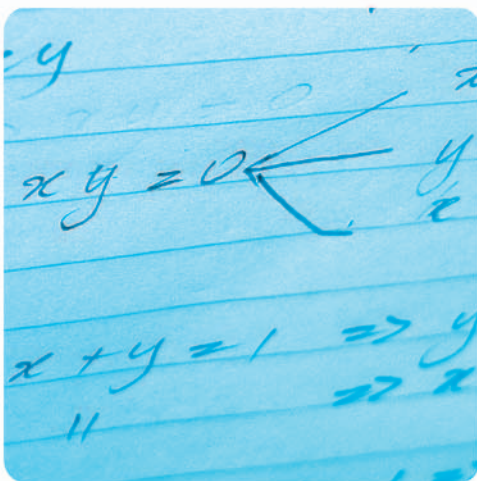
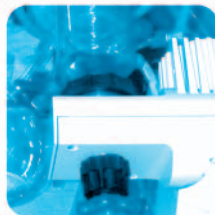


Faculty of Natural and Agricultural Sciences

Report 2008



Faculty of

**Natural and
Agricultural Sciences**

Report 2008

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Preface

From the Dean's Office

In 2008 the Faculty of Natural and Agricultural Sciences once again lived up to its vision to be acknowledged as a faculty that is at the forefront of the practice of natural and agricultural science where the highest levels of quality and credibility are reflected.

During the year the faculty not only remained one of the leaders in training and career development in the natural and agricultural sciences, but it also made a concerted effort to enlarge its international footprint and to establish itself internationally. This is evident in the visits of staff from the faculty to universities such as the USA-based University of Minnesota and Virginia Polytechnic Institute and State University (Virginia Tech) and the extension of international agreements between the University of the Free State (UFS) and these institutions. The faculty also had the privilege of hosting a high-level delegation from the University of Minnesota on the Main Campus in Bloemfontein in August 2008.

The turmoil in the international markets firstly led to very high oil prices, which spilt over to the grain markets and high food prices. This, in turn, led to high inflation levels and therefore high interest rates. Eventually the exchange rate also deteriorated against the major currencies. In the latter part of the year the whole situation was turned upside down with the collapse of the financial markets. The faculty did not escape this and the price of equipment for which orders were placed sky rocketed. Innovative skills had to be applied to remain on track with our equipment strategy.

Although 2008 was an exceptionally difficult year for the UFS and the institution had to bear the brunt of the Reitz video and the reaction of the national and international community, the faculty still managed to perform and expand its core business.

The faculty offers multi-disciplinary and holistic courses to send skilled and capable students into the South African workplace and to empower the labour force. Our general and extended programmes are continuously assessed and improved in order to improve our throughput rates and quality of teaching.

The staff at the faculty worked tirelessly this year to broaden our product offering and to provide our students with the best quality teaching in the country. I applaud their efforts of expanding capacity, developing programmes and strengthening re-



Prof. Herman van Schalkwyk.

lationships both within and outside the faculty and the university.

I also want to applaud the staff and students of the faculty with their achievements this year – whether it is on a personal level, in their capacity as staff member of their respective department/centre or for the faculty. To mention a few:

- Ms Estelle Heideman HIV/Aids coordinator of the Lengau Agricultural Development Centre, received a bursary to participate in a leadership programme in the United States of America (USA), which trains female leaders in South Africa who contribute to the prevention of HIV at a local, regional and national level;
- In the Department of Agricultural Economics, Prof. Johan Willemse, known for his contribution towards agriculture, was appointed on the non-executive board of Absa;

Staff in the dean's office



The staff working in the dean's office are, from the left, front: Ms Stefanie Naborn, Manager: Marketing and Liaison, Ms René Bloem, Secretary, Prof. Neil Heideman, Vice-Dean: Faculty of Natural and Agricultural Sciences; back: Mr Clasie Claassen, Assistant Administrative Officer, Mr Johan Kruger, Faculty Manager, Ms Lorinda Rust, Secretary, and Ms Mitzie Cloete, Typist/Clerical Assistant.

- Prof. James du Preez, Departmental Chair of the Department Microbial, Biochemical and Food Biotechnology, received the silver medal for exceptional published research awarded at the biennial conference of the South African Society for Microbiology hosted in Graham's Town. It was only the seventh time since 1986 that the medal was awarded;
- A study of the UFS about how the change in the packaging of DNA with cellular development is influenced by the expression of genes, in which Prof. Hugh Patterson played a leading role, was published in a leading peer-reviewed scientific journal *Proceeding of the National Academy of Sciences* of the USA (PNAS). The PNAS journal has an impact factor of 10, which means that studies published in this journal

are referred to by ten other scientific studies within the scope of two years;

- Prof. Riaan Luyt, professor in Chemistry and head of the Natural Sciences Programme at the Qwaqwa Campus, received an honorary medal from the Polymer Institute of the Slovak Academy of Sciences during a conference hosted in the High Tatras mountains of Slovakia;
- Prof. Maryke Labuschagne from the Department of Plant Sciences was the recipient of the National Science and Technology Forum's (NSTF) research capacity-development award. A team consisting of Prof. Jan van der Westhuizen and Dr Susan Bonnet from the Department of Chemistry, Prof. Kenneth Swart and Prof. Thinus van der Merwe from FARMOVS-PAREXEL also

received the innovation award for an outstanding contribution to science, engineering and technology by either an individual or a team over the last ten years from the NSTF;

- Prof. Maryke Labuschagne received a second prestigious national award for her research when the 2008 Cereal Science and Technology - SA's (CST-SA) Award for research and development was awarded to her; and
- Prof. Ivan Horak, extraordinary professor at the university's Department of Zoology and Entomology, became the third person in the history of the UFS to receive the D.Sc. degree.

In closing I would like to thank the faculty's lecturing staff for their support and enthusiasm during the past year. However, none of these achievements would have been possible without the interest and hard work of the administrative staff.

During 2008 we have all worked together to live up to the faculty's motto: "There is no substitute for excellence!" This report covers the activities of the faculty in 2008. It is a reflection of a year's commitment from a team of highly skilled academic and support staff.

