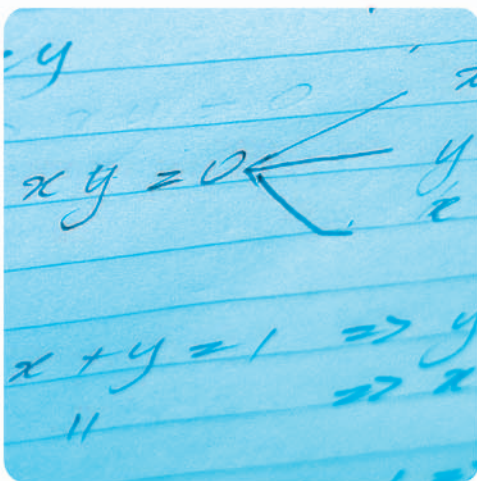


# Faculty of Natural and Agricultural Sciences

## Report 2008





**Faculty of**

**Natural and  
Agricultural Sciences**

**Report 2008**

**Issued by**

Faculty of Natural and Agricultural Sciences  
University of the Free State

**Editorial compilation**

Lacea Loader

**Language revision**

Nanette Lötter  
Corrie Geldenhuys

**Revision of bibliographical data**

Mercia Coetzee

**Layout and cover design**

Chrysalis advertising and publishing

**Photographers**

Leonie Bolleurs  
Stephen Collett  
Reinier Brönn

**Printing**

Bloemfontein Repro Services

The Afrikaans version is also available on a compact disc from the dean's office or on the university's website at [www.ufs.ac.za](http://www.ufs.ac.za)

# Contents

<b>Contents</b>	<b>iii</b>
<b>Preface</b>	<b>1</b>
<b>Faculty news</b>	<b>3</b>
<b>Departments:</b>	
<b>Agricultural Sciences</b>	<b>07</b>
- Agricultural Economics	08
- Animal, Wildlife and Grassland Sciences	13
- Plant Sciences	20
- Soil, Crop and Climate Sciences	29
<b>Building Sciences</b>	<b>37</b>
- Architecture	38
- Quantity Surveying and Construction Management	42
- Urban and Regional Planning	46
<b>Natural Sciences</b>	<b>49</b>
- Chemistry	50
- Computer Science and Informatics	61
- Genetics	64
- Geography	68
- Geology	71
- Mathematical Statistics and Actuarial Science	77
- Mathematics and Applied Mathematics	80
- Microbial, Biochemical and Food Biotechnology	82
- Physics	94
- Plant Sciences	20
- Zoology and Entomology	99
<b>Centres</b>	<b>109</b>
- Disaster Management Training and Education Centre for Africa (DIMTEC)	110
- Environmental Management	113
- Lengau Agricultural Development Centre	117
- Microscopy	120
- Sustainable Agriculture and Rural Development	125
<b>Experimental Farm</b>	<b>129</b>
- Paradys Experimental Farm	130
<b>Institute</b>	<b>133</b>
- Groundwater Studies	134
<b>Statistical data</b>	<b>137</b>
<b>Glossary</b>	<b>141</b>

## Contact details

### Dean

Prof. Herman van Schalkwyk  
+27 51 401 2535  
hvs.sci@ufs.ac.za

### Office of the dean

Ms Lorinda Rust  
+27 51 401 2322  
rustl.sci@ufs.ac.za

### Faculty manager

Mr Johan Kruger  
+27 51 401 2490  
krugerjd.sci@ufs.ac.za

### Marketing and liaison

Ms Stefanie Naborn  
+27 51 401 2531  
nabornsa.sci@ufs.ac.za

### Physical address of the office of the dean

Room 9A, Biology Building, Main Campus, Bloemfontein

### Postal address

University of the Free State  
PO Box 339  
Bloemfontein  
South Africa  
9300

**Fax:** +27 51 401 3728

**E-mail:** [natagri.sci@ufs.ac.za](mailto:natagri.sci@ufs.ac.za)

**Faculty website:** [www.ufs.ac.za/natagri](http://www.ufs.ac.za/natagri)

## 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.



# Department of Zoology and Entomology

“We started planning the building of an environmental education centre at the Leseding Research Camp in the Okavango Delta, Botswana” - Prof. Jo van As.

## Overview

The year 2008 was a time of planning for the Department of Zoology and Entomology. Two major projects were initiated, namely a year-long programme to commemorate the birth of Charles Darwin and the 150<sup>th</sup> anniversary of his famous book *On the Origin of Species* and the development of plans to build an environmental education centre at the Leseding Research Camp in the Okavango Delta in Botswana, a long-standing dream of the department. The third D.Sc. degree in the history of the University of the Free State (UFS) was also conferred on Prof. Ivan Horak, professor extraordinary in the department.

The department is organised into six research groups, each with its own objectives and specific study area. There is also a satellite department on the Qwaqwa Campus. The groups do, however, share common goals within the strategic priorities of the Faculty of Natural and Agricultural Sciences and the UFS.

Prof. Jo van As, Departmental Chairperson, is also involved in activities of the Cluster for Water Management in Water Scarce Areas at the UFS, whilst Prof. Schalk Louw participates in the Cluster concerning Technologies for Sustainable Crop Industries in Semi-arid Regions. Prof. Van As and Ms Deidré West were part of a symposium called “The Orange River Basin – The Resource”, which was held in Bloemfontein



Prof. Jo van As.

from 12-14 November, where Ms West presented a talk.

The annual postgraduate seminar day was held on 13 November at the Paradys Experimental Farm. There were a total of 29 outstanding presentations by postgraduate students, and Prof. Neil Heideman, Vice-Dean of the faculty and a herpetologist, delivered the guest lecture. The following contributions received awards: Ms Andri Erasmus and Mr H Butler “Behavioural aspects of bontebok (*Damaliscus Pygargus Pygargus*) and tsessebe (*D. Lunatus Lunatus*) in the central Free State (Hons); Mr Lucas Janse van Vuuren and Prof. Neil Heideman “A taxonomic



review of the genus *Microaconitias* (Reptilia Acontinae) using DNA and morphometric data” (M.Sc.); and Mr Johan van Niekerk and Prof. Ordino Kok “The activity patterns of birds in the central Free State, South Africa” (Ph.D.).

The **Aquatic Parasitology group** consists of Profs Jo van As and Linda Basson, Dr Liesl van As and the following postgraduate students: Ms Hafeleni Matete, Ms Elindi Jansen van Rensburg, Ms Deidré West and Ms Hanlie Groenewald.

Prof. Jo van As and Dr Liesl van As spent the April 2008 recess at the De Hoop Nature Reserve in the Western Cape with the third-





*Field work in the Okavango Delta Panhandle.*

year Zoology students as part of the practical requirement of the Marine Ecology course. This has been ongoing for the past 15 years and since 2004 it has become a combined excursion with staff and students of the department of Plant Sciences.

During the excursion, Prof. Van As and Dr Van As spent their time with the third-year students on the rocky shore at De Hoop, while Prof. Linda Basson and the postgraduate students concentrated on collecting and examining fish in the tidal pools of the rocky shore. Two former doctoral students also joined them, i.e. Dr Cecile Reed from the University of Cape Town, who brought a master's student with her, and Dr Kevin Christison from the Department of Environmental Affairs and Tourism in Cape Town.

