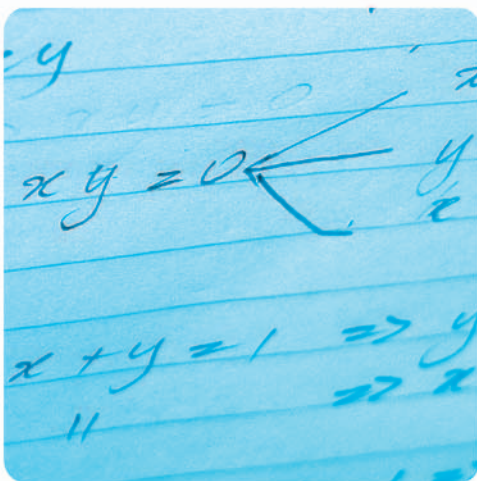
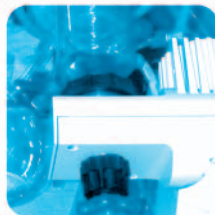


Faculty of Natural and Agricultural Sciences

Report 2008



Faculty of

**Natural and
Agricultural Sciences**

Report 2008

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University of the Free State

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Contents

Contents	iii
Preface	1
Faculty news	3
Departments:	
Agricultural Sciences	07
- Agricultural Economics	08
- Animal, Wildlife and Grassland Sciences	13
- Plant Sciences	20
- Soil, Crop and Climate Sciences	29
Building Sciences	37
- Architecture	38
- Quantity Surveying and Construction Management	42
- Urban and Regional Planning	46
Natural Sciences	49
- 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
Centres	109
- 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
Experimental Farm	129
- Paradys Experimental Farm	130
Institute	133
- Groundwater Studies	134
Statistical data	137
Glossary	141

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Preface

From the Dean's Office

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

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

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

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

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

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



Prof. Herman van Schalkwyk.

lationships both within and outside the faculty and the university.

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

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

Staff in the dean's office



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

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

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

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

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

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

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

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

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

Faculty news

Successful visit from delegation of the University of Minnesota

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

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

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



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

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

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

50 years of Agriculture celebrated



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

Winners of NSTF awards assist with recruitment of students



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

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

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

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

Young scientists learn what faculty can offer



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

Two UFS academics appointed on the Land Bank Board



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

UFS extends exchange agreement with USA university



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

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

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

Itjoriseng Project launched



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

2007 Faculty report launched



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

Department of

Geology

“The Mineral Resource Management programme continues to contribute to the South African mining industry.” - Prof. Willem van der Westhuizen.

Overview

The past year was yet another progressive year in the history of the Department of Geology. Two new lecturers with international experience joined the department and postgraduate students from Germany and South Africa conducted research on a variety of topics. Staff and students attended various conferences around the globe to present research and build new relationships.

Student numbers again reached record heights and measures were introduced to select students from the second year onward to ensure continued quality teaching. The first-year module, GWS114, which accommodates students from both the Faculty of Natural and Agricultural Sciences and the Faculty of the Humanities at the University of the Free State (UFS), will become two separate modules in 2010, to better serve both faculties and to enable the management of large student numbers. The number of postgraduate students also increased, with new and exotic research topics.

The Mineral Resource Management programme continues to contribute to the South African mining industry. Seven students enrolled in 2008, bringing the total number of students in the programme to 26.

Changes in the staff profile during 2008 included the appointment of Prof. Michael Haschke, igneous petrologist and tectonics specialist. Prof. Haschke has been lecturing at the University of



Prof. Willem van der Westhuizen.

Cardiff in Wales for the past two years and has experience from research in the Alps, Israel and Iran. Another addition to the department was Dr Holger Sommer, a metamorphic petrologist, recently from the University of Botswana. Dr Sommer received his Ph.D. from the Johannes Gutenberg University in Mainz, Germany and he has conducted research in the United States of America (USA), Europe and Africa. Ms Annegret Lombard bade the department farewell, after lecturing in mineralogy for five years. Ms Huibrie Joubert, a former student of the department who directed the outreach programme, was appointed as junior lecturer in mineralogy.



Purchases for 2008 included thin sectioning apparatus to replace equipment that was bought in the late 1970s. Ten more student microscopes were added to bring the total number of student microscopes to 30. A stereo microscope was purchased to satisfy research demands in the department. Another specialised microscope that was bought will be connected to a Fourier Transform Infra Red Spectrometer (FTIR) in the Department of Physics. An A0 plotter was another addition towards the end of 2008. Most of the purchases form part of the faculty equipment acquisition initiative.

Students from universities across the country who are



Prof. Michael Haschke explaining the intricacies of the tectonic history of Spain to a group of students from the Cardiff University and the UFS during an excursion in Spain during April 2008.



Students investigating diamond bearing kimberlite in the Letseng Diamond Mine in Lesotho during an adverse weather spell.

bursary holders from AngloGold Ashanti participate in a symposium each January to report on their vacation work/research. The symposium takes the form of a competition and a student from the UFS, Mr Conrad Pienaar, obtained a second place in the geology section.

The department was represented by a Ph.D., four M.Sc. and three third-year students at the joint conference of the Society of Economic Geologists (SEG) and the Geological Society of South Africa (GSSA) held at Misty Hills, Johannesburg. Ms Janine Kotke-Levine, Ph.D. student, presented a talk on the PGE ratios in the Middle Group chromitites of the Eastern Bushveld Complex, while Mr

Lourens Joubert, M.Sc. student, presented a poster dealing with the Nkomati Ni deposit.

