

Faculty of SCIENCE

Research in the Faculty of Science takes place through 13 separate departments, arranged on disciplinary grounds, and 15 affiliated formal research units and centres accredited by the University Research Committee. The vast majority of our staff are active in research and contribute to the overall research output of the faculty.



Dean's Report

Despite a climate of decreasing research income from government for fundamental research, 2012 saw a number of research successes. The cost of research continues to grow and, despite the pressure on funding, particularly from government, staff were successful in raising some R108 million from government and non-governmental sources to support the research enterprise, with income from non-governmental sources comprising some R47.6 million of this total. Income from this external funding from industry, government, public entities, and statutory bodies was essential in providing bursaries to master's and PhD students, postdoctoral fellowships, salaries of research and support staff, and project running expenses. The number of research contracts (145), and the income derived therefrom (R47.6 million), were significantly down on 2011 values (260 and R75.6 million respectively), which is a concern. Nevertheless, despite this funding pressure, the number of PhD and postdoctoral researchers continued to grow, with 124 postdoctoral fellows spread among the departments, and 376 PhD and 454 master's students registered in the faculty. The number of doctoral degrees awarded in 2012 was 62, and that of master's degrees was 137, approximately 20 percent of the latter with distinction; both PhD and master's graduate numbers reflect increases over 2011. Two students who excelled in their postgraduate studies were Ms Andrea Muller, Department of Mathematics and Applied Mathematics, who received the S2A3 Bronze Medal for her MSc dissertation, titled *Humpback whales, rock lobsters, and mathematics: Exploration of assessment models incorporating stock-structures*, and Dr Ranga Jayakodi, Department of Chemistry, who received the Faculty PhD medal for his thesis, titled *In silico investigation of the mechanism of ricin-catalysed depurination reaction and design of novel ricin inhibitors*. Research publication output from staff and postgraduate students remained high, with some 900 peer-reviewed, accredited publications appearing in 2012.

One measure of our faculty achievements, in terms of recognition and international standing in the research arena, is through the increasing number of staff receiving high NRF ratings. In this regard, the faculty is proud of the latest additions to our current 14 NRF A-rated, 66 B-rated, 44 C-rated, and six P-rated researchers. The latter, in particular, reflect the growing research strength of our younger academic staff. Associate Professor Heribert Weigert of the Department of Physics received an NRF A rating in recognition of his research in Theoretical Physics, and two young researchers, Dr Åke Fagereng (Department of Geological Sciences) and Dr Andrew Hamilton (Department of Physics), received NRF P ratings in 2012; Dr Fagereng

PROFESSOR
ANTON LE ROEX
Dean of Science

for his research work on earthquake dynamics and Dr Hamilton for his research related to the discovery of the Higgs Boson via the ATLAS consortium at the Large Hadron Collider. In total, 152 staff in the faculty are NRF-rated.

At the university level, associate professors Merle Sowman and Rachel Wynberg received the newly instituted Social Responsiveness Award for their leadership of, and research conducted through, the Environmental Evaluation Unit, aimed at uplifting poor communities in the Western Cape and further afield. Two of our younger scientists, Drs Will Horowitz (Department of Physics) and Åke Fagereng (Department of Geological Sciences), received prestigious UCT Fellows' Young Researcher Awards, Dr Horowitz for his significant contributions to the determination of the properties of matter microseconds after the Big Bang, through demonstrating the importance of novel physics mechanisms in tomographic analyses, and Dr Fagereng for his studies on faults and fractures in the Earth's crust, aimed at understanding how the Earth deforms and particularly the processes that lead to earthquakes.

The faculty was privileged to be awarded two DST/NRF SARCHI Chairs in 2012, one in Environmental and Social Dimensions of the Bioeconomy, awarded to Associate Professor Rachel Wynberg (Department of Environmental and Geographical Sciences), the other in Stable Isotopes in Archaeology and Paleo-environmental Studies, awarded to Professor Judy Sealy (Department of Archaeology). These two additions now bring the number of DST/NRF SARCHI Research Chairs in the faculty to 10.

Staff of the faculty continued to garner national and international awards for their research contributions. Professor Jill Farrant of the Department of Molecular and Cell Biology received the L'Oréal-UNESCO Women in Science Award in Life Sciences (region: Africa and Arab States), at a ceremony in Paris in April 2012 for her work on desiccation tolerance in plants. Other notable achievements by staff in the faculty were the receipt of the prestigious Humboldt Foundation Georg Foster Research Award by Professor Daya Reddy (Department of Mathematics and Applied Mathematics), and the Humboldt Foundation In Memory of Neville Alexander Research Award received by Emeritus Professor Césareo Dominguez of the Physics Department. National honours went to Professor Anusuya Chinsamy-Turan (Department of Zoology), who was awarded the NRF Special Category Award for Transformation of the Science Cohort in recognition of her excellent research performance and international standing as a palaeobiologist, and Professor Kelly Chibale (Department of Chemistry), who

Departments

Department of Archaeology

Department of Astronomy

Department of Botany

Department of Chemistry

Department of Computer
Science

Department of Environmental
and Geographical Science

Department of
Geological Sciences

Department of Mathematics
and Applied Mathematics

Department of Molecular
and Cell Biology

Department of Oceanography

Department of Physics

Department of
Statistical Sciences

Department of Zoology

received the NRF's Champion of Research and Capacity Development at Higher Educational Institutions in South Africa Award. Professor Ed Rybicki, Department of Molecular and Cell Biology, was successful in obtaining a prestigious Harry Oppenheimer Trust award for his work on Rift Valley fever virus and Crimean-Congo haemorrhagic fever virus proteins in plants, as reagents and potential vaccines.

The quality and research performance of the academic staff in the Science faculty is ably supported by many highly skilled and dedicated administrative and technical staff. They make an invaluable contribution to the research endeavour of the faculty and their skills are critical to the wide range of exciting research activities reported on in this 2012 Research Report.



DOCTORAL GRADUATIONS

M. BIRD (ZOOLOGY)

Effects of habitat transformation on temporary wetlands in the Southwestern Cape, South Africa

Supervised by Associate Professor J. Day

R. BLAMEY (OCEANOGRAPHY)

Mesoscale convective complexes over Southern Africa

Supervised by Professor C. Reason

T. BOOM (MOLECULAR AND CELL BIOLOGY)

*A biological study of the cellular response to heat stress in the South African alga *Gracilaria gracilis**

Supervised by Associate Professor V. Coyne and Dr S. Rafudeen

N.A.K. BROWNE (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

Model evaluation for seasonal forecasting over Southern Africa

Supervised by Professor B. Hewitson and Dr B.J. Abiodun

L.A. CORKER (PHYSICS)

Probabilistic methods applied to fluctuating systems

Supervised by Professor D.T. Britton

V.B.G. COSTA (ZOOLOGY)

Using stable isotopes as a tool to understand the

trophic relationships and movements of seabirds off Southern Africa

Supervised by Associate Professor P.G. Ryan and Dr R. Wanless (Birdlife South Africa)

K. DAVIES (CHEMISTRY)

Characterisation and topological analysis of novel metal-organic frameworks

Supervised by Professor S. Bourne

S.J. DU PLESSIS (MOLECULAR AND CELL BIOLOGY)

Molecular characterisation of selected gastrointestinal microbiota in South African HIV-positive patients during HAART

Supervised by Associate Professor V. Abratt and Associate Professor S.J. Reid

E. DU TOIT (MOLECULAR AND CELL BIOLOGY)

The development of probiotics for use in the ostrich farming industry in South Africa

Supervised by Associate Professor S.J. Reid

J.L. EWART-SMITH (ZOOLOGY)

The relationship between periphyton, flow and nutrients in foothill rivers of the south-western Cape, South Africa

Supervised by Associate Professor J. Day and Dr J.M. King

M.R. GAMIELDIEN (CHEMISTRY)

Parameterization of the Gay-Berne coarse-grained potential from atomistically detailed anisotropic free energy volumes

Supervised by Professor K.J. Naidoo

R. GAUJOUX (MOLECULAR AND CELL BIOLOGY)

Non-negative matrix factorization: tools and application to gene expression deconvolution

Supervised by Professor C. Seoighe and Professor N. Mulder

D.M. HAREBOTTLE (ZOOLOGY)

Assessing the conservation value of wetlands and waterbirds with a focus on the winter rainfall region of South Africa

Supervised by Emeritus Professor L. Underhill and Dr T. Williams (Cape Nature)

N.C.G. HART (OCEANOGRAPHY)

Synoptic-scale rainfall patterns over Southern Africa: scale interactions with large-scale modes of variability

Supervised by Professor C. Reason and Dr N. Fauchereau (CSIR)

S. HOFMEYR (ZOOLOGY)

Impacts of environmental change on large terrestrial bird species in South Africa: insights from citizen science data

Supervised by Emeritus Professor L. Underhill and Dr P. Barnard (South African National Biodiversity Institute)

S.M. HUDDY (MOLECULAR AND CELL BIOLOGY)

*Development of a transformation protocol and cell culture system for the commercially important species of red macroalga *Gracilaria gracilis**

Supervised by Associate Professor V. Coyne

V.O. IKORO (PHYSICS)

A study of postgraduate students in an Astrophysics bridging year: identifying contradictions in a complex system

Supervised by Associate Professor S. Allie and Professor D. Demaree (Physics, Oregon State University, USA)

R. JAYAKODY (CHEMISTRY)

In silico investigation of the mechanism of ricin-catalysed depurination reaction and design of ricin inhibitors

Supervised by Professor K.J. Naidoo

G.S. JOSEPH (ZOOLOGY)

Understanding pattern-process relationships in a heterogeneous landscape: effects of large termitaria on diversity and disturbance regimes in Miombo woodlands of northern Zimbabwe

Supervised by Professor G. Cumming and Honorary Professor D.H.M. Cumming

H. KAMBAFWILE (CHEMISTRY)

Synthesis of activity-based protein profiling probes for malaria and hypertension disease models and potential novel ACE Inhibitors with an attenuated zinc binding group

Supervised by Professor K. Chibale

M.J. KOTZE (ZOOLOGY)

*Olfactory responses of *Dasineura dielsi* Rübsaamen (Diptera: Cecidomyiidae) females to host plant volatiles*

Supervised by Professor A. Chinsamy-Turan and Dr A. Jürgens (University of KwaZulu-Natal)

M.M. KOTZE (ASTRONOMY)

Exploring the super-orbital periodic behaviour of X-ray binaries

Supervised by Professor P. Charles and Professor B. Warner

L. LANGE (ZOOLOGY)

Use of demersal bycatch data to determine the distribution of soft-bottom assemblages off the West and South Coasts of South Africa

Supervised by Professor C. Griffiths

M.D. MABULA (MATHEMATICS AND APPLIED MATHEMATICS)

Compactness in asymmetrically normed lattices

Supervised by Dr J. Conradie and Professor H.-P. Künzi

B. MAKHUBELA (CHEMISTRY)

The design, synthesis and characterization of polynuclear materials for applications in catalysis

Supervised by Dr G.S. Smith

P. MALATJI (CHEMISTRY)

Studies towards degradable polymers: new zinc(II) and palladium(II) complexes as catalysts for lactide polymerization and carbon monoxide/styrene copolymerization

Supervised by Associate Professor A.T. Hutton and Professor N.J. Coville (University of the Witwatersrand)

S.M. MARR (ZOOLOGY)

Conservation of the native freshwater fishes of the Cape floristic region (South Africa): management of non-native species

Supervised by Associate Professor J. Day

E.M. MASINDE (COMPUTER SCIENCE)

ITIKI: bridge between African indigenous knowledge and modern science on drought prediction

Supervised by Dr A. Bagula and Professor N. Muthama (University of Nairobi)

M. MASUBELELE (BOTANY)

Understanding the past to conserve the future: long-term environmental and vegetation change in the Karoo Midlands, South Africa, over the 20th century

Supervised by Professor T. Hoffman and Professor W. Bond

A.L. MONJANE (MOLECULAR AND CELL BIOLOGY)

Analysis of recombination and evolution of maize streak virus

Supervised by Professor E. Rybicki, Dr D. Martin, Dr D. Shepherd and Dr A. Varsani

H.B.H. MOHAMED (MATHEMATICS AND APPLIED MATHEMATICS)

Properties of solutions of the equations for generalized Oldroyd-B fluids

Supervised by Professor B.D. Reddy

C. MOODLEY (MOLECULAR AND CELL BIOLOGY)

*Molecular characterization of ABC-type multidrug efflux systems in *Bifidobacterium longum* subsp. *longum* T JCM 1217*

Supervised by Associate Professor V. Abratt

J.M.W. MWICIGI (ZOOLOGY)

*The distribution, formation, origins and constituents of nepheloid layers on the Agulhas bank, South Africa, and their implications for Chokka (*Loligo Reynaudi*) Squid*

Supervised by Associate Professor M. Lucas and Dr M.J. Roberts (Oceans and Coasts, Environmental Affairs: DEA)

R.K. NAIDOO (MOLECULAR AND CELL BIOLOGY)

*Investigation of the *Gracilaria gracilis* proteome response to nitrogen limitation*

Supervised by Associate Professor V.E. Coyne

M. NDLOVU (ZOOLOGY)

Environmental influences on moult and movement strategies in Southern African waterfowl

Supervised by Professor G. Cumming and Professor P.A.R. Hockey

F.P.J. NEHAMA (OCEANOGRAPHY)

Modelling the Zambezi river plume using the regional oceanic modelling system

Supervised by Professor C. Reason

S.A. NICHOLSON (MOLECULAR AND CELL BIOLOGY)

*The molecular characterisation of the *recA* locus in the opportunistic pathogen *Bacteroides fragilis**

Supervised by Associate Professor V. Abratt

P.M. NJOGU (CHEMISTRY)

Molecular hybrids of N-benzoyl-(2R, 3S)-3-phenylisoserine with antimalarial scaffolds: design, synthesis and biological evaluation for antitumoural and antiplasmodial activity

Supervised by Professor K. Chibale, Associate Professor D.T. Hendricks and Dr A. Jardine

S. NSUMIWA (CHEMISTRY)

Synthesis and investigation of quinolone based b-haematin formation inhibitors as potential antimalarials

Supervised by Professor T.J. Egan

S.S. NTSANGASE (PHYSICS)