Prof. Herman van Schalkwyk
Dean: Faculty of Natural and Agricultural Sciences
University of the Free State

Faculty news

Successful visit from delegation of the University of Minnesota

A senior delegation from the University of Minnesota in the United States of America (USA) paid a very successful visit to the University of the Free State (UFS) in May 2008 to explore ways of strengthening already existing ties between the two institutions.

Teacher training, capacity building in health sciences and student preparedness were among the areas of cooperation that were investigated, within the context of the Strategic Academic Cluster initiative of the UFS. Poverty reduction strategies were also a strong focus area.

The Faculty of Natural and Agricultural Sciences has had a cooperation agreement with the University of Minnesota's Department of Applied Economics since 2002 and the exchange of staff



During the visit are, from the left: Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS, Prof. Robert Jones, Senior Vice-President: System Academic Administration at the University of Minnesota, Dr Meredith Quiad, Associate Vice-President and Dean: International Programmes, University of Minnesota, Prof. Teuns Verschoor, Acting Rector of the UFS and Prof. Ezekiel Moraka, Vice-Rector: Student Affairs at the UFS.

has been taking place on a regular basis. This agreement will be expanded and both institutions are now exploring the possibility of

applying it across faculties. Both institutions have committed seed funding to formalise the cooperation agreement.

50 years of Agriculture celebrated



The faculty celebrated 50 years of the teaching of agriculture at the UFS in November 2008. Part of the celebrations was a seminar with the theme "Challenges in a changing agricultural environment". Some of the guest speakers are, from the left: Mr Corwyn Botha, Chairman: Agri Business Chamber and Managing Director of the Cape Agri Group, Mr Motsepe Matlala, President of NAFU, Mr Hans van der Merwe, Executive Head: Agri SA, Prof. Herman van Schalkwyk: Dean: Faculty of Natural and Agricultural Sciences at the UFS, and Mr Sugar Ramakarane, Head: Department of Agriculture, Free State Province.

Winners of NSTF awards assist with recruitment of students



Here are, from the left: Dr Martin Ntwaeaborwa, senior lecturer at the Department of Physics and finalist in the category for black researchers, Prof. Kenneth Swart, FARMOVS-PAREXEL, Prof. Maryke Labuschagne, head of Plant Breeding at the UFS's Department of Plant Sciences and female recipient of the award for the development of research capacity over the past five to ten years, and Prof. Jan van der Westhuizen, Department of Chemistry at the UFS; front: Ms Kedibone Aphane, MRC. Prof. Swart and Prof. Van der Westhuizen were the leaders of the team who received the award for the development of innovation by a corporate organisation or institution.

Representatives of the South African Medical Research Council (MRC) visited the UFS to recruit students who want to study in the fields of sci-

ence, engineering and technology. To assist with the recruitment, the winners of awards made by the National Science and Technology Forum (NSTF) earlier this year,

made presentations to create an interest amongst students. The UFS had four finalists of whom two were the winners in their respective categories.

Young scientists learn what faculty can offer



Young science lovers gathered in Sasolburg for the annual Sasol TechnoX in August 2008. The faculty's exhibition captured the learners' attention through an interactive representation of the application fields of science. Delegates from the Departments of Mathematics and Applied Mathematics, Chemistry, Zoology and Entomology, as well as UFS Marketing stood ready to answer the questions of the 20 832 learners who attended the event. Pictured here is Theo Viljoen, M.Sc. student in Forensic Entomology, sharing interesting facts regarding insects with learners.

Two UFS academics appointed on the Land Bank Board



Prof. Herman van Schalkwyk (left), Dean: Faculty of Natural and Agricultural Sciences, and Mr Theo Potgieter from the UFS School of Management were appointed on the Land Bank Board in March 2008. Prof. van Schalkwyk was appointed as Director and Deputy Chairperson and Mr Potgieter as Director of the Board. The appointments were made by the Minister of Agriculture and Land Affairs, Ms Lulu Xingwana, and are effective for a period of four years.

UFS extends exchange agreement with USA university



Here are, from the left, front: Dr SK de Datta, Vice-Rector: International Affairs, VT, Prof. Herman van Schalkwyk, Dean of the Faculty of Natural and Agricultural Sciences, UFS, Dr Martin Ntwaeaborwa, senior lecturer at the Department of Physics, UFS; back: Prof. Jim McKenna, Department of Crop, Soil and Environmental Affairs, VT, Prof. Izak Groenewald, Director of the Centre for Sustainable Agriculture and Rural Development at the UFS and responsible for the faculty's international liaison, Dr Michael Bertelsen, VT's international office, Dr Aldo Stroebel, Head: Internationalisation at the UFS and Dr Liesel Herselman, senior lecturer at the Department of Plant Sciences, UFS.

A delegation from the faculty visited the Virginia Tech University (VT) in the USA in June 2008 to confirm and extend the existing student exchange agreements between the two institutions.

During the visit the agreement, which started in 1997, was extended for the next five years. More than 150 students from both institutions have already taken part in this exchange agreement and it is the most successful student exchange agreement that VT is involved in. Although agricultural students from the UFS initially took part in the agreement, it was extended to other departments in the faculty and also to the rest of the UFS.

Itjoriseng Project launched



The faculty launched the Itjoriseng Project on the Main Campus in Bloemfontein in March 2008. The aim of the project is to improve the skills of teachers in the subjects Mathematics and Physical Science for Grades 10–12. "Itjoriseng" is the Sotho word for "sharpen yourself". At the launch were, from the left: Mr Mzamo Jacobs, Director: Curriculum Development for Further Education and Training, Free State Department of Education, Mr Johan Kruger, Faculty Manager, Ms Elna Marais, Chief Education Specialist: Curriculum Development, Free State Department of Education, and Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS.

2007 Faculty report launched



The faculty once again produced another report in which the various departments and centres highlighted their activities for 2007. The report was so well received that a second edition had to be printed. Here are some of the departmental chairpersons during the launch of the report in June 2008.