A workshop in basic geology for Humanity students was organised by Mss Annegret Lombard and Alida Litthauer. The course enabled the students to apply aspects of earth science to sculpture courses that they will be presenting to under-privileged learners.

Members of the department (second- and third-year students Messrs Jannie Schabort and Alex Munro respectively, and Prof. Willem van der Westhuizen) were invited to join a geological field trip to Spain by the Cardiff University during April. Prof. Michael Haschke and Dr Lesley

Cherns supervised the two-week field mapping course in Cantabria Spain for Cardiff University students and afforded the students a unique opportunity to experience and learn about mountain-forming mechanisms and the anatomy of a now eroded ancient mountain range constructed some 450 million years ago.

During April a student workshop on diamond history was presented by Dr Holger Sommer at Kimberley. This was attended by students from the UFS and the University of Botswana. Two third-year students, Jessica Potgieter and Megan Purchase, accompanied Dr Sommer to the conference of the American Geophysical Union (AGU) in San Francisco in the USA where both presented posters on research that they conducted under the supervision of Dr Sommer. This group also attended a workshop about volcanic processes presented by the Mineralogical Society of America.

A tragic event occurred during the geological excursion to the Northern Cape when second-year student L Ntwawagae drowned in the Orange River near Augrabies. Our heartfelt sympathies are extended to his family, friends and fellow students.

AEON EarthWise, now managed from the UFS, is an outreach programme under the supervision of Prof. Marian Tredoux and Ms Huibrie Joubert, who was appointed AEON EarthWise manager from April 2008. Their first event was presented in the Northern Cape in the form of a science weekend consisting of a teacher's workshop, with 19 participating teachers, and a family Maths & Science workshop for 225 parents and learners. Displays were from departments within the Faculty of Natural and Agricultural Science. A very enthusiastic response was received from all participants and facilitators.

The following students completed their M.Sc. degrees:

- **Michael P van den Heever** with a thesis entitled "A sedimentological investigation of the B-Reef at Masimong 5 Shaft. Mr L Nel acted as supervisor.

- Gideon P du Plessis with his thesis entitled "The relationship between geological structures and dolerite intrusions in the Witbank Highveld Coalfield, South Africa". Dr H E Praekelt acted as supervisor.
- Johannes J du Plessis with a thesis entitled: "Petrochemical characterisation of dolerites and their influence on coal in the Witbank Highveld Coalfield, South Africa". Prof. WA van der Westhuizen acted as supervisor.
- DB Masinge (Harmony) and Mark T G Button (Anglo Coal) were awarded degrees in MRM (Mineral Resource Management).

The following M.Sc. studies were initiated during 2008:

- J Globig: Phase relationships of lherzolites from the Rovic Mine, South Africa: A pilot study of extensive and intensive parameters using mineralogical phase equilibria. Supervisor: Dr H Sommer.
- C Hocks: Phase relationships of eclogites from the Rovic Mine, South Africa: A pilot study of extensive and intensive parameters using mineralogical phase equilibria. Supervisor: Dr H Sommer.
- TB Lekgetho: Investigation of the relative geochemical behaviour of PGE and BMS during flotation. Supervisor: Prof. M Tredoux.
- A Litthauer: The geochemistry of intrusive dykes in the Carletonville Gold Fields. Supervisor: Prof. WA van der Westhuizen and co-supervisor Prof. M Tredoux.
- SW van der Merwe: The Lebtheinia Banded Iron Formation in Mauritania; genesis and economic significance. Supervisor: Prof. WA van der Westhuizen and co-supervisor: Prof. CDK Gauert.

Students in the process of completing their theses are Ulrike Rantzs, Sebastian Fuchs, Jens Kirste, Lourens Joubert, Arnold Joubert, Mark Burnett, Hunter Kennedy and Annegret Lombard.

The following students completed their Ph.D. degrees:



Students on an excursion to the Vredefort Impact Structure near Parys in the Free State. The background consists of a rock type called pseudotachylite that resulted from the tremendous impact of a meteorite two billion years ago.

- Janine Kottke-Levin: A geochemical study of the Middle Group chromitites, Helena mine, Bushveld complex, South Africa. Promotors: Prof. M Tredoux and Dr CD Gauert.
- Rodney M Douglas: A new perspective on the geohydrological and surface processes controlling the depositional environment at the Florisbad Archaeozoological site. (Departments of Geology and Geography). Promotors: Profs M Tredoux & P Holmes.

The department is busy with several research projects. They include among others:

Uranium research: Uranium research is continuing with mining companies in South Africa. One postgraduate student is in the process of completing her Magister degree on the Dominion Group. Another student is doing research on uranium deposits in the Free State.

Witwatersrand gold deposits: One student involved in research on these deposits has completed his research and another project will commence in 2009.

Mantle research and metamorphic petrology: Research is conducted to distinguish between pro-

ductive and barren kimberlites. An important question that is being addressed is the amount of water that is stored in minerals in the earth's mantle. Metamorphic research is aimed at understanding the formation of orogenic belts through the history of the earth.

Namaqua Metamorphic Complex: Staff members conducted research in the Rosh Pinah area during 2008 and are also involved in research on the interesting geology of Bushmanland.

