuring food security. - Interpret the macro-and-micro-economic principles of food commodities within a food security context.
CNFS	3714	Food security III	Linking sustainability to the food security concept focusing on permaculture, changing diets, policy agendas, economics, biodiversity, organic production, biotechnology, waste management and the future of sufficient food production from and environmental aspect.	MAIN	Students will be able to: -Define and interpret the term sustainability and what it inherently entails; -Describe agriculture production within the food security concept and how it relates to sustainability; - Investigate and evaluate the potential of modern agriculture production methods on sustainability; -Interpret the possible outcomes/ consequences of adjusted behavior regarding the food value chain and consumption on food security and sustainability; -Predict the ethical implications that human decisions and actions can have on sustainability within food security; and - Evaluate the current human behavioral aspects an how it relates to the food security situation.
CNFS	3724	Food security IV	Students will study the following topics: food security in a household context; asset models for household food security mapping; assessment of vulnerable individuals; governmental policies on household food security; current situational factors within the community; coping strategies; food security and nutrition; affect of HIV/AIDS and intervention programs.	MAIN	Student will be able to: -Define and interpret food security in a household context. -Differentiate between asset models for household food security mapping and interpret the use thereof; -Use available resources to identify and compile an assessment of vulnerable individuals within certain households in the community. -Explain the influence of current governmental policies on household food security. - Predict possible outcomes of current situational factors within the community/household-cultural nexus that impacts food security; -Investigate coping strategies and the management of food insecurity as a product of human behavior; - Establish and explain the correlation between food security and nutrition; - Ascertain and interpret the effect of the high prevalence of HIV/AIDS on food security in the South African context; and - Appraise an compare different intervention programs to promotes food security.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CNSB	1614	Consumer behaviour I	The future of South Africans has never been more uncertain and challenging than in the present. For the consumer to remain successful in times of rapid change, it is imperative to maintain a disciplined business and marketing approach. Understanding markets s derived from knowing why consumers adapt certain behavioral patterns; why, when and how they purchase the varied types of products and services they consume.	MAIN	Student will be able to: - Define the concept of consumer behavior; - Classify diversity in the market and how it can be segmented; - Identify what role value and satisfaction play relating to consumer behavior; - Discuss how to do consumer research and collect secondary data; - Explain how to motivate consumers; - Describe how to measure the motives when consumers make purchasing decisions; - Differentiate between possible perceptions consumers have; - Apply knowledge on attitude formation to change a particular attitude; - Analyze the elements of consumer learning and information processing; and - Construct persuasive messages to the consumer through good communication.
CNSB	1624	Consumer behaviour II	To understand the consumer from a local and global perspective, the study requires an understanding of the challenges and changes taking place both here and abroad. The focus is on consumers as members of society, as well as broad cultural groups and cross-cultural consumer research to international marketing. Consumer decision-making process and reactions to innovations are also handled.	MAIN	Student will be able to: -Define the contemporary South African family and life cycle; -Distinguish between the different social classes and how it affects consumer behaviour; -Explain the influence of culture on consumer behaviour; -Analyse the impact of subculture on age, religion and gender and women in South Africa; -Evaluate multinational strategies: global versus local; -Discuss the use of cross-cultural psychographic segmentation as an indicator for consumer behaviour; -Argue the decision-making process and ethical dimensions relating to consumer behaviour; -Differentiate between the levels of consumer decision-making, gifting behaviour and consuming and processing; and -Critique marketing ethics and social responsibility.
CNSB	2614	Cosumer behaviour III	Sustainable consumption encompasses a wide range of consumer behavior, including consumer purchase of econ-friendly products, factors driving sustainable consumption behavior and consumer attitudes towards sustainable consumption. Products and services need to be consumed in such a way as to have a minimal impact on the environment so future generations can meet their needs.	MAIN	Student will be able to: -Define terms and specific vocabulary relevant to the sustainability spectrum; -Explain what sustainable consumption behavior entails; - Interpret sustainable consumption behavior in a South African context; - Analyze post-purchase and post-use behavior of consumers; - Apply green consumption in everyday life: recycle, rethink, reuse and reduce; - Evaluate the available infrastructure/ opportunities to enable sustainable post-consumption behavior; - Assess the factors (external and internal) that influences consumers' post-consumption behavior; - Create a theoretically feasible solution for post-consumer consumption behavior education; and -Discuss what influence major phenomenon's (energy crisis; global warming) has on consumers and how to build around it.