Development of a recoil detector and the study of exotic asymmetric shapes in nuclei

Supervised by Dr R.A. Bark (external) and Dr R. Bark (Nuclear Physics, iThemba LABS)

P.M. OKOUMA (MATHEMATICS AND APPLIED MATHEMATICS)

Aspects of dark energy and cosmic curvature

Supervised by Professor B. Bassett

O. OLELA OTAFUDU (MATHEMATICS AND APPLIED MATHEMATICS)

Convexity in quasi-metric spaces

Supervised by Professor H.-P. Kunzi

P. PILLAY (CHEMISTRY)

*Antiplasmodial neolignans from *Trema orientalis*: identification, synthesis and analogue generation*

Supervised by Professor K. Chibale and Dr V. Maharaj (CSIR)

A. POTTS (BOTANY)

Tracking thicket through space and time: insights into the evolutionary history of the Albany Subtropical Thicket from comparative phylogeography and distribution modelling

Supervised by Professor T.A. Hedderson and Professor R. Cowling (Nelson Mandela Metropolitan University)

C. POWELL (PHYSICS)

J/ψ production in heavy ion collisions at the STAR detector at RHIC

Supervised by Professor A. Peshier, Emeritus Professor J. Cleymans and Dr G. Odyniec (Lawrence Berkeley National Laboratory, USA)

R. RADEMEYER (MATHEMATICS AND APPLIED MATHEMATICS)

The evolution of management procedures for the South African hake resource in the 2000s

Supervised by Professor D. Butterworth and Dr É. Plagányi (CSIRO, Australia)

R. RAMSOUT (CHEMISTRY)

Investigation of the in vitro and in vivo effects of some herbal preparations on risk factors for calcium oxalate kidney stone disease

Supervised by Professor A.L. Rodgers

N. RAZAK (GEOLOGICAL SCIENCES)

An investigation into the effectiveness of a controlled source electromagnetic survey in locating petroleum resources offshore Equatorial Guinea

Supervised by Mr G.C. Smith

A.F. REDDY (MOLECULAR AND CELL BIOLOGY)

*Characterisation of the effect of stress on nitrogen metabolism in the commercially important agarophyte *Gracilaria gracilis**

Supervised by Associate Professor V.E. Coyne

H.A.B. SALATA (ZOOLOGY)

Environmental factors influencing the distribution of bats (Chiroptera) in South Africa

Supervised by Professor D. Jacobs

M. SMART (MOLECULAR AND CELL BIOLOGY)

Flowering in Protea: a molecular and physiological study

Supervised by Dr L. Roden and Associate Professor M. Cramer

S. STATHOPOULOS (MOLECULAR AND CELL BIOLOGY)

The tangled history of olfaction in African mole-rats, Bathyergidae: insights from olfactory receptor genes

Supervised by Dr C. O’Ryan and Dr J.M. Bishop

T. SUINYUY (BOTANY)

The role of cone volatiles and thermogenesis in the pollination of Encephalartos cycads with particular reference to E.villosus

Supervised by Professor J.J. Midgley, Honorary Professor J. Donaldson (Botany and SANBI) and Professor S. Johnson (University of KwaZulu-Natal)

R.S. THELINGWANI (CHEMISTRY)

Integration of in silico and in vitro ADMET properties in lead identification and optimization of compounds for the treatment of parasitic diseases

Supervised by Professor K. Chibale, Honorary Professor C. Masimirembwa and Professor P. Smith

M. TUKULULA (CHEMISTRY)

The application of the Multi-Component Reaction (MCR) strategy in the design and synthesis of new antiplasmodial and antimycobacterial agents

Supervised by Professor K. Chibale

C.J. UYS (ZOOLOGY)

The impact of pine plantations and alien invertebrates on native forest and fynbos invertebrate communities in Table Mountain National Park

Supervised by Professor M. Picker and Professor C. Griffiths

C.K. WAINMAN (OCEANOGRAPHY)

Estimating the upper ocean vertical temperature structure from surface temperature as applied to the southern Benguela

Supervised by Professor F. Shillington

N.D. WATERMEYER (CHEMISTRY)

Design and synthesis of potential inhibitors of enzymes involved in the biosynthesis and utilisation of mycothiol

Supervised by Associate Professor D.W. Gammon and Associate Professor D. Steenkamp

RESEARCH CONTRACTS
145

VALUE OF RESEARCH
CONTRACTS
R47.55 million

NRF-RATED RESEARCHERS
152

SARCHI RESEARCH CHAIRS
11

ACCREDITED RESEARCH
GROUPINGS
13

DOCTORAL GRADUATIONS
62

DHET-ACCREDITED JOURNALS
327.20 units

PEER-REVIEWED PUBLICATIONS
920

FILED PATENTS
28

GRANTED PATENTS
6

POSTGRADUATE STUDENTS
1015

POSTGRADUATE FUNDING
R48 million

POSTDOCTORAL RESEARCH
FELLOWS
124

POSTDOCTORAL RESEARCH
FUNDING
R22.2 million



PATENTS

FILED APPLICATIONS

ARENDEZ-BAILEY, B.L., ELLICK, T.N., IYER, K., IYER, R., RAFUDEEN, M.S. AND THOMSON, J.A.

Plant stress-inducible promoter.

Provisional Patent Application South Africa 2012/06750

BRITTON, D.T. AND HÄRTING, M.

A Thin Film Semiconductor Device and Method of Manufacturing a Thin Film Semiconductor Device.

Divisional Patent Application Japan 2012-015646

BRITTON, D.T. AND HÄRTING, M.

Flexible temperature and strain sensors.

Provisional Patent Application South Africa 2012/00709

BRITTON, D.T. AND HÄRTING, M.

Thermal Imaging Sensors.

Provisional Patent Application South Africa 2012/00708

BRITTON, D.T., HÄRTING, M. AND WALTON, S.D.

Current switching transistor.

Provisional Patent Application South Africa 2012/07163

BRITTON, D.T., HÄRTING, M. AND WALTON, S.D.

Large area temperature sensor.

Provisional Patent Application South Africa 2012/00771

CAIRA, M.R., DE VILLIERS, M.M., LIEBENBERG, W. AND STIEGER, N.

Injectable Formulation of a Reverse Transcriptase Inhibitor for the Treatment of Cancer

National Phase Patent Application Canada 2796620

CAIRA, M.R., DE VILLIERS, M.M., LIEBENBERG, W. AND STIEGER, N.

Injectable Formulation of a Reverse Transcriptase Inhibitor for the Treatment of Cancer

National Phase Patent Application Europe 11730445.1

CAIRA, M.R., DE VILLIERS, M.M., LIEBENBERG, W. AND STIEGER, N.

Injectable Formulation of a Reverse Transcriptase Inhibitor for the Treatment of Cancer

National Phase Patent Application South Africa 2012/07797

CAIRA, M.R., DE VILLIERS, M.M., LIEBENBERG, W. AND STIEGER, N.

Injectable Formulation of a Reverse Transcriptase Inhibitor for the Treatment of Cancer

National Phase Patent Application United States 13/696,472

F.P. WEWERS (CHEMISTRY)

Transition metal complexes of bis(diphenylphosphino) methane, dithizone and dithiolenes: structural, spectroscopic, electrochemical and computational studies
Supervised by Associate Professor A.T. Hutton

M.R. WILHELM (ZOOLOGY)

Growth and otolith band formation of Namibian hake merluccius capensis
Supervised by Associate Professor A. Jarre and Associate Professor C.L. Moloney

D.S. WORKU (PHYSICS)

Statistical models to describe nuclear matter at high temperatures and densities
Supervised by Professor J. Cleymans

F. ZHENG (CHEMISTRY)

Olefin oligomerization reactions: theoretical studies using cyclometallated palladium(II) catalysts and experimental studies on platinum(II) analogues
Supervised by Associate Professor A.T. Hutton, Professor S.F. Mapolie (Stellenbosch University) and Dr C.G.C.E. van Sittert (North-West University)

CAIRA, M.R., LIEBENBERG, W. AND STIEGER, N.
Method for Producing a Composition.
National Phase Patent Application South Africa 2012/04410

CAIRA, M.R., LIEBENBERG, W. AND STIEGER, N.
Method of Producing a Polymorph Form.
National Phase Patent Application Brazil 11 2012 014762

CAIRA, M.R., LIEBENBERG, W. AND STIEGER, N.
Method of Producing a Polymorph Form.
National Phase Patent Application China 201080061226.2

CAIRA, M.R., LIEBENBERG, W. AND STIEGER, N.
Method of Producing a Polymorph Form.
National Phase Patent Application Germany 11
2010004862.2

CAIRA, M.R., LIEBENBERG, W. AND STIEGER, N.
Method of Producing a Polymorph Form.
National Phase Patent Application India 5373/DELNP/2012

CHIBALE, K., WATERSON, D., WITTY, M.J. AND YOUNIS, Y.
New Anti-Malarial Agents.
Provisional Patent Application United States 61/600,324

HITZEROTH, I.I., MACLEAN, J.M., RYBICKI, E.P. AND
WILLIAMSON, A-L.
Expression of Proteins in Plants.
Divisional Patent Application China 201210488322.6

HITZEROTH, I.I., MACLEAN, J.M., RYBICKI, E.P. AND
WILLIAMSON, A-L.
Expression of Proteins in Plants.
Divisional Patent Application India 9603/DELNP/2012

HITZEROTH, I.I., PINEO, C.B. AND RYBICKI, E.P.
HPV Chimaeric Particle.
PCT Patent Application PCT PCT/IB2012/056912

JACOBS, M. AND JARDINE, M.A.
Tricyclic Derivatives.
Provisional Patent Application South Africa 2012/08875

JARDINE, M.A.
Modified Chitosan for Argentation Chromatography.
Provisional Patent Application South Africa 2012/08014

JARDINE, M.A., MAKHUBELA, B.C.E. AND SMITH, G.S.
A Polymer Support.
National Phase Patent Application China 201080040614.2

JARDINE, M.A., MAKHUBELA, B.C.E. AND SMITH, G.S.
A Polymer Support.
National Phase Patent Application Europe 10842020.9

JARDINE, M.A., MAKHUBELA, B.C.E. AND SMITH, G.S.
A Polymer Support.
National Phase Patent Application India 2724/DELNP/2012

JARDINE, M.A., MAKHUBELA, B.C.E. AND SMITH, G.S.
A Polymer Support.
National Phase Patent Application South Africa 2012/02047

JARDINE, M.A., MAKHUBELA, B.C.E. AND SMITH, G.S.
A Polymer Support.
National Phase Patent Application United States 13/496,116

JAYAKODY, R.S. AND NAIDOO, K.J.
Ricin transition state analogue inhibitors.
PCT Patent Application PCT PCT/IB2012/054999

LE, H.
Medium Access Control in Wireless Sensor Networks.
National Phase Patent Application South Africa 2012/06813

Granted applications

CHIBALE, K., NCHINDA, A.T. AND STURROCK, E.D.
Angiotensin I-Converting Enzyme (ACE) Inhibitors.
National Phase Patent Application Europe 06765437.6

EGAN, T.J., HUNTER, R. AND ZISHIRI, V.K.
*Quinoline Antimalarial Containing a Chloroquine
Resistance Reversing Dibemethin Group.*
National Phase Patent Application South Africa 2011/01772

HITZEROTH, I.I., MACLEAN, J.M., RYBICKI, E.P. AND
WILLIAMSON, A-L.
Expression of Proteins in Plants.
National Phase Patent Application Europe 06740997.9

HITZEROTH, I.I., MACLEAN, J.M., RYBICKI, E.P. AND
WILLIAMSON, A-L.
Expression of Proteins in Plants.
National Phase Patent Application South Africa 2008/03486

ILLING, N., STEIN, D.J. AND VAN HEERDEN, J.H.
A Method of Diagnosing a Mental State.
National Phase Patent Application South Africa 2011/06540

RYBICKI, E.P. AND VARSANI, A.D.
*Chimaeric Human Papillomavirus 16 L1 Virus Like Particles
and a Method for Preparing the Particles.*
Divisional Patent Application United States 12/174,104

Department of Archaeology

HEAD OF DEPARTMENT: PROFESSOR JUDITH SEALY

Departmental Profile

The Department of Archaeology is characterised by a diversity of well-established research interests. The Western Cape has a rich archaeological heritage which includes evidence of hunter-gatherer settlement, pastoralist communities and colonial settlers - all the subject of ongoing research. Further afield, the Department also has a research focus on the archaeology of early Tswana and Sotho-speaking agropastoralists, particularly in North West and the Free State. In addition, the Department is home to archaeometric and materials research, focussing on palaeoanthropology, past environments, early human diets and materials analysis. The Department of Archaeology has developed an expertise in Cultural Resource Management, working with both government and private sectors to mitigate the effects of development and widen public awareness of the importance of the past.

