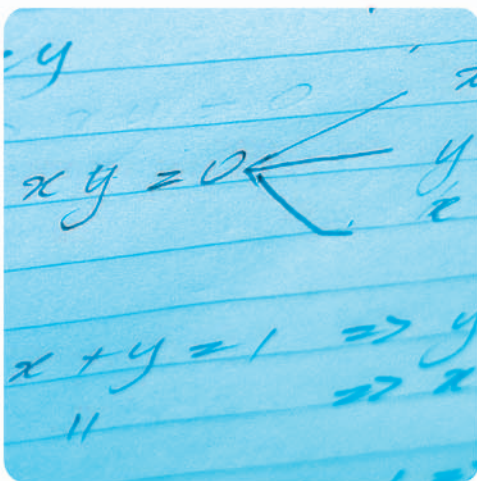


# Faculty of Natural and Agricultural Sciences

## Report 2008





**Faculty of**

**Natural and  
Agricultural Sciences**

**Report 2008**

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# 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>

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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 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.



## Department of

# Mathematical Statistics and Actuarial Science

“We are in the process of upgrading our actuarial programme.” - Prof. Daan de Waal.

### Overview

The Department of Mathematical Statistics and Actuarial Science has about 4 000 undergraduate and 30 post-graduate students. Because of the growth in popularity of Actuarial Science, the department changed its name to include this field of study in 2008. The Actuarial programme is offered up to level 1 and the department is in the process of upgrading it to level 2. One student, Mr Warren Henning, completed his Actuarial studies in 2008, while 29 students received their doctorates during the year.

The department had three international students – one from Botswana and two from Lesotho. Mr Martin Khutsoane submitted his dissertation entitled “Risk Modelling: The Acceptable risk and losses due to additional risk” and Ms Lieketseng Masenyetse submitted her dissertation entitled “Aspects of stochastic modelling for biological systems”. Mr Wilson Thupeng completed a Ph.D. degree entitled “Measures of Goodness of fit in extreme modelling”.

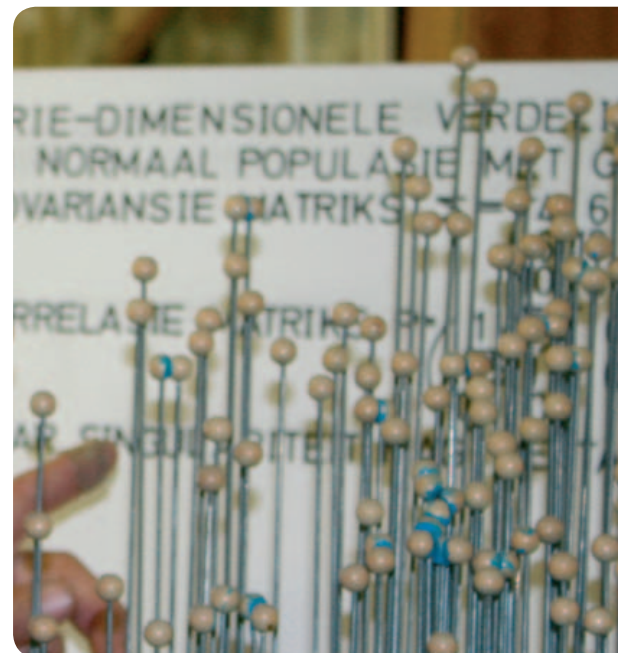
Staff members are involved in several national and international associations and institutions. Prof. Daan de Waal, Departmental Chairperson, is a member of the South African Statistical Association (SASA) as well as the International Statistical Institute (ISI). Prof. Max Finkelstein was a visiting researcher at the Max Planck Institute for Demographic Research in Rostock, Germany



Prof. Daan de Waal.

from July to August 2008. He also he paid a research visit to the St. Petersburg Elektropribor Institute, Russia during December 2008. Prof. Robert Schall is the Associate Editor of the *South African Statistical Journal*.