Institute for

Groundwater Studies

“The institute received numerous requests from the mining industry to present a short course focusing on groundwater-related problems associated with the mining environment” - Dr Ingrid Dennis.



Dr Ingrid Dennis.

Overview

The Institute for Groundwater Studies (IGS) was founded in 1974 by Prof. Frank Hodgson, who became its first director. When Prof. Hodgson retired after more than 30 years at the helm, Dr Ingrid Dennis was appointed as director on 1 August 2007.

To date, more than 300 postgraduate students in Geohydrology have been qualified from this institution.

During 2008, 17 honours, 22 M.Sc. and 11 Ph.D. students were registered at the institute. The total number of registered students amounted to 50, of which nine were international students. These students were from Came-

roon, Zimbabwe, Botswana, Eritria, Congo, Zambia, Namibia and Switzerland. The course material included practical fieldwork such as drilling and aquifer testing. In 2008, a group of students also attended a week-long field school, which included a visit to an industrial complex and a rural water supply scheme.

Dr Danie Vermeulen presented a Geophysics course which was attended by approximately 35 postgraduate students from six universities, with funding from the Framework Programme for Research Education and Training in Water (FETWater) training programme. The course was an extension

of a FETWater gathering attended by Drs Ingrid Dennis, Rainier Dennis and Danie Vermeulen in Dullstroom, Mpumalanga.

Drs Ingrid Dennis and Rainier Dennis held two-day training workshops on the Groundwater Resource Directed Measures (GRDM) software for employees from the Department of Water Affairs and Forestry and Local Government, as well as for consultants in the groundwater industry. The workshops were held in Bloemfontein, Durban, Stellenbosch, Port Elizabeth and Pretoria.

Dr Vermeulen was one of approximately 500 delegates who attended an International Mine Water Association (IMWA) congress in June 2008, at Karlovy Vary in the Czech Republic. The topic of Dr Vermeulen's presentation was "Operation and Monitoring guidelines for irrigation with coal mine water in South Africa". The association has members from the water sector in the mining industry from all over the world. After the congress, Dr Vermeulen engaged in a tour to visit all the mines in Bohemia in order to investigate groundwater-related issues.

Drs Ingrid Dennis and Jennifer Pretorius were invited to present a paper on the impacts of mining waste on groundwater systems at the 4th International Mining and Industrial Waste Management Conference from 11-12 March 2008 in Rustenburg, North West Province. The conference was attended by local and international engineers and scientists.

Business Zone organised a Mine Water Management workshop at the conference centre of the Reserve Bank in Pretoria. The two-day forum was attended by 150 delegates, of which only ten were invited speakers. Drs Ingrid Dennis and Danie Vermeulen were among the invited speakers.

The IGS received numerous requests from the mining industry to present a short course focusing on groundwater-related problems associated with the mining environment. During November 2008, a week-long short course was held on the subject at Bain's Game Lodge in Bloemfontein. Seventy-eight delegates from the mining industry and regulators attended the course. The course was opened by guest speakers Mr Nikisi Lesufi of the Chamber of Mines and retired Prof. Frank Hodgson. All lecturing staff at the IGS presented course material in their specialisation fields. Two other presenters (Messrs Melt Marais and Piet van Deventer) from Fraser Alexander Tailings also presented course material on mining waste deposits.

On 18 and 19 November 2008, Dr Rainier Dennis visited Gaborone, Botswana to attend a "Groundwater in SADC IWRM (International Water Resource Management) Initiative" workshop. The objectives of the workshop were to assess, develop and initiate actions to create a sustainable integration of groundwater resources management.

The four-year Water Research Commission (WRC) project on field investigations to study the fate and transport of light non-aqueous phase liquids (LNAPLs) in groundwater was awarded to the IGS in early 2007. For this project, the IGS collaborated with the Universities of KwaZulu-Natal and Pretoria, and Golder Associates Consultants. This project aims to consolidate knowledge about the fate and transport of LNAPL pollutants in groundwater in a systematic manner. As part of the project, representatives from the industry (oil companies, consultants, researchers and regulators) were invited to workshops in February 2008. The intention of



At the FETWater Meeting in Dullstroom were, from the left: Dr Ingrid Dennis, Director: Institute for Groundwater Studies at the UFS, Mr Ronny Verhoeven, Ghent University, Belgium, Mr Rudy Herman, Flemish Government, Mr Steve Mitchell, Water Research Council, Mr Alex Makarigakis, United Nations Educational, Scientific and Cultural Organisation (UNESCO), Dr Rainier Dennis, Institute for Groundwater Studies at the UFS, Dr Danie Vermeulen, Institute for Groundwater Studies at the UFS, Dr Jan Roos (UFS), and Mr Andries Jordaan, Director: Disaster Management Training and Education Centre for Africa (DiMTEC) at the UFS.

the workshops was to combine the dissemination of the products of the WRC project K5/1501 on DNAPLs and to obtain collective input from the industries and oil companies, regulators and local authorities on the objectives, approach and methodologies planned for the LNAPL research. The workshops were presented by Drs Jennifer Pretorius and Brent Usher, held in Pretoria, Durban and Cape Town, and attended by approximately 60 delegates.

Regular speeches concerning irrigation with groundwater were presented by Dr Vermeulen at the Agricultural Unions in the Free State and Northern Cape. For many farmers, this is an important subject and invoked lively discussions.

Prof. Gerrit van Tonder and Dr Jennifer Pretorius gave several presentations to local pensioners' societies on subjects ranging from water quality to groundwater use.

In 2008, the South African Development Community (SADC) short-listed the IGS to host the Groundwater Managing Institute of Southern Africa. The IGS has been visited by representatives from the SADC and negotiations are currently ongoing.

A two-year contract with Goldfields Mining Group was

awarded to the IGS laboratory. The purpose of the contract is to assess the acid-generating potential of all the mining group's waste deposits. The IGS laboratory renewed its contract with BloemWater to perform weekly bacterial and two-weekly chemical analyses of all the water supply points in the region. The Department of Water Affairs and Forestry also awarded a contract for all the analyses of water samples taken by the regulator in the Free State region.

