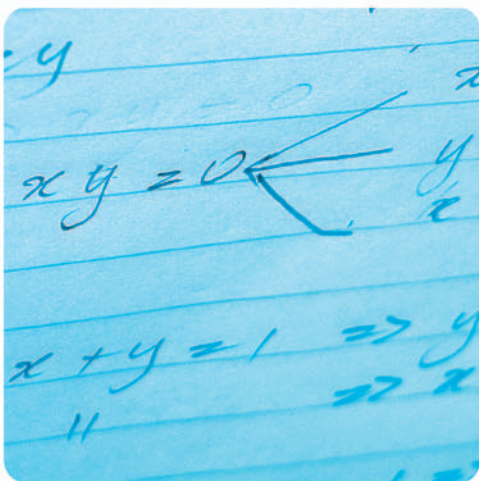


# Faculty of Natural and Agricultural Sciences

## 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 Clasia 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.



# Lengau Agricultural Development Centre

“Livestock auctions are held every Friday at the centre to support emergent farmers/entrepreneurs” - Dr Léan van der Westhuizen.

## Overview

The Lengau Agricultural Development Centre has become a pinnacle in the development of newly-settled and prospective emerging and commercial black farmers. During 2008 the centre’s Agricultural Skills Development, Training and Mentorship Programme was evidence of the Faculty of Natural and Agricultural Sciences’ aim of being an engaged faculty of the University of the Free State (UFS) by means of utilising its academic capacity and facilities to face the challenges of a sustainable agriculture in the region, country and continent.

The need for human resource development is being realised in all sectors of the economy, but a particular need exists within the agricultural sector since, for many decades, black farmers were excluded from participating in mainstream agriculture. Prospective black farmers engaged in subsistence farming on communal land and had limited access to the commercial sector. Development and growth from subsistence to commercial farming is difficult in a highly competitive sector. It requires innovative skills and knowledge and diverse inputs to be successful.

One of the three experimental farms of the UFS is earmarked for agricultural skills development and the training of emerging farmers, farm workers and entrepreneurs in agricultural business. The buildings, facilities and a portion of the land of the Sydenham Experimen-



*Dr Léan van der Westhuizen.*

tal Farm are used for animal and crop production and alternative natural and agricultural skills development opportunities in value-adding and marketing.

The UFS, Mangaung Local Municipality, Free State Provincial Department of Agriculture and the National African Farmers Union embraced the programme as partners in agricultural transformation. The facilities at the centre are utilised in an extensive manner to address the needs of newly settled and prospective emerging and commercial black farmers. Services range from livestock auctioneering, branding, dehorning, castration, primary herd, ordinary and advanced food gardening. The centre also serves



as a centre for education of under- and postgraduates, mentors, farmers and black entrepreneurs in many aspects of livestock, crop farming and agri business.

The centre aims to undertake systematic small farmer training, tackle local development issues and enrich the curriculum in terms of research and training at the UFS, on a simultaneous basis. Some of the agricultural know-how and skills training are in the form of:

- using the facilities as part of an apprenticeship programme for prospective farmers, with a mentorship and support system in place to facilitate “learning by doing” before moving on to





*Mr Andrew Mapolesa, one of the trainee broiler producers, amongst the three-week-old birds.*

a commercial farm. Prospective trainee farmers will select a programme in beef cattle farming, dairy farming, small stock farming, pig farming, poultry farming or vegetable production;

- providing skills training for agricultural entrepreneurs, farm workers, young people wanting to make a livelihood in the agricultural sector, farmers in the farmer trainee programme and recently settled farmers. This is done by the presentation of short courses at the centre, a

mobile training capacity to serve municipalities in the Free State Province, educational tours to key centres relevant to ongoing projects and designing and soliciting accreditation of appropriate learnership courses;

- supporting emergent farmers/entrepreneurs through livestock auctions every Friday at the centre, linkages to input suppliers and markets, aftercare of newly settled farmers and start-up entrepreneurs. The centre provides appropriate infrastructure on municipal land for small-scale farming entrepreneurs. The centre enhances lobbying capacity by establishing commodity groups with linkages to regional and national farmer organisations. Assistance is also given to process applications to the Land Redistribution for Agricultural Development (LRAD) programme;
- an outreach programme through partnerships to extend the clientele through a "hub-and-spokes" framework to different parts of the country; and
- establishing an HIV/Aids prevention, care and support initiative amongst farmers, farm workers and associated communities.