Ventersdorp Supergroup: The Ventersdorp Supergroup is still being researched and current research includes high-magnesium lavas at the base of the Allanridge Formation.

Bushveld Igneous Complex: Research is concentrated on the investigation of recent neotectonic activity related to the sagging of this complex.

Sedimentological research on the Karoo Supergroup is receiving attention and aspects such as stratigraphy, sedimentology and mineralisation are regarded as priorities. The uranium occurrences in the Karoo Supergroup were also investigated during 2008.



Dr Holger Sommer (back, left) from the department in a meeting with Prof. Haemyeong Jung (front, left) of the University of South Korea and two students, Ms Jessika Potgieter (back, right) and Ms Megan Purchase (front, right), in San Francisco during the AGU fall meeting.

Economic geology research on ore genesis is being conducted by Prof. Christoph Gauert and students.

Platinum geochemistry is being researched by Prof. Marian Tredoux with students.

Meteorites also form part of the research of this department and

currently this aspect forms part of the research of Ms Annegret Lombard under the supervision of Prof. Tredoux.

Research on the Kango Group by Dr Hermann Praekelt resulted in one publication in 2008 and further research is being conducted on the possible discovery of a hitherto unknown fossil.

During the year several distinguished academics visited the department. These included the following:

A multidisciplinary workshop entitled "Rhenish Shield meets Gondwana" was held on 12 March 2008. The purpose was to establish contacts between earth scientists at the University of Bonn in Germany and several South African institutions. Prof. Christoph Gauert chaired the meeting and he presented a talk entitled "Current metallogenic research at Free State University's Geology Department".

The De Beers Alex du Toit Memorial Lecture was presented by Emeritus Professor Tony Naldrett of Toronto in Canada on 24 July 2008 on the topic "From the Mantle to the Bank: The life history of some Ni-Cu sulfide deposits".

Other visitors included Dr Iain MacDonald of Cardiff University (geochemistry of the northern limb of the Bushveld Complex); Profs Vincent Courtillot and Fredric

Fluteau and Dr Martine Gerard from the Institute of Physics of the Globe in Paris, France and Dr Duncan Miller, an independent consultant (archaeometallurgy in Africa). Dr Sospeter Muhongo was yet another high profile visitor to the department during November.

Another event hosted by the department was the Rainbow Rally arranged by UFS Marketing to raise funds for paediatric cancer patients (teams had to answer a questionnaire on geology using clues from the exhibits in the department's museum).

Prof. Wayne Colliston attended the 33rd International Geological Congress in Oslo, Norway. As a national delegate of the International Union of Geological Sciences (IUGS) for South Africa, he contributed to the winning of the South African bid for hosting the 35th International Geological Congress (IGC) in 2016 in Cape Town. He also participated in a field excursion to investigate ore deposits in Bergslagen, Sweden – a mining district for over 1 000 years.

Dr Holger Sommer presented his UFS Mantle Research Group's 2008 results at the AGU conference in San Francisco concerning the petrology of diamond-bearing rocks.

Prof. Marian Tredoux attended the Lunar and Planetary Institute's (LPI) 40th Lunar and Planetary Institution (LPI) Science Conference: Large meteorite impacts and planetary evolution in Parys from 17-21 August 2008.

Geological excursions were undertaken to the following localities:

- Prof. Marian Tredoux accompanied Prof. Michael Haschke and 40 third-year students to the Vredefort Impact Structure near Parys in the Free State Province.
- The annual structural geology honours field course was held at Masimong 5 Shaft in the Free State Goldfields. Students were taught to do underground mapping and how to present their results. Course instruction and supervision were provided by Prof. Wayne Colliston.

Collaboration

Local

Department of Geology, University of Pretoria
 Department of Geology, University of the Witwatersrand
 Billiton PLC
 Harmony Mining Company
 African Rainbow Minerals
 Eysizwe Coal
 Council for Geosciences, Pretoria
 South African Committee for Stratigraphy

International

Imperial College
 Royal School of Mines Dept. of Geology
 University of Halle
 University of Leipzig
 University of Graz
 University of Innsbruck
 University of Cardiff
 Research Centre Geesthacht, Hamburg
 BGR (German Federal Survey of Geology)
 University of Western Australia
 Kernforschung Zentrum, Karlsruhe

Mineral Resource Management

Kumba Resources
 Exxaro

- An excursion for third-year students was undertaken to the Letseng diamond mine in Lesotho during September. Dr Holger Sommer supervised this excursion.
- Second and third-year students undertook an excursion to the Namaqua Mobile Belt (eastern Namaqualand) where structural features and metamorphic rocks were investigated. Dr Hermann Praekelt and Ms Annegret Lombard accompanied the students.
- Second-year students studying sedimentology visited the Jagersfontein area (two excursions) to become acquainted with the intricacies of Karoo sedimentology and stratigraphy. The excursions were overseen by Messrs Leon Nel and Johan Look.
- The two third-year mine excursions took students to Goldfield's Beatrix Mine in

Welkom. Prof. Christoph Gauert was the responsible lecturer.

- First-year students were entertained on a visit to AVBOB (Afrikaanse Verbond Nywerhede) where they were provided with insights into the dimension stone industry and the manufacture of slabs from igneous rock for cladding, work surfaces and tomb stones. Ms Annegret Lombard and Ms Alida Litthauer were the overseers for this excursion. During the second semester excursions were directed to geologically interesting areas in the Bloemfontein, Thaba 'Nchu and Dewetsdorp areas.