Prof. Linda Basson spent two weeks in the Okavango, from the end of October to middle November, with a colleague from the University of Limpopo, Prof. PH King, and two postgraduate students. From mid-November 2008 to mid-January 2009, Prof. Jo van As and Dr Liesl van As accompanied postgraduate students on a field trip to the Leseding Research Camp in the Okavango Delta. Just before the end of December they also did a survey at Lake Ngami. For five days, the group had the privilege of hosting Prof. Hennie Van Coller and his

family at the research camp. Prof. Van Coller is the chairperson of the "Suid-Afrikaanse Akademie vir Wetenskap en Kuns". This meant that campfire discussions were of high academic standard, dealing with issues such as environmental pollution and even language pollution.

Profs Jo van As and Linda Basson, Drs Liesl van As and Candice Jansen van Rensburg, as well as Mr Joseph Möller (Zoology honours student) and Ms Deidré West (M.Sc. student) attended the 46<sup>th</sup> Annual Conference of the Microscopy Society of Southern Africa (MSSA), held in Gabarone, Botswana from 21-25 July 2008, where a total of four oral presentations emanated from this group on aquatic parasitology and water ecology.

The **Nematology research group** consists of Dr Candice Jansen van Rensburg and an honours student, Ms Henda Landman. Dr Jansen van Rensburg is at present in Belgium, having left in September to complete her master's degree in Nematology at the University of Gent. She was chosen from many applicants from across the globe and will be finishing her degree in August 2010.

Dr Jansen van Rensburg and Ms Landman also joined Dr Liesl van As on the third-year ecology excursion at the De Hoop Nature Reserve in April. They did a field survey

of nematode species occurring in the fynbos. Ms Landman finished her honours project at the end of 2008, on nematode species associated with a sunflower cultivar in the Free State province. She and Dr Jansen van Rensburg attended the symposium of the 46<sup>th</sup> Annual Conference of the MSSA in Gaborone (Botswana) from 21-25 July where Ms Landman presented a poster with the title: "Plant-parasitic nematodes associated with a sunflower cultivar in the Free State Province". Ms Landman also attended two other conferences, namely the 23<sup>rd</sup> International Congress of Entomology (ICE2008) at the ICE in Durban from 6-12 July with members of the Entomology group and the 18<sup>th</sup> Annual Symposium on Soil-borne Diseases Interest Group of South Africa, held in Stellenbosch from 17-18 September with Profs Schalk Louw, Neal McClaren and Wijnand Swart.

During 2008 the **Eco-Ethology group** researched the behaviour of various animals ranging from mammals and birds to extinct mammals.

With regard to mammals, behavioural aspects of antelope species were the main focus of several studies. The fast-growing game farming industry in South Africa, including the Free State province, has led to an increasing number of non-native game species being introduced into areas outside their natural range. The possible hybridisation between the closely-related bontebok and tsessebe was investigated by Ms Andri Erasmus as part of an honours research project, while Ms Lindi Heyns researched behavioural and genetic aspects of blesbok and bontebok in continuation of her master's degree.

Another master's degree student, Ms Elylia Erasmus, investigated the behaviour of black wildebeest and red hartebeest at Willem Pretorius Nature Reserve. Mr Savvas Vrahimis, associated with the Free State Department of Tourism, Environmental and Economic Affairs, researched aspects of the ecology, behaviour and genetic status of black wilde-



beest in the Free State in continuation of his Ph.D. study. Concerning carnivores, Ms Michelle van As has commenced her master's degree by investigating the behaviour of leopards in Lydenburg.

Behavioural studies of Free State bird species, part of a ten year project, were continued by Mr Johan van Niekerk. The contribution that this long-term study will make to the general knowledge of avifauna in the grassland biome is of inestimable value.

Mr Dewald du Plessis, another master's degree student, has undertaken the investigation of the brain evolution of extinct non-mammalian cynodonts. As part of his study, fossils were scanned and digitally converted to three-dimensional images at the Nuclear Energy Corporation of South Africa (NECSA) near Pelindaba in the North West Province. This study aims to correlate brain size with the physiology and behaviour of these animals.

Mr Hennie Butler and Ms Lindi Heyns attended the fourth European Conference on Behavioural Biology at Dijon, France from 18-20 July 2008 where Mr Butler presented a poster on the feeding association between cattle egrets and their mammal hosts, while Ms Heyns presented a paper on the inter-specific interaction amongst four sympatric carnivore species in the Free State. During the conference contact was established with several leaders in the field of behavioural studies.

Mr Johan van Niekerk attended the 12<sup>th</sup> Pan-African Ornithological Congress from 7-12 September 2008 at Goudini Spa in the Western Cape, where he presented a paper as well as a poster. The paper concerned a ten-year study on the activity patterns of birds in the central Free State and the poster involved communal roosts of the Lesser Kestrel in the Free State.

**The Medical, Veterinary, Forensic Entomology and Agricultural Entomology group** has several post-graduate students. Progress of students in Forensic Entomology is as follows:

Mr Kobus Kolver completed the final practical aspects of his research on the influence of burning of a body. He is currently busy processing his results, planning to submit his thesis for assessment by the end of November 2009.

Ms Sonja Brink is doing a taxonomic study of the immature stages of blowflies, of importance in forensic crime investigations. She aims to complete her study by November 2009.

Mr Shaun Hoffman is doing a project in forensic entomology. The subdiscipline is Entomotoxicology. This project is done in collaboration with Dr Piet van der Merwe from the Department of Pharmacology at the UFS. It is expected that Mr Hoffman will complete his study during 2009.

Mr Theo Viljoen is busy with a research project in collaboration with Ms Karin Ehlers from the Department of Genetics. His project deals with the possible differences/similarities between closely-related blowfly species *viz. Lucilia cuprina* and *Lucilia sericata*. These two species are morphologically almost identical and difficult to distinguish from each other. They are very important in criminal investigations.

Mr Viljoen started his research early in 2008, and initially tried to isolate human DNA from the crop content of third instar blowfly larvae. The project was temporarily cancelled due to the high cost of chemicals and genetic markers. Funds were not available to make this project viable.

The progress of students in Veterinary Entomology is as follows:

Dr Gert J Venter, a world-renowned researcher on the bio-ecology and vector potential of *Culicoides* spp. received his Ph.D. degree during the autumn graduation ceremony in 2008. He is currently co-supervisor for Mr Julien Liebenberg, an M.Sc. student in this group.

Ms Ansie Scholtz is an employee of the Department of Agriculture at Elsenburg in the Western Cape. Her project deals



A postgraduate student busy dissecting a fish at the Leseding Research Camp in the Okavango Panhandle.

with various aspects and causes of blowfly strike on sheep. Since she is a full-time employee at the Department of Agriculture, her research project has progressed at a slower rate than was expected. She plans to complete her studies by November 2009, however, and will submit her thesis for assessment at this time. She is currently busy processing her results and writing some of the chapters. In the meantime she is also busy preparing manuscripts from her research for publication in subject-related scientific journals.

Mr Julien Liebenberg is doing an M.Sc. project on the bio-ecology of the *Culicoides* in the Free State. Aspects of the bio-ecology and vector potential of these biting and blood-feeding midges have not been researched extensively in the Free State.

These biting midges are of great veterinary importance, because they can transmit the bluetongue virus to sheep, bovine ephemeral disease virus (three-days-stiffness disease) to cattle and African horse sickness virus to horses. The latter disease can cause large financial losses to the equine breeding and equestrian sport industry, as well as to international trade in horses. Next to the goldmine industry, the equestrian industry is the biggest money spinner for the country.