Research is an important part of the department’s activities. Prof. De Waal conducted research on risks in the energy market, which is an Eskom project. Prof. Finkelstein did research on stochastic models for biological aging with a grant from the National Research Foundation (NRF) as well as research on engineering applications of reliability theory and mixture failure rate modelling.



The department received several national and international visitors, namely Prof. Pieter van Gelder from the University of Technology in Delft, The Netherlands who delivered a presentation on “Robust detection of discordant sites in regional frequency analysis, based on L-Moments, with applications to flood defence design” in January 2008. Prof. Subha Chakraborti of the Department of Information Systems, Statistics and Management Science at the University of Alabama, United States of America (USA), gave a presentation on “Statistical Process Control - Parametric and Nonparametric” in July





Staff of the department in 2008.

## Staff

**Professors:** Profs Daan de Waal, Max Finkelstein, Abrie van der Merwe, Robert Schall

**Senior Lecturers:** Dr Martin van Zyl, Ms Linda van der Merwe

**Lecturers:** Drs Inet Kemp, Andréhette Verster, Delson Chikobvu, Messrs Dries Naudé, Kobus Bekker, Michael von Maltitz, Sean van der Merwe, Mss Wallina Oosthuizen, Elizabeth Girmay

**Part-Time Lecturers:** Messrs Frans Koning, GJ Mellet

**Secretary:** Ms Elize Mathee

**Assistant Officer:** Ms Ella Hayes

**Messenger:** Mr William Baranye

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2008, and Prof. Edward George from the Wharton School of the University of Pennsylvania, USA did a presentation on "Practical Im-

plementation of Bayesian Model Selection by using Bayesian Additive Regression Trees" in November 2008. Local visitors included Dr Renalde Huysamen from the Centre for Higher Education Studies and Development (CHESD) at the UFS who made a presentation on Leadership Development in October 2008 and Mr Justin Harvey of the UFS who discussed "Credibility intervals for the ratio of means from two populations that contain zero and lognormal observations" in October 2008.

Prof. Finkelstein published a book entitled *Failure Rate Modelling for Risk and Reliability*, which was published by Springer in London. He was also appointed as the Editor-in-Chief of the *South African Statistical Journal* and as the Associate Editor of *Applied Stochastic Models in Business and Industry*. Mr Delson Chikobvu completed his Ph.D. degree with the title, "Bayesian Analysis of Process Capability Indices for Single and Multiple Sources of Variability". ■

## Research outputs

### Research articles

**Booyesen, F., Van der Berg, S., Burger, R., Von Maltitz, M.J. & Du Rand, G.** 2008. Using an asset index to assess trends in poverty in seven Sub-Saharan African Countries. *World Development* 36(6): 1113-1130.

**De Waal, D.J., Beirlant, J. & Dierkx, G.** 2008. Predicting high quantiles through the Dirichlet process on extreme modelling. *South African Statistical Journal* 42(2): 89-99.

**Dierkx, G., Beirlant, J., De Waal, D.J. & Gillou, A.** 2008. A new estimation method for Weibull-type tails based on the mean excess function. *Journal of Statistical Planning and Inference* 139(6): 1905-1920.

**Finkelstein, M.S.** 2008. Reliability modelling for biological aging. *Journal of Risk and Reliability* 222(1): 1-7.

**Finkelstein, M.S. & Esaulova, V.** 2008. On asymptotic failure rates in bivariate frailty competing risks models. *Statistics and Probability Letters* 78(10): 1174-1180.

**Van Zyl, J.M.** 2008. The use of ratios to compare volatilities and VaRs. *Communications in Statistics-Simulation and Computation* 37(10): 2089-2095.