During these excursions the students gained knowledge on aspects of Karoo geology and stratigraphy, dolerite occurrences, sedimentology and geomorphology. Mr Johan Look led these excursions. ■

Research outputs

Research articles

Ahmadian, J., Haschke, M., McDonald, I., Regelous, M., Ghorbani, M. & Emami, M. 2008. High magmatic flux during Alpine-Himalayan collision: Constraints from the Kal-e Kafi complex, central Iran. *Geological Society of America Bulletin* 121(5/6): 857-868.

Colliston, W.P. & Schoch, A.E. 2008. Comments: Paper by Lacassie *et al.* (Journal of Geochemical Research 91: 81-98). *Journal of Geochemical Research* 99: 61-65.

Colliston, W.P., Schoch, A.E. & Praekelt, H. 2008. Comments on the papers by Baillie *et al.* concerning the age and deposition of the Bushmanland group (*South African Journal of Geology* 110: 59-86) and single zircon ages of the Aggeneys Granite Suite (*South African Journal of Geology* 110: 87-110). *South African Journal of Geology* 111(1): 109-111.

De Waal, S., Schweitzer, J., Graham, I., Gauert, C. & Ripley, E. 2008. A Bushveld-related high-Ti igneous suite (HITIS) derived from an alkali to transitional basaltic magma, South Africa. (South African Journal of Geology special issue in celebration of the centennial of the Department of

Geology at the University of Pretoria). *South African Journal of Geology* 111(2-3): 201-224.

Muundjua, M., Galdeano, A., Carporzen, L., Gilder, S.A., Hart, R.H., Andreoli, M.A.G. & Tredoux, M. 2008. Reply to comment by W.U. Reimold, R.L. Gibson and H. Henkel on Muundjua *et al.* (2007): Magnetic imaging of the Vredefort impact crater, South Africa. *Earth and Planetary Science Letters* 261: 456-468.

Praekelt, H.E., Germs, G.J.B. & Kennedy, J.H. 2008. A distinct unconformity in the Cango Caves Group of the Neoproterozoic to early Paleozoic Saldania Belt in South Africa: Its regional significance. *South African Journal of Geology* 111(4): 357-368.

Shafiei, B., Haschke, M. & Shahabpour, J. 2008. Recycling of orogenic arc crust triggers porphyry Cu mineralization in Kerman Cenozoic arc rocks, southeastern Iran. *Miner Deposita* 44: 263-283.

Sommer, H., Hauenberger, C.A., Kroener, A. & Muhongo, S. 2008. Isothermal decompression history in the "Western Granulite" terrain, central Tanzania: Evidence from

Staff

Professor: Prof. Willem van der Westhuizen

Associate Professors: Profs Wayne Colliston, Christoph Gauert, Michael Haschke, Marian Tredoux

Senior Lecturers: Drs Hermann Praekelt, Holger Sommer

Junior Lecturer: Ms Annegret Lombard

Part-Time Lecturers: Messrs Johan Look, Leon Nel

EarthWise Officer: Ms Huibrie Joubert

Affiliated Lecturers: Prof. Gerhard Beukes, Messrs PG Laurens, Johann Grobler, Ron Vrijens, André Dunne, Derek Hall, Mss Daleen Diedericks, Vanessa Lickfold

Senior Officer: Ms Rina Immelman

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reaction textures and trapped fluids in metapelites. *Journal of African Earth Science* 51: 123-144.

Sommer, H., Regenauer-Lieb, K., Gasharova, B. & Siret, D. 2008. Grain boundaries: A possible water reservoir in the Earth's mantle? *Mineralogy and Petrology* 94: 1-8.

Conference contributions

Fuchs, S., Glaesser, W., Reichhardt, F. & Gauert, C. 2008. *Petrological investigation of the Main Zone and platiniferous upper Critical Zone rocks of the north-eastern Bushveld Complex at Phoshiri, based on mineralogical and geochemical variations.* Paper delivered at the Joint Conference of the Society of Economic Geologists (SEG) and the Geological Society of South Africa (GSSA) (SEG-GSSA 2008): Africa uncovered - Mineral resources for the future. Misty Hills, Johannesburg, South Africa. 7-10 July.

Gauert, C., Colliston, W. & Mouton, E. 2008. *Mineralization model for the deformed base-metal bearing exhalative iron formations at Spitskop, Gariep Belt, southern Namibia.* Paper delivered at the Joint Conference of the Society of Economic Geologists (SEG) and the Geological Society of South Africa (GSSA) (SEG-GSSA 2008): Africa uncovered - Mineral resources for the future. Misty Hills, Johannesburg, South Africa. 7-10 July.

Haschke, M., Jacobson, L., Van der Westhuizen, W.A. & Steenekamp, S. 2008. *Recent flexural slip and rift-branch propagation into the Bushveld Complex, South Africa.* Paper delivered at the American Geophysical Union (AGU) Conference, San Francisco, California, USA. 14-18 December.

Jacobson, L. & Van der Westhuizen, W.A. 2008. *The chemical composition of Khoisan coastal pottery between Saldanha Bay and Port Nolloth.* Paper delivered at the Association of Southern Africa Professional Archaeologists (ASAPA) Meeting, Cape Town, South Africa. 25-28 March.