*Prof. Ivan Horak, professor extraordinary at the department, became the third person in the history of the UFS to receive the D.Sc. degree. The degree was awarded to him during the spring graduation ceremony which took place on the Main Campus in Bloemfontein. Here are, from the left: Prof. Jo van As, Departmental Chairperson, Prof. Horak and Ms Ellie van Dalen, Lecturer at the department.*

During July 2008 Prof. Theuns van der Linde, Prof. Schalk Louw and Mr Vaughn Swart accompanied a group of 12 postgraduate students to the XXIIIrd International Congress of Entomology in Durban. This congress was hosted by the Entomological Society of Southern Africa. The congress was held in the International Convention Centre (ICC) in Durban from 6-12 July 2008. Papers and posters arising from research done by this group were presented. A number of previous postgraduate students also attended the congress and some of them mentioned their supervisors as co-authors in their presentations.

Prof. Van der Linde acted as co-convenor for the Medical and Veterinary Section and also as organiser of the Forensic Entomology Symposium.

During 2008 Prof. Van der Linde and Mr Shaun Hoffman were requested by the South African Police Services (SAPS) to attend ten crime scenes. Their expertise was needed to help to determine the postmortem interval of the deceased persons.

In 2008 the **Insects on New Crops Programme (INCroP) research group's** cooperative agreement research on pistachio nuts (client: Industrial Development

Corporation - Green Valley Nuts, Prieska), cactus pear (client: SA CactusNet), hoodia (Clients: Phytopharm, United Kingdom and Unilever, United Kingdom) and agave (client: Agave Distillers, Graaff-Reinet) is ongoing and fieldwork and consultation were conducted at all the sites.

Cooperative research on lettuce cultivation under shade house conditions (with the Central University of Technology (CUT), Bloemfontein) was completed and the student submitted an M.Tech. dissertation. Research on mango weevil population dynamics and management (conducted at Bavaria Fruit Estates, Hoedspruit) was also completed and the student submitted a M.Sc. dissertation.

Cooperative research on wheat leaf miner bionomics (with the Agricultural Research Council's (ARC) Small Grain Institute, Bethlehem and Griqualand West Corporation, Douglas), Hemipteran insects as vectors of sorghum diseases (with the division Plant Pathology, at the UFS), navel orangeworm survival on pistachio (with Green Valley Nuts, Prieska) and arboreal insect stratification along the Omaruru River, Namibia (with Polytechnic of Namibia, Windhoek) is ongoing.

Prof. Schalk Louw participated in the 18<sup>th</sup> Symposium on Soil

Health and Soilborne Plant Diseases hosted at the ARC's Vredenburg Research Centre, Stellenbosch from 16-18 September 2008. He also co-sponsored Ms Henda Landman, the first Nematology postgraduate student in the department, to attend the symposium.

Prof. Louw participates in the UFS's Research Cluster 4, namely: "Technologies for Sustainable Crop Industries in Semi-arid Regions" as far as pest management on new crops and soil health management are concerned.

He also organised and co-ordinated the participation of 12 entomology students from the department at the 23<sup>rd</sup> International Congress of Entomology that was hosted in Durban during July 2008. Funding received from the Office of the Dean of the Faculty for Natural and Agricultural Sciences made this possible. Prof. Louw was also Deputy Chairperson: Congress Management Committee at the same event.

Prof Louw is the organiser and co-ordinator of the seminar series of the faculty. Five seminars by visiting scientists to the faculty were presented in 2008.

During 2008 field work was conducted by the **Arachnology group** at several localities as part of the South African National Survey of Arachnida (SANSA): in the Western Cape (Sutherland, Anysberg Nature Reserve, Prins Albert, Calitzdorp), the Eastern Cape (Jansenville, Sterkstroom) and KwaZulu-Natal (Ophathe Game Reserve). Several under- and postgraduate students in the department assisted with collecting spiders and other arachnids. The data that is generated through this field work will contribute to the proposed Red Data list of arachnids in South Africa, which is assessing the conservation status of approximately 33% of the Arachnida in the country that have been well studied taxonomically.

During the June-July recess, Mr Haddad paid a three-week visit to the Royal Museum for Central Africa in Tervuren, Belgium. The

aim of the visit was to identify all unidentified Corinnidae spiders, to genus level at least, and to loan specimens for taxonomic studies. The visit was very successful, a variety of new species were discovered, and material from more than 1 200 vials was identified. This includes material forming part of Ph.D. student Domir de Bakker's study of tree canopy-dwelling spiders from African savannas and forests.

Ms Lyle completed her M.Sc. study on the taxonomy of the sac spider subfamily Trachelinae (Araneae: Corinnidae) in June, and passed her degree with distinction. She subsequently started preparing her chapters for publication. During 2008 she also presented several practical modules as part of the undergraduate Entomology curriculum. At the end of 2008 she took up a post as Invertebrate Curator at the Northern Flagship Institute – Transvaal Museum in Pretoria, where she will be responsible for maintaining the wet collection.

Ms Fourie continues her M.Sc. project investigating the ground-, grass- and tree-living spider communities of the Erfenis Dam Nature Reserve. This includes a study on the effects of controlled burning of grassland on succession processes and species diversity of spiders.

**The Integrated Pest Management and Environmental Agriculture group's** field work during 2008 involved a survey of agricultural management practices associated with new crops on farms in the Western Cape, KwaZulu-Natal and the Northern Cape during March to May, which will be included in Mr Vaughn Swart's Ph.D. Mr Swart is lecturer and researcher in the group.

The new crops include olives, wine grapes, fruit orchards, kenaf, pecan nuts and pistachio nuts. Some of the crops are cultivated in new locations, thus giving them the status of new crops. The main aim was obtain an idea of what agricultural management practices are utilised in terms of overall biodiversity.



*The Faculty of Natural and Agricultural Sciences hosted a delegation of Australian agricultural and environmental scientists and farmers at the Paradys Experimental Farm. The group was travelling through Southern Africa on an exploratory fact-finding mission aimed at learning more about local soil conservation practices and agriculture in general. The Dean, Prof Herman van Schalkwyk, and scientists of the faculty as well as members of the Australian delegation made presentations as part of the visit. Pictured from the right, standing, are: Mr Simon Proust, Soil Conservationist, Prof Van Schalkwyk, Mr John Lawrie, Catchment Coordinator and Ms Anne Williams, farmer and President of Central Western Conservation Farming Association. Seated, from the left, are: Mr Ian Packer, Senior Soils Officer, and Robert Goodear, farmer.*

During May Mr Swart attended the 2<sup>nd</sup> National Environmental Management Systems (EMS) Association Forum in Newcastle, New South Wales, Australia.

The 2<sup>nd</sup> National EMS Forum grew from the success of the first, with 90 delegates attending. The theme of the forum, "Changing our Thinking: Adapting with EMS", reflected the need to embed the concept of environmental management into mainstream business practices. Mr Swart presented a paper on the establishment of an EMS bio-indicator protocol for South African agriculture which is based on new crop case studies. He was hosted by the president of Environmental Management Systems Association (EMSA), Ms Genevieve Carruthers. Ms Carruthers works with Australian farmers and develops and implements EMS on farms. Ms Carruthers is a foundation member of the UN Environmental Program BestPracticeNetwork, established in 2004 and has worked on EMS since 1997 across a wide range of industries.

During August Mr Swart hosted Mr Simon Proust, Mr John Lawrie and several other farmers, consultants and their dependants (about 25 people) for a weekend in Bloemfontein at the Paradys Experimental Farm of the UFS. Mr Swart met Mr Proust at the EMS Forum where they arranged a networking weekend during a planned visit to South Africa. The highlight of the weekend was the seminars which were presented by a group of representatives from the UFS, including Prof. Herman Van Schalkwyk, Dean of the Faculty of Natural and Agricultural Sciences and a group representing the Australians (farmers and consultants). The weekend was sponsored by the Centre for Plant Health Management (CePHMa), the Centre of Environmental Management and Prof. Van Schalkwyk.