### Books

**Finkelstein, M.** 2008. *Failure rate modelling for risk and reliability*. London: Springer.

### Chapters in books

**Du Burger, R., Booyesen, F., Van der Berg, S. & Von Maltitz, M.J.** 2008. Marketable wealth in a poor African country: Wealth accumulation by households in Ghana. In *Personal wealth from a global perspective*, edited by J.B. Davies. New York: Oxford University Press. pp. 248-268.

**Finkelstein, M.S.** 2008. Degradation and shock models. In *Encyclopedia of quantitative risk assessment and*



analysis, edited by E. Melnick & B. Everitt. Chichester, UK: John Wiley & Sons. pp. 481-489.

**Finkelstein, M.S. & Esaulova, V.** 2008. Asymptotic properties of bivariate competing risks models. In *Advances in mathematical modelling for reliability*, edited by T. Bedford; J. Quigley; L. Wals; B. Alkali; A. Daneshkhah & G. Hardman. Amsterdam: IOS Press. pp. 96-102.

## Reports

**De Waal, D.J. & Beirlant, J.** 2008. *Comparing tail probabilities from different models on extremes*. Technical report number 387 to the University of the Free State, Bloemfontein, South Africa.

**Naude, A.M., Chikobvu, M. & Chandran, T.M.** 2008. *Caring for the carers: Emotional and social impact on health professionals caring for the HIV/AIDS patients in Free State Province*. Technical report number 382 to the University of the Free State, Bloemfontein, South Africa.

**Oosthuizen, W. & Lombaard, C.S.** 2008. *Methods for the assessment of the assumption of normality of data*. Technical report number 383 to the University of the Free State, Bloemfontein, South Africa.

**Van der Merwe, A.J. & Chikobvu, D.** 2008. *Process capability indices the balanced random effects model*. Technical report number 390 to the University of the Free State, Bloemfontein, South Africa.

**Van der Merwe, A.J. & Harvey, J.** 2008. *Credibility intervals for the ratio of means of two populations that contain zero and lognormally distributed observations*. Technical report number 389 to the University of the Free State, Bloemfontein, South Africa.

**Van der Merwe, A.J. & Hugo, J.** 2008. *Tolerance intervals for averages of observations from new or unknown batches in the case of the random effects model*. Technical report number 388 to the University of the Free State, Bloemfontein, South Africa.

**Van der Merwe, L.** 2008. *Students' perceptions of statistics as field of study - A phenomenological study: A qualitative research study to explore the different ways in which a group of students experience statistics*. Technical report number 385 to the University of the Free State, Bloemfontein, South Africa.

**Van Zyl, J.M.** 2008. *A likelihood ratio test for White Noise using Laplace Distribution*. Technical report number

386 to the University of the Free State, Bloemfontein, South Africa.

**Van Zyl, J.M.** 2008. *Improved estimation of the location parameter of symmetric stable data*. Technical report number 380 to the University of the Free State, Bloemfontein, South Africa.

**Van Zyl, J.M.** 2008. *Modeling inflows into the Gariep Dam using Bayesian Dynamic Models*. Technical report number 384 to the University of the Free State, Bloemfontein, South Africa.

**Van Zyl, J.M. & Liyambo, P.T.** 2008. *Basic theory of eigenvalues of a wishart matrix with some of the applications in economics and finance*. Technical report number 381 to the University of the Free State, Bloemfontein, South Africa.

## Conference contributions

**Bekker, K.N. & Van der Merwe, A.J.** 2008. *A nonparametric bayesian approach applied to the Bühlmann-Straub Credibility Model*. Paper delivered at the 9<sup>th</sup> World Meeting of the International Society for Bayesian Analysis (ISBA2008), Hamilton Island, Australia. 21-25 July.

**Chikobvu, D. & Van der Merwe, A.J.** 2008. *A bayesian simulation solution to the supplier selection problem using capability indices*. Invited paper delivered to the Department of Marketing, Monash University, Victoria, Australia. 15 July.