For 2009, the IGS was granted R100 000 by SASOL for the third consecutive year, for the purpose of groundwater-related research. ■



Students during a drilling practical.

Research outputs

Research articles

Dennis, I., Pretorius, J.A., Van Deventer, P. & Steyl, G. 2008. *Methods to assess the impacts of tailings dams on the groundwater system in South Africa*. *Journal of Mining and Metallurgy* 44A(1): 59-66.

Gebrekrastos, R.A., Shapiro, A.M. & Usher, B.H. 2008. In situ estimation of the effective chemical diffusion coefficient of a rock matrix in a fractured aquifer. *Hydrogeology Journal* 16(4): 629-639.

Usher, B.H. 2008. Upscaling laboratory results on water quality for underground collieries in South Africa's Highveld Coalfields. *Minerals Engineering Journal* 22(1): 43-56.

Vermeulen, P.D. & Usher, B.H. 2008. The effect of graben structures on the migration of groundwater contaminants on an industrial site. *Environmental Geology* 10. [Online].

Chapters in books

Dennis, I. & Veltman, S. 2008. The South African groundwater decision tool. In *Groundwater flow understanding: From local to regional scale*, edited by J.J. Carrillo Rivera and M.A. Ortega Guerrero. Leiden, The Netherlands: Taylor and Francis. pp. 135-149.

Usher, B.H. & Veltman, S. 2008. The development of a methodology for groundwater management in dolomitic terrains of South Africa. In *Groundwater flow understanding: From local to regional scale*, edited by J.J. Carrillo Rivera and M.A. Ortega Guerrero. Leiden, The Netherlands: Taylor and Francis. pp. 165-182.

Reports

Adams, S., Beekman, H.E., Campbell, R.B., Conrad, J., Fey, M.B., Jovanovic, N., Saayman, I.C., Thomas, A. & Usher, B.H. 2008. *Assessment of aquifer vulnerability*. Report no: 1432/1/07 to the Water Research Commission (WRC), Pretoria, South Africa.

Dennis, I. 2008. *Groundwater Reserve Determination for the Thukela Catchment: Inception Report*. Report about project no: WP 9437/3 to the Department of Water Affairs and Forestry (DWAF), Pretoria, South Africa.

Dennis, I. 2008. *Review of Berg WAAS conceptual and numerical models*. Report about project no: P14/14/2/3/8/2/2 to the Department of Water Affairs and Forestry (DWAF), Pretoria, South Africa.

Dennis, I. 2008. *Review of commercial software packages to calculate surface-groundwater interaction*. Report about project no: P14/14/2/3/8/2/2 to the Department of Water Affairs and Forestry (DWAF), Pretoria, South Africa.

Dennis, R. 2008. *Training and testing of neural networks to simulate surface-groundwater interaction*. Report about project no: P14/14/2/3/8/2/2 to the Department of Water Affairs and Forestry (DWAF), Pretoria, South Africa.

Dennis, R. & Dennis, I. 2008. *Review of groundwater component of WSAM*. Report about project no: P14/14/2/3/8/2/2 to the Department of Water Affairs and Forestry (DWAF), Pretoria, South Africa.

Gebrekrastos, R.A., Groenewald, J., Jagals, P., Lenong, S., Pienaar, M.,

Pretorius, J.A., Robertson, N., Traoré, H.N., Tshitenge, C., Usher, B.H. & Zadoroshnaya, V. 2008. *Field and laboratory investigations to study the fate and transport of dense non-aqueous phase liquids (DNAPLs) in groundwater*. Report no: 1501/5/08 to the Water Research Commission (WRC), Pretoria, South Africa.

Gebrekrastos, R.A., Pretorius, J.A. & Usher, B.H. 2008. *Groundwater monitoring guidelines for DNAPLs in South African Aquifers*. Report no: 1501/4/08 to the Water Research Commission (WRC), Pretoria, South Africa.

Gebrekrastos, R.A., Pretorius, J.A. & Usher, B.H. 2008. *Guidelines for the acceptance of monitored natural attenuation processes in South Africa*. Report no: 1501/3/08 to the Water Research Commission (WRC), Pretoria, South Africa.

Gebrekrastos, R.A., Pretorius, J.A. & Usher, B.H. 2008. *Manual for site assessment at DNAPL contaminated sites in South Africa*. Report no: 1501/2/08 to the Water Research Commission (WRC), Pretoria, South Africa.

Usher, B.H., Van Tonder, G.J. & Vermeulen, P.D. 2008. *Determination of the impact of coal mine water irrigation on groundwater resources*. Report no: 1507/1/08 to the Water Research Commission (WRC), Pretoria, South Africa.

Conference contributions

Dennis, I., Pretorius, J.A. & Van Deventer, P. 2008. *Impacts of tailings dams on the groundwater systems in South Africa*. Paper delivered at the 4th International Mining and Industrial Waste Management Conference: The tailings life cycle: Managing waste for life, Orion Safari Lodge, Rustenburg, South Africa. 11-12 March.

Vermeulen, P.D. & Usher, B.H. 2008. *Operation and monitoring guidelines for irrigating with coal mine water in South Africa*. Paper delivered at the 10th International Mine Water Association (IMWA) Congress: Mine Water and the Environment, Karlovy Vary, Czech Republic. 2-5 June.