During July Mr Swart attended the 23<sup>rd</sup> International Congress of Entomology (ICE) in Durban, South Africa where over 2,500 delegates from 102 countries participated. He presented a paper on using insects as bio-indicators to establish a protocol for South





*Dr Rogier Junte, a final-year veterinary student at the University of Utrecht, The Netherlands, was involved in a research project with the research team of the Pesticides Resistance Testing Facility at the department. The project was coordinated by Ms Ellie van Dalen from the test facility and Prof. Frans Jongejan of the University of Utrecht. Here are, from the left, front: Dr Junte and Ms van Dalen; back: Prof. Neil Heideman, Vice-Dean: Faculty of Natural and Agricultural Sciences, and Prof. Jo van As, Departmental Chairperson.*

African agriculture, based on new crop case studies.

In September Mr Swart was approached by Oubaai Golf Estate, George, South Africa, for assistance with a wood borer problem. Mr Swart was accompanied by Dr Léan van der Westhuizen and Mr Theuns Louw to investigate the problem. It was reported that three species of wood borer were found to be causing damage to various structures within the estate. The group recommended that they treat the infected wood with a special preservative.

Mr Tienie Kotze of Kalahari Desert Products found false codling moth larvae ("worms") in nuts that he received in November from pecan growers in several regions and approached the CePHMa to conduct further investigations.

Mr Swart presented a talk at the AGM and Symposium of the South African Pecan Producers Association (SAPPA) about the False Codling Moth and other potential threats with regard to insects and diseases. The feedback from farmers was promising with SAPPA donating R10 000 for research purposes for 2009 and inviting members of CePHMa to the annual general meeting in May 2009 to discuss further potential

research and funding opportunities for CePHMa.

The **Pesticide Resistance Testing and Research Facility** started the year off by hosting a short course on parasites of the Free State, presented by Prof. Ivan Horak and attended by honours students of the department, personnel of ClinVet International and representatives of Bayer, Ceva and Novartis. During this hands-on course, attendees were privileged to experience Prof. Horak's extensive first hand knowledge of both external parasites, especially the different tick species, and internal parasites found in and on animals dwelling on the Free State plains. His unique way of conveying information also led to increased interest in making use of the services provided by this study group by the companies that attended.

During the course of 2008, this interest was displayed in the growing number of samples received from the three companies attending, for testing of tick collections from different parts of South Africa for the presence of resistance to chemical control. A combined effort to shed more light on the ever-increasing problem of tick resistance in South Africa was also undertaken by

our group in collaboration with Bayer, Division Animal Health and a private consultant, Mr Pierre van Niekerk, developer of the Scorpion dip apparatus. In this field study, a visiting veterinary student, Rogier Junte, in his final year of rotation at the University of Utrecht, The Netherlands, joined the group to research the acaricide resistance in the blue cattle tick and use of the Scorpion dip applicator in this collaborative research project as part of his practical obligation to obtain more first-hand knowledge of domestic animals in South Africa and their parasite problems.

During the initial three-month phase of this study, blue ticks, *Rhipicephalis (Boophilus)* species, were collected on three farms each in three different problem-stricken areas of KwaZulu-Natal, Eastern Cape and Limpopo provinces and tested in the laboratory for the presence of resistance to three different acaricides. Results were used to plan short- and long-term management strategies to restrict the further development of already high levels of tick resistance in these areas. The second phase of the study, to determine the efficacy of these strategies, will continue though 2009.

Ms Ellie van Dalen visited the laboratory of Prof. Conrad Mathee, Evolutionary Genetics, Department of Botany and Zoology, Stellenbosch University in July to obtain first hand experience of molecular techniques and the application of polymerase chain reactions for use in identifying resistance mechanisms of ticks at molecular level.

A field trip to nine farms in the Eastern Cape province was undertaken during October 2008 by Ms Van Dalen and her master's student, Ms Octavia Motlogeloa, to collect ticks from cattle and conduct field drags for immature stages of ticks on each of the nine farms. This was done as part of Ms Motlogeloa's study to determine the status of tick resistance to chemical control on neighbouring farms with different management systems, in an area where tick resistance on one farm had been confirmed. This field trip was the first of three collections,



Prof. Jo van As, Departmental Chairperson, and his team were involved in the production of a film by the well-known wildlife film maker Tim Liversedge, about flamingoes in the Makgadigadi Pan in Botswana.

with the next two scheduled to be conducted during 2009.

Ms Van Dalen also attended the VI<sup>th</sup> International Conference on Ticks and Tick-borne Pathogens (TTP-6), which took place in Buenos Aires, Argentina, from 21-26 September, where she presented a poster on the current status of tick resistance to acaricides used for control in the KwaZulu-Natal and Eastern Cape provinces of South Africa. This meeting also provided the opportunity to analyse the complex world of ticks and the pathogens they transmit, under the general subject: "The challenge of ticks in a warming planet".

The group was also involved in contract research projects for in vitro efficacy studies in collaboration with ClinVet International for two South African clients, Afrivet Business Management, Cipla Vet (Pty) Ltd and Sumitomo Chemical Co., Ltd, from Japan.

The year was concluded by a trade visit during the last week of November by Ms Van Dalen, to re-establish and extend collaboration with clients in the pharmaceutical arena. For this purpose meetings were set up with Dr Patrick Page of Bayer Animal Health in Isando and Mr Ronnie Dawsen of Virbac, Centurion. Both meetings led to renewed interest and enthusiasm and 2009, with its tick resistance problems, will be

tackled with a vengeance as a result of collaboration with these companies.

Mr Whitey Jordaan completed his field collections to determine the geographic distribution of *Ixodes* (Acari: Ixodidae) ticks in the Free State province and the seasonality of those associated with African Buffalo, as part of his M.Sc. studies. The comparative taxonomy of four morphologically very similar ticks from the *Rhipicephalus* genus, done by Ms Sharon Terry as part of her M.Sc. project, was also completed and both plan to hand in their dissertations early in 2009. Ms Terry also assisted in a research project run by Josephus Fourie at Clivet on the role of mating behaviour in the displacement of *Rhipicephalus decoloratus* with *R. microplus*, in the Eastern Cape province during the first semester of 2008. She also lectured the first-year practical course BLG 144 during the second semester.

The following are postgraduate students:

**Terry, S.** Dissertation: "A Taxonomic description of all stages of four *Ixodes* (Acari: Ixodidae) ticks." Promoter: Horak, IG

**Jordaan, A.J.** Dissertation: "Geographic distribution of *Ixodes* (Acari: Ixodidae) ticks in the Free State Province and seasonality of those associated with African

## Staff

### Main Campus:

**Professors:** Profs Jo van As, Linda Basson, Ordino Kok, Schalk Louw, Theuns van der Linde

**Professors Extraordinary:** Profs Leon Fourie, Gerhard Prinsloo

**Senior Lecturers:** Drs Liesl Van As, Léan van der Westhuizen

**Lecturers:** Dr Candice Jansen van Rensburg, Messrs Hennie Butler, Charles Haddad, Ms Ellie van Dalen

**Junior Lecturers:** Mr Vaughn Swart, Ms Lindi Heyns

**Affiliated Researchers:** Profs Dawie Kok, Ivan Horak, Dr Jennifer Botha-Brink

**Permanent Non-Academic Staff:** Mss Christa du Rand, Ina Erasmus, Isabel Human, Sylvia Teele, Messrs Patrick Mohasi, Emmanuel Palesa, Andreas Tlou, William Lesoana