**Chikobvu, D. & Van der Merwe, A.J.** 2008. *A process capability index for averages of observations from new batches in the case of the balances random effects model*. Poster presented at the 9<sup>th</sup> World Meeting of the International Society for Bayesian Analysis (ISBA2008), Hamilton Island, Australia. 21-25 July.

**Chikobvu, D. & Van der Merwe, A.J.** 2008. *A process capability index for averages of observations from new batches in the case of the balances random effects model*. Paper delivered at the 51<sup>st</sup> Annual Conference of the South African Statistical Association (SASA), University of Pretoria, Pretoria, South Africa. 27-31 October.

**Chikobvu, D. & Van der Merwe, A.J.** 2008. *Bayesian simulation of process capability indices*. Invited paper delivered to the Department of Marketing, Monash University, Victoria, Australia. 14 July.

**Finkelstein, M.S.** 2008. *On some approaches to defining virtual age of non-repairable objects*. Paper delivered at the Conference of the European Safety and Reliability

Association (ESRA) and the 17<sup>th</sup> Annual Conference for the Society for Risk Analysis Europe (SRA-E), Valencia, Spain. 21-26 September.

**Finkelstein, M.S.** 2008. *On some approaches to defining virtual age of non-repairable objects*. Proceedings of the Conference of the European Safety and Reliability Association (ESRA) and the 17<sup>th</sup> Annual Conference for the Society for Risk Analysis Europe (SRA-E), Valencia, Spain. 21-26 September. pp. 1909-1913.

**Finkelstein, M.S. & Cha, J.H.** 2008. *On shock processes with independent wear increments*. Paper delivered at the 51<sup>st</sup> Annual Conference of the South African Statistical Association (SASA), University of Pretoria, Pretoria, South Africa. 27-31 October.

**Schall, R.** 2008. *Outliers in replicate design cross-over studies*. Paper delivered at the 51<sup>st</sup> Annual Conference of the South African Statistical Association (SASA), University of Pretoria, Pretoria, South Africa. 27-31 October.

**Thupeng, W.M. & De Waal, D.J.** 2008. *The deviance information criterion as a bayesian measure of model assessment for extreme value model*. Paper delivered at the 51<sup>st</sup> Annual Conference of the South African Statistical Association (SASA), University of Pretoria, Pretoria, South Africa. 27-31 October.

**Verster, A. & De Waal, D.J.** 2008. *The spectral distribution expressed in terms of a mixture of Dirichlets for modeling multivariate extremes*. Poster presented at the 9<sup>th</sup> World Meeting of the International Society for Bayesian Analysis (ISBA2008), Hamilton Island, Australia. 21-25 July.

**Von Maltitz, M.J.** 2008. *An application of sequential regression multiple imputation on panel data*. Paper delivered at the Sample Surveys and Bayesian Statistics (SSBS2008) Conference and Workshop, Southampton, Hampshire, UK. 25-29 August.