CNSB	2624	Consumer behaviour IV	Man and his housing needs are influenced by the individual and family values, standards and objectives in the different stages of the family life cycle. A variety of housing types are available to select from to fulfil the specific need. The family and its housing is dependent on the environment, therefore we emphasise a sustainable environment.	MAIN	Student will be able to: -Define the different terms relevant to housing; - Identify the factors that influence housing needs and the provision of housing; - Assess an individual or family's physiological, security, safety and social needs in terms of housing; - Differentiate between the different stages of a family life cycle relating to the housing needs of the individual or family; - Distinguish between different housing types; Evaluate a housing arrangement in terms of fulfillment for a special needs group (elderly, disabled, student); -Discuss the psychological influences of safe and secure housing on the individual; - Explain the term sustainable housing; and - Interpret sustainable housing in a South African context.
CNSB	3714	Consumer behaviour V	Personal financial management is the process whereby an individual or a family unit seeks to budget, save, and spend monetary resources over time, taking into account various financial risks and future life events. Circumstances relating to investment-, retirement-, health-, income tax-, career-, estate-, credit and protection planning need to be considered.	MAIN	Students will be able to: - Define personal financial management and what it entails; - Explain the advantage and disadvantage of personal financial management; - Implement principles of personal finances through successfully compiling a household budget; - Assess the efficiency of a budget and suggest recommendations; - Discuss the effect of credit planning on an individual's personal finances; - Identify and interpret the influence of the consumer credit act on the finances of the individual; - Evaluate how career choices will potentially affect lifestyle and consequently personal finances; - Define and differentiate between the different types of taxation the government can charge; - Interpret how taxation will influence different investment strategies and retirement planning. - Distinguish between the different forms of estate planning and the influence thereof on personal finances; - List the financial considerations taken into account when buying a residence; and - Compare the financial implications when starting your own business or buying a franchise or existing business.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CNSB	3724	Consumer behaviour VI	Wealth and a high majority of jobs are created by small businesses started by entrepreneurially minded individuals, many of whom go on to create big businesses. Entrepreneurial ventures also create jobs and conditions for a prosperous society. In today's digital world it is necessary to know how to use online marketing to promote you business, as the virtual word has many benefits.	MAIN	Student will be able to: - Differentiate between small, medium and micro-enterprises in an entrepreneurial sense; - Explain the basic business concepts; - Discuss the business environment in a South African context; - Assess the viability of a business idea; - Identify and interpret the development of business ideas; - Compile a business plan; - List the steps in setting up a business; - Differentiate between search engine marketing and optimisation; - Define the concepts of online advertising, online selling, email marketing, mobile marketing and social media marketing; and - Discuss an implement an e-marketing strategy.
CNSF	2614	Food III	Students will study the principles of diary products and their substitutes; protein rich foods, fruit and vegetables and legumes; soups, salads and gelatines. The work will include the food chemistry as well as the preparation changes of the different food groups.	MAIN	Student will be able to: -Examine and discuss recipe science, food preparation basics, meal management, food safety basics, food chemistry basics, food selection and evaluation of the different food groups and cooking methods; - Evaluate food products for purchase; - Select the appropriate food preparation method for the type of food and to apply the method; - Evaluate the quality of a food product for purchase; - Plan food purchase and preparation within a certain schedule to fit specific requirements; - Prepare food products to a specific standard and within a certain schedule; -Discuss the structure and composition of meats, poultry, fish and shellfish; and - Apply various cooking methods to all the food groups.
CNSF	2624	Food preparation I	This module contains fundamental knowledge, theories, principles and practices of Consumer Sciences including cereal, grains and pasta, flour and flour mixtures, starches and sauces, quick breads, yeast breads, cakes & cookies, pastries and pies, candy, food preservation, beverages, frozen desert, sweeteners, fats and oils. The practical work includes food preparation with regards to aspects of the theory.	MAIN	Upon successful completion of the module students will be able to: - Detail knowledge of cereal, grains and pasta, flour and flour mixtures, starches and sauces, quick breads, yeast breads, cakes & cookies, pastries and pies, candy, food preservation, beverages, frozen desert, sweeteners, fats and oils; - Evaluate food products such as cereal, grains and pasta, flour and flour mixtures, starches and sauces according to given criteria; - Explain the influence of cooking methods on the properties of grain cereal and pasta products; - Identify appropriate food preservation and cooking methods for specific cereal, grain or pasta; and - Develop and apply criteria for cereal, grain and pasta purchase.