### Qwaqwa Campus:

**Senior Lecturer:** Dr Michael Cunningham

**Lecturer:** Ms Constance Nangammbi

**Junior Lecturers:** Mr Johann van As, Mss Hafeleni Matete, Fumane Nyaile

## Contact details

### Prof. Jo van As

Faculty of Natural and Agricultural Sciences  
Department of Zoology and Entomology  
University of the Free State  
PO Box 339  
Bloemfontein  
South Africa  
9300

**Telephone:** +27 51 401 2427

**Fax:** +27 51 444 5943

**E-mail:** vanasJG.SCI@ufs.ac.za

**Website:** www.ufs.ac.za

Buffalo." Promoter: Horak, I.G.; and

**Motlogeloa, B.O.O.O.** Dissertation: "Investigation of tick resistance to chemical control on nine farms in the Grahamstown area to determine the influence of management strategies on resistance development." Promoter: EMSP van Dalen. ■

# Research outputs

## Research articles

- Ali, K. & Louw, S.VdM.** 2007. Evaluation of coccinellid predator and entomopathogenic fungus for biological control against the pea aphid on field pea. *Ethiopian Journal of Agricultural Sciences* 19: 103-110.
- Butler, H.J.B. & Kok, O.B.** 2008. Relationship between group size and feeding success of cattle egrets (*Bubulcus ibis*) in the central Free State. *South African Journal of Science and Technology*. 27(3): 216-227.
- Haddad, C.R. & Lyle, R.** 2008. Three new genera of tracheline sac spiders from southern Africa (Araneae: Corinnidae). *African Invertebrates* 49: 37-76.
- Haddad, C.R., Louw, S.VdM. & Pekar, S.** 2008. Commercial pistachio orchards maintain lower density and diversity of spiders (Araneae): A study from South Africa. *African Plant Protection* 14: 24-36.
- Kuntner, M., Haddad, C.R., Aljančić, G. & Blejcek, A.** 2008. Ecology and web allometry of the arboricolous nephilid orb-weaving spider *Clitaetra irenae* in Maputaland. *Journal of Arachnology* 36: 583-594.
- Louw, S.VdM., Parau, J.V. & Olevano, J.C.** 2008. Bio-ecology of sap beetles (Nitidulidae), a new double impact pest on cactus pear in South Africa. *Acta Horticulturae* (In press).
- Ntondini, Z., Van Dalen, E.M.S.P. & Horak, I.G.** 2008. The extent of acaricide resistance in one, two and three-host ticks on communally grazed cattle in the eastern region of the Eastern Cape Province, South Africa. *Journal of the South African Veterinary Association* 79(3):130-135.
- Reed, C., Basson, L., Van As, L. & Dyková, I.** 2007. Four new myxozoans (Myxosporea: Bivalvulida) from intertidal fishes along the south coast of Africa. *Folia Parasitologica* 54: 283-292.
- Swart, V.R. & Louw, S.VdM.** 2008. False codling moth: A potential pest on pecan nuts. *S.A. Pecan Journal* 52: 18-20.
- Van As, L.L. & Van As, J.G.** 2007. *Lamproglana hepseti* n.sp. (Copepoda: Lernaevidae), a gill parasite of the African pike, *Hepsetus odoe* (Bloch) from the Okavango River and Delta, Botswana. *Systematic Parasitology* 67: 19-24.

## Reports

- Grobler, A. & Louw, S.VdM.** 2008. *Survival of the navel orangeworm, Amyelois transitella (Walker) (Lepidoptera: Pyralidae), on pistachio nuts in South Africa.* Report to the Industrial Development Corporation – Green Valley Nuts, Prieska, South Africa.
- Louw, S.VdM.** 2008. *Dominant olive pests in the eastern Free State, South Africa.* Report to Mr Oscar de Freitas, DeLuc, Ladybrand, South Africa.
- Louw, S.VdM.** 2008. *Site visit to olive orchards at DeLuc, Ladybrand (December 2008).* Report to Mr Oscar de Freitas, DeLuc, Ladybrand, South Africa.
- Louw, S.VdM. & Fourie, DeV.** 2008. *Towards the management of Paramecopsstapeliae on Hoodia gordonii plants.* Final report (2007-2008) to Phytopharm plc, Godmanchester, United Kingdom & CePHMa, University of the Free State, Bloemfontein, South Africa. (Co-operative Agreement).
- Swart, V.R. & Van der Westhuizen, M.C.** 2008. *The situation analysis of three species of woodborers at Oubaai Golf Estate, George.* Report to Mr William McIntyre, Oubaai Golf Estate, George, Western Cape, South Africa.

## Conference contributions

- Basson, L.** 2008. *One fish species, a plethora of ciliophorans.* Proceedings of the Microscopy Society of Southern Africa, 38: 66. Paper presented at the 46<sup>th</sup> Annual Conference of the Microscopy Society of Southern Africa (MSSA 2008), University of Botswana, Gaborone, Botswana. 21-25 July.
- Brink, S., Van der Linde, T.C., Basson, L. & Van Wyk, P.W.J.** 2008. *Differentiation between forensic important Central South African Calliphoridae and Sarcophagidae puparia, using puparium specific characteristics.* Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Butler, H.J.B. & Kok, O.B.** 2008. *Feeding association between cattle egrets (Bubulcus ibis) and mammal hosts in the central Free State, South Africa.* Poster presented at the 4<sup>th</sup> Biennial European Conference on Behavioural Biology (ECBB2008), Dijon, France. 18-20 July.

- Colahan, B.D. & Van Niekerk, D.J.** 2008. *The Lesser Kestrel at communal roosts in the Free State, South Africa – A coordinated survey.* Poster presented at the 12<sup>th</sup> Pan-African Ornithological Congress: Birds and People - Interaction, Utilisation and Conservation, Goudini Spa, Western Cape, South Africa. 7-12 September.
- Dippenaar-Schoeman, A.S. & Haddad, C.R.** 2008. *The South African National Survey of Arachnida (SANSA).* Paper presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Dippenaar-Schoeman, A.S., Haddad, C.R. & Van den Berg, A.M.** 2008. *Spiders can help the African farmer to combat pests.* Paper presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Dippenaar-Schoeman, A.S., Jones, A., Haddad, C.R. & Lotz, L.N.** 2008. *SANSA surveys in the Free State: The spider fauna of the Mpetsane Conservation Estate (Arachnida: Araneae).* Poster presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Foord, S.H., Dippenaar-Schoeman, A.S., Van Rensburg, B.J. & Haddad, C.R.** 2008. *Preliminary patterns of spider (Araneae) diversity in the savanna biome of South Africa.* Poster presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Fourie, DeV. & Louw, S.VdM.** 2008. *In situ identification of powdery stinkbug egg package status as a management practice in pistachio orchards in South Africa.* Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Fourie, R. & Haddad, C.R.** 2008. *Diversity and abundance of spiders (Arachnida: Araneae) in the field and tree layers of the Erfenis Dam Nature Reserve, Free State Province.* Poster presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.