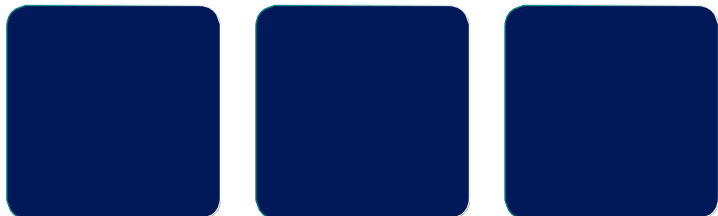
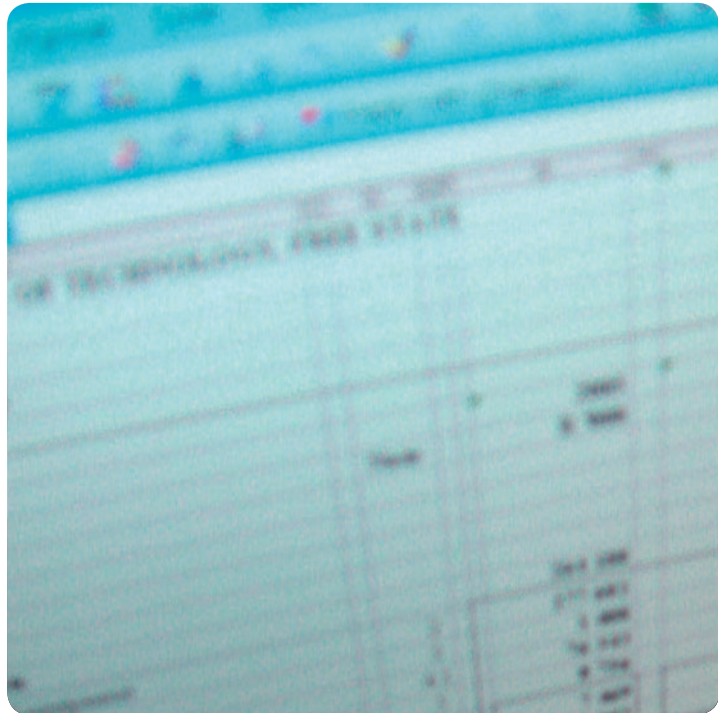
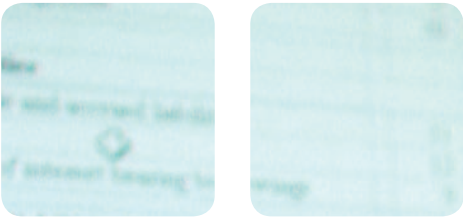
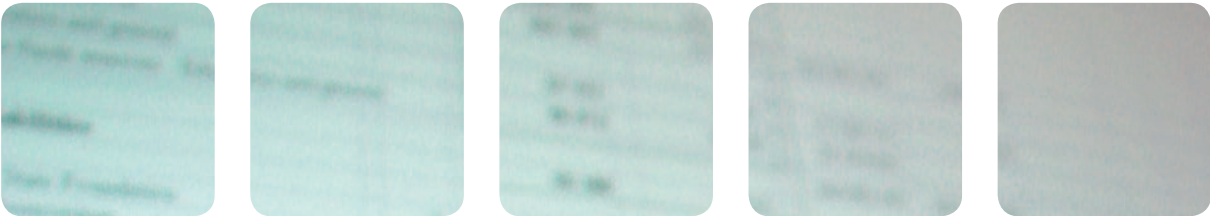
**Von Maltitz, M.J.** 2008. *An application of sequential regression multiple imputation on panel data: Further research*. Paper delivered at the 51<sup>st</sup> Annual Conference of the South African Statistical Association (SASA), University of Pretoria, Pretoria, South Africa. 27-31 October.

**Von Maltitz, M.J. & Van der Merwe, A.J.** 2008. *An application of SRMI on panel data - Results and further research*. Paper delivered at the 51<sup>st</sup> Annual Conference of the South African Statistical Association (SASA), University of Pretoria, Pretoria, South Africa. 27-31 October.