CNSF	3714	Food V	Home and industrial food preservation. Preserving principles, preparing raw material, blanching, freezing, pasteurisation, UHT, heat sterilisation, microwave and infrared radiation, freeze-drying, coating and packaging.	MAIN	Student will be able to: - Examine the process of product development in the food industry; - Examine the way in which the principles of subjects studied until now can be applied in the development of a food product; - Generate new ideas and test concepts; - Discuss the sensory evaluation process (also including elementary data analysis); - Identify development potential in raw products; - Determine the challenges in a product development process; - Gather and Integrate relevant information for product development; - Set criteria for the product; - Plan and implement a product development process; and - Evaluate the success of the product tot he criteria.
CNSF	3724	Food VI	Development of food products. The criteria, principles and approaches. Practical work: Demonstration and or practical application of the steps in food product development.	MAIN	Student will be able to: - Distinguish between different methods; - Select suitable methods of preservation for specific products; - Evaluate different methods for suitability for a specific product; -Apply different preservation methods; - Set criteria for different preserved products; - Evaluate the quality of a product against the set criteria; and - Develop new economically an environmentally sustainable food products in an increasingly global context.
CNSI	1612	Interior I	The interior design profession: the services provided by an interior designer; steps involved with the design process; various methods available to communicate design vision to the consumer; forecasting and trends; principles of a professional practice. Case studies and visits to businesses and shadow work - practical.	MAIN	Student will be able to: - Acknowledge the services provided by an interior designer; - Perform the steps involved with the design process; - Build extensive knowledge on the various methods available to communicate their design vision to the consumer; - Build skills on forecasting and trends; and - Apply the principles of professional practice.

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CNSI	1622	Interior II	Design and architectural principles, elements and finishes: principles and elements of design; colour schemes; lighting solutions; new products; techniques; sustainable interior uses. Sketch-up designs.	MAIN	Student will be able to: - Apply the principles and elements of design to enhance a space; - Create colour schemes to fit a space; - Describe and pair lighting solutions to spaces; - Apply principles of new products, manufacturing techniques and applications for lining interiors; and - Design a space by making use of sketch-up.
CNSI	2612	Interior III	Socially responsible design, ergonomics and special user groups - space in terms of human factors and environmental factors; speciality segments of interior design; spaces to suit people's needs - applying knowledge of furnishings. Sketch - up: Practical.	MAIN	Student will be able to: - Outline work, the worker and the work place including detailed knowledge of ergonomics; - Evaluate, select and apply appropriate work methods in the work place to ensure a productive and motivating environment; - Identify, evaluate and select appropriate apparatus for the home; - Evaluate different sources of information for appropriate household apparatus for specified tasks, and to apply well-developed processes of analysis, synthesis and critical evaluation of that information; - Decide and act appropriately in the selection of an apparatus; - Evaluate performance against given criteria, and accurately identify and address own task-specific learning needs in a given context, and to support the learning needs of others; and - Work effectively in a team or group, and to take responsibility for management of the work process including the responsibility for the use of energy and manpower where appropriate. - Evaluate a space in terms of human factors and environmental factors. - Differentiate between the specialties segments of interior design. - Create space to suit people's needs by applying knowledge of furnishings.
CNSI	2622	Interior IV	Period design styles.Historical interior styles. Inspiration to contemporary spaces. Sketch-up.	MAIN	Student will be able to: - Investigate and describe historic interior styles; - Apply historic style inspiration to contemporary spaces and - Use Sketch-up to design a contemporary space.
CNSI	3712	Interior V	The properties of textile fibres and fabrics determine their suitability towards a specific product. Textile fibres are classified according to their source of origin or manufacture. The macro- and microstructure, physical and chemical properties and construction and finishing influence the uses and maintenance of different textile fabrics.	MAIN	Student will be able to: - Classify textile fibres in generic groups; - Evaluate a textile for use by the consumer according to properties; - Prescribe the care and maintenance instructions according to the properties of each textile; - Explain the textile fibre performance in terms of the structure and the physical and chemical properties of the textile; - Identify textile fibres by applying burning, microscope, chemical and stain methods; and - Identify and analyse the environmental impact of different textile fibres.