- Fourie, R. & Haddad, C.R.** 2008. *Diversity and abundance of spiders (Arachnida: Araneae) in the field and tree layers of Erfenis Dam Nature reserve, Free State Province, South Africa*. Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Haddad, C.R. & Dippenaar-Schoeman, A.S.** 2008. *Oonopidae survey in Southern Africa*. Poster presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Haddad, C.R., Bonaldo, A.B., Ramirez, M.J. & Labarque, F.** 2008. *A revision of the Afrotropical spider genus Mandaneta Strand, 1932 (Araneae: Corinnidae)*. Paper presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Haddad, C.R., Dippenaar-Schoeman, A.S. & Cumming, M.** 2008. *Termitophily and termitophagy in spiders: An African phenomenon?* Paper presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Haddad, C.R., Lyle, R., Bosselaers, J. & Ramirez, M.J.** 2008. *A revision of the endemic South African spider genus Austrachelas Lawrence, 1938, with its transfer to the Gallieniellidae (Arachnida: Araneae)*. Paper presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Hoffman, S., Van der Linde, T.C. & Van der Merwe, P.J.** 2008. *The use of blowfly larvae in entomotoxicology - The influence of gunshot residue on insect succession and the development of Chrysomya chloropyga (Diptera: Calliphoridae) larvae*. Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Jansen van Rensburg, C. & Van As, J.G.** 2008. *Protoeces sp. (Trematoda: Digenea) in the brown mussel, Perna perna*. Paper presented at the 46<sup>th</sup> Annual Conference of the Microscopy Society of Southern Africa (MSSA 2008), University of Botswana, Gabarone, Botswana. 21-25 July.
- Jordaan, F. & Louw, S.VdM.** 2008. *The management of Scyphophorus acupunctatus Gyllenhal (Coleoptera: Curculionidae) on Agave americana (Agavaceae) in South Africa*. Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Kok, O.B. & Heyns, L.** 2008. *Interspecific interaction amongst four sympatric carnivore species in the Free State, South Africa*. Paper presented at the 4<sup>th</sup> Biennial European Conference on Behavioural Biology (ECBB2008), Dijon, France. 18-20 July.
- Kolver, J.H. & Van der Linde, T.C.** 2008. *A forensic anomaly: Decomposition in the fast lane*. Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Kolver, J.H. & Van der Linde, T.C.** 2008. *A forensic conflict: What happened to Sarcophaga cruentata?* Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Landman, H. & Jansen van Rensburg, C.** 2008. *Plant-parasitic nematodes associated with a sunflower cultivar in the Free State Province*. Poster presented at the 46<sup>th</sup> Annual Conference of the Microscopy Society of Southern Africa (MSSA 2008), University of Botswana, Gabarone, Botswana. 21-25 July.
- Landman, H. & Jansen van Rensburg, C.** 2008. *Plant-parasitic nematodes associated with a sunflower cultivar in the Free State Province*. Poster presented at the 46<sup>th</sup> Annual Conference of the Microscopy Society of Southern Africa (MSSA 2008), University of Botswana, Gabarone, Botswana. 21-25 July.
- Liebenberg, J.E., Van der Linde, T.C. & Venter, G.J.** 2008. *The species composition and bio-ecology of Culicoides spp frequenting livestock in the Bloemfontein district*. Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Lyle, R. & Haddad, C.R.** 2008. *A taxonomic revision of the Afrotropical tracheline sac spider genus Trachelas L. Koch, 1872 (Araneae: Corinnidae), with emphasis on southern Africa*. Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Lyle, R. & Haddad, C.R.** 2008. *Tracheline sac spiders of the Afrotropical Region, with a revision of the genus Cetonana Strand, 1929 (Araneae: Corinnidae)*. Paper presented at the 9<sup>th</sup> Colloquium of the African Arachnological Society, Lajuma Mountain Retreat, Soutpansberg, South Africa. 3-7 February.
- Muller, B., Louw, S.VdM., Prinsloo, G.L. & Nesper, S.** 2008. *Morphological identification of Chalcidoidea wasps occurring on Erythrina caffra and E. lysistemon and the impact of nutrient availability and concentration on survival rates*. Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Pretorius, J., Louw, S.VdM. & Venter, P.** 2008. *Occurrence and seasonality of Aphididae and Coccinellidae species associated with lettuce cultivated under variable shade house conditions in the central Free State (South Africa)*. Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Prinsloo, G.J., Ninkovic, V. & Van der Linde, T.C.** 2008. *Could semiochemicals enhance parasitism of aphids on Russian wheat aphid cultivars?* Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Prinsloo, G.J., Ninkovic, V. & Van der Linde, T.C.** 2008. *The effects of semiochemicals and aphid resistant cultivars on Russian wheat aphid control*. Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Richter, J., Prinsloo G.J. & Van der Linde, T.C.** 2008. *The potential use of plant extracts as control option for Russian wheat aphid*. Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.
- Swart, V.R., Seaman, M.T. & Louw, S.VdM.** 2008. *Establishing a protocol for South African agriculture, based on*

*new crop case studies*. Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.

**Swart, V.R., Seaman, M.T. & Louw, S.VdM.** 2008. *Establishing a protocol for South African agriculture, based on new crop case studies*. Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.

**Swart, V.R., Seaman, M.T. & Louw, S.VdM.** 2008. *Establishing an EMS bio-indicator protocol for South African agriculture, based on new crop case studies*. Paper presented at the 2<sup>nd</sup> National Environmental Management Systems (EMS) Association Forum, Newcastle City Hall, Newcastle, New South Wales, Australia. 19-22 May.

**Van As, L. & Van As, J.G.** 2008. *Tadpole ciliophorans of Lake Ngami, Botswana*. Paper presented at the 46<sup>th</sup> Annual Conference of the Microscopy Society of Southern Africa (MSSA 2008), University of Botswana, Gabarone, Botswana. 21-25 July.

**Van Dalen, E.M.S.P.** 2008. *Current status of tick resistance against Acaricides used for control in the Kwa-zulu Natal and Eastern Cape Provinces, South Africa*. Poster presented at the VI<sup>th</sup> International Conference on Ticks and Tick-borne Pathogens (TTP-6): The Challenge of Ticks in a Warming Planet, Buenos Aires, Argentina. 21-26 September.

**Van der Linde, T.C., Kolver, K. & Hoffman, S.** 2008. *To be at the crime scene with the police investigation team is vital: Two case reports*. Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.

**Van Niekerk, D.J.** 2008. *A 10-year study on the activity patterns of birds in the central Free State, South Africa*. Paper presented at the 12<sup>th</sup> Pan-African Ornithological Congress: Birds and People - Interaction, Utilisation and Conservation, Goudini Spa, Western Cape, South Africa. 7-12 September.

**Venter, G.J., Wright, I.M. & Van der Linde, T.C.** 2008. *A multi-vector potential for transmitting African horse sickness virus (AHSV) in South*

*Africa*. Paper presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.