# Statistical data

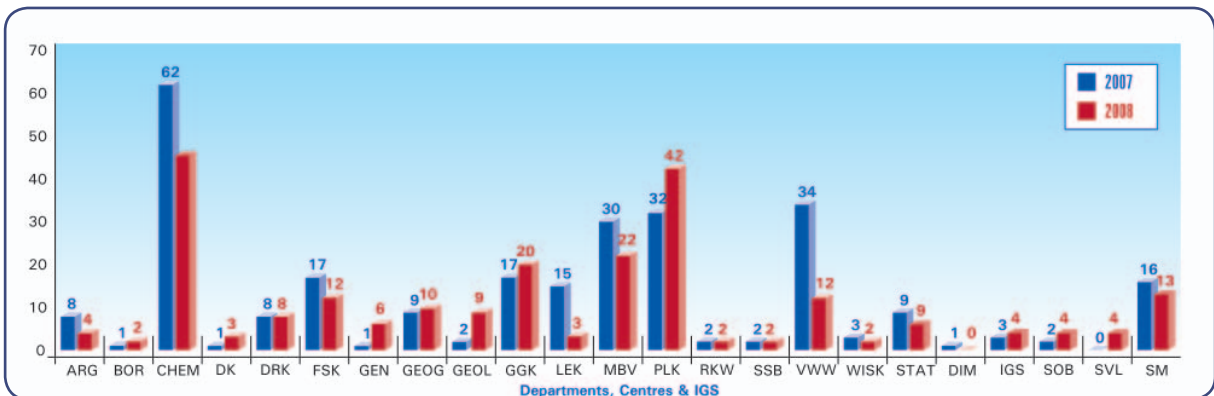


## Research outputs: 2007-2008

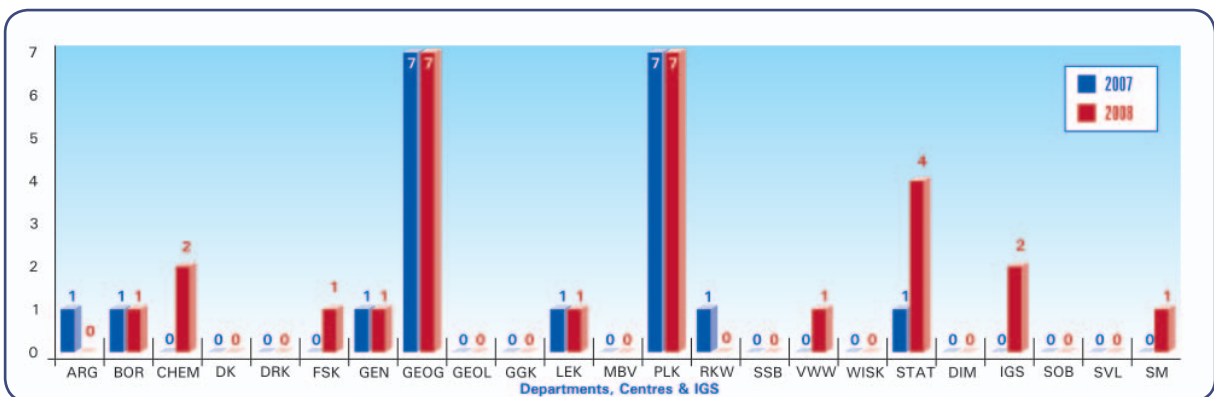
### List of abbreviations

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		

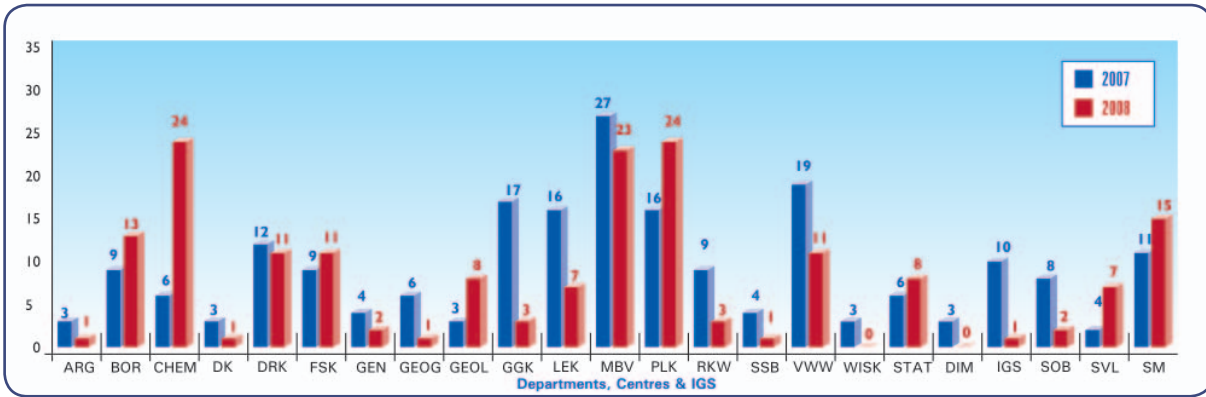
### Accredited articles



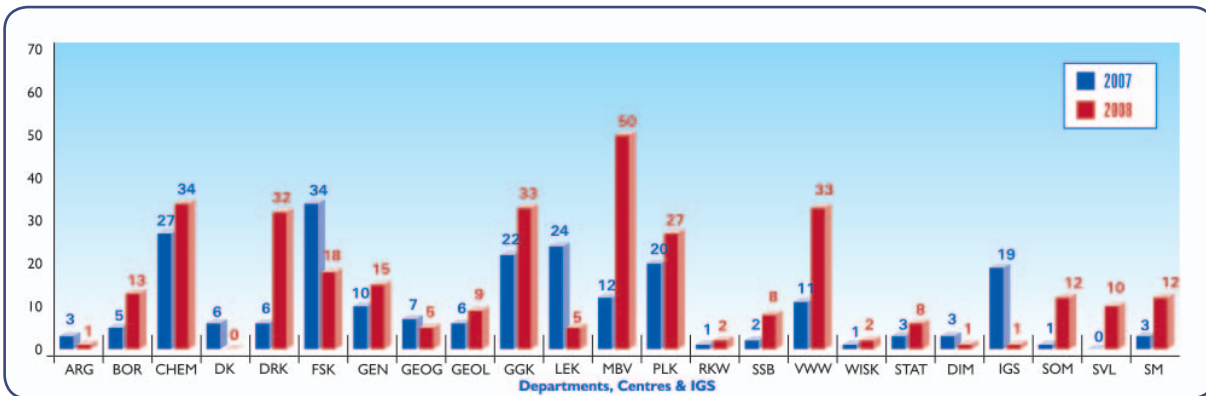
### Books



### International conferences



### Local conferences



## Student figures: 2007-2008

### Student figures

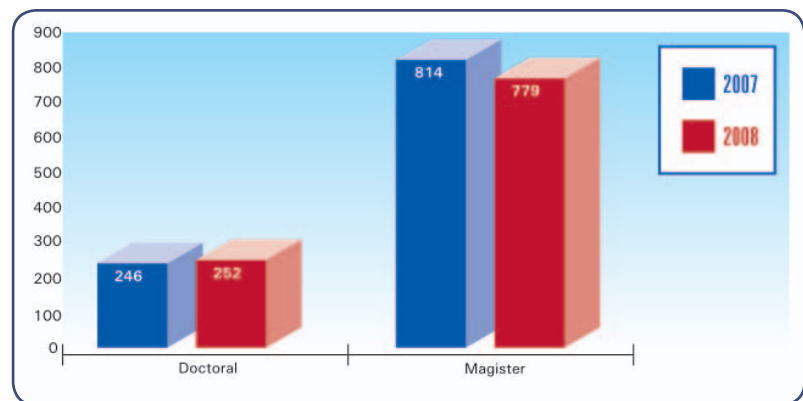