CNSI	3722	Interior VI	The classification and construction of yarns and fabrics. The influence of construction on the fabric properties. Finishing, dyeing and printing of textile fabrics. Care and maintenance of textile fabrics.	MAIN	Student will be able to: -Discuss weaving looms, process of weaving, basic weaves; - Predict performances of fabrics based inn fabrication, yarn structure and fibre; - Relate advances in fabric production to market availability and cost; - Differentiate between warp-and filling-knit fabrics; -Discuss versatility of knit fabrics for apparel, interior and technical products; -Examine and discuss how finishing affects fabric, including cost, quality, performance and appearance; - Identify different fabric construction methods; - Evaluate the application possibilities of a specific type of construction; - Evaluate the effect of specific finishes on the quality and end use of specific textile fabrics; -Evaluate the application possibilities of specific dyeing and printing methods; and - Prescribe textile care for a specific fabric or garment considering the construction and finishes;
FSCS	2634	Food systems for consumer science	"The student will become acquainted with the classification and preparation of the food systems solids, liquids, gels, foams, emulsions, analogues and combinations thereof. The student will become acquainted with the nutrients and additives that are employed to obtain the different food systems and will integrate food science knowledge to be able to understand the physical-chemical properties of the food systems. Practical work: The students will use the classification, composition of the structure and application of food additives practically."	MAIN	"After successful completion of the course, the student should be able to: - Explain how nutrients and additives are employed to attain the different food systems; - Explain the physical-chemical properties of the different food systems; - Demonstrate how the knowledge of the food science specialization relates to other disciplines and practices; and - Apply selected information appropriately for the preparation of specific food systems."

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
Postgraduate					
CNCS	6809	Research Project	Research project: Introduction, problem statement, aim, literature review, methodology, data collection, analysis, discussion of results, conclusion and summary.	MAIN	Student will be able to: -Deduct an aim from a given problem statement; -Gather literature relevant to the problem; -Integrate the literature in a literature review with proper reference to the literature; -Identify the methodology to collect the data; -Apply the methodology scientifically to collect data; -Interpret the data and discuss it; -Draw conclusions from the data; and -Write a research report.
CNCS	6814	The early history of textiles, clothing, interiors or foods	The early history of textiles, clothing, interiors or foods.	MAIN	Students will be able to: -discuss and explain the development of the history of textiles, clothing, interiors or food.; -describe of the influences of factors such as geography, religion, politics and economics on the history of textiles, clothing, interiors or food; identify and classify items to specific periods on specific features; and display insight in relevant research methodologies for history of textiles, clothing, interiors or food.
CNCS	6824	The recent history of textiles, clothing, interiors or foods	The early history of textiles, clothing, interiors or foods.	MAIN	Student will be able to: -develop and discuss an overview of the development of the history of textiles, clothing, interiors or food; -develop and discuss overview of the influences of factors such as geography, religion, politics and economics on the history of textiles, clothing, interiors or food; - identify and classify items to specific periods on specific features; and develop insight in relevant research methodologies for history of textiles, clothing, interiors or food.
CNFD	6808	Consumer Analysis of Foods	Advanced aspects in consumer preferences and analysis of foods.	MAIN	Student will be able to: -Explain advanced aspects in consumer preference and analysis; -Will be familiar with the mental, emotional and physical processes used to select, obtain consume and dispose of food products or food services to satisfy needs and wants and the impact that these processes have on the consumer and society; -Apply the knowledge concerning the aspects of the theory in practice; -Develop scientific thinking through mastering the skills to select, interpret, evaluate, review, compare and organize subject matter; -Compare literature through critical reading; and -Use relevant research methodologies.
CNST	6844	Psychological aspects of clothing	Psychological aspects of clothing: Self-concept, clothing symbolism, conformity, individuality.	MAIN	Student will be able to: -Outline the psychological aspects of clothing; -Conversant with the psychological perspective on clothing; -Develop scientific thinking through mastering the skills to select, inerpret, evaluate, review, compare and organize the subject matter of thepsycological aspects of clothing; -Integrate the work of different authors when discussing a specific aspect; -Compare views through critical reading; -Use the research methodology for studies in the psychological aspects of clothing; and -Collect and review literature and compile an organized and logical paper.