Jacobson, L. & Van der Westhuizen, W.A. 2008. *Provenancing pottery from northern Botswana and northeastern Namibia.* Paper delivered at the Association of Southern Africa Professional Archaeologists (ASAPA) Meeting, Cape Town, South Africa. 25-28 March.

Joubert, P.L. & Gauert, C. 2008. *Chemical variation of chrome spinels in the Uitkomst Complex – Significance*

for petrogenesis and deformation? Paper delivered at the Joint Conference of the Society of Economic Geologists (SEG) and the Geological Society of South Africa (GSSA) (SEG-GSSA 2008): Africa uncovered - Mineral resources for the future, Misty Hills, Johannesburg, South Africa. 7-10 July.

Kirste, J., Glaesser, W., Davidson, M. & Gauert, C. 2008. *Reconstruction of the contact metamorphic aureole around the Ni-Cu-PGE-bearing Uitkomst Complex, near Badplaas, Mpumalanga Province, South Africa.* Paper delivered at the Joint Conference of the Society of Economic Geologists (SEG) and the Geological Society of South Africa (GSSA) (SEG-GSSA 2008): Africa uncovered - Mineral resources for the future, Misty Hills, Johannesburg, South Africa. 7-10 July.

Kottke-Levin, J. & Tredoux, M. 2008. *PGE ratios in the Middle Group chromitites of the eastern Bushveld complex.* Paper delivered at the Joint Conference of the Society of Economic Geologists (SEG) and the Geological Society of South Africa (GSSA) (SEG-GSSA 2008): Africa uncovered - Mineral resources for the future, Misty Hills, Johannesburg, South Africa. 7-10 July.

Potgieter, J., Sommer, H., Regenauer-Lieb, K. & Gasharova, B. 2008. *OH and CO diffusion profiles in garnets from eclogitic xenoliths from the Victor diamond mine, South Africa.* (UNESCO IGCP 557 Project: Diamonds, Xenoliths and Kimberlites: A window into the Earth's interior). Paper delivered at the American Geophysical Union (AGU) Conference, San Francisco, California, USA. 14-18 December.

Purchase, M., Sommer, H., Regenauer-Lieb, K. & Gasharova, B. 2008. *Diffusion profiles of OH towards melt inclusions in garnets in Iherzolite xenoliths from the Victor diamond mine, South Africa.* (UNESCO IGCP 557 Project: Diamonds, Xenoliths and Kimberlites: A window into the Earth's interior). Paper delivered at the American Geophysical Union (AGU) Conference, San Francisco, California, USA. 14-18 December.

Rantzsch, U., Glaesser, W., Stewart, R., Gauert, C. & Van der Westhuizen, W. 2008. *Mineralogical and geochemical investigation of conglomerate-hosted Uranium-Gold ores of the Dominion Group, Western Witwatersrand, South Africa.* Paper delivered at the Joint Conference of the Society of Economic Geologists

(SEG) and the Geological Society of South Africa (GSSA) (SEG-GSSA 2008): Africa uncovered - Mineral resources for the future, Misty Hills, Johannesburg, South Africa. 7-10 July.

Regenauer-Lieb, K., Sommer, H. & Gaede, O. 2008. *Weertman cracks and the fast extraction of diamonds from the Earth's mantle.* (UNESCO IGCP 557 Project: Diamonds, Xenoliths and Kimberlites: A window into the Earth's interior). Paper delivered at the American Geophysical Union (AGU) Conference, San Francisco, California, USA. 14-18 December.

Sommer, H., Regenauer-Lieb, K. & Gasharova, B. 2008. *Multi-stage water enrichment processes in the wake of the Farralon slab.* (UNESCO IGCP 557 Project: Diamonds, Xenoliths and Kimberlites: A window into the Earth's interior). Paper delivered at the American Geophysical Union (AGU) Conference, San Francisco, California, USA. 14-18 December.

Sommer, H., Regenauer-Lieb, K., Hauzenberger, C.A.H. & Gasharova, B. 2008. *Rapid uplift of the Jwangeng kimberlite, South Botswana: Caused by mantle metasomatism and documented by OH-diffusion profiles in garnet from eclogitic xenoliths.* (UNESCO IGCP 557 Project: Diamonds, Xenoliths and Kimberlites: A window into the Earth's interior). Paper delivered at the 18th Annual Goldschmidt Conference, Vancouver, Canada. 13-18 July.