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Senior Lecturer: Dr Brent Usher

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Affiliated Researchers: Profs Jopie Botha, Frank Hodgson, Messrs Mehari Menghistu, Richard Akoachere, Michael Bester, Modreck Gomo, Georges Moukodi, Charl van der Merwe

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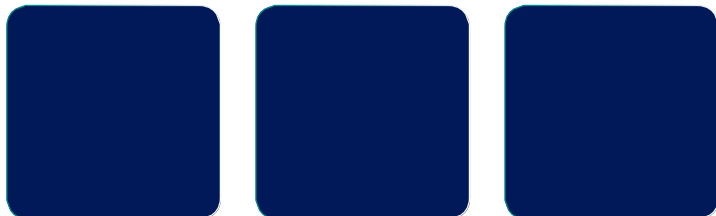
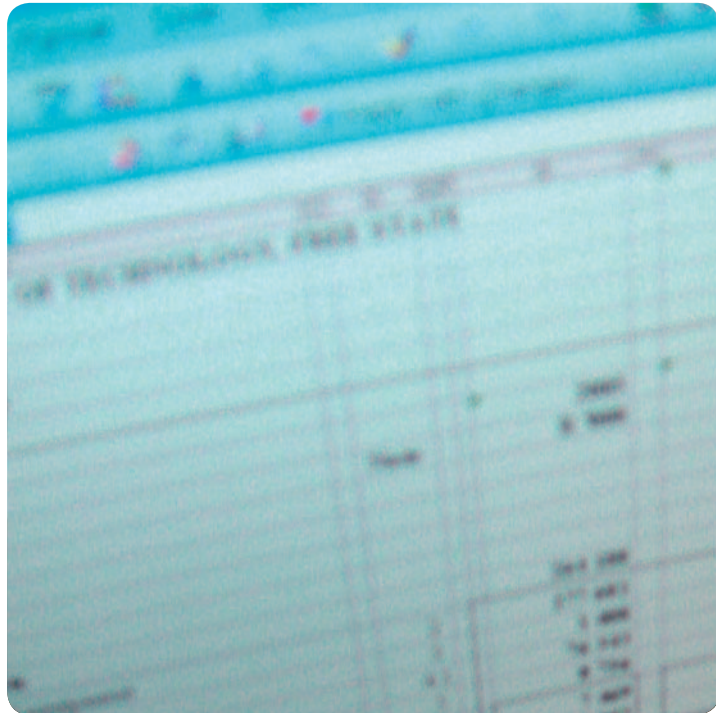
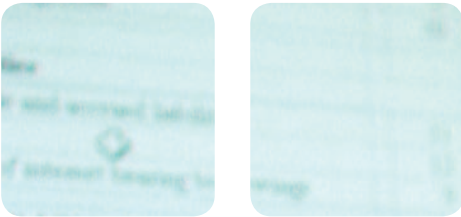
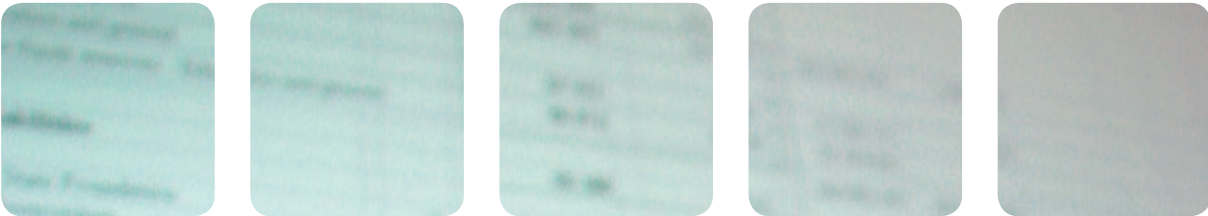
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Statistical data