An agreement was entered into with BKB Louwid Auctioneers during 2008 to conduct weekly livestock auctions for the Bloemfontein area at the Lengau Agricultural Development Centre. This brings together commercial and small-

scale farmers and makes the latter aware of the commercial value of their livestock. Two of the trainee farmers canvass livestock from the commonage farmers on a regular basis. Another trainee has become a real entrepreneur, making a good profit out of buying and selling animals from and at the auctions. The auctioneering activities resulted in an average turnover of approximately R1 754 000 per month. The trainee, commonage and small-holder, and emergent farmers also take note of the price-determining factors and are in the process of changing their type of stock and management accordingly.

In conjunction with the National Emergent Red Meat Producers' Organisation (NERPO), Mangaung Local Municipality and Free State Provincial Department of Agriculture, 12 farmers' days were held in the Motheo district where farmers were skilled in vaccination, branding, dehorning, castration and tick control. They also received training and advice in breeding and bull selection for the improvement of livestock. More than 2 500 head of cattle were handled and 76 farmers attended the sessions. A presenter from the Institute of Dairy Technology in Pretoria trained 15 stock farmers on primary herd care.

Another two hydroponic units were erected in 2008 at the centre with financial support from the Free State Provincial Department of Agriculture. Six hydroponic units and approximately half a hectare of open garden space are used to train 14 trainees in vegetable production skills at the centre. Another six units were erected by the 12 Blackthorn beneficiaries at Falaona in the eastern Free State and two units are in production in Wepener. Tomatoes, green peppers, spinach and lettuce are the main crops produced in the hydroponic units.

Twenty-two people were trained in broiler production skills at the centre and at Reddersburg. Three trainees made a success of the first trials in broiler production of 200 birds per cycle, achieving a mortality rate of 3.5% and slaughter mass of 2.017 kg per bird at



*Produce of the Mamello sewing project at the Lengau Agricultural Development Centre.*



average. The production cost per dressed broiler was an average of R10.78 per kg.

Three trainee stock farmers were successfully allocated land on the road to Thaba Nchu, Jagersfontein and Boshoff. It is foreseen that another three trainees will be allocated land within the next few months. These farmers are mentored on a regular basis and buy and sell livestock at the Lengau auctions.

The Thusano Animal Feeds entrepreneurship of eight shareholders was established at the Lengau Agri Centre to market lucern, teff, maize and straight run. One of the storage facilities at the centre is used to handle the fodder bought in bulk and sold mainly to developing farmers. Furthermore, four entrepreneurs are utilising the eucalyptus (bluegum) trees at the Lengau Agricultural Development Centre as a source of fire-wood for the local community.

A skills audit, strategic planning and gaps analysis of 50 LRAD projects was done in five districts in the Limpopo Province. The centre tendered for the follow-up agricultural skills development of the beneficiaries of these projects.

Ms Doretha Jacobs of the Department of Microbiology, Biochemistry and Food Biotechnology, in conjunction with the Department of Labour, trained 18 beneficiaries in sewing skills. The Mangaung Local Municipality funded the equipment. A variety of products were produced and marketed at the Langenhoven Park market. Two beneficiaries left the project during 2008 and started their own businesses. Consumer Science students apply their knowledge and skills in this project for community service learning purposes.

The Lengau HIV and Aids Prevention, Care and Support programme was officially launched in 2007. Five information sessions were held at the centre to introduce employees, emerging farmers and local sex workers to certain aspects regarding HIV/Aids. The programme also participated in the Free State Rural Development

Partnership Project (FSRDPP) with particular focus on farming communities in the Trompsburg, Springfontein and Philippolis rural areas. The objective of these sessions and workshops was to equip attendants with basic information on HIV/Aids and to impress upon them the importance of knowing one's status. Feedback received from the participants during and after the sessions was very positive.