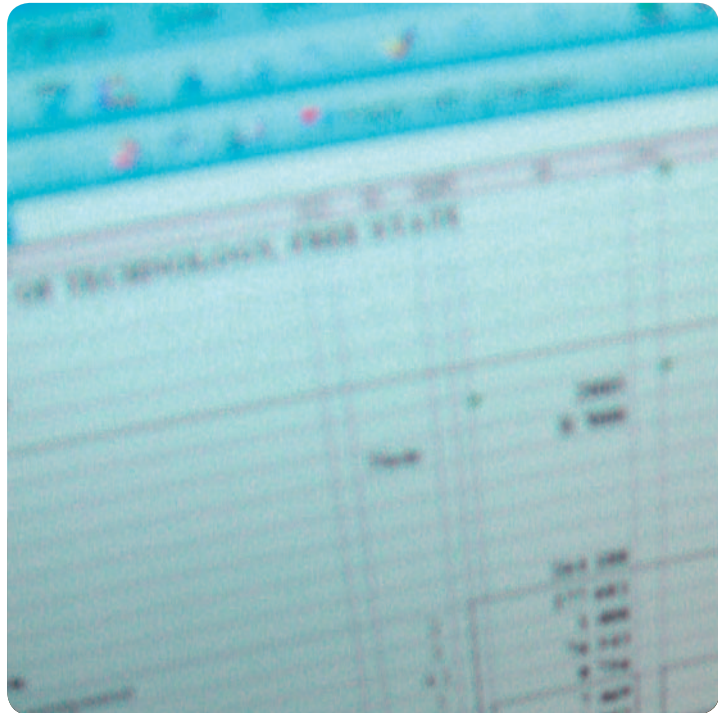
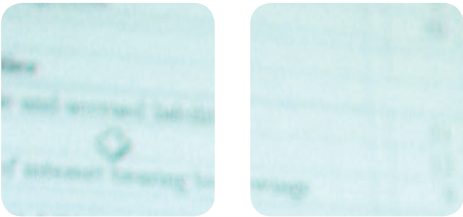
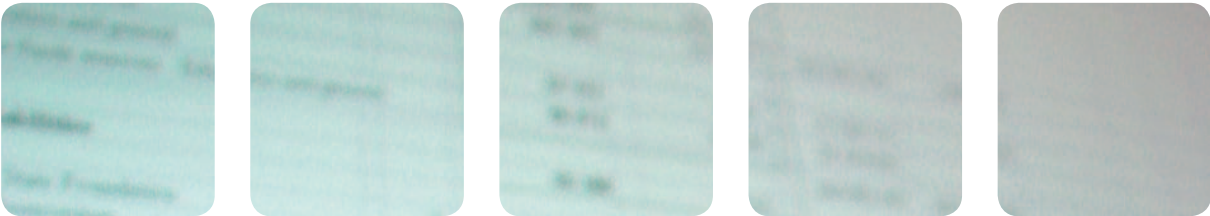
Sommer, H., Regenauer-Lieb, K., Hauzenberger, C.A.H. & Gasharova, B. 2008. *Rapid uplift of the Victor kimberlite, South Africa: caused by mantle metasomatism and documented by OH-diffusion profiles in eclogites.* (UNESCO IGCP 557 Project: Diamonds, Xenoliths and Kimberlites: A window into the Earth's interior). Paper delivered at the 33rd International Geological Congress (33IGC) and the Geoscience World Congress 2008: Earth Systems Science - Foundation for Sustainable Development, Oslo, Norway. 6-14 August.

Tredoux, M. & Keller, G. 2008. *Is the KTB iridium anomaly a unique cosmic marker?* Paper delivered at the American Geophysical Union (AGU) Conference, San Francisco, California, USA. 14-18 December.

Tredoux, M. 2008. *PGE enrichment at the KTB: A sign of cause or a sign of effect?* Paper delivered at the 40th Lunar and Planetary Institution (LPI) Science Conference: Large meteorite impacts and planetary evolution, Parys, South Africa. 17-21 August.