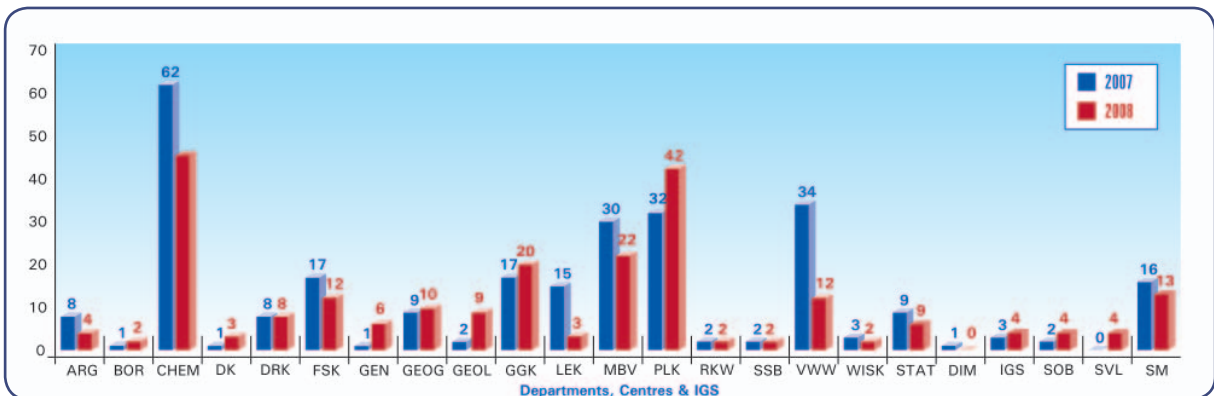


Research outputs: 2007-2008

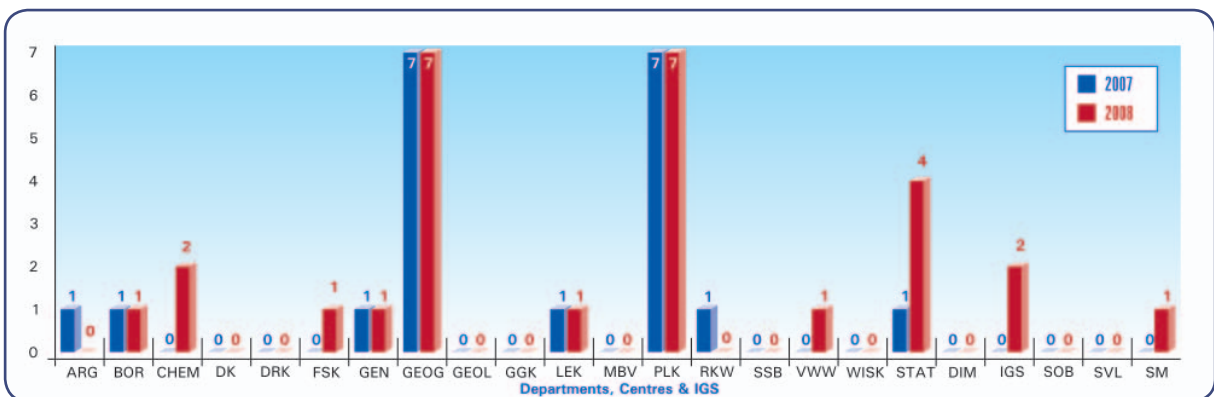
List of abbreviations

Abbreviation	Name	Abbreviation	Name
ARG	Department of Architecture	GGK	Department of Soil, Crop and Climate Sciences
BOR	Department of Quantity Surveying and Construction Management	IGS	Institute for Groundwater Studies
SOB	Centre for Environmental Management	LEK	Department of Agricultural Economics
CEM	Department of Chemistry	MBV	Department of Microbial, Biochemical and Food Biotechnology
SM	Centre for Microscopy	PLK	Department of Plant Sciences
SVL	Centre for Sustainable Agriculture and Rural Development	RKW	Department of Computer Science and Informatics
DK	Dean's Office	SSB	Department of Urban and Regional Planning
DRK	Department of Zoology and Entomology	SRB	Disaster Management Training and Education Centre for Africa (DIMTEC)
FSK	Department of Physics	VWW	Department of Animal, Wildlife and Grassland Sciences
GEN	Department of Genetics	STAT	Department of Mathematical Statistics and Actuarial Science
GEOG	Department of Geography	WISK	Department of Mathematics and Applied Mathematics
GEOL	Department of Geology		