An HIV and Aids Farm Project was implemented in the Philippolis district on the farms Slangfontein, Pypersfontein and Dwarsrivier. After the farms were identified, contact was made with the farmers and, once permission had been granted, the facilitators were introduced to the farm workers and the project commenced. The farmers' attitudes towards the programme varied and it was interesting to note that more progress was made on the farm where the farmer showed his support and even made a special effort to get his workers to attend the sessions. Groups of approximately twelve husbands, wives and children were informed of HIV/Aids – the basics, Attitudes and Stigma, Transmission, Prevention, Testing and Positive Living. When asked how their lives had changed since the start of the programme they explained that they now made use of preventative measures. They felt that they had a relationship of trust and respect with the facilitators and that they had gained valuable knowledge. Many of the workers stated that they had been tested for HIV and would continue to do this to ensure that they would be around to see their children grow up. The simplicity of the farm workers' lives, and their willingness and appreciation for the programmes, serves as encouragement to continue to reach a community which is so often forgotten.

Staff of the Lengau Agricultural Development Centre was involved in training of malaria vector control officers in Mozambique. The programme will be extended to other countries in Central Africa during 2009 and afterwards. ■



Members of the Blackthorn hydroponics project in the process of erecting one of the six tunnels.

## Staff

### Permanent:

**Senior Lecturer:** Dr Léan van der Westhuizen

**Community Development Officer:** Ms Lolly Mogoere

### Temporary:

**HIV/Aids Prevention, Care and Support Coordinator:** Ms Estelle Heideman

**Manager Administration:** Mr Mogale Mphahlele

**Farm Assistants:** Messrs Raymond Melusi, Solomon Bebeza

**Farm Guards:** Mr Peter Makiti, Mr Esau Selepe

## Contact details

**Dr Léan van der Westhuizen**

Faculty of Natural and Agricultural Sciences  
Lengau Agricultural Development Centre  
University of the Free State  
PO Box 12544  
Brandhof  
Bloemfontein  
South Africa  
9324

**Telephone:** + 27 51 443 8859

**Fax:** + 27 51 443 8092

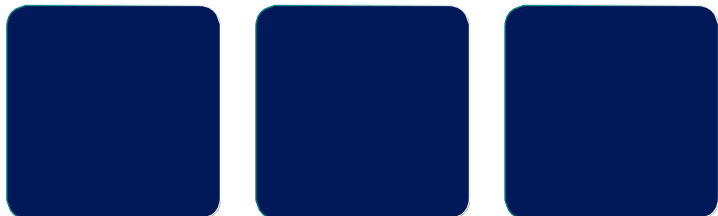
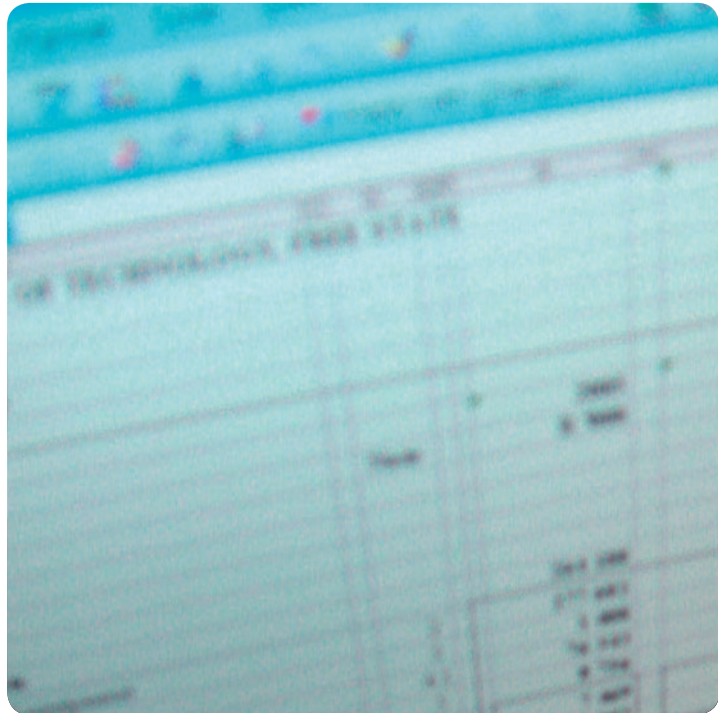
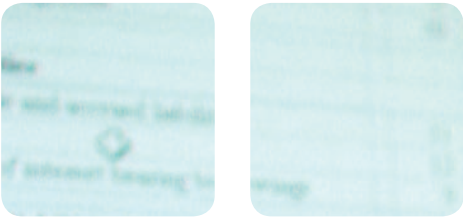
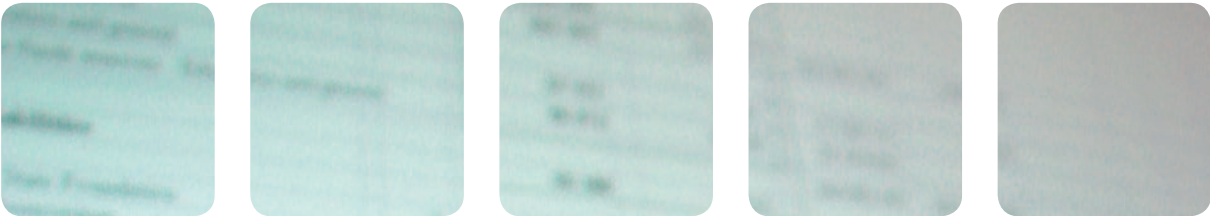
**E-mail:** [mcvdw@telkomsa.net](mailto:mcvdw@telkomsa.net)