Departmental Statistics

Permanent and Long Term Contract Staff

| | |
|-----------------------------------|----|
| Professor | 1 |
| Associate Professor | 1 |
| Senior Lecturers | 2 |
| Lecturers | 3 |
| Research Staff | 5 |
| Technical Support Staff | 2 |
| Administrative and Clerical Staff | 1 |
| Departmental Assistant | 1 |
| Lab Assistant | 1 |
| Total | 17 |

Honorary staff

| | |
|------------------------------|---|
| Honorary Research Associates | 6 |
| Total | 6 |

Students

| | |
|----------------|-----|
| Postdoctoral | 0 |
| Doctoral | 9 |
| Master's | 10 |
| Honours | 6 |
| Undergraduates | 623 |
| Total | 648 |

Research Fields and Staff

Permanent staff

PROFESSOR JUDITH SEALY

Head of Department. Archaeometry, stable isotopes, precolonial southern Africa
Judith.Sealy@uct.ac.za

ASSOCIATE PROFESSOR REBECCA ROGERS ACKERMANN

Hominid evolution, variation, morphometrics, visualization and modelling, quantitative methods
Becky.Ackermann@uct.ac.za

DR DAVID BRAUN

Senior lecturer, Early Stone Age in eastern and southern Africa, stone artefact technology
drbraun76@gmail.com

DR SHADRECK CHIRIKURE

Senior lecturer, Archaeometallurgy, Iron Age, heritage studies
Shadreck.Chirikure@uct.ac.za

DR SIMON HALL

Senior lecturer, hunter-gatherers and farmers, Stone/Iron Age interaction, landscape sharing
Simon.Hall@uct.ac.za

DR RIASHNA SITHALDEEN

Lecturer, Primate biogeography using genetic techniques, academic development in the geosciences
Riashna.Sithaldeen@uct.ac.za

DR DEANO STYNDER

Lecturer, African fauna, faunal analysis, ecomorphology, palaeoenvironments
Deano.Stynder@uct.ac.za

DR ALEXANDRA SUMNER

Lecturer, Lithic analysis, human cognitive evolution
Alexandra.Sumner@uct.ac.za

Contract research staff

MR DAVID HALKETT

Contract archaeology, historical archaeology, prehistory of the southwestern Cape

MR TIM HART

Contract archaeology, historical archaeology, prehistory of the southwestern Cape

MR JAYSON ORTON

Contract archaeology, historical archaeology, prehistory of the southwestern Cape

DR LITA WEBLEY

Contract archaeology, historical archaeology, prehistory of the southwestern Cape

MS LIESBET SCHIETECATTE

Contract archaeology, historical archaeology, prehistory of the southwestern Cape

Emeritus Professors**PROFESSOR NIKOLAAS J. VAN DER MERWE**

Isotopes, palaeodiets, palaeoenvironments, archaeometallurgy

PROFESSOR JOHN PARKINGTON

Hunter-gatherers, palaeoenvironmental reconstruction and human ecology, prehistoric art, coastal archaeology

Emeritus Associate Professor**ASSOCIATE PROFESSOR A. SMITH**

Prehistoric pastoralism, origins of food production, ethnohistory

Honorary Research Associates**DR GRAHAM. AVERY**

Archaeozoology

DR KYLE BROWN

Stone artefact studies, landscape archaeology

DR PER DITLEF FREDRIKSEN

Ceramics, ethnoarchaeology, archaeology of farming communities

MR PIETER JOLLY

Contact period rock art, history of San-Nguni/Sotho interaction

PROFESSOR TIM MAGGS

Iron Age archaeology in southern Africa

DR WEBBER NDORO

Heritage Studies

PROFESSOR SUSAN PFEIFFER

Biological anthropology

PROFESSOR LARISSA SWEDELL

Primateology

Distinguished visitors**PROFESSOR JACK FISHER**

Montana State University – faunal remains in archaeology

DR ALEX MACKAY

Australian National University – Pleistocene lithic technology

PROFESSOR SUSAN PFEIFFER

University of Toronto – biological anthropology

PROFESSOR PIERRE-JEAN TEXIER

CNRS-Valbonne France – prehistory

DR GUILLAUME PORRAZ

CNRS, University of Paris 10 – Stone artefact technology of the Middle Stone Age

PROFESSOR MARGOT WINER

Historical archaeology, landscape archaeology

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Research output**Chapters in books**

Malan, A. 2012. The cultural landscape. In N. Worden (ed.), Cape Town Between East and West: Social Identities in a Dutch Colonial Town, pp. 1-25. South Africa: Jacana Media (Pty) Ltd. ISBN 9781431402922.

Articles in Peer-reviewed Journals

Brown, K., Marean, C., Jacobs, Z., Schoville, B.J., Oestmo, S., Fisher, E., Bernatchez, J., Karkanas, P. and Matthews, T. 2012. An early and enduring advanced technology originating 71,000 years ago in South Africa. *Nature*, 491: 590-593.

Chirikure, S. 2012. Reverse archaeology or relevance seeking archaeology? *Heritage and Society*, 5(1): 116-120.

Chirikure, S., Manyanga, M. and Pollard, A. 2012. When science alone is not enough: radiocarbon timescales, history, ethnography and elite settlements in southern Africa. *Journal of Social Archaeology*, 12(3): 356-379.

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- Codron, J., Codron, D., Sponheimer, M., Kirkman, K., Duffy, K., Raubenheimer, E.J., Melice, J., Grant, R., Clauss, M. and Lee-Thorp, J. 2012. Stable isotope series from elephant ivory reveal lifetime histories of a true dietary generalist. *Proceedings of the Royal Society B-Biological Sciences*, 279: 2433-2441.
- Delius, P., Maggs, T. and Schoeman, M. 2012. Bokoni: old structures, new paradigms? Rethinking pre-colonial society from the perspective of the stone-walled sites in Mpumalanga. *Journal of Southern African Studies*, 38(2): 399-414.
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- Gossa, T., Chemere, Y.S. and Negash, A. 2012. A reassessment of the Middle and Later Stone Age lithic assemblages from Aladi Springs, Southern Afar Rift, Ethiopia. *Azania: Archaeological Research in Africa*, 47(2): 210-222.
- Govender, R., Chinsamy-Turan, A. and Ackermann, R. 2012. Anatomical and landmark morphometric analysis of fossil phocid seal remains from Langebaanweg, West Coast of South Africa. *Transactions of the Royal Society of South Africa*, 67(3): 135-149.
- Hall, S.L. 2012. Identity and political centralisation in the western regions of Highveld, c.1770-c.1830: an archaeological perspective. *Journal of Southern African Studies*, 38(2): 301-318.
- Hamilton, C.A. and Hall, S.L. 2012. Reading across the divides: commentary on the political co-presence of disparate identities in two regions of South Africa in the late eighteenth and early nineteenth centuries. *Journal of Southern African Studies*, 38(2): 281-290.
- Koleini, F., de Beer, F., Schoeman, M., Pikirayi, I., Chirikure, S., Nothnagel, G. and Redebe, J.M. 2012. Efficiency of neutron tomography in visualizing the internal structure of metal artefacts from Mapungubwe museum collection with the aim of conservation. *Journal of Cultural Heritage*, 13: 246-253.
- Koleini, F., Schoeman, M., Pikirayi, I. and Chirikure, S. 2012. Evidence for indigenous strip-drawing in the production of wire at Mapungubwe Hill (1220-1290 AD): towards an interdisciplinary approach. *Journal of Archaeological Science*, 39: 757-762.
- Kupczik, K. and Stynder, D.D. 2012. Tooth root morphology as an indicator for dietary specialization in carnivores (Mammalia: Carnivora). *Biological Journal of the Linnean Society*, 105: 456-471.
- Kurki, H.K., Pfeiffer, S. and Stynder, D.D. 2012. Allometry of head and body size in Holocene foragers of the South African Cape. *American Journal of Physical Anthropology*, 147: 462-471.
- Loftus, E. and Sealy, J.C. 2012. Interpreting stable carbon isotopes in human tooth enamel: an examination of tissue spacings from South Africa. *American Journal of Physical Anthropology*, 147: 499-507.
- Oldfield, C.C., McHenry, C.R., Clausen, P.D., Chamoli, U., Parr, W.C.H., Stynder, D.D. and Wroe, S. 2012. Finite element analysis of ursid cranial mechanics and the prediction of feeding behaviour in the extinct giant *Agriotherium africanum*. *Journal of Zoology*, 286: 163-170.
- Orton, J. 2012. Tortoise burials in Namaqualand: uncovering ritual behaviour on South Africa's west coast. *Azania: Archaeological Research in Africa*, 47(1): 99-114.
- Parkington, J.E. 2012. Mussels and mongongo nuts: logistical visits to the Cape west coast, South Africa. *Journal of Archaeological Science*, 39: 1521-1530.
- Pfeiffer, S. 2012. Two disparate instances of healed cranial trauma from the Later Stone Age of South Africa. *South African Archaeological Bulletin*, 67(196): 256-261.
- Sahle Chemere, Y., Negash, A. and Braun, D.R. 2012. Variability in ethnographic hidescraper use among the Hadiya of Ethiopia: implications for reduction analysis. *African Archaeological Review*, 29: 383-397.
- Steele, T., Mackay, A., Orton, J. and Schwartz, S. 2012. Varsche Rivier 003, a new Middle Stone Age site in southern Namaqualand, South Africa. *South African Archaeological Bulletin*, 67(195): 108-119.
- Stynder, D.D., Ungar, P., Scott, J.R. and Schubert, B.W. 2012. A dental microwear texture analysis of the Mio-Pliocene hyaenids from Langebaanweg, South Africa. *Acta Palaeontologica Polonica*, 57(3): 485-496.

Sumner, T.A. 2012. The comparative study of scraper retouch patterns from the Levantine Mousterian: a pilot project. *Journal of the Israel Prehistoric Society*, 42: 1-28.

Wilkins, J., Schoville, B.J., Brown, K. and Chazan, M. 2012. Evidence for early hafted hunting technology. *Science*, 338: 942-946.

Williams, F., Schroeder, L. and Ackermann, R.R. 2012. The mid-face of lower Pleistocene hominins and its bearing on the attribution of SK 847 and StW 53. *Homo-Journal of Comparative Human Biology*, 63(4): 245-257.

Master's degrees (by research)

Kramer, P. 2012. The history, form and context of the 19th century corbelled buildings of the Great Karoo. MPhil. 265pp. Supervised by Hall, S.

Mathoho, N.E. 2012. Indigenous iron production south of the Luvuvhu River, Limpopo Province, South Africa. MPhil. 125pp. Supervised by Chirikure, S. and Hall, S.

Smuts, K. 2012. An archaeology of the eighteenth and nineteenth century Cape wine economy from the perspective of Solms Delta and Babylonstoren. MSc. 265pp. Supervised by Hall, S.

Smuts, T. 2012. An archaeological perspective on the 19th century development of land, landscape and sheep farming in the Karoo. MSc. 160pp. Supervised by Hall, S.

Department of Astronomy

HEAD OF DEPARTMENT: PROFESSOR RENÉE C. KRAAN-KORTEWEG

Departmental Profile

The Astronomy department has a strong focus on multi-wavelength (X-ray, optical, infrared, radio) observational astronomy with strengths in extragalactic astronomy (large-scale structures of galaxies, cosmic flows, galaxy evolution and star formation, galaxy clusters, galaxy dynamics and dark matter), stellar astrophysics (Cataclysmic variables, X-ray binaries, accretion disks in compact binaries, supernova remnants, stellar pulsations and stellar evolution) and astronomical instrumentation (high-speed CCD detectors).

The Department hosts two SARCHI chairs, one in Astrophysics and Space Science (DST/NRF) and one in Extragalactic Multi-wavelength Astronomy (SKA). Staff in the Astronomy department lead four of the ten

MeerKAT Large (legacy) Survey Projects, focussing on the study of explosive radio transients in our Galaxy and the nearby Universe (ThunderKAT), to the study of the gas dynamics in nearby galaxies (Mhongoose) and the evolution of galaxies and their gas content over cosmic time scales (MIGHTEE and Laduma).

The Astronomy department is part of the Research Centre for Astrophysics, Cosmology and Gravitation (ACGC) at UCT (<http://www.acgc.uct.ac.za>), established in 2009, and is an active participant of the National Astrophysics and Space Science Programme – hosted at UCT – which offers Honours and Master's degrees. Strong links have been established with the South African Astronomical Observatory (SAAO) and the SKA South Africa project through joint staffing positions and postgraduate student supervision. The Department also enjoys active research collaborations with a range of national and international groups.

In 2012 the Astronomy department has welcomed Professor Thomas Jarrett, a new DST/NRF SARCHI Chair in Astrophysics and Space Science, whilst Professor Erwin de Blok, DST/NRF SARCHI Chair from 2007-2012 left the department in January 2012 to join ASTRON in the Netherlands. He was appointed Honorary Professor to the Department from July 2012, and is still active in research and student supervision. Our postdoctoral cohort has continued to grow from eight in 2011 to twelve in 2012.

Departmental Statistics

Permanent and long-term contract staff

| | |
|-----------------------------------|------|
| Professors | 3.5 |
| Associate Professor | 1 |
| Senior Scholar/Emeritus Professor | 1 |
| Senior Lecturer | 1 |
| Lecturer | 1.5 |
| Visiting SKA Professor | 0.1 |
| Administrative Staff | 3 |
| Total | 11.1 |

Honorary & Emeritus Staff

| | |
|--------------------|---|
| Honorary Professor | 1 |
| Total | 1 |

Affiliated Researchers

| | |
|----------------------|----|
| Honorary Professors | 2 |
| Honorary Academic | 1 |
| Total | 3 |
| Postdoctoral Fellows | 12 |
| Total | 12 |

Students

| | |
|-------------------------------|-----|
| Doctoral | 16 |
| Master's (Research) | 2 |
| Master's (NASSP Dissertation) | 16 |
| Master's (NASSP Coursework) | 19 |
| Honours (NASSP) | 20 |
| Undergraduate | 129 |
| Total | 202 |

Research Fields and Staff

Permanent Staff

PROFESSOR RENÉE C. KRAAN-KORTEWEG (HEAD OF DEPARTMENT), CO-DIRECTOR ACGC

Large-scale structures and streaming motions in the nearby Universe, the Zone of Avoidance, systematic HI-surveys, evolution and transformation of galaxies.

PROFESSOR CLAUDE CARIGNAN (SKA SARCHI CHAIR)

Galaxy dynamics and dark matter; astronomical instrumentation and techniques.

PROFESSOR THOMAS JARRETT (DST/NRF SARCHI CHAIR)

Galaxy evolution and star formation, large-scale structure and bulk-flow motions in the local Universe, astrophysical databases and large data sets.

PROFESSOR PATRICIA WHITELOCK (JOINT SAAO/UCT POSITION)

Galactic structure, stellar evolution, Local Group galaxies, long period variable and symbiotic stars.

EMERITUS DISTINGUISHED PROFESSOR BRIAN WARNER (SENIOR SCHOLAR)

Cataclysmic variable stars, white dwarf stars, history of astronomy.

ASSOCIATE PROFESSOR PATRICK A. WOUTD

Cataclysmic variable stars, ultra-compact binaries, high time domain astrophysics.

DR KURT VAN DER HEYDEN (SENIOR LECTURER)

Supernovae and Supernova remnants, systematic HI surveys, clusters of galaxies, X-ray spectroscopy.

DR SARAH BLYTH (LECTURER)

Large-scale structure, galaxy evolution and galaxy clusters, HI-surveys.

DR VANESSA MCBRIDE (LECTURER, JOINT SAAO/UCT POSITION)

X-ray binaries, Magellanic Clouds.

PROFESSOR ROB FENDER (VISITING SKA PROFESSOR)

X-ray binaries, neutron stars, black holes, accretion disks, radio transient surveys.