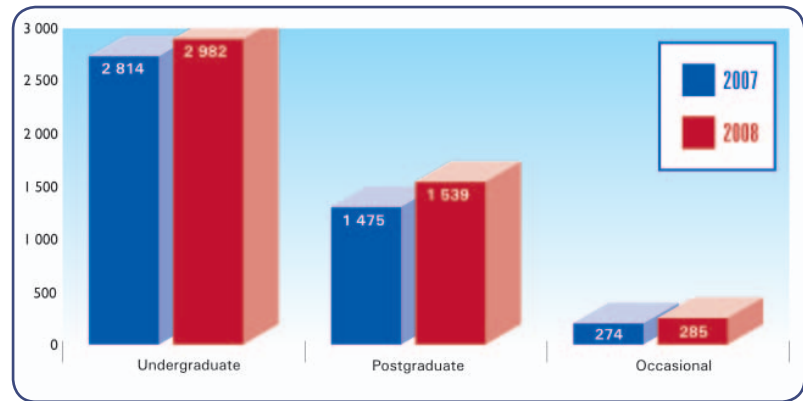
Year	Description	Black	Coloured	Asian	White	Total
2007	Undergraduate	1492	66	38	1218	2814
	Postgraduate	710	41	40	684	1475
	Occasional	230	6	2	36	274
<b>*TOTAL</b>		<b>2432</b>	<b>113</b>	<b>80</b>	<b>1938</b>	<b>4563</b>
2008	Undergraduate	1667	51	37	1227	2982
	Postgraduate	755	40	43	701	1539
	Occasional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