**Website:** [www.ufs.ac.za](http://www.ufs.ac.za)





# Statistical data

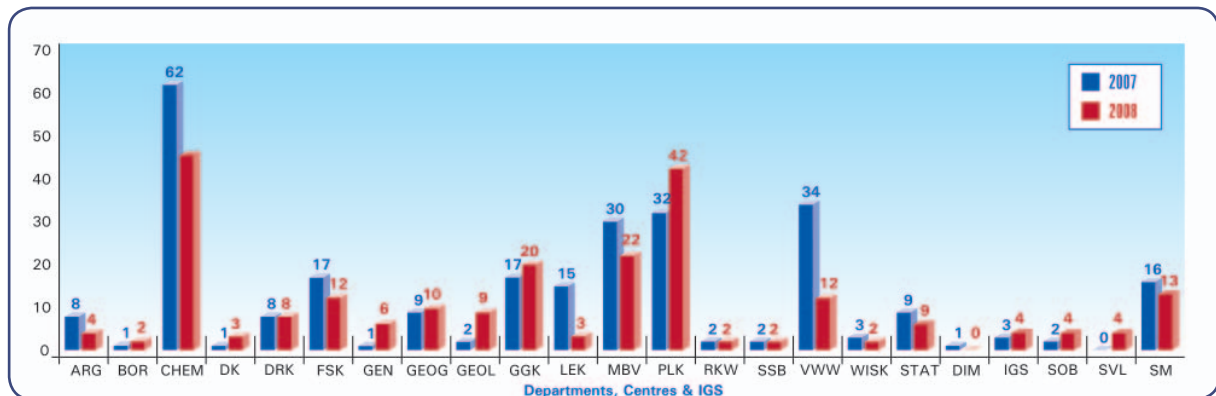


## Research outputs: 2007-2008

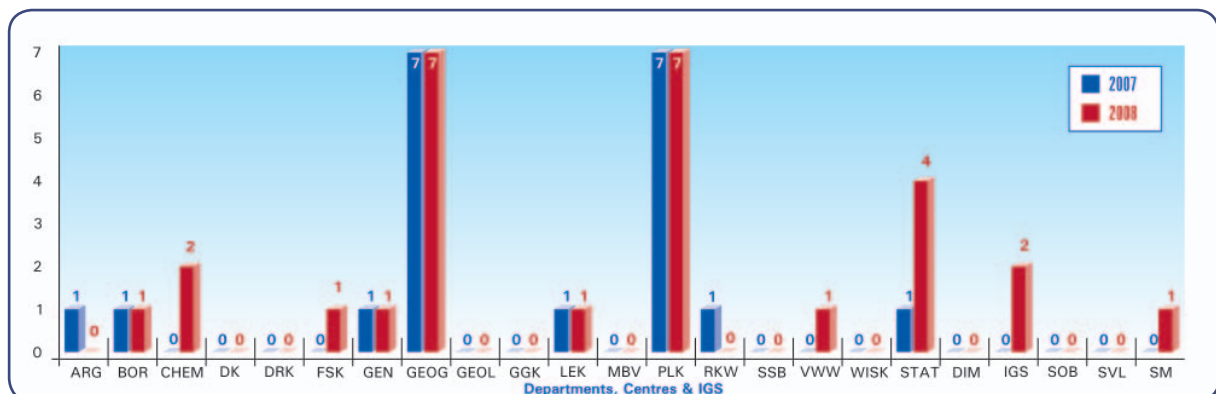
### List of abbreviations

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		

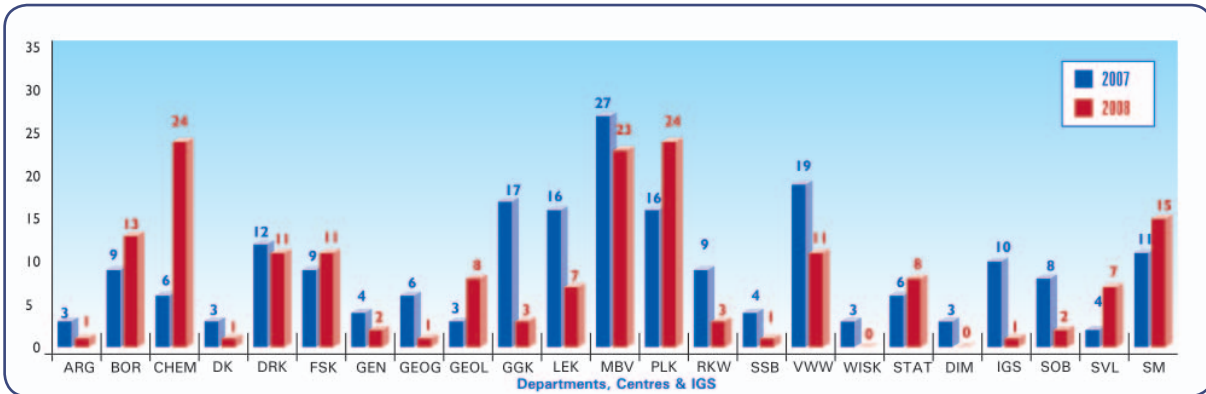
### Accredited articles



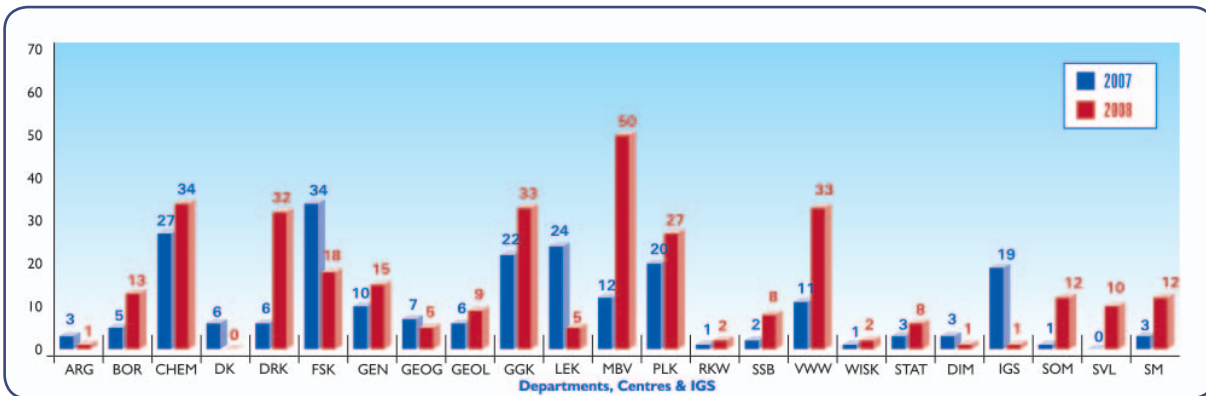