Honorary Staff in the Department

HONORARY PROFESSOR MICHAEL W. FEAST & HONORARY RESEARCH ASSOCIATE

Stellar evolution, Galactic structure, long-period variable stars, distance scale.

Honorary Staff Associated with the Department

HONORARY PROFESSOR PHIL A. CHARLES (UNIVERSITY OF SOUTHAMPTON)

Cataclysmic variables, X-ray binaries, neutron stars, black holes, accretion disks.

HONORARY PROFESSOR ERWIN DE BLOK (ASTRON, NL)

Dark matter in disk galaxies, low-surface brightness galaxies, HI surveys, the interstellar medium in nearby galaxies, evolution of dark galaxies.

PROFESSOR PETER DUNSBY

Honorary Academic, Director NASSP, Co-director ACGC
Theoretical cosmology and gravity.

Postdoctoral Fellows

DR GARRY ANGUS

Cosmological simulations with modified Newtonian Dynamics.

DR RICHARD ARMSTRONG

Radio transients, radio interferometric techniques.

DR MACIEJ BILICKI

Cosmology, large-scale structure of the Universe, cosmic density and velocity fields, redshift and peculiar velocity surveys, cosmic flows.

DR MICHAEL CORIAT

Accretion, jets, black hole and neutron star X-ray binaries.

DR ED ELSON

Dynamical and star formation studies of nearby galaxies. simulations of HI data sets.

DR ROGER DEANE

High redshift astrophysics with SKA Pathfinders and the effect of massive black holes on their host galaxies.

DR KELLEY HESS

Neutral hydrogen in nearby galaxies, galaxy groups and clusters.

DR DANIELLE LUCERO

Cold gas and star formation in early-type galaxies.

DR NATASHA MADDOX

Quasars and multi-wavelength observations of galaxies.

DR DAVID PUGLIELLI

Galaxy dynamics.

DR VALERIO RIBEIRO

Cataclysmic variables, novae, radio transients.

DR MATTHEW SCHURCH

Cataclysmic variables and X-ray binaries.

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Research output

Articles in Peer-reviewed Journals

Angus, G., Van der Heyden, K.J., Famaey, B., Gentile, G., McGaugh, S.S. and De Blok, W.J.G. 2012. A QUMOND galactic N-body code - I. Poisson solver and rotation curve fitting. *Monthly Notices of the Royal Astronomical Society*, 421(3): 2598-2609.

Angus, G., Van Der Heyden, K. and Diaferio, A. 2012. The dynamics of the bulge dominated galaxy NGC 7814 in MOND. *Astronomy & Astrophysics*, 543: A76.

Bilicki, M. and Seikel, M. 2012. We do not live in the $R_h = ct$ universe. *Monthly Notices of the Royal Astronomical Society*, 425(3): 1664-1668.

Cannon, J.M., O'Leary, E.M., Weisz, D.R., Skillman, E.D., Dolphin, A.E., Bigiel, F., Cole, A.A., De Blok, W.J.G. and Walter, F. 2012. On the origin of the supergiant HI shell and putative companion in NGC 6822. *Astrophysical Journal*, 747(2): 122.

Darnley, M.J., Ribeiro, V., Bode, M.F., Hounsell, R.A. and Williams, R.P. 2012. On the progenitors of galactic novae. *Astrophysical Journal*, 746(1): 61.

Drave, S.P., Bird, A.J., Townsend, L., Hill, A.B., McBride, V., Sguera, V., Bazzano, A. and Clark, D.J. 2012. X-ray pulsations from the region of the supergiant fast X-ray transient IGR J17544-2619. *Astronomy & Astrophysics*, 539: A21.

Elson, E., De Blok, W.J.G. and Kraan-Korteweg, R.C. 2012. Star formation models for the dwarf galaxies NGC 2915 and NGC 1705. *Astronomical Journal*, 143(1): 1.

Feast, M.W., Whitelock, P., Menzies, J.W. and Matsunaga, N. 2012. The cepheid distance to the local group galaxy NGC 6822. *Monthly Notices of the Royal Astronomical Society*, 421: 2998-3003.

Gentile, G., Angus, G., Famaey, B., Oh, S.-H. and de Blok, W.J.G. 2012. Isolated and non-isolated dwarfs in terms of modified Newtonian dynamics. *Astronomy & Astrophysics*, 543: A47.

Hess, K., Wilcots, E.M. and Hartwick, V.L. 2012. Fresh activity in old systems: radio AGNs in fossil groups of galaxies. *Astronomical Journal*, 144(2):48.

Hodge, J.A., Carilli, C.L., Walter, F., De Blok, W.J.G., Riechers, D., Daddi, E. and Lentati, L. 2012. Evidence for a clumpy, rotating gas disk in a submillimeter galaxy at $z = 4$. *Astrophysical Journal*, 760 (1): 11.

Ianjamasimanana, R., De Blok, W.J.G., Walter, F. and Heald, G.H. 2012. The shapes of the HI velocity profiles of the THINGS Galaxies. *Astronomical Journal*, 144: 96.

Jurdana-Sepic, R., Ribeiro, V., Darnley, M.J. and Bode, M.F. 2012. Historical light curve and search for previous outbursts of Nova KT Eridani (2009). *Astronomy & Astrophysics*, 537: A34.

- Kotze, M. and Charles, P. 2012. Characterizing X-ray binary long-term variability. *Monthly Notices of the Royal Astronomical Society*, 420: 1575-1589.
- Leroy, A., Bigiel, F., De Blok, W.J.G., Boissier, S., Bolatto, A., Brinks, E., Madore, B.F., Munoz-Mateos, J.-C., Murphy, E., Sandstrom, K., Schrubba, A. and Walter, F. 2012. Estimating the star formation rate at 1kpc scales in nearby galaxies. *Astronomical Journal*, 144(3): 1-31.
- Li, K.L., Kong, A.K.H., Charles, P.A., Lu, T.-N., Bartlett, E.S., Coe, M.J., McBride, V., Rajoelimanana, A., Udalski, A., Masetti, N. and Franzen, T. 2012. A luminous Be+white dwarf supersoft source in the wing of the SMC: Maxi J0158-744. *Astrophysical Journal*, 761: 99-111.
- Maddox, N., Hewett, P.C., Peroux, C. and Nestor, D.B. 2012. The large area KX quasar catalogue - I. Analysis of the photometric redshift selection and the complete quasar catalogue. *Monthly Notices of The Royal Astronomical Society*, 424: 2876-2895.
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- Parisi, P., Masetti, N., Jimnez-Bailn, E., Chavushyan, V., Palazzi, E., Landi, R., Malizia, A., Bassani, L., Bazzano, A., Bird, A.J., Charles, P.A., Galaz, G., Mason, E., McBride, V., Minniti, D., Morelli, L., Schiavone, F. and Ubertini, P. 2012. Accurate classification of 29 objects detected in the 39 month Palermo Swift/BAT hard X-ray catalogue. *Astronomy & Astrophysics*, 545: A101.
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- Pepper, J., Kuhn, R., Siverd, R., James, D. and Stassun, K. 2012. The KELT-south telescope. *Publications of the Astronomical Society of the Pacific*, 124(913): 230-241.
- Potter, S., Romero-Colmenero, E., Kotze, M., Zietsman, E., Butters, O.W., Pekeur, N. and Buckley, D.A.H. 2012. On the spin modulated circular polarization from the intermediate polars NY Lup and IGR J15094-6649. *Monthly Notices of the Royal Astronomical Society*, 420: 2596-2602.
- Rajpaul, V. 2012. Evolutionary-algorithm-based analysis of gravitational microlensing light curves. *Monthly Notices of the Royal Astronomical Society*, 427: 1755-1768.
- Rajpaul, V. and Veller, C. 2012. Purely competitive evolutionary dynamics for games. *Physical Review E*, 86: 041907.
- Schechtman-Rook, A. and Hess, K. 2012. NGC 4656UV: A UV-selected tidal dwarf galaxy candidate. *Astrophysical Journal*, 750(2): 171.
- Schruba, A., Leroy, A., Walter, F., Bigiel, F., Brinks, E., De Blok, W.J.G., Kramer, C., Rosolowsky, E., Sandstrom, K., Schuster, K., Usero, A., Weiss, A. and Wiesemeyer, H.W. 2012. Low CO luminosities in dwarf galaxies. *Astronomical Journal*, 143(6): 138.
- Seward, F.D., Charles, P., Foster, D.L., Dickel, J.R., Romero, P.S., Edwards, Z., Perry, M. and William, R.M. 2012. Dem L241, a supernova remnant containing a high-mass x-ray binary. *Astrophysical Journal*, 759(2): 123.
- Smolders, K., Neyskens, P., Blommaert, J.A.D.L., Hony, S., Van Winckel, H., Decin, L., van Eck, S., Sloan, G., Cami, J., Uttenthaler, S., Degroote, P., Barry, D., Feast, M.W., Groenewegen, M., Matsuura, M., Menzies, J.W., Sahai, R., van Loon, J.T.h., Zijlstra, A., Acke, B., Bloemen, S., Cox, N., de Cat, P., Desmet, M., Exter, K., Ladjal, D., Ostensen, R., Saesen, S., van Wyk, F., Verhoelst, T. and Zima, W. 2012. The spitzer spectroscopic survey of s-type stars. *Astronomy & Astrophysics*, 540: A72.
- Somero, A., Hakala, P., Muhli, P., Charles, P. and Vilhu, O. 2012. Phase-resolved optical and x-ray spectroscopy of low-mass x-ray binary X1822-371. *Astronomy & Astrophysics*, 539: A111.
- Stewart, R. and Warner, B. 2012. William John Burchell: The multi-skilled polymath. *South African Journal of Science*, 108(11/12): 45-53.
- Tekola, A., Visnen, P. and Berlind, A. 2012. The environments of local luminous infrared galaxies: star formation rates increase with density. *Monthly Notices of the Royal Astronomical Society*, 419: 1176-1186.
- Vaisanen, P., Rajpaul, V., Zijlstra, A., Reunanen, J. and Kotilainen, J. 2012. The nuclear polycyclic aromatic hydrocarbon emission of merger system NGC 1614: rings within rings. *Monthly Notices of the Royal Astronomical Society*, 420: 2209-2220.
- Van Heerden, H., Martinez, P. and Kilkenny, D. 2012. Determination of the rotation periods for the roAp stars HD 9289 and HD 190290 and non-detection of rotational amplitude modulation in the roAp stars HD 75425 and HD 217522. *Monthly Notices of the Royal Astronomical Society*, 426: 969-974.
- Whitelock, P. 2012. Asymptotic giant branch variables in the galaxy and the local group. *Astrophysics and Space Science*, 341(1): 123-129.
- Williams, P.M., van der Hucht, K.A., van Wyk, F., Marang, F., Whitelock, P., Bouchet, P. and Setia Gunawan, D.Y.A. 2012.

Recurrent dust formation by WR 48a on a 30-year time-scale. *Monthly Notices of the Royal Astronomical Society*, 420: 2526-2538.

Woudt, P.A., Warner, B., Gulbis, A., Coppejans, R., Hamsch, F.-J., Beardmore, A.P., Evans, P.A., Osborne, J., Page, K., Wynn, G.A. and Van Der Heyden, K. 2012. CC sculptoris: a superhumping intermediate polar. *Monthly Notices of the Royal Astronomical Society*, 427: 1004-1013.

Woudt, P.A., Warner, B., De Bude, D., MacFarlane, S., Schurch, M. and Zietsman, E. 2012. High-speed photometry of faint cataclysmic variables - VII. Targets selected from the Sloan digital sky survey and the Catalina real-time transient survey. *Monthly Notices of the Royal Astronomical Society*, 421: 2414-2429.

Woudt, P.A., Warner, B. and Zietsman, E. 2012. SDSS J0349-0059 is a GW virginis star. *Monthly Notices of the Royal Astronomical Society*, 426: 2137-2141.

Peer-reviewed published conference proceedings

Bagetakos, I., Brinks, E., Walter, F., De Blok, W.J.G., Usero, A., Leroy, A., Rich, J.W. and Kennicutt, R.C. 2011. The porosity of the neutral ISM in 20 THINGS galaxies. In J.P. Zahn (ed.), *Proceedings of EAS Publications Series*, January 2011, Switzerland. Cambridge, UK: Cambridge University Press. ISSN 1152015.

Carignan, C. 2012. Astrophysics in Burkina Faso. In P. Martinez and P. Charles (eds), *Proceedings of the Second Middle East-Africa Regional IAU Meeting (MEARIM-II)*, 10-15 April 2011, Cape Town, South Africa. Observatory, South Africa: South African Astronomical Observatory (SAAO). ISSN 10278389.

Catala, L., Crawford, S.M., Buckley, D.A.H. and Pickering, T. 2012. Atmospheric turbulence characterization at the Sutherland site: implications for the future SALT adaptive optics system. In P. Martinez and P. Charles (eds), *Proceedings of the Second Middle East-Africa Regional IAU Meeting (MEARIM-II)*, 10-15 April 2011, Cape Town, South Africa. Observatory, South Africa: South African Astronomical Observatory (SAAO). ISSN 10278389.

De Bude, D., Woudt, P.A., Warner, B. and MacFarlane, S. 2012. Ultra-compact binaries in the galaxy. In P. Martinez and P. Charles (eds), *Proceedings of the Second Middle East-Africa Regional IAU Meeting (MEARIM-II)*, 10-15 April 2011, Cape Town, South Africa. Observatory, South Africa: South African Astronomical Observatory (SAAO). ISSN 10278389.

Kraan-Korteweg, R.C. and Cluver, M.E. 2012. The SED of the nearby HI-massive LIRG HIZOA J0836-43: from the NIR to the radio domain. In R.J. Tufts (ed.), *Proceedings of The Spectral Energy Distribution of Galaxies*, 5-9 September 2011, University of Central Lancashire, Preston, UK. UK: Cambridge University Press. ISBN 9781107019843.

Portas, A., Brinks, E., Usero, A., Walter, F., De Blok, W.J.G. and Kennicutt, R.C. 2012. The edges of things. In J.P. Zahn (ed.), *Proceedings of EAS Publications Series*, January 2011, Switzerland. Cambridge, UK: Cambridge University Press. ISSN 1152015.