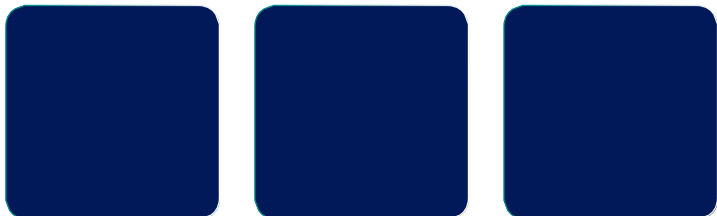
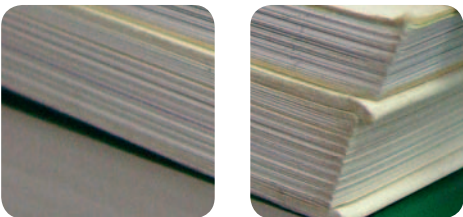
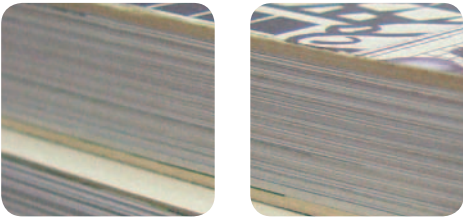
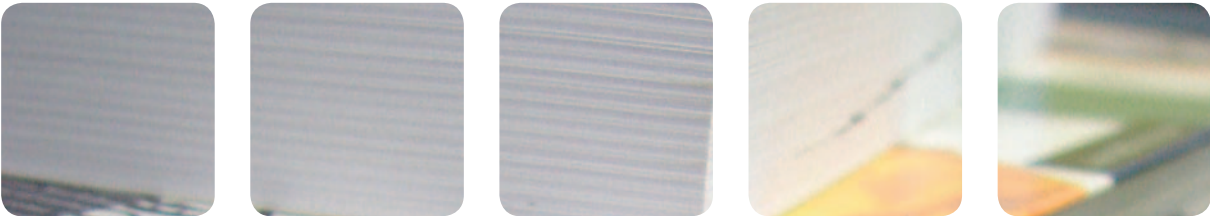
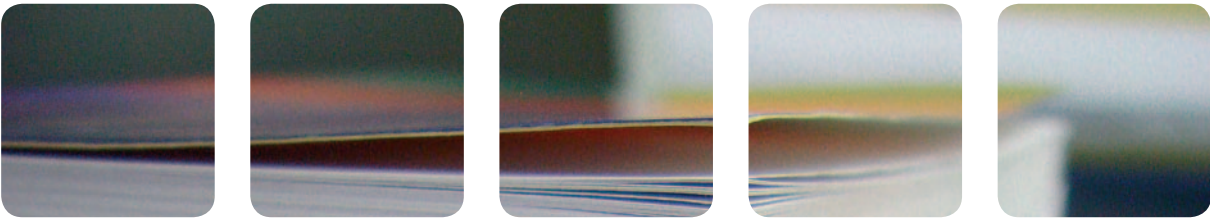
### Comparison for the Faculty of Natural and Agricultural Sciences







# 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