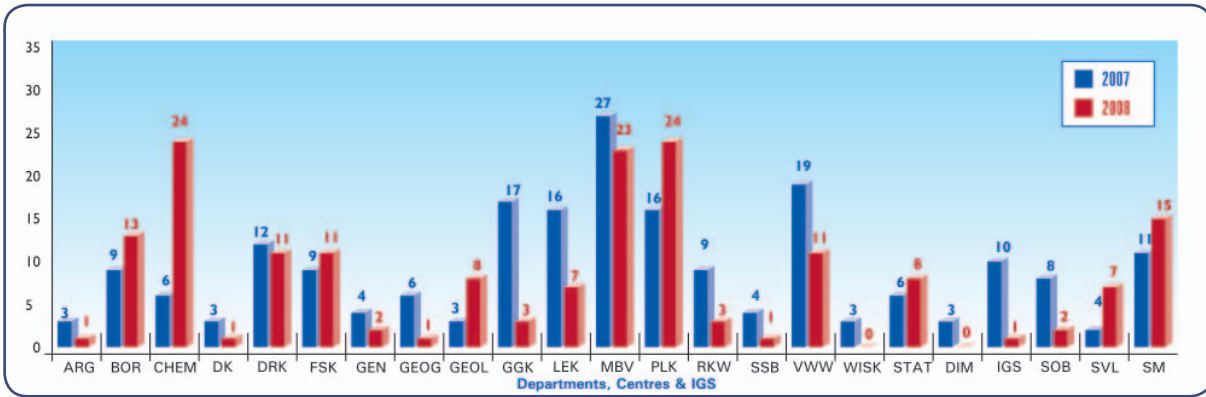
Accredited articles



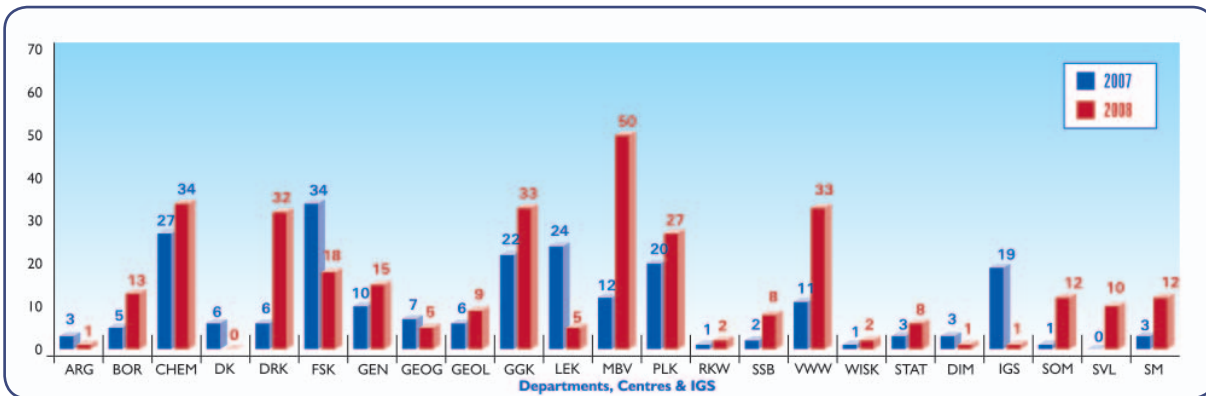
Books



International conferences



Local conferences



Student figures: 2007-2008

Student figures

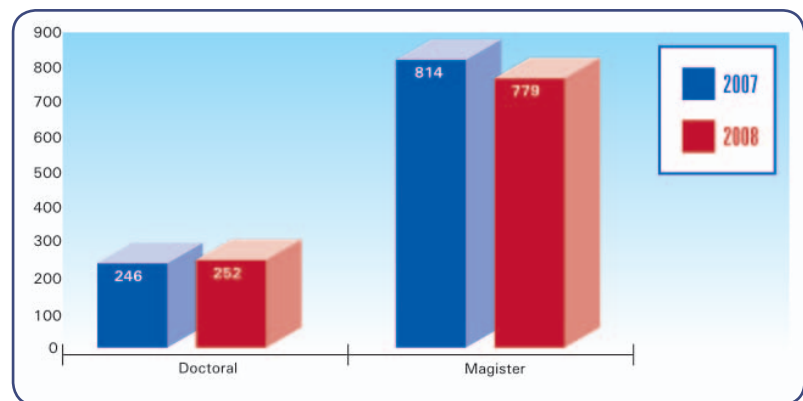
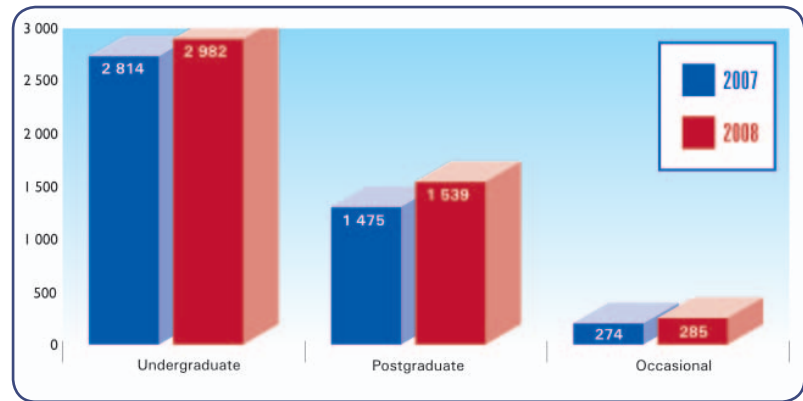
Year	Description	Black	Coloured	Asian	White	Total
2007	Undergraduate	1492	66	38	1218	2814
	Postgraduate	710	41	40	684	1475
	Occasional	230	6	2	36	274
*TOTAL		2432	113	80	1938	4563
2008	Undergraduate	1667	51	37	1227	2982
	Postgraduate	755	40	43	701	1539
	Occasional	260	5	1	19	285
* TOTAL		2682	96	81	1947	4806

International students

Nationality	Year	Year
	2007	*2008
Angola	2	0
Asian countries	20	24
Botswana	17	23
Democratic Republic of the Congo	0	1
European countries	9	10
Lesotho	118	144
Malawi	3	5
Mauritius	2	3
Mozambique	4	7
Namibia	54	65
North America	15	5
Other African countries	47	69
South America	1	0
Swaziland	5	6
Zambia	7	7
Zimbabwe	48	60
Total	352	429

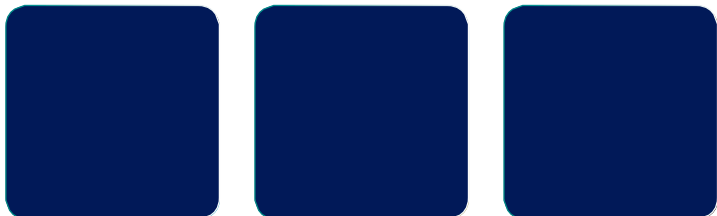
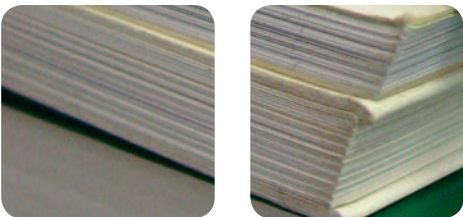
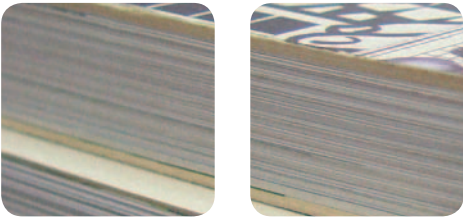
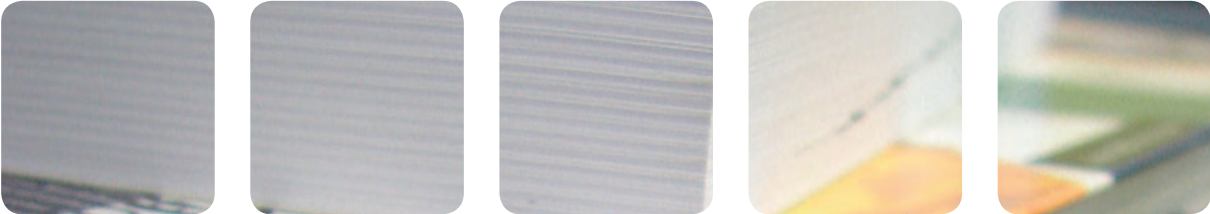
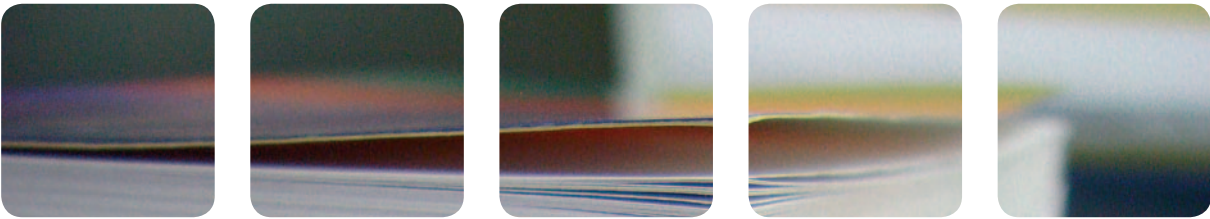
*2008 Final HEMIS figures not available

Comparison for the Faculty of Natural and Agricultural Sciences





Glossary



Glossary

A

AACC -	American Association for Cereal Chemists
AACE -	Association for the Advancement of Cost Engineering
ADF -	Amsterdam Density Functional Programme
ADG -	Average Daily Grain
AEASA -	Agricultural Economics Association of South Africa
AEON -	the African Earth Observation Network
AGU -	American Geophysical Union
AI -	Artificial Insemination
ARC -	Agricultural Research Council
ARV -	Antiretroviral
ASC -	Architecture Student Conference
ASAQS -	Association of South African Quantity Surveyors
ASOCSA -	Association of Schools of Construction of Southern Africa

B

BBSRC -	Biotechnology and Biological Sciences Research Council
BMBF -	Federal Ministry of Education and Research, Germany

C

CAA -	Commonwealth Association of Architects
CANSA -	Cancer Association of South Africa
CAB -	Centro de Astrobiología
CED -	Centre for Education Development
CePHMa -	Centre for Plant Health Management
CHESD -	Centre for Higher Education Studies and Development
CHPC -	Centre for High Performance Computing
CIDB -	Construction Industry Development Board
CIOB-SA -	Chartered Institute of Building, South Africa
CSIR -	Council for Scientific and Industrial Research Organisation
CSTA -	Cereal Science and Technology Association
CUT -	Central University of Technology