Rajoelimanana, A. and Charles, P.A. 2012. Long-term Properties of HMXBs in the SMC. In P. Martinez and P. Charles (eds), *Proceedings of the Second Middle East-Africa Regional IAU Meeting (MEARIM-II)*, 10-15 April 2011, Cape Town, South Africa. Observatory, South Africa: South African Astronomical Observatory (SAAO). ISSN 10278389.

Ribeiro, V. 2012. The multifrequency behaviour of the recurrent nova RS ophiuchi. In F. Giovannelli and L. Sabau-Graziati (eds), *Proceedings of Workshop on the Golden Age of Cataclysmic Variables and Related Objects. Memorie Della Societa Astronomica Italiana*, 12-17 September 2011, Palermo, Italy. Trieste, Italy: Istituto Nazionale di Astrofisica. ISSN 1824016X.

Schurch, M. 2012. Quasi Periodic variations in long period Be x-ray binaries. In P. Martinez and P. Charles (eds), *Proceedings of the Second Middle East-Africa Regional IAU Meeting (MEARIM-II)*, 10-15 April 2011, Cape Town, South Africa. Observatory, South Africa: South African Astronomical Observatory (SAAO). ISSN 10278389.

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Woudt, P.A., Warner, B. and De Bude, D. 2012. Orbital period distribution of cataclysmic variables in the Catalina real-time transient survey. In P. Martinez and P. Charles (eds), *Proceedings of the Second Middle East-Africa Regional IAU Meeting (MEARIM-II)*, 10-15 April 2011, Cape Town, South Africa. Observatory, South Africa: South African Astronomical Observatory (SAAO). ISSN 10278389.

Department of Botany

(Including the Bolus Herbarium and the Plant Conservation Unit)

HEAD OF DEPARTMENT: PROFESSOR JEREMY J. MIDGLEY

Departmental Profile

Botany is a vibrant department, which strives towards the development of a centre of excellence for research and teaching of the ecology, evolution, physiological ecology and systematics of marine and terrestrial plants of southern Africa. The department includes two research units, the Bolus Herbarium and the Plant Conservation Unit, and is also home to the Department of Environmental Affairs & Tourism Chief Directorate: Marine & Coastal Management. Research thrusts include plant population, community and reproductive ecology, systematics, floristics, biogeography and evolutionary biology of the unique Cape Floral Kingdom and its response to different land use practices, ecology and economics of marine and freshwater algae, the ecophysiology of plant responses to pollution and global change, the physiology of plant nitrogen-fixing symbioses and dendrochronology and palaeoecology. The Plant Conservation Unit focuses on sustainable land use, restoration and palaeoecology/environmental history with an emphasis on the conservation of the vegetation of the winter rainfall region of South Africa, while the Bolus Herbarium is researching the taxonomy of and curating a specimen collection of over a third of a million southern African species. The staff are also active on Research Councils, policy-making forums and advisory committees.

Departmental Statistics

Permanent and long-term contract staff

| | |
|-----------------------------------|----|
| Professors | 5 |
| Associate Professors | 3 |
| Senior Lecturers | 2 |
| Lecturers | 2 |
| Scientific Staff | 2 |
| Technical Support Staff | 6 |
| Administrative and Clerical Staff | 3 |
| Total | 23 |

Honorary Staff

| | |
|------------------------------|----|
| Honorary Professors | 3 |
| Honorary Assoc. Professors | 1 |
| Honorary Research Associates | 10 |
| Total | 14 |

Students

| | |
|---------------|-----|
| Postdoctoral | 8 |
| Doctoral | 23 |
| Master's | 24 |
| Honours | 11 |
| Undergraduate | 486 |
| Total | 480 |

Research Fields and Staff

Permanent staff

PROFESSOR JEREMY MIDGLEY

Head of Department; plant ecology; evolutionary biology; forest ecosystem dynamics.

PROFESSOR JOHN J. BOLTON

Phycology; marine and freshwater biology; mariculture.

PROFESSOR WILLIAM J. BOND

Plant ecology; evolutionary biology; conservation biology; fire and community dynamics.

DR SAMSON B. CHIMPHANGO

Physiology; nitrogen fixation.

ASSOCIATE PROFESSOR MICHAEL D. CRAMER

Physiology; ecophysiology; plant nutrition.

DR EDMUND FEBRUARY

Senior Lecturer: palaeoecology; ecophysiology.

DR LINDSEY GILLSON

Deputy Director of the Plant Conservation Unit: conservation ecology; palaeoecology; theoretical ecology; landscape history.

PROFESSOR TERRY HEDDERSON

Plant systematics; bryology; molecular systematics; life history traits.

PROFESSOR M. TIMM HOFFMAN

Director of the Plant Conservation Unit: plant ecology; conservation biology; community ecology; biodiversity.

DR A. MUTHAMA MUASYA

Senior Lecturer: plant systematics; molecular systematics; biogeography.

DR ANTHONY G. VERBOOM

Senior Lecturer: Plant systematics, ecophysiology, biogeography.

Honorary Professors

PROFESSOR RICHARD COWLING

Plant ecology; conservation biology; community ecology; biodiversity.

PROFESSOR JOHN S. DONALDSON

Biodiversity.

PROFESSOR PETER LINDER

Systematics; taxonomy; evolutionary biology.

Honorary Associate Professors

ASSOCIATE PROFESSOR ROBERT J. ANDERSON

Phycology.

Honorary Research Associates

DR N. ALLSOPP

Ecophysiology

DR N. BERGH

Systematics

DR P. CARRICK

Restoration ecology

DR B HARDING

Phycology

DR S. HIGGINS

Ecosystems Ecology.

DR A.G. REBELO

Ecology.

DR R. ROHDE

Environmental Historian.

DR G. SCOTT

Systematics.

DR A. SEYDACK

Forest Ecology.

PROFESSOR C. STIRTON

Plant Systematics.

Contact Details

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Web: <http://www.uct.ac.za/depts/botany/>

Research output

Chapters in books

Boardman, J., Hoffman, M.T., Holmes, P.J. and Wiggs, G. 2012. Soil erosion and land degradation. In P. Holmes and M. Meadows (eds), *Southern African Geomorphology: Recent Trends and New Directions*. Bloemfontein: Sun Press. ISBN 9781 920382025.

Articles in Peer-reviewed Journals

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Ah-Peng, C., Bardat, J., Pocs, T., Soderstrom, L., Stamenoff, P. and Strasberg, D. 2012. Red list of liverworts and hornworts for Réunion (mascarene archipelago). *Phytotaxa*, 68: 1-23.

Anderson, R.J., Bolton, J.J., Smit, A.J. and Da Silva Neto, D. 2012. The seaweeds of Angola: the transition between tropical and temperate marine floras on the west coast of southern Africa. *African Journal of Marine Science*, 34: 1-13.

Bolton, J.J., Anderson, R.J., Smit, A.J. and Rothman, M. 2012. South African kelp moving eastwards: the discovery of *Ecklonia maxima* (Osbeck) Papenfuss at De Hoop Nature Reserve on the south coast of South Africa. *African Journal of Marine Science*, 34(1): 147-151.

Bond, W.J. and Midgley, G.F. 2012. Carbon dioxide and the uneasy interactions of trees and savannah grasses. *Philosophical Transactions of the Royal Society B-Biological Sciences*, 367: 601-612.

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Bond, W.J. and Midgley, J.J. 2012. Fire and the angiosperm revolutions. *International Journal of Plant Sciences*, 173(6): 569-583.

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- Cohen, C., Wakeling, J., Mandiwana-Neudani, T., Sande, E., Dranzoa, C., Crowe, T. and Bowie, R.C.K. 2012. Phylogenetic affinities of evolutionarily enigmatic African galliforms: the Stone Partridge *Ptilopachus petrosus* and Nahans Francolin *Francolinus nahani*, and support for their sister relationship with NewWorld quails. *Ibis*, 154: 768-780.
- Cramer, M.D., Wakeling, J. and Bond, W.J. 2012. Belowground competitive suppression of seedling growth by grass in an African savanna. *Plant Ecology*, 213: 1655-1666.
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- Higgins, S.I., Bond, W.J., Combrink, H.J., Craine, J.M., February, E.C., Govender, N., Lannas, K., Moncreiff, G. and Trollope, W. 2012. Which traits determine shifts in the abundance of tree species in a fire-prone savanna? *Journal of Ecology*, 100: 1400-1410.
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- Kunz, N.S., Hoffman, M.T. and Weber, B. 2012. Effects of heuweltjies and utilization on vegetation patterns in the Succulent Karoo, South Africa. *Journal of Arid Environments*, 87: 198-205.
- Malan, H.L., Meszjasz-Przybylowicz, J., Przybylowicz, W., Farrant, J.M. and Linder, P.W. 2012. Distribution patterns of the metal pollutants Cd and Ni in soybean seeds. *Nuclear Instruments & Methods in Physics Research Section B-Beam Interactions with Materials and Atoms*, 273: 157-160.
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- Muasya, A.M., Viljoen, J.-A., Stirton, C.H. and Helme, N.A. 2012. Two new leafless species of *Ficinia* (Cyperaceae) from the Greater Cape Floristic Region of South Africa. *South African Journal of Botany*, 79: 96-101.
- Parr, C., Gray, E. and Bond, W.J. 2012. Cascading biodiversity and functional consequences of a global change-induced biome switch. *Diversity and Distributions*, 18: 493-503.
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- Stock, W.D. and Verboom, G.A. 2012. Phylogenetic ecology of foliar N and P concentrations and N:P ratios across mediterranean-type ecosystems. *Global Ecology and Biogeography*, 21: 1147-1156.
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Van der Niet, T. and Johnson, S.D. 2012. Phylogenetic evidence for pollinator-driven diversification of angiosperms. *Trends in Ecology & Evolution*, 27(6): 353-361.

Verboom, G.A., Moore, T., Hoffmann, V. and Cramer, M.D. 2012. The roles of climate and soil nutrients in shaping the life histories of grasses native to the Cape Floristic Region. *Plant and Soil*, 355: 323-340.

Wakeling, J., Cramer, M.D. and Bond, W.J. 2012. The savanna-grassland "treeline": why don't savanna trees occur in upland grasslands? *Journal of Ecology*, 100: 381-391.

West, A.G., Dawson, T.E., February, E.C., Midgley, G.F., Bond, W.J. and Aston, T. 2012. Diverse functional responses to drought in a Mediterranean-type shrubland in South Africa. *New Phytologist*, 195: 396-407.

Yano, O., Ikeda, H., Watson, M.F., Rajbhandari, K.R., Jin, X.F., Hoshino, T., Muasya, A.M. and Ohba, H. 2012. Phylogenetic position of the Himalayan genus *Erioscirpus* (Cyperaceae) inferred from DNA sequence data. *Botanical Journal of the Linnean Society*, 170: 1-11.

Doctoral dissertations

Smart, M. 2012. Flowering in *Protea*: a molecular and physiological study. 194pp. Supervised by Roden, L.C.

Department of Chemistry

(Including the Centre for Supramolecular Chemistry Research, the MRC/UCT Drug Discovery & Development Research Centre and the Scientific Computing Research Unit)

HEAD OF DEPARTMENT: PROFESSOR SUSANA A. BOURNE

Departmental Profile

The research activities of the department reflect the wide range and scope of the traditional sub-disciplines of inorganic, organic and physical chemistry, sustained by analytical, spectroscopic and computational methodology. The four main research focus areas are synthetic and medicinal chemistry, supramolecular chemistry, transition metal chemistry as well as biophysical and structural chemistry. Programmes are devoted to fundamental and applied chemical research, and to interdisciplinary studies in which chemistry plays a key role. Synthetic studies are carried out in organic, organometallic and co-ordination chemistry, in order to develop and apply new methodology, and to prepare biologically active compounds, novel catalysts and components of new materials. These studies also provide tools for analytical and separation science, and models for advanced structural and conformational studies. Molecular structure determination with the aid of spectroscopic and X-ray diffraction techniques are two areas of specialisation in the department. Computational chemistry is a leading area of specialization supported by several state of the art LINUX clusters. Computer code development and modelling applications of biological and industrial problems play a key role in many of the Department's research programmes. There is also an active research thrust in the area of chemistry education, with a particular focus on student learning in tertiary level chemistry courses.

The Department of Chemistry is home to three UCT-accredited research units

The Centre for Supramolecular Chemistry Research, CSCR (Dir. Prof. Mino Caira) studies the physical chemistry of supramolecular systems. Research projects include the synthesis and characterization of metal organic frameworks (MOFs) and large metal-containing supramolecular assemblies with the potential for guest uptake (gas storage, molecular sensing), the study of selectivity in organic host-guest systems, and the beneficiation of pharmaceutically relevant materials

through the investigation of their polymorphs, solvates, cyclodextrin inclusion complexes and cocrystals. Solid phases are studied using powder and single crystal X-ray diffraction, thermal analysis (including TGA and DSC) and spectroscopy (FTIR and solid-state NMR techniques). The thermodynamics of inclusion and complexation processes in solution are investigated by high-resolution NMR spectroscopy and isothermal titration calorimetry.

The MRC/UCT Drug Discovery & Development Research Centre, H3D (Dir. Prof. Kelly Chibale) aims to bridge the gap between basic and clinical studies, training a new generation of African scientists with key skills required for drug discovery and development – integrating medicinal chemistry, biology, pharmacology as well as drug metabolism and pharmacokinetics (DMPK) studies as reflected in the processes of Absorption, Distribution, Metabolism and Excretion (ADME). H3-D also focuses on beneficiation of clinically used drugs, including generic medicines. Drug beneficiation, amongst other things, involves selection of the optimum form of a solid drug candidate for pharmaceutical development and (re)formulation.

The Scientific Computing Research Unit, SCRU (Dir. Prof. Kevin J. Naidoo) develop state-of-the-art high performance computing (HPC) software as well as providing a modelling and informatics platform for applications in chemistry and chemical biology. SCRU's research activities include the development of software acceleration for life science applications. This aspect the unit's research is supported by hardware giant Nvidia Corporation. SCRU's specialised HPC facility houses the South Africa's most sophisticated scientific compute servers and GPU clusters designed for chemical and chemical biology applications. The specific objectives of the unit are to trace gene-to-glycan biochemical schemes important in glycobiology as well as model enzyme catalysed chemical reactions and ionic liquids.