Statistical data

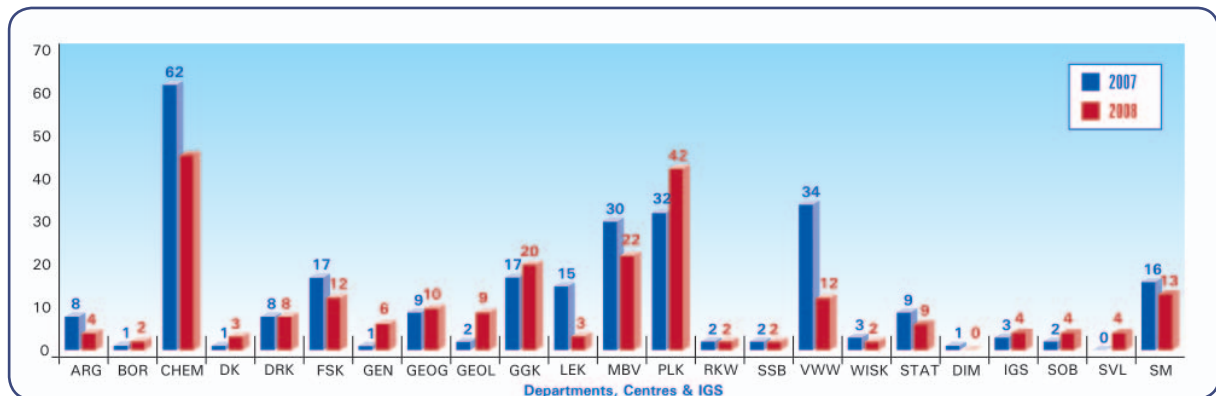


Research outputs: 2007-2008

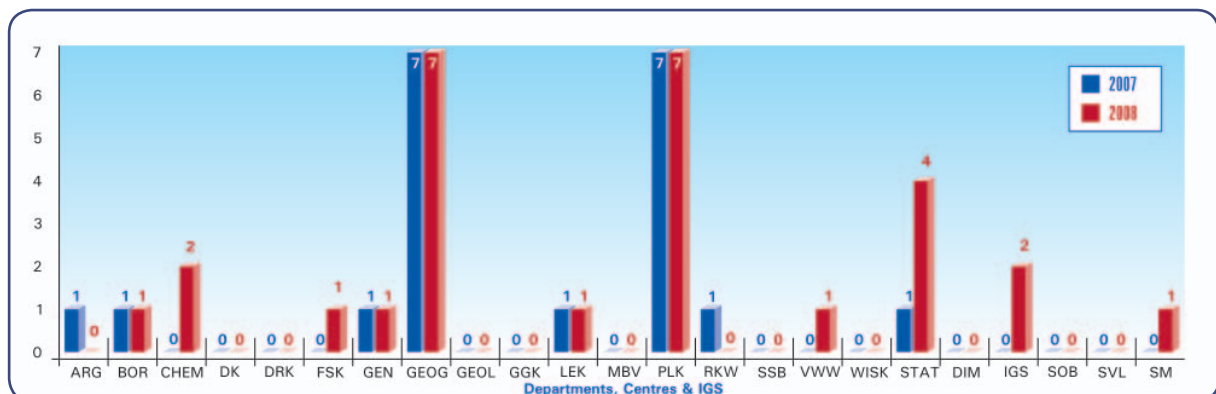
List of abbreviations

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

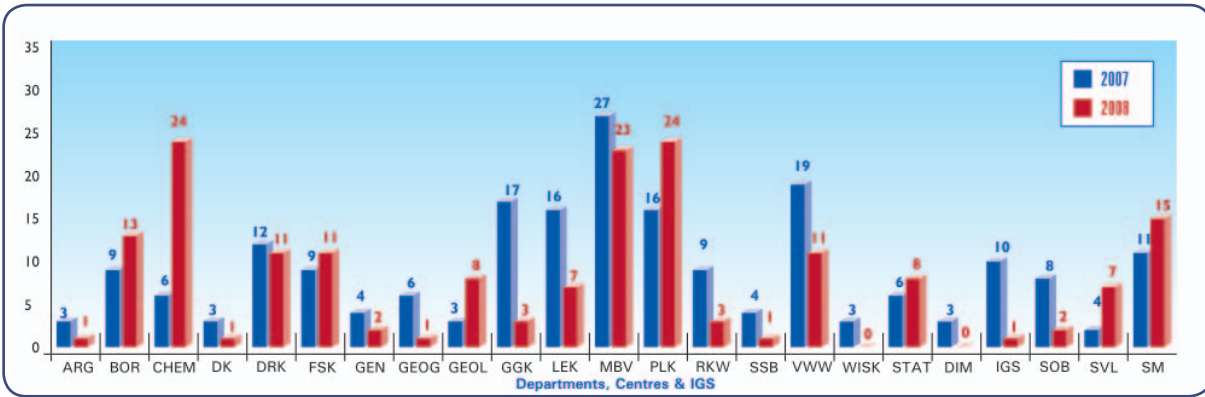
Accredited articles



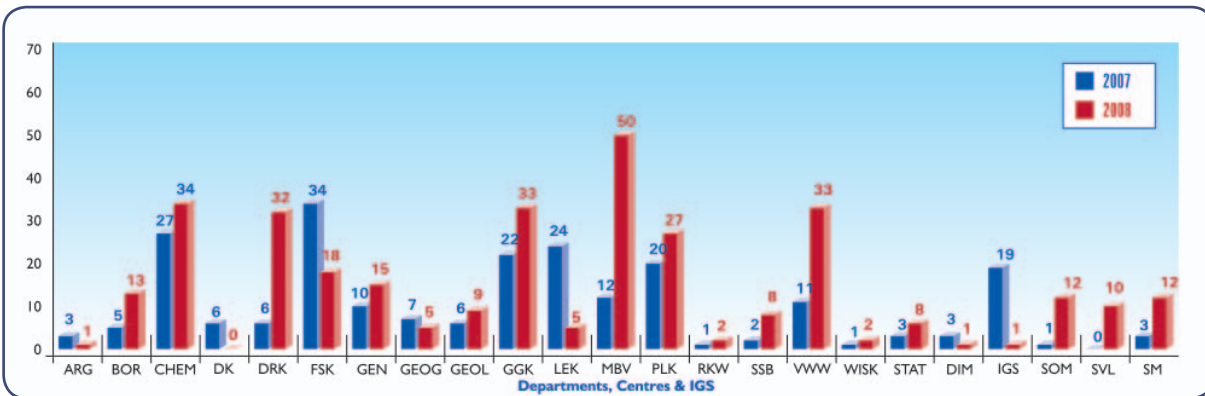
Books



International conferences



Local conferences



Student figures: 2007-2008

Student figures

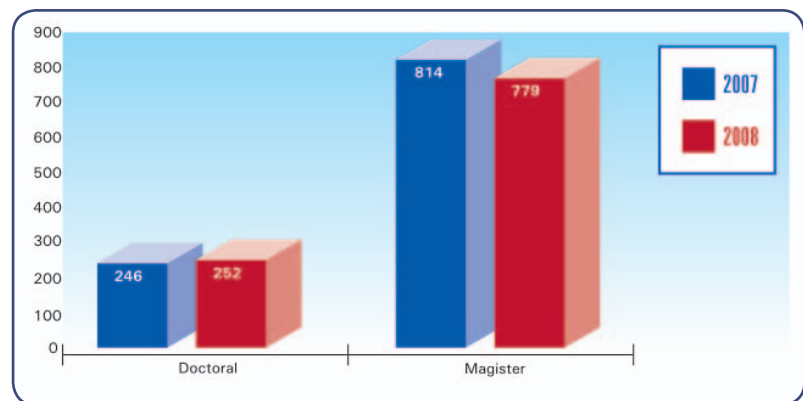
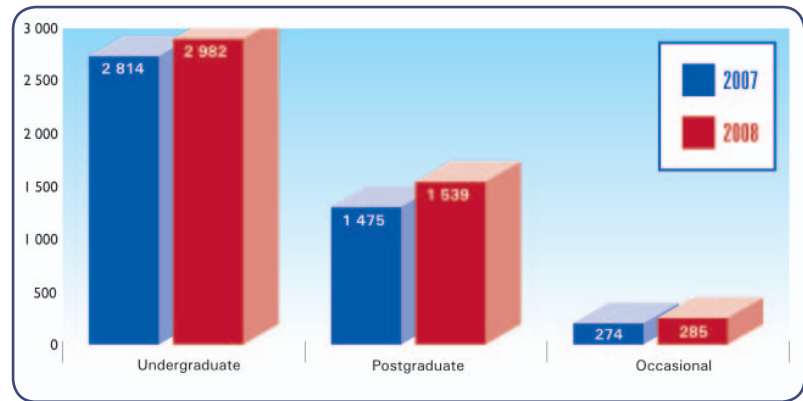
Year	Description	Black	Coloured	Asian	White	Total
2007	Undergraduate	1492	66	38	1218	2814
	Postgraduate	710	41	40	684	1475
	Occasional	230	6	2	36	274
*TOTAL		2432	113	80	1938	4563
2008	Undergraduate	1667	51	37	1227	2982
	Postgraduate	755	40	43	701	1539
	Occasional	260	5	1	19	285
* TOTAL		2682	96	81	1947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

International students

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

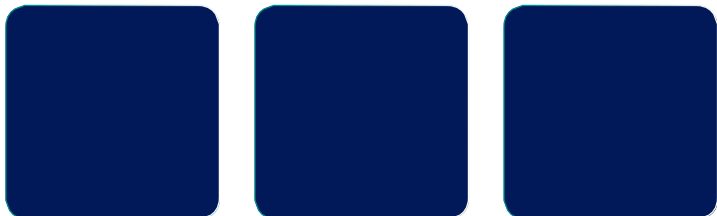
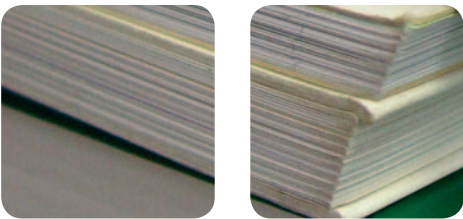
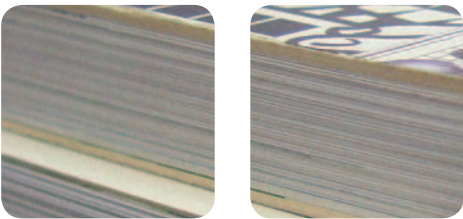
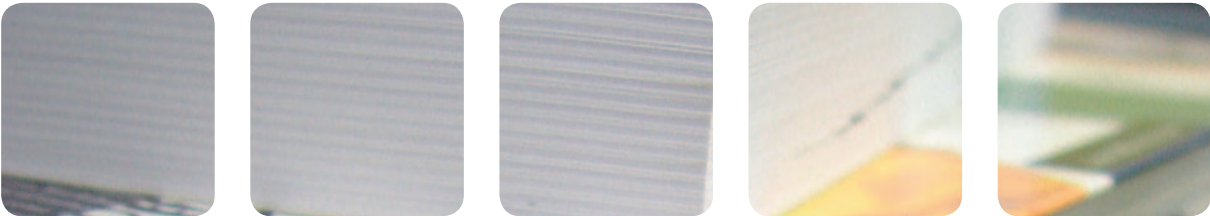
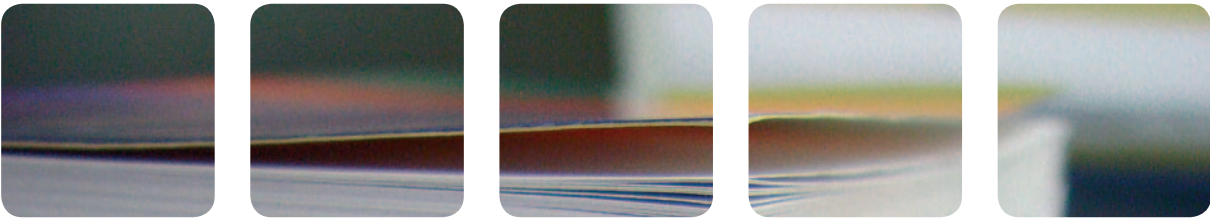
*2008 Final HEMIS figures not available

Comparison for the Faculty of Natural and Agricultural Sciences





Glossary



Glossary

A

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

B

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

C

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

D

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

E

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

F

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

G

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

H

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

I

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

L

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

M

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

N

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

O

OECD -	Organisation for Economic Cooperation and Development
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P

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

R

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

S

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

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

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

T

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

U

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

W

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