CNST	6854	Natural textile fibres	Natural vegetable fibres, natural protein fibres and manmade fibres from natural origin.	MAIN	Students will be able to: -Describe natural fibres and regenerated fibres from natural origin; -Analyse the properties of a fibre; -Evaluate a specific fibre for a specific end use; -Integrate the theories of different authors in compiling a literature review; -Assess the environmental impact of different fibre production systems; -Critically review information on new fibres and compile textile care prosesses for new textile fibre products; and -Work in a team and take responsibility for the planning of textile evaluation projects

Module code		Course Long Title	Course Description	Campus	Learning Outcomes
CNST	6864	Finishes for natural textile fibres	Finishes to improve the appearance and function of natural fibres.	MAIN	Student will be able to: -Explain the finishes for natural fibres and regenerated fibres from natural origin; -Analyse the properties of a finished fibres; -Evaluate a specific finish for a specific end use; -Integrate the theories of different authors in compiling a literature review; -Assess the environmental impact of different fibre finishes and application methods; -Review information on new finishes and asses the value in terms of the improvement of the properties compared to the impact; and -Work in a team and take responsibility for the planning of textile finish evaluation projects.
CFNS	8900	Food and Nutrition Security Dissertation	Research project in specialized fields of Food and Nutrition Security as discussed by study leader(s), Academic Departmental Head and student that include aspects of food and Nutrition Security. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.		Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CFNS	9100	Food and Nutrition Security Thesis	Research project in specialized fields of Food and Nutrition Security as discussed by study leader(s), Academic Departmental Head and student that include aspects of food and Nutrition Security. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.		Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CNCS	8900	Consumer Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Consumer Science , including: Research project in specialized field of Consumer Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CNCS	9100	Consumer Sciences Thesis	This module contains fundamental knowledge, theories, principles and practices of Consumer Sciences, General including: Research project in specialized field of Consumer Sciences, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing

15. EQUIVALENT MODULES

Module code of 2023 modules	Equivalent module code
ACSF2746	ACSF2726
AGEG4808	AGEG6808
ANIF4824	FSCM6814
ANIF4864	FSCD6814
ANIP4824	ANIP6824
CHEA2601	CHEM2631
CHEA6803	CHEM6813
CHEB3701	CHEM3731
CHEB6803	CHEM6833
CHEC6803	CHEM6853
CHED6803	CHEM6873
CHEE6803	CHEM6823
CHEF6803	CHEM6843
CHEG6803	CHEM6863
CHEH6803	CHEM6883
CHEM1501	CHEM1551
CHEM2601	CHEM2611
CHEM3701	CHEM3711
CLIM3724	CLIM3764
CLIM4834	CLIM6834
CLIM4844	CLIM6844
CLIM4854	CLIM6854
CROP3714	CROP3754
CROP4814	CROP6814
CROP4834	CROP6834
CRPR6808	QRPR6808
CSIQ1614	CSIQ1533+CSIQ1681
DATA2614	DATA2614
ECPM1514	EFCP2514
FSCG4826	FSCG6826
FSCP4814	FSCP6814

Module code of 2023 modules	Equivalent module code
GEOE1624	GEOG1624
GEOG1514	GEOE1514
GERS2624	QCIV3624
GLGY2646	GLGY2641, GLGY2643
HORT3734	HORT3774
PHYS1644	PHYS1543
PHYS6814	PHYD6804
PLTB4814	PLTB6814
PLTB4824	PLTB6824
PLTB4834	PLTB6834
PLTB4854	PLTB6854
PPLG4834	PPLG6834
PPLG4844	PPLG6844
SCCS2684	SOIL2664
SCCS4808	SCCS6808
SOIL3724	SOIL3744
HORT3724	HORT3764
HORT3754	HORT3714
CROP3764	CROP3744
SOIL4814	SOIL6814
SOIL4834	SOIL6834
CROP4824	CROP6824
CROP4844	CROP6844
SOIL4824	SOIL6824
SOIL4844	SOIL6844
CLIM4814	CLIM6814
CLIM4864	CLIM6864
CLIM4874	CLIM6874
SCCS4824	SCCS6824

15.1 LIST OF NEW AND CHANGED MODULES IN DEPARTMENT SCCS