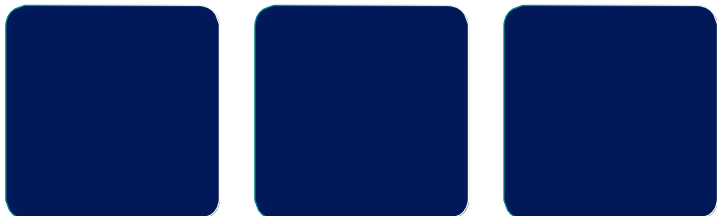
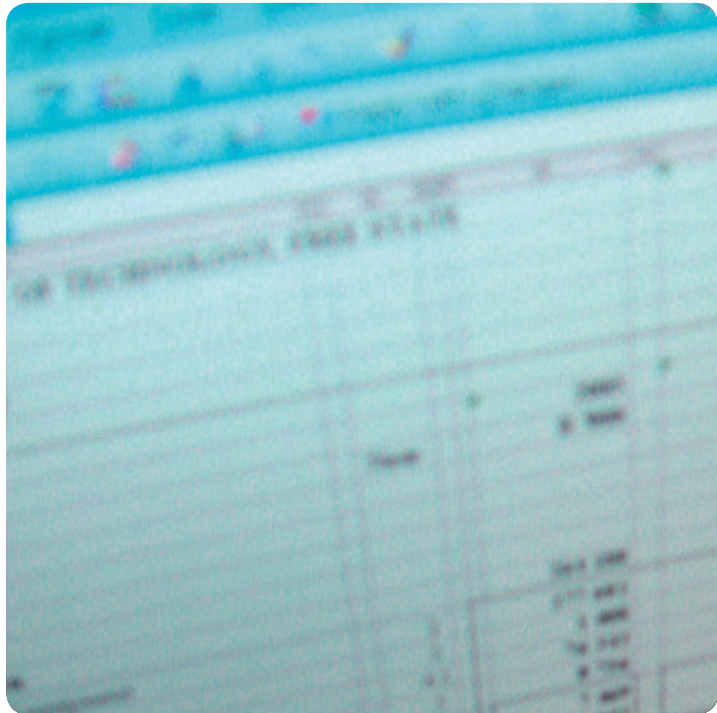
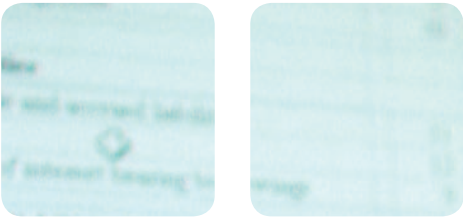
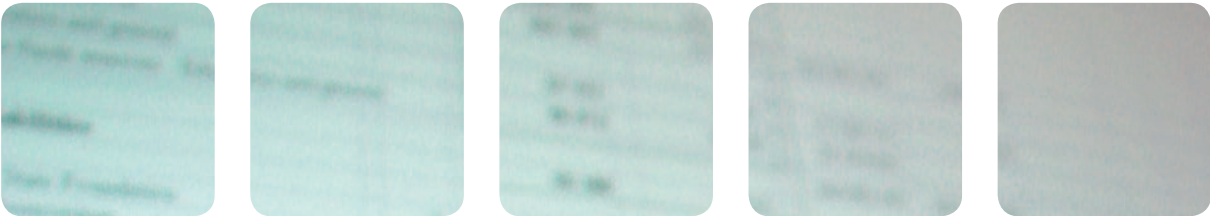
**Viljoen, T.E., Van der Linde, T.C. & Ehlers, K.** 2008. *Preliminary study: The analyses of blowfly larval crops for the presence of host genomic DNA*. Poster presented at the 23<sup>rd</sup> International Congress of Entomology (ICE2008): Celebrating Entomology – Contributing to Modern Science, International Convention Centre, Durban, South Africa. 6-12 July.

**West, D. & Van As, J.G.** 2008. *Succession of zooplankton re-establishment in Lake Ngami, Botswana*. Paper presented at the 46<sup>th</sup> Annual Conference of the Microscopy Society of Southern Africa (MSSA 2008), University of Botswana, Gabarone, Botswana. 21-25 July.

**West, D., Van As, J.G. & Dennis, I.** 2008. *The conservation condition of the unprotected Okavango Delta, Botswana*. Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, The Orange River Basin: The Resource, Centre for Environmental Management, University of the Free State, Bloemfontein, South Africa. 12-14 November.