The research enterprise of the Department of Chemistry is significantly enhanced by the appointment of two of its permanent staff members to DST/NRF South African National Research Chairs - Professor Kevin Naidoo in Scientific Computing and Professor Kelly Chibale in Drug Discovery. These highly prestigious appointments have raised the Department's international research profile significantly and contribute substantially to its research outputs.

Departmental Statistics

Permanent and long-term contract staff

| | |
|-----------------------------------|----|
| Professors | 7 |
| Associate Professors | 4 |
| Senior Lecturers | 3 |
| Lecturers | 2 |
| Senior Scholars | 2 |
| Scientific Officers | 7 |
| Technical Officers | 8 |
| Research Staff | 5 |
| Support Staff | 9 |
| Administrative and Clerical Staff | 7 |
| Total | 54 |

Honorary Staff

| | |
|------------------------------|---|
| Emeritus Professors | 3 |
| Honorary Research Associates | 3 |
| Total | 6 |

Students

| | |
|----------------|------|
| Postdoctoral | 26 |
| Doctoral | 51 |
| Master's | 30 |
| Honours | 17 |
| Undergraduates | 1648 |
| Total | 1772 |

Research Fields and Staff

Permanent and long-term contract staff

PROFESSOR SUSAN A. BOURNE

Inclusion chemistry; crystallography; thermal analysis.

PROFESSOR MINO R. CAIRA

Solid state chemistry; drug polymorphism; drug pseudopolymorphism; drug-cyclodextrin inclusion; drug complexation; co-crystallization; drug enantiomeric separation.

PROFESSOR KELLY CHIBALE

Organic synthesis; medicinal chemistry.

ASSOCIATE PROFESSOR BETTE DAVIDOWITZ

Chemical education; curriculum design; writing and communication within the discipline.

PROFESSOR TIMOTHY J. EGAN

Bioinorganic chemistry of the malaria parasite.

ASSOCIATE PROFESSOR DAVID W. GAMMON

Natural products chemistry; phytochemical studies on medicinal plants; carbohydrates; heterogeneous catalysis of organic reactions.

PROFESSOR ROGER HUNTER

Synthesis; indole alkaloids; calixarenes; p-block synthetic methodology.

ASSOCIATE PROFESSOR ALAN T. HUTTON

Organometallic chemistry; co-ordination chemistry; microwave chemistry; electrochemistry.

PROFESSOR GRAHAM E. JACKSON

Nuclear magnetic resonance; computer modelling; metal-ion equilibria; design of metal containing drugs; copper and rheumatoid arthritis.

DR ANWAR JARDINE

Senior Lecturer: medicinal chemistry; chemical biology; enzymology; natural product and organic synthesis; drug design and development.

PROFESSOR KEVIN J. NAIDOO

Computational chemistry; polymers; statistical physics; pharmaceutical drug design.

DR CLIVE OLIVER

Lecturer: self-assembly; large supramolecular assemblies; crystallography; inclusion chemistry.

ASSOCIATE PROFESSOR NEIL RAVENSCROFT

Physicochemical analysis of biologicals; carbohydrates; glycoconjugate and protein vaccines.

DR GREGORY S. SMITH

Senior Lecturer: organometallic chemistry; catalysis; metal-containing polymers and dendrimers; bio-organometallic chemistry.

DR GERHARD VENTER

Lecturer: computational chemistry; electronic structure calculations; free energy methods for properties of solutions; ionic liquids.

DR SARAH WILSON

Senior Lecturer.

Senior Scholars**PROFESSOR LUIGI R. NASSIMBENI**

Physical chemistry; thermal analysis; kinetics; inclusion compounds.

PROFESSOR ALLEN L. RODGERS

Kidney stones; urine chemistry; calcium oxalate crystallization.

Honorary Research Associates**DR SHIRLEY C. CHURMS**

Writing and communication within the discipline.

PROFESSOR RAYMOND J. HAINES

Organometallic chemistry.

DR ELIZABETH TIMME

Assessment of possible immuno-modulatory carbohydrates from local and indigenous plants and fungi.

Emeritus Professors**PROFESSOR JAMES R. BULL**

Organic synthesis; steroidal hormones; 19-norsteroids; estrogens; bioactive steroids; predictive design; cycloaddition.

PROFESSOR PETER W. LINDER

Solution equilibria of cyclodextrin inclusion complexes.

PROFESSOR ALISTAIR M. STEPHEN

Carbohydrate chemistry.

Research Associate**DR GAËLLE RAMON**

Supramolecular Chemistry; Inclusion Compounds; Metal Organic Frameworks; Crystal Engineering

Postdoctoral Fellows**DR YASSIR YOUNIS ADAM**

Hit to Lead and Lead Optimization Medicinal Chemistry Progression of Antimalarial Hits

DR ANDREW ANDAYI

New generation of combined drugs to fight tuberculosis

DR CHRIS BARNETT

Development of High Speed Informatics and Simulation Tools for Applications in Glycobiology

DR NYARADZO CHIGORIMBO-TSIKIWA

Biocatalytic modification of natural compounds for metabolite analysis.

DR DYANNE CRUICKSHANK

Beneficiation of Bioactive Compounds via Supramolecular Chemistry

DR FREDERIC DOUELLE

Hit to lead and lead optimization medicinal chemistry progression of antimalarial hits.

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Hit to Lead and Lead Optimization Medicinal Chemistry Progression of Antimalarial Hits

DR TZU-SHEAN FENG

New generation of combined drugs to fight tuberculosis

DR RIEDAA GAMIELDIEN

Hybrid algorithms, Hybrid Architecture on a distributed highly available Protein Server for Structure Prediction, Functional Exploration and Gene Signatures

DR RICHARD KLAUS GESSNER

New generation of combined drugs to fight tuberculosis

DR DIEGO GONZALEZ-CABRERA

Hit to lead and lead optimization medicinal chemistry progression of antimalarial hits.

DR EMMA HAGER

The Synthesis of Water-Soluble Metallodendrimers for Use as Catalysts in Olefin Transformation Reactions

DR ZE HAN

Hit to lead and lead optimization medicinal chemistry progression of antimalarial hits.

DR AHMAD HUSAIN

Crystal engineering of large supramolecular assemblies and metal-organic frameworks

DR CLAIRE LE MANACH

Hit to lead and lead optimization medicinal chemistry progression of antimalarial hits.

DR STEFAN LOUW

Synthesis of novel artemisinin hybrid anti-malarial drugs.

DR BANOTHILE CHARITY EVENTS MAKHUBELA

Development of Water-Soluble Metallodendrimers for Biphasic Catalysis and as Novel Bioorganometallic Drugs

DR JESTIN MANDUMPAL

Development of coarse grain molecular dynamics software for protein folding

DR MAIA MEURILLON

New generation of combined drugs to fight Tuberculosis.

DR GRACE MUGUMBATE

Application of in silico Tools to the discovery of novel anti-infective agents.

DR DUBEKILE NYONI

The Design and Development of Novel Ruthenium, Rhodium and Iridium Dendritic Multinuclear Complexes for Use in Medicinal Bio- and Nanotechnology

PAQUET, TANYA

Hit to Lead and Lead Optimization Medicinal Chemistry Progression of Antimalarial Hits

DR MARIVEL SAMIPILLAI

Selectivity in Host-guest Systems

DR RAJNI SHARMA

Synthesis of N domain selective ACE inhibitors.

DR KAWALJIT SIGH

Towards the synthesis of reversed anti-tuberculosis agents and hybrid bacterial efflux pump inhibitors

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New generation of combined drugs to fight tuberculosis

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Research output**Edited books**

Chibale, K., Davies-Coleman, M. and Masimirembwa, C. (eds) 2012. Drug Discovery in Africa. 429pp. Germany: Springer Heidelberg New York Dordrecht London. ISBN 9783642281747.

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Doctoral dissertations

- Davies, K. 2012. Metal-organic frameworks and their uses as gas sorption devices. 214pp. Supervised by Bourne, S.A.
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- Gamielidien, M.R. 2012. Parameterization of the Gay-Berne coarse-grain potential from atomistically detailed anisotropic free energy volumes. 178pp. Supervised by Naidoo, K.J.
- Jayakody, R.S. 2012. In silico investigation of the mechanism of ricin-catalysed depurination reaction and design of novel ricin inhibitors. 210pp. Supervised by Naidoo, K.J.
- Kambafwile, H.K. 2012. Synthesis of activity-based protein profiling probes for malaria and hypertension disease models and potential novel ACE inhibitors with an attenuated zinc binding group. 223pp. Supervised by Chibale, K. and Sturrock, E.
- Makhubela, B.C.E. 2012. The design, synthesis and characterisation of polynuclear materials for applications in catalysis. 135pp. Supervised by Smith, G.S. and Jardine, A.
- Malatji, P. 2012. Studies towards degradable polymers: new zinc(II) and palladium(II) complexes as catalysts for lactide polymerization and carbon monoxide/styrene

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Njogu, P. 2012. Molecular hybrids of N-benzol-(2R, 3S)-3-phenylisoserine with antimalarial scaffolds: design, synthesis and biological evaluation for antitumoural and antiplasmodial activity. 209pp. Supervised by Chibale, K., Hendricks, D. and Jardine, A.

Nsumiwa, S. 2012. Synthesis and investigation of quinoline based beta-haematin formation inhibitors as potential antimalarials. 180pp. Supervised by Egan, T.J. and Chibale, K.

Pillay, P. 2012. Antiplasmodial neolignans from *trema orientalis*-identification, synthesis and analogue generation. 228pp. Supervised by Chibale, K. and Maharaj, V.

Ramsout, R. 2012. Investigation of the in vivo and in vitro effects of some herbal preparations on risk factors for calcium oxalate stone disease. 182pp. Supervised by Rodgers, A.L.

Thelingwani, R.S. 2012. Integration of in silico and in vitro ADMET properties in lead identification and optimization of compounds for the treatment of parasitic diseases. 204pp. Supervised by Chibale, K., Masimirembwa, C. and Smith, P.

Tukulula, M. 2012. The application of the multi-component reaction (MCR) strategy in the design and synthesis of new antiplasmodial and antimycobacterial agents. 239pp. Supervised by Chibale, K.

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Wewers, F.P. 2012. Transition metal complexes of bis(diphenylphosphino)methane, dithizone and dithiolenes: structural, spectroscopic, electrochemical and computational studies. 214pp. Supervised by Hutton, A.T.

Zheng, F. 2012. Olefin oligomerization reactions: theoretical studies using cyclometallated palladium(II) catalysts and experimental studies on platinum(II) analogues. 218pp. Supervised by Moss, J.R., Hutton A.T., Mapolie, S.F. and van Sittert, C.G.C.E.

Master's degrees (by research)

Adams, M. 2012. Mono- and multinuclear PGM complexes containing thiosemicarbazones: synthesis, characterisation

and antiplasmodial evaluation. MSc. 127pp. Supervised by Smith, G.S. and Chibale, K.

Bowden, G.D. 2012. Novel acyclic nucleotide phosphonates against RNA viruses. MSc. 115pp. Supervised by Hunter, R.

Matsinha, L.C. 2012. Design, synthesis and characterisation of water-soluble ruthenium arene complexes and their evaluation as aqueous biphasic hydroformylation catalysts. MSc. 98pp. Supervised by Smith, G.S. and Mapolie, S.F.

Nengwekhulu, T.M. 2012. Computer simulations of a chromatographic column used in the separation of platinum group metal chlorinated complexes. MSc. 95pp. Supervised by Naidoo, K.J. and Venter, G.A.

Department of Computer Science

HEAD OF DEPARTMENT: ASSOCIATE PROFESSOR SONIA BERMAN

Departmental Profile

The Department's main research themes are Information and Communication Technology for Development (ICT4D) and High Performance Computing (HPC). ICT4D is a multi-disciplinary field which looks at the design and creation of computer systems for the developing world. These systems could cover any sub-discipline of computing, such as the Internet of Things, virtual environments, security, interaction design, artificial intelligence and information retrieval. However they differ in that design constraints for the developing world are different: power is limited, networks scarce, users can be illiterate, etc. ICT4D deals with the creation of ICT solutions that address defined developmental and social challenges like education, medical care, identity and human dignity. High Performance Computing is an enabling technology that seeks to improve the performance of computing applications. For example, a carbohydrate simulation might be reduced from years to months, or digital 3D content produced in real time rather than requiring minutes to generate. A major theme of this HPC research is improving the speed of discipline-specific computational solutions.

The Department has two research centres and several research laboratories. The Collaborative Visual Computing Laboratory works in five main areas: procedural modelling, geometric compression, graphical simulation, virtual environments and computer games. The Digital Libraries Laboratory covers information storage and retrieval, including multilingual retrieval and cultural heritage

preservation. The High Performance Computing Laboratory applies GPU programming and high throughput computing to areas such as scientific computing, visualisation and information retrieval, particularly in the domains of cultural heritage, radio astronomy and computational chemistry. The Intelligent Systems and Advanced Telecommunications Laboratory focuses on wireless sensor networks; and the Network and Information Security Laboratory on algorithms and systems for safe and secure information access.

ICT is an enabling technology, and thus highly cross-disciplinary. The UCT Centre in ICT for Development seeks to design, create and evaluate technologies that address the needs of the developing world, and to study the impacts of existing technology. This centre also includes staff from diverse UCT departments, such as Civil Engineering and Film and Media. It is closely associated with the Hasso-Plattner Research School in ICT for Development, through which the Hasso-Plattner Institute (Germany) funds African PhD students working in ICT for Development. The Samsung Mobile Innovation Lab is a joint Information Systems – Computer Science unit. The Telkom-Siemens Centre of Excellence in ATM and Broadband Networks and their Applications includes UCT's Communications Group Laboratory in Electrical Engineering and the Departments of Computer Science at UCT and at Stellenbosch University.