### Books



### International conferences



### Local conferences



## Student figures: 2007-2008

### Student figures

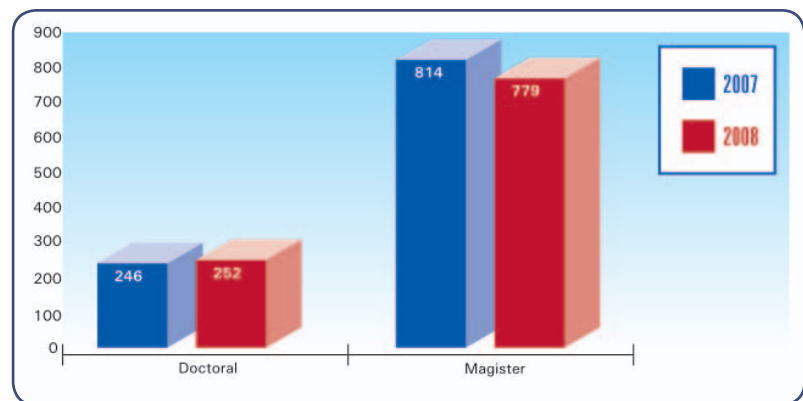
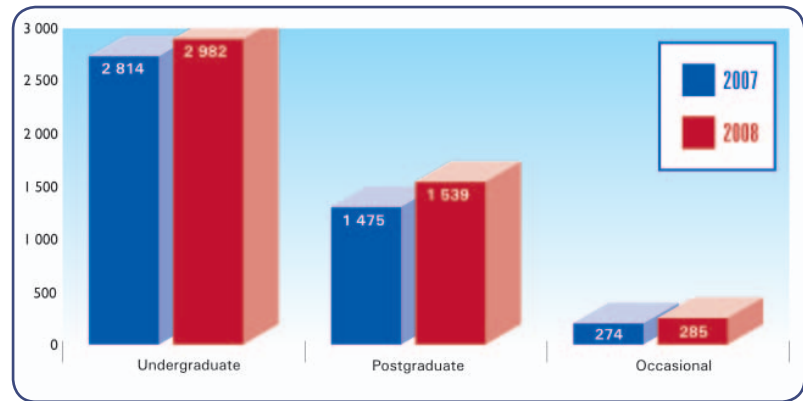
Year	Description	Black	Coloured	Asian	White	Total
2007	Undergraduate	1492	66	38	1218	2814
	Postgraduate	710	41	40	684	1475
	Occasional	230	6	2	36	274
<b>*TOTAL</b>		<b>2432</b>	<b>113</b>	<b>80</b>	<b>1938</b>	<b>4563</b>