# Statistical data

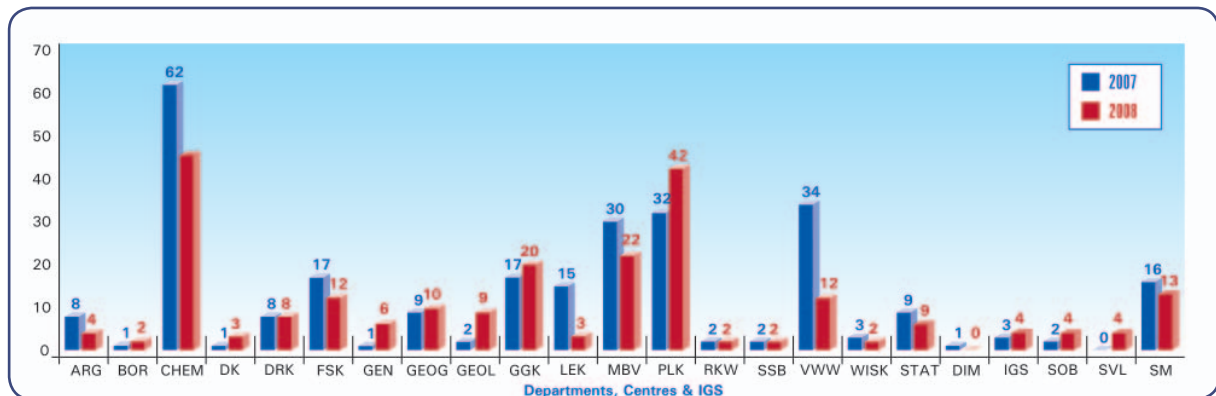


## Research outputs: 2007-2008

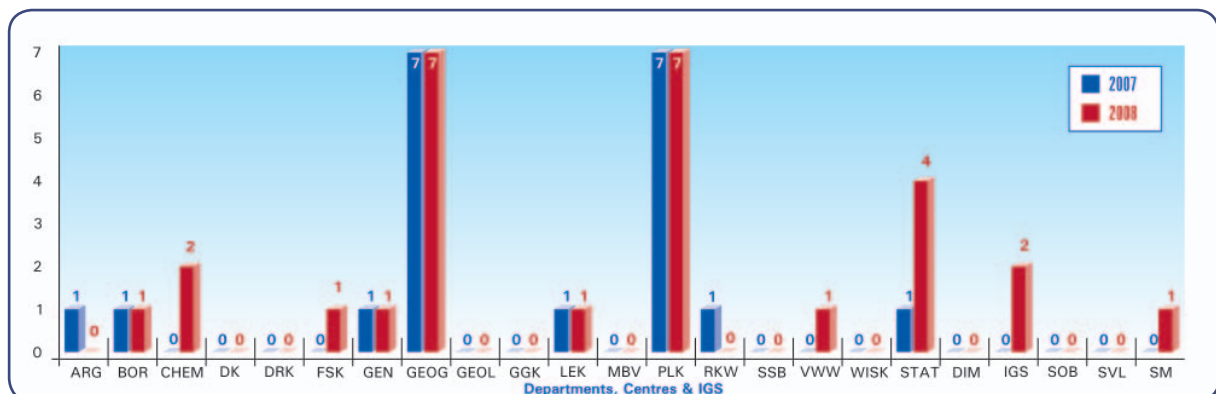
### List of abbreviations

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

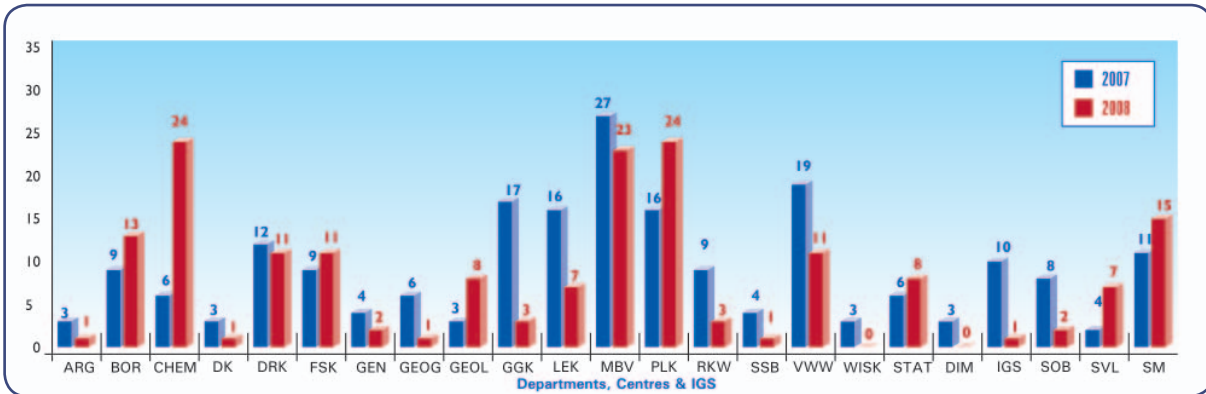


### Books

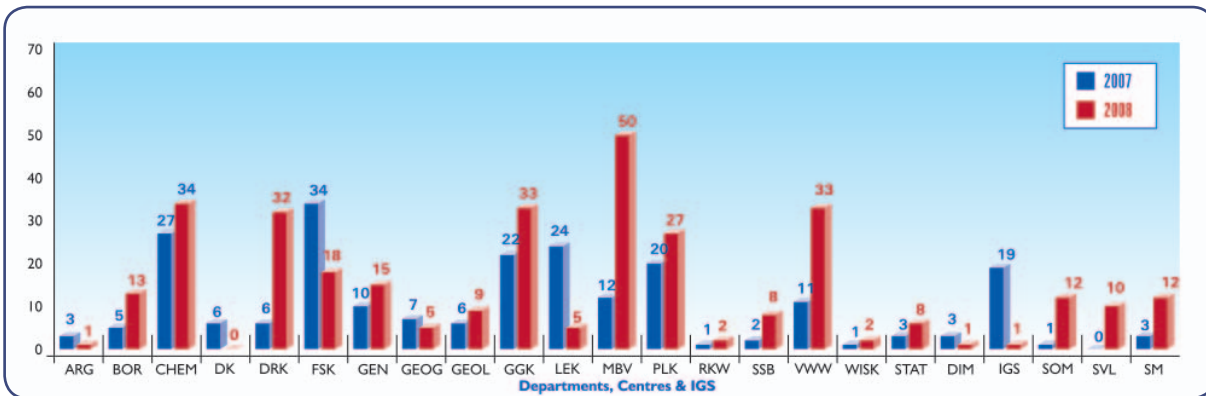




### International conferences



### Local conferences



## Student figures: 2007-2008

### Student figures

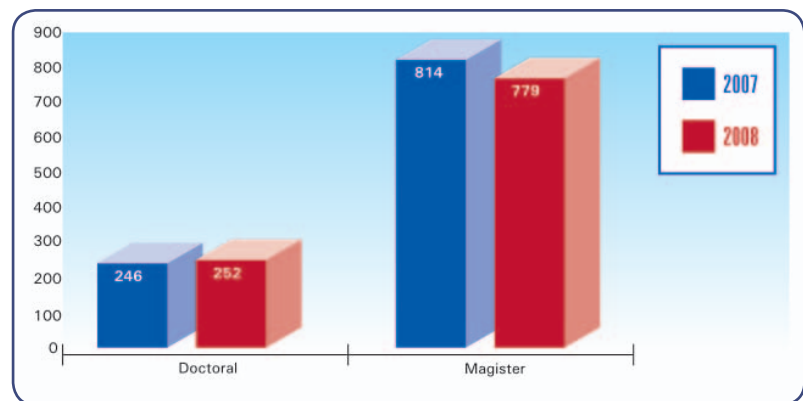
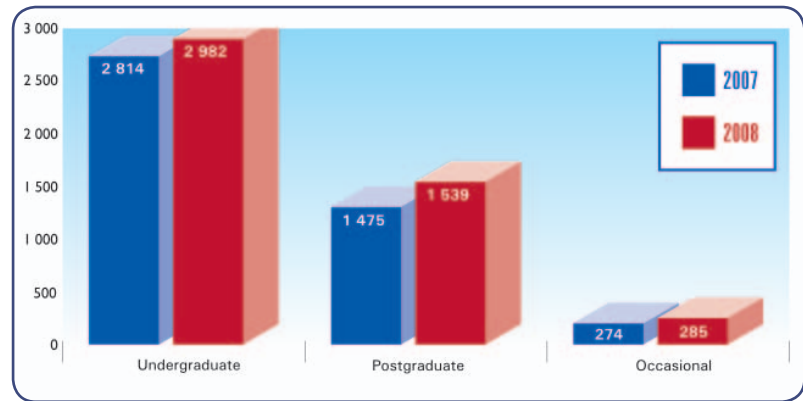
Year	Description	Black	Coloured	Asian	White	Total
2007	Undergraduate	1492	66	38	1218	2814
	Postgraduate	710	41	40	684	1475
	Occasional	230	6	2	36	274
<b>*TOTAL</b>		<b>2432</b>	<b>113</b>	<b>80</b>	<b>1938</b>	<b>4563</b>
2008	Undergraduate	1667	51	37	1227	2982
	Postgraduate	755	40	43	701	1539
	Occasional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

### 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
<b>Total</b>	<b>352</b>	<b>429</b>

\*2008 Final HEMIS figures not available

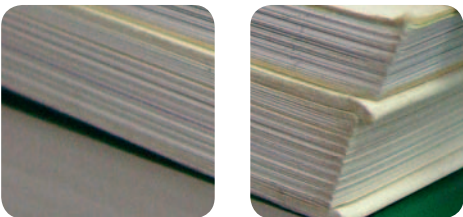
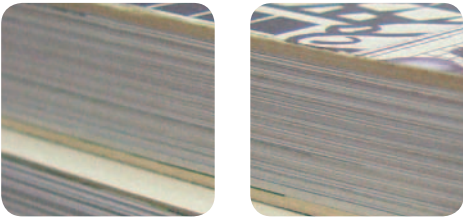
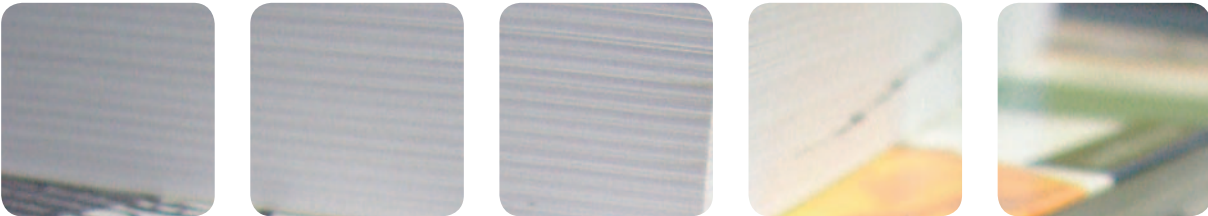
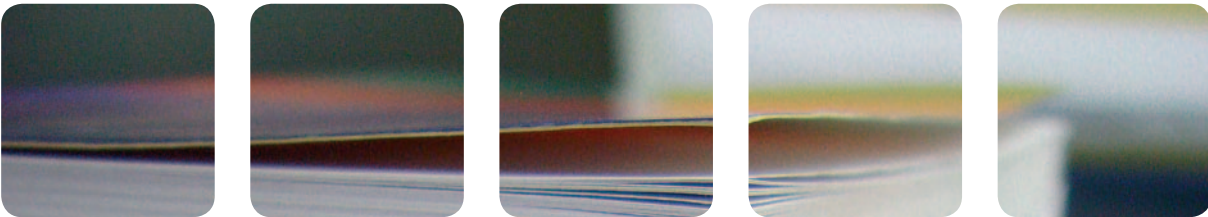
### Comparison for the Faculty of Natural and Agricultural Sciences







# 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
--------	---

**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