Departmental Statistics

Permanent Staff

| | |
|--------------------------------|----|
| Professors | 2 |
| Associate Professors | 4 |
| Senior Lecturers | 6 |
| Administrative & Support Staff | 6 |
| Total | 18 |

Adjunct & Honorary Staff

| | |
|---------------------|---|
| Adjunct Professors | 1 |
| Honorary Professors | 1 |
| Total | 2 |

Students

| | |
|---------------|------|
| Postdoctoral | 1 |
| Doctoral | 24 |
| Master's | 85 |
| Honours | 40 |
| Undergraduate | 1005 |
| Total | 1155 |

Research Fields and Staff

Permanent Academic Staff

DR ANTOINE BAGULA

Traffic Engineering; Network Engineering; Network Security; Internet of Things

ASSOCIATE PROFESSOR SONIA BERMAN

Head of Department; Data management

PROFESSOR EDWIN BLAKE

ICT for Development; Human-Computer Interaction; User Experience in Games and Virtual Environments

ASSOCIATE PROFESSOR JAMES GAIN

Computer Graphics; High Performance Computing; Visualisation

DR ANNE KAYEM

Information Security

ASSOCIATE PROFESSOR MICHELLE KUTTEL

Computational Science; Parallel Processing; Scientific Visualisation and Design

DR HANH LE

Networks; Distributed Computing

DR PATRICK MARAIS

Computer Graphics; Image Processing, GPU Computing

PROFESSOR GARY MARSDEN

Mobile Interaction Design; ICT for Development

DR AUDREY MBOGHO

Human Language Technologies; e-Health; Intelligent Systems and User Interfaces

DR GEOFF NITSCHKE

Artificial Intelligence; Co-evolution; Robotics

ASSOCIATE PROFESSOR HUSSEIN SULEMAN

Digital Libraries; Information Retrieval; Internet technology; High Performance Computing; Computer Science Education

Administrative and Support Staff

MRS SALEGGA VALLEY

Administrative Officer

MRS EVE GILL

Administrative Assistant

MRS THELMA JENNEKER

Senior Secretary

MS BERNIE SAM

Departmental Assistant

MR ADEMOLA ADEKAYODE

Computer Systems Administrator

MR CRAIG BALFOUR

Computer Systems Administrator

Postdoctoral Fellows**DR BRUCE MERRY**

Computer Graphics

Adjunct and Honorary Professors**HONORARY PROFESSOR JUDITH BISHOP**Software Engineering; Programming Languages;
Distributed Systems**ADJUNCT PROFESSOR ANDREW HUTCHISON**

Information Security

Contact DetailsPostal address: Department of Computer Science,
University of Cape Town, Private Bag X3, Rondebosch, 7701

Telephone: SA (21) 650 2663

Fax: SA (21) 650 3551

Email: dept@cs.uct.ac.za

Web: <http://www.cs.uct.ac.za/>**Research Output****Chapters in books**

Adamatzky, A., Akl, S., Alonso-Sanz, R., Van Dessel, W., Zuwairie, I., Ilachinski, A., Jones, J., Kayem, A., Martinez, G.J., de Oliveira, P.P.B., Prokopenko, M., Schubert, T., Slood, P.M.A., Strano, E. and Yang, X. 2012. Biorationality of motorways. In A. Adamatzky (ed.), *Bioevaluation of World Transport Networks*. Singapore: World Scientific Publishing Co Pty Ltd. ISBN 978981440703.

Dray, S., Light, A., Dearden, A., Evers, V., Densmore, M., Ramachandran, D., Kam, M., Marsden, G., Sambasivan, N., Smyth, T., van Greunen, D. and Winters, N. 2012. Human-computer interaction for development: changing human-computer interaction to change the world. In J.A. Jacko (ed.), *The Human-Computer Interaction Handbook*. 3rd edition. USA: CRC Press Taylor & Francis. ISBN 9781439829431.

Kayem, A., Martin, P. and Akl, S. 2012. Self-protecting access control: on mitigating privacy violations with fault tolerance. In G.O.M. Yee (ed.), *Privacy Protection Measures and Technologies in Business Organizations: Aspects and Standards*. USA: IGI Global. ISBN 9781613505014.

Kayem, A. and Adamatzky, A. 2012. Trans-African highways. In A. Adamatzky (ed.), *Bioevaluation of World Transport Networks*. Singapore: World Scientific Publishing Co Pty Ltd. ISBN 978981440703.

Merry, B. 2012. Performance tuning for tile-based architectures. In P. Cozzi and C. Riccio (eds), *OpenGL Insights*. CRC Press. ISBN 9781439893760.

Articles in Peer-reviewed Journals

Bagula, A.B., Zennaro, M., Inggs, G., Scott, S. and Gascon, D. 2012. Ubiquitous sensor networking for development (USN4D): an application to pollution monitoring. *Sensors*, 12(1): 391-414.

Eicher, A., Marais, P.C., Warton, C.M.R., Jacobson, S.W., Jacobson, J.L., Molteno, C.D. and Meintjes, E.M. 2012. A heuristic image search algorithm for active shape model segmentation of the caudate nucleus and hippocampus in brain MR images of children with FASD. *South African Computer Journal*, 49: 35-53.

Kuttel, M., Ravenscroft, N., Foschiatti, M., Cescutti, P. and Rizzo, R. 2012. Conformational properties of two exopolysaccharides produced by *Inquilingus limosus*, a cystic fibrosis lung pathogen. *Carbohydrate Research*, 350: 40-48.

Marais, P.C., Kenwood, J., Smith, K., Kuttel, M. and Gain, J.E. 2012. Efficient compression of molecular dynamics trajectory files. *Journal of Computational Chemistry*, 33: 2131-2141.

Marsden, G., Cutrell, E., Jones, M., Nanavati, A. and Rajput, N. 2012. Making technology invisible in the developing world. *Computer*, 45(4): 82-85.

Mugwanya, R., Marsden, G., Ng'ambi, D. and Traxler, J. 2012. Using a participatory action research approach to design a lecture podcasting system. *International Journal of Mobile and Blended Learning*, 4(2): 67-86.

Ponjou Tasse, F., Gain, J.E. and Marais, P.C. 2012. Enhanced texture-based terrain synthesis on graphics hardware. *Computer Graphics Forum*, 31(6): 1959-1972.

Winschiers, H., Bidwell, N. and Blake, E.H. 2012. Altering participation through interactions and reflections in design. *CoDesign-International Journal of CoCreation in Design and the Arts*, 8(2-3): 163-182.

Winschiers, H., Bidwell, N. and Blake, E.H. 2012. Community consensus: design beyond participation. *Design Issues*, 28(3): 89-100.

Peer-reviewed published conference proceedings

Boyinbode, O., Bagula, A.B. and Ng'ambi, D. 2012. A mobile learning application for delivering educational resources to mobile devices. In C.A. Shoniregun and G.A. Akmayeva (eds), *International Conference on Information Society (i-Society 2012) Proceedings*, 25-28 June 2012, London, UK. UK: Infonomics Society. ISBN 9781908320056.

Boyinbode, O., Bagula, A.B. and Ng'ambi, D. 2012. An interactive mobile learning system for enhancing learning in higher education. In I.A. Sanchez and P. Isaias (eds), *Proceedings of the IADIS International Conference Mobile Learning 2012*, 11-13 March 2012, Berlin, Germany. Berlin, Germany: IADIS Press. ISBN 9789728939663.

Brown, D., Marsden, G. and Rivett, U.K. 2012. Water Alert! Using mobile phones to improve community perspective on drinking water quality in South Africa. In M.L. Best and E. Zegura (eds), *Proceedings of the Fifth International Conference on Information Technologies and Development (ICTD2012)*, 12-15 March 2012, Atlanta, USA. USA: ACM. ISBN 9781450310451.

Chepken, C., Mugwanya, R., Marsden, G. and Blake, E.H. 2012. ICTD interventions: trends over the last decade. In M.L. Best and E. Zegura (eds), *Proceedings of the Fifth International Conference on Information Technologies and Development (ICTD2012)*, 12-15 March 2012, Atlanta, USA. USA: ACM. ISBN 9781450310451.

Crumley, Z., Marais, P.C. and Gain, J.E. 2012. Voxel-space shape grammars. *Proceedings of the 20th International Conference on Computer Graphics, Visualization and Computer Vision (WSCG 2012)*, 26-28 June 2012, Plzen, Czech Republic. Czech Republic: Vaclav Skala - Union Agency. ISBN 9788086943794.

Evers, V., Brewster, S., Lazar, J., Liu, Z., Marsden, G., Prates, R.O. and Nijboer, F. 2012. Changing requirements to HCI funding: a global perspective. *ACM Annual Conference Extended Abstracts on Human Factors in Computing Systems Extended Abstracts (CHI EA '12)*, 5-10 May 2012, USA. USA: The Association for Computing Machinery (ACM). ISBN 978-1-4503-1016.

Falola, O., Osunmakinde, I. and Bagula, A.B. 2012. A comparative drivability analysis for autonomous robots in underground mines using the entropy and SRM models. In

H. Gelderblom and H. Lotriet (eds), *Proceedings of South African Institute for Computer Scientists and Information Technologists (SAICSIT) 2012 (SAICSIT 2012)*, 1-3 October 2012, Centurion, South Africa. Pretoria, South Africa: ACM. ISBN 9781450313087.

Jensen, K.L., Marsden, G., Cutrell, E., Jones, M. and Morrison, A. 2012. NUIs for new worlds: new interaction forms and interfaces for mobile applications in developing countries. *ACM Annual Conference Extended Abstracts on Human Factors in Computing Systems Extended Abstracts (CHI EA '12)*, 5-10 May 2012, USA. USA: The Association for Computing Machinery (ACM). ISBN 978145031016.

Havenga, M., Williams, K. and Suleman, H. 2012. Motivating users to build heritage collections using games on social networks. In H.-H. Chen and C.G. Chowdhury (eds), *Proceedings of the 14th International Conference on Asia-Pacific Libraries, ICADL 2012. The Outreach of Digital Libraries: A Globalized Resource Network*, 12-15 November 2012, Taipei, Taiwan. Taiwan: Springer. ISBN 9783642347511.

Kayem, A., Desai, A. and Hammar, S. 2012. On anonymizing social network graphs. In H.S. Venter, M. Looock and M. Coetzee (eds), *Proceedings of the 2012 Information Security for South Africa (ISSA 2012) Conference*, 15-17 August 2012, Johannesburg, South Africa. USA: IEEE. ISBN 978-1-4673-2159-4.

Kivaisi, A. and Mbogho, A. 2012. Web-based corpus acquisition for Swahili language modelling. In P. Nocera and E. Barnard (eds), *Proceedings of the 3rd International Workshop on Spoken Language Technologies for Under-resourced Languages (SLTU'12)*, 7-9 May 2012, Cape Town, South Africa. SA: CSIR. ISBN 978186822615.

Machaka, P., Bagula, A.B. and de Wet, N. 2012. A highly scalable monitoring tool for wi-fi networks. *Proceedings of the 2012 IEEE 1st International Symposium on Wireless Systems within the Conferences on Intelligent Data Acquisition and Advanced Computing Systems (IDAACS-SWS'12)*, 20-21 September 2012, Offenburg, Germany. Germany: IEEE. ISBN 9781467346771.

Mafuta, M., Zennaro, M., Bagula, A.B., Ault, G., Gombachika, H. and Chadza, T. 2012. Successful deployment of a wireless sensor network for precision agriculture in Malawi. In J. Ueyama, D. Hughes and K. Lee (eds), *Proceedings 2012 IEEE 3rd International Conference on Networked Embedded Systems for Every Application (NESEA 2012)*, 13-14 December 2012, Liverpool, UK. UK: IEEE. ISSN 9781467347235.

- Masinde, E., Zeba, N. and Bagula, A.B. 2012. Extending the power of mobile phone using service oriented computing. In N. Venkatasubramanian, V. Getov and S. Steglich (eds), Proceedings of Mobilware Wireless Middleware, Operating Systems, and Applications. 4th International ICST Conference, Mobilware 2011, 22-24 June 2011, London, UK. UK: Springer. ISBN 9783642306068.
- Masinde, E., Bagula, A.B. and Muthama, N. 2012. The role of ICTs in downscaling and up-scaling integrated weather forecasts for farmers in sub-Saharan Africa. In M.L. Best and E. Zegura (eds), Proceedings of the Fifth International Conference on Information Technologies and Development (ICTD2012), 12-15 March 2012, Atlanta, USA. USA: ACM. ISBN 9781450310451.
- Mkhwanazi, X., Le, H. and Blake, E.H. 2012. Clustering between data mules for better message delivery. In L. Barolli, T. Enokido, F. Xhafa and M. Takizawa (eds), Proceedings of 26th IEEE International Conference on Advanced Information Networking and Applications Workshops (WAINA 2012), 26-29 March 2012, Fukuoka, Japan. USA: IEEE. ISBN 9780769546520.
- Mohamed Nour, M., Williams, K. and Suleman, H. 2012. Evaluating simple repository deposit for open educational resources. In H.-H. Chen and G. Chowdhury (eds), Proceedings of the 14th International Conference on Asia-Pacific Libraries, ICADL 2012. The Outreach of Digital Libraries: A Globalized Resource Network, 12-15 November 2012, Taipei, Taiwan. Taiwan: Springer. ISBN 9783642347511.
- Mugwanya, R., Marsden, G. and Traxler, J. 2012. Pragmatic podcasting: facilitating podcasting in developing HEIs. In I.A. Sanchez and P. Isaias (eds), Proceedings of the IADIS International Conference Mobile Learning 2012, 11-13 March 2012, Berlin, Germany. Berlin, Germany: IADIS Press. ISBN 9789728939663.
- Mvumbi, T., Kundaali, F., Manzi, Z., Williams, K. and Suleman, H. 2012. An online meeting tool for low bandwidth environments. In H. Gelderblom and H. Lotriet (eds), Proceedings of South African Institute for Computer Scientists and Information Technologists (SAICSIT) 2012 (SAICSIT 2012), 1-3 October 2012, Centurion, South Africa. Pretoria, South Africa: ACM. ISBN 9781450313087.
- Nel, M., Williams, K. and Suleman, H. 2012. Evaluating large image support for DSpace. In H.-H. Chen and G. Chowdhury (eds), Proceedings of the 14th International Conference on Asia-Pacific Libraries, ICADL 2012. The Outreach of Digital Libraries: A Globalized Resource Network, 12-15 November 2012, Taipei, Taiwan. Taiwan: Springer. ISBN 9783642347511.
- Paihama, J., Williams, K. and Suleman, H. 2012. Assessing the design of web interoperability protocols. In H. Gelderblom and H. Lotriet (eds), Proceedings of South African Institute for Computer Scientists and Information Technologists (SAICSIT) 2012 (SAICSIT 2012), 1-3 October 2012, Centurion, South Africa. Pretoria, South Africa: ACM. ISBN 9781450313087.
- Phiri, L., Williams, K., Robinson, M., Hammar, S. and Suleman, H. 2012. Bonolo: a general digital library system for file-based collections. In H.-H. Chen and G. Chowdhury (eds), Proceedings of the 14th International Conference on Asia-Pacific Libraries, ICADL 2012. The Outreach of Digital Libraries: A Globalized Resource Network, 12-15 November 2012, Taipei, Taiwan. Taiwan: Springer. ISBN 9783642347511.
- Reitmaier, T., Bidwell, N., Siya, M., Marsden, G. and Tucker, W. 2012. Communicating in designing an oral repository for rural African villages. In P. Cunningham and M. Cunningham (eds), Proceedings of IST-Africa 2012 Conference Proceedings, 9-11 May 2012, Dar es Salaam, Tanzania. Pretoria: IST-Africa 2012. ISBN 9781905824342.
- Rieke, R., Coppolino, L., Hutchison, A., Prieto, E. and Gaber, C. 2012. Security and reliability requirements for advanced security event management. In I. Kotenko and V. Skormin (eds), Proceedings 6th International Conference on Mathematical Methods, Models and Architectures for Computer Network Security, MMM-ACNS 2012, 17-19 October 2012, St Petersburg, Russia. Heidelberg: Springer. ISBN 9783642337031.
- Robinson, S., Vartiainen, E., Jones, M. and Marsden, G. 2012. Picotales: collaborative authoring of animated stories using handheld projectors. Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work (CSCW '12), 11-15 February 2012, Seattle, WA, USA. New York, USA: ACM. ISBN 9781450310864.
- Schraefel, M.C., Rouncefield, M., Kellogg, W., Ackerman, M., Marsden, G., Bodker, S., Wyche, S. and Reddy, M. 2012. Domain crossing: how much expertise is enough? Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work (CSCW '12), 11-15 February 2012, Seattle, WA, USA. New York, USA: ACM. ISBN 9781450310864.
- Sibanda, C. and Bagula, A.B. 2012. Network selection for mobile nodes in heterogeneous wireless networks using knapsack problem dynamic algorithms. Proceedings of Papers. 2012 20th Telecommunications forum (TELFOR 2012), 20-22 November 2012, Belgrade, Serbia. Belgrade: Academic Mind - Belgrade. ISBN 9781467329842.