2008	Undergraduate	1667	51	37	1227	2982
	Postgraduate	755	40	43	701	1539
	Occasional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

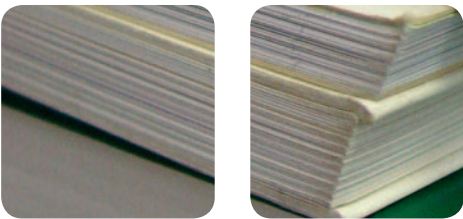
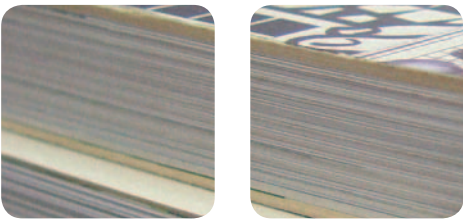
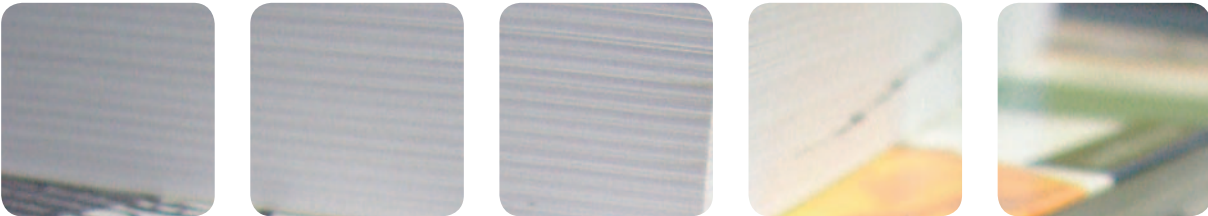
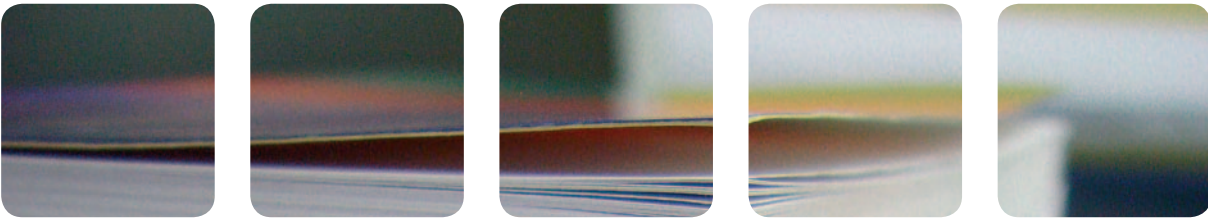
### Comparison for the Faculty of Natural and Agricultural Sciences







# 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