D

DiMTEC -	Disaster Management Training and Education Centre for Africa
DMISA -	Disaster Management Institute of Southern Africa
DRRW -	Durable Rust Resistance in Wheat
DST -	Department of Science and Technology
DWAF -	Department of Water Affairs and Forestry

E

ECA -	European Crystallographic Association
EGIC -	Economic Growth and International Competitiveness
EMSA -	Environmental Management Systems Association
EMS -	Environmental Management Systems
EPWP -	Expanded Public Works Programme

F

FAO -	Food and Agricultural Organisation
FETWater -	Framework Programme for Research Education and Training in Water
FMP -	Facilities Management Programme
FSRDPP -	Free State Rural Development Partnership Project
FTIR -	Fourier Transform Infra Red Spectrometer

G

FGAP -	Facility for Genomics and Proteomics
GIS -	Geographical Information Systems
GMO -	Genetically Modified Organisms
GRDM -	Groundwater Resource Directed Measures
GSSA -	Grassland Science Society of South Africa
GSSA -	Geological Society of South Africa

H

HCI -	Human-computer Interaction
HRTEM -	High Resolution Transmission Electron Microscopy

I

IAMA -	International Food and Agribusiness Management Association
IAU -	International Astronomical Union
ICACS -	International Conference on Atomic Collisions in Solids
ICCC -	International Conference on Coordination Chemistry
ICEC -	International Cost Engineering Council
ICRISAT -	International Crops Research Institute for the Semi-Arid Tropics
ICSU -	International Council for Science
IDC -	Industrial Development Corporation
IGC -	International Geological Congress
IGS -	Institute for Groundwater Studies
IMWA -	International Mine Water Association
INCRoP -	Insects on New Crops Programme
IPMP -	Intensive Project Management Programme
ISI -	International Statistical Institute
ISME -	International Society for Microbial Ecology
IT -	Information Technology
IUMS -	International Union of Microbiological Societies

L

LPI -	Lunar and Planetary Institute
LRAD -	Land Redistribution for Agricultural Development

M

MCEE -	Minnesota Council on Economic Education
MDC -	Maputo Development Corridor
MEC -	Member of the Executive Council
MNS -	Material and Nanosciences Cluster
MOU -	Memorandum of Understanding
MRC -	Medical Research Council
MSA -	Masters in Sustainable Agriculture
MSSA -	Microscopy Society of Southern Africa
MUCPP -	Mangaung University Community Partnership Programme

N

NAMC -	National Agricultural Marketing Council
NASA -	National Aeronautics and Space Administration
NASSP -	National Astrophysics and Space Science Programme
NBN -	National Bioinformatics Network
NCEE -	National Council for Economic Education
NDF -	Neutral Detergent Fibre
NECSA -	Nuclear Energy Corporation of South Africa
NERPO -	National Emergent Red Meat Producers Organisation
NGO -	Non-Governmental Organisation
NRF -	National Research Foundation
NSTF -	National Science and Technology Forum
NWGA -	National Wool Growers' Association

O

OECD -	Organisation for Economic Cooperation and Development
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P

PAQS -	Pacific Association of Quantity Surveyors
PDMS -	Provincial Disaster Management Centre
PRT -	Protein Research Trust

R

RDP -	Redress and Development Programme
RIBA -	Royal Institute of British Architects
RICS -	Royal Institute of Chartered Surveyors
RIEP -	Research Institute of Education Planning
RMMA -	Red Meat Abattoirs Association
RPO -	Red Meat Producers Organisation
RTPI -	Royal Town Planning Institute

S

SA -	South Africa
SAAPMB -	South African Association of Physicists in Medicine and Biology
SAB -	South African Breweries Limited

SABC -	South African Broadcasting Corporation
SACAP -	South African Council for the Architectural Professions
SACPCMP -	South African Council for the Property Valuers Profession
SACPLAN -	South African Council of Planners
SACQSP -	South African Council for the Quantity Surveying Profession
SADC -	Southern African Development Community
SAFA -	South African Feedlot Association
SAFEFE -	South African Foundation for Economic and Financial Education
SAFOI -	South African Fryer Oil Initiative
SAIA -	South African Institute of Architects
SAIM -	Society for Industrial and Applied Mathematics
SAISC -	Southern African Institute of Steel Construction
SANBI -	South African National Biodiversity Institute
SANCID -	South African Commission on Irrigation and Drainage
SANPAD -	South African Netherlands Research Programme on Alternatives in Development
SANSA -	South African National Survey of Arachnida
SAPOA -	South African Property Owners Association
SAPPS -	Symposium of the South African Pecan Producers Association
SAQA -	South African Qualifications Authority
SASA -	South African Statistical Association
SASHS -	Southern African Society for Horticultural Sciences
SASM -	South African Society for Microbiology
SAWMA -	South African Wildlife Management Association
SAWSS -	Southern African Weed Science Society
SCM -	Scientific Computing and Modeling
SEG -	Society of Economic Geologists
SEM -	Scanning Electron Microscope

SLE -	Senior Lecturer Equivalent
SSSSA -	Soil Science Society of South Africa
SWMA -	Southern African Wildlife Management Association

T

TEM -	Transmission Electron Microscope
THRIP -	Technology and Human Resource for Industry Programme

U

UCT -	University of Cape Town
UEC -	Unit for Earth Construction
UFS -	University of the Free State
UJ -	University of Johannesburg
UK -	United Kingdom
UN -	United Nations
UNESCO -	United Nations Educational, Scientific and Cultural Organisation
UNU -	United Nations University
UP -	University of Pretoria
USA -	United States of America
USAID -	United States Agency for International Development
UWC -	University of the Western Cape

W

WCAP -	World Conference on Animal Production
WITS -	University of the Witwatersrand
WRC -	Water Research Commission