New Module code 2023	Name of module	Equivalent code	Prerequisite	Old code 2022	What happens if student fail the old module code
CROP2614 (BSc and BAgric)	Concepts in Crop Production	CROP2614 (BSc and BAgric)	Student must have passed SCCS1624 in order to continue with this module.	CROP2614 AGRI 2614	Repeat CROP2614
CROP3714 (BSc) existing module	Summer Grain, Oil and Protein-Rich Crops	CROP3754 (BAgric)	Student must have passed CROP2614 in order to continue with this module	CROP3714 AGRI 3714	Repeat CROP3714 or CROP3754
CROP3764 (BAgric)	Small grain, Industrial and diverse crops	CROP3744 (BSc)	Student must have passed CROP2614 in order to continue with this module	CROP 2624 AGRI2624	Repeat CROP3764/3744
SCCS2624 (BSc and BAgric)	Crop Development	None (BSc and BAgric)	Student must have passed SCCS1624 in order to continue with this module	New module	Repeat SCCS2624
HORT3734 (BAgric)	Fruit production	HORT3774 (BSc Agric) existing code	Student must have passed CROP2614 in order to continue with this module	New module	Repeat new module
HORT3724 (BAgric)	Applied fruit production	HORT3764 (BSc) existing code	Student must have passed HORT3734/ 3774 in order to continue with this module	New module	Repeat new module
HORT3754 (BSc)	Vegetable production	HORT3714 To create in 2023 (BAgric) create this equivalent code	Student must have passed CROP2614 in order to continue with this module	CROP3724	Repeat HORT3754
CLIM3734	Micrometeorology	No equivalent	Student must have passed CLIM2614 or in order to continue with this module.	CLIM3754/3714	Repeat CLIM3754/3774
CLIM4854 (BSc)	Agrometeorological Services for Extension	CLIM6854 (Hons)	None		
CLIM4874 (BSc) (starting in 2024)		CLIM6874 (Hons)	Student must have passed CLIM3754/3774 in order to continue with this module.		This is currently and existing module (CLIM4814/CLIM6814)
SCCS4824 (BSc)	Modelling soil, crop and climate interactions	SCCS6824 (Hons) Create code	None	New module	
CLIM4864 (BSc)	Tropical Meteorology	CLIM6864 (Hons)	Student must have obtained a minimum mark for CLIM4834/6834 in order to continue with this module.		But content will be the same and we just want a 4th year code
SOIL2674	Soil Fertility and Fertilization	None	Student must have passed SCCS1624 in order to continue with this module	SOIL3714/34	Repeat SOIL2674
SCCS2684 (BSc and BAgric)	Sustainable Soil and Water Management	None (BSc and BAgric)	Students must have passed SCCS 1624 in order to register for this module	SOIL2624/2664	Repeat new module
SOIL3774 (BAgric)	Soil Classification, Evaluation, and Land Use Planning	SOIL3754 (BSc Agric) To create in 2023)	Student must have passed SCCS2684 in order to register for this module.	SOIL2614/2654	Repeat SOIL3774
SCCS3724	Research Methodologies in SCCS	None	None	New module	Repeat new module

15.2 LIST OF NEW AND CHANGED MODULES IN DEPARTMENT ANIMAL SCIENCE

New Module code 2023	Name of module	Equivalent/ Old code	What happens if student fail the old module code
ANIB3713	Theory of Animal Breeding	ANIB3714	Register for the new code
ANIB4823	Animal Breeding: Practical App	ANIB4824	Register for the new code
ANIF3714	Food Products from Animals	NEW MODULE	Register for the new code
ANIF4824	Meat Science	FSCM4814	Register for the new code
ANIF4864	Dairy Science	FSCD4814	Register for the new code
ANIG3702	Animal Science Practicals III	ANIG3704	Register for the new code
ANIG3754	Monogastric Production Systems	ANIG3733, ANIG3743	Register for the new code and for WILD3723 or WDMT3723
ANIN3723	Exp Nutr Feed Stds Farm Animal	NEW MODULE	
ANIP3713	Animal Anatomy and Physiology	ANIP3714	Register for the new code
GRAS3763	Applied Rangeland and Pasture	GRAS3724, GRAS3714	Register for the new code and for WILD3723 or WDMT3723
WDMT3723	Applied Game Farm Management	WDMT3714	Register for the new code
WILD3723	Wildlife Research and Monitoring	WILD3764	Register for the new code