Ssekakubo, G., Suleman, H. and Marsden, G. 2012. Learning management systems: understanding the expectations of learners in developing countries. In M.B. Nunes and M. McPherson (eds), Proceedings of the IADIS International Conference e-learning 2012, 17-20 July 2012, Lisbon, Portugal. Portugal: IADIS Press. ISBN 9789728939717.

Ssembatya, R. 2012. An access control framework for the protecting mobile health records: the case study of developing countries. In R.A. Botha, P.S. Dowland and S.M. Furnell (eds), Proceedings of the Ninth International Network Conference (INC 2012), 11-12 July 2012, Port Elizabeth. United Kingdom: Plymouth University. ISBN 9781841023151.

Walton, M.N., Hassreiter, S., Marsden, G. and Allen, S. 2012. Degrees of sharing: proximate media sharing and messaging by young people in Khayelitsha. In P. Baudisch et al. (eds), Proceedings of MobileHCI'12. Proceedings of the 14th International Conference on Human Computer Interaction with Mobile Devices and Services, 21-24 September 2012, New York. New York, USA: The Association for Computing Machinery (ACM). ISBN 9781450311052.

Zennaro, M., Bagula, A.B. and Nkoloma, M. 2012. From training to projects: wireless sensor networks in Africa. Proceedings of the 2012 IEEE Global Humanitarian Technology Conference (GHTC 2012), 21-24 October 2012, Seattle, Washington, USA. USA: IEEE Computer Society. ISBN 9780769548494.

Zennaro, M., Pietrosevoli, E., Bagula, A.B. and Nleya, S. 2012. On the relevance of using affordable tools for white spaces identification. Proceedings of 2012 IEEE 8th International Conference on Wireless and Mobile Computing, Networking and Communications (IEEE WiMob 2012), 8-10 October 2012, Barcelona, Spain. Spain: IEEE. ISBN 9781467314299.

Doctoral dissertations

Masinde, E.M.I. 2012. ITIKI: Bridge between African indigenous knowledge and modern science on drought prediction. Supervised by Bagula, A.B.

Master's degrees (by research)

Allen, S.L. 2012. Analyzing the impact of mobile technology on mobile-centric youth in South Africa. Supervised by Marsden, G.

Crumley, Z.P.W. 2012. Voxel-space shape grammars. Supervised by Marais, P.C. and Gain, J.

Erasmus, D.J. 2012. Video quality requirements for South African sign language communications over mobile phones. Supervised by Blake, E.

Fisher, M. 2012. Performance benchmarking physical and virtual linux environments. Supervised by MacGregor, K.J.

Havenga, M.B. 2012. Building heritage collections using games on social networks. Supervised by Suleman, H.

Idowu, M.F. 2012. Evaluation of the usability and usefulness of automatic speech recognition among users in South Africa. Supervised by Mbogho, A.

Isafiade, O.E. 2012. Drivable region detection for autonomous robots applied to South African underground mining. Supervised by Bagula, A.B.

Joseph, A. 2012. Expert system adjudication of hospital data in HIV disease management. Supervised by Berman, S.

Koletka, R. 2012. An architecture for secure searchable cloud storage. Supervised by Hutchison, A. M.

Manchip, D.G. 2012. Computer-aided timing training system for musicians. Supervised by Mbogho, A.

Marquard, S.C. 2012. Improving seachability of automatically transcribed lectures through dynamic language modelling. Supervised by Mbogho, A.

Mehta, A. 2012. Cognitive inerference mitigation in wireless sensor networks. Supervised by Bagula, A.B.

Mohamed Nour, M. 2012. An end-to-end solution for complex open educational resources. Supervised by Suleman, H.

Omar, M.Z. 2012. Component-based digital library scalability using clusters. Supervised by Suleman, H.

Paihama, J.K. 2012. Meta-standardisation of interoperability protocols. Supervised by Suleman, H.

Saunder, I.A. 2012. Draggable tag clouds: A dynamic query interface for visual information seeking. Supervised by Marsden, G.

Sharpey-Schafer, K.P. 2012. A simulation model for evaluating national patient record networks in South Africa. Supervised by Suleman, H.

Swanepoel, A.W. 2012. The design of a mobile user interface for an interest rate calculator. Supervised by Marsden, G.

Talbot, M.J. 2012. SHOP-Net: Moving from paper to mobile. Supervised by Marsden, G.

Williams, K.M. 2012. Learning to read bushman: Automatic handwriting recognition for bushman texts. Supervised by Suleman, H.

Department of Environmental and Geographical Science

(Including the Environmental Evaluation Unit)

HEAD OF DEPARTMENT: PROFESSOR MICHAEL E. MEADOWS

Departmental Profile

Major research themes covered by staff in the department reflect the interaction between humans and their environment and the variability of this environment, and the dynamic socio-economic and political conditions affecting society as a whole. Members of staff in the department draw empirical evidence from Africa to explore and engage these themes at various scales ranging from the global to the national, while also paying attention to specific challenges of reconstruction and development in South Africa. Much of the current research is focused on climate change, adaptation and modelling; ecology and society; environmental impact assessment; Quaternary palaeoenvironments, geomorphology and remote sensing; theories, policies and practices in natural resource governance and management; biodiversity conservation and benefit sharing; and urban theory, policy and planning.

The department has ongoing research initiatives and collaboration with dozens of institutions that are spread across six continents. It has strong working relationships with institutions in five countries in Africa (Botswana, Kenya, Liberia, Mozambique, and Tanzania); five countries in Asia (China, India, Indonesia, Japan and Sri Lanka); eight countries in Europe (France, Germany, Ireland, Italy, Netherlands, Spain, Sweden and United Kingdom); two countries in North America

(Canada and the United States); and one country in South America (Brazil).

The Environmental Evaluation Unit was established as an independent professional consulting, research and training unit within the Department of Environmental and Geographical Science in 1985, based at the University of Cape Town. During the past 20 years, the EEU has completed over 150 consulting assignments and projects for private, institutional and government clients. The EEU has established itself as a centre of excellence in the field of environmental management, sustainable development, and natural resource management in Africa, particularly within the SADC region (projects have been completed in South Africa, Botswana, Namibia, Mozambique, Lesotho, Swaziland and the Seychelles).

Departmental Statistics

Permanent and Long-term Contract Staff

| | |
|--------------------------------|----|
| Professors | 3 |
| Associate Professors | 4 |
| Senior Lecturers | 4 |
| Lecturers | 4 |
| Research Staff | 19 |
| Research Associates | 2 |
| Administrative & Support Staff | 12 |
| Total | 48 |

Emeritus & Honorary Staff

| | |
|---------------------|---|
| Honorary Professors | 3 |
| Emeritus Staff | 2 |
| Total | 5 |

Students

| | |
|---------------|------|
| Postdoctoral | 7 |
| Doctoral | 39 |
| Master's | 73 |
| Honours | 22 |
| Undergraduate | 1034 |
| Total | 1175 |

Research Fields and Staff

Permanent Academic Staff

DR BABATUNDE ABIODUN

Lecturer; Atmospheric Science, Climatology

DR PIPPIN ANDERSON

Lecturer; Postgraduate co-ordinator

DR SHARI DAYA

Lecturer; Gender, Modernity

DR FRANK ECKARDT

Senior Lecturer; Geomorphology, Remote Sensing

PROFESSOR BRUCE HEWITSON

Chair in Climate Change
Atmospheric Science, Climatology

DR RICHARD HILL

Senior Lecturer; Environmental Assessment and Management

DR PETER JOHNSTON

Research Officer; Seasonal Forecasting Applications; Climate Change

PROFESSOR MIKE MEADOWS

Head of Department; Quaternary Environmental Change

ASSOCIATE PROFESSOR SOPHIE OLDFIELD

Political and Economic Geography

PROFESSOR SUE PARNELL

Urban Studies, Historical Geography

DR ZARINA PATEL

Senior Lecturer; Environmental governance and politics

ASSOCIATE PROFESSOR MAANO RAMUTSINDELA

Political Geography, Transnational Regionalism

ASSOCIATE PROFESSOR MERLE SOWMAN

Environmental Planning and Management, Coastal and Small-Scale Fisheries Management

DR KEVIN WINTER

Lecturer; Environmental Management, Water Resources, Monitoring and Evaluation

ASSOCIATE PROFESSOR RACHEL WYNBERG

SARChI Chair in Environmental and Social Dimensions of the Bio-economy Biodiversity and Social Justice, Commercial Use of Biodiversity, Access and Benefit Sharing; Genetic Resources for Food and Agriculture

DR GINA ZIERVOGEL

Senior Lecturer; Vulnerability and Adaptation

Long-term Contract Staff

DR MARIA HAUCK

Coastal and Small-Scale Fisheries Management

Contract Research Staff

MS LISA COOP

Research Assistant; Climate Data Analysis

MR CHIMANGO HARA

Intern; Environmental Law

MS PHILILE NONHLANHLA MBATHA

Junior Researcher; Coastal and Marine Management

DR BRADLEY RINK

Human Geography

MS KIRSTEN SCOTT

Research Assistant; EIA, Social Scoping Reports

MS ANNA STEYNOR

Research Associate; Stakeholder Engagement

MS JACKIE SUNDE

Research Assistant; Fisheries

MS KATE SUTHERLAND

Research Assistant; Climate Data Analysis

MS MATHILDA JACI VAN NIEKERK

Research Assistant; Biodiversity and Social Justice, Commercial Use of Biodiversity, Access and Benefit Sharing

MS RUWANI WALAWEGE

Research Assistant; Climate Data Analysis

DR PIOTR WOLSKI

Senior Researcher; Hydrology

Administrative and Support Staff

MRS SHARON ADAMS

Administrative Officer

MR ALDINO ARENDSE

Administrative and Financial Co-ordinator

MRS SHARON BARNARD

Administrative Assistant

MR ROGER DUFFETT

IT Manager

MR TONY GEORGE

Library Assistant

MS FAHDELAH HARTLEY

Senior Secretary

MR SAYED HESS

Laboratory Departmental Assistant

MR CHRIS JACK

Senior Scientific Technical Officer

MS VUYOKAZI MAFUNYA

Administrative Assistant

MR PHILLIP MUKWENHA

IT Assistant

MRS SHAADA REDDY

Librarian

MS SHAHIEDA SAMSODIEN

Senior Secretary

Postdoctoral Fellows

DR OLIVIER CRESPO

Agricultural and Water Research Modelling

DR JOSEPH DARON

Climate uncertainties and adaptation

DR CHRIS LENNARD

Atmospheric Science

DR NEIL MACKELLAR

Climate and Land-cover Change

DR KABIRI NGETA

Environmental Governance for Social Justice

DR KAZEEM OARE OKOSUN

Epidemiological modelling and climate impact

DR SERGE RAEMAEEKERS

Small-scale Fisheries Governance

Honorary Professors

PROFESSOR JOHN BOARDMAN

Soil Erosion, Land Degradation

PROFESSOR JONATHAN CRUSH

International Migration, Transnationalism

PROFESSOR DAVE THOMAS

Arid Zone Geomorphology, Quaternary Science

Research Associates

DR LAURENCE NATHAN

DR DAVID FIG

Emeritus Staff

PROFESSOR RON DAVIES

PROFESSOR RICHARD FUGGLE

Contact Details

Postal address: Department of Environmental and Geographical Science, University of Cape Town, Private Bag X3, Rondebosch, 7701

Telephone: SA (21) 650 2873/4

Fax: SA (21) 650 3456

Research output

Edited books

Cartwright, A., Parnell, S., Oelofse, G. and Ward, S. (eds) 2012. *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*. 270pp. Abingdon, Oxon: Routledge. ISBN 9780415527583.

Frayne, G.B., Moser, C. and Ziervogel, G. (eds) 2012. *Climate Change, Assets and Food Security in Southern African Cities*. 197pp. Abingdon, Oxon: Earthscan. ISBN 9780415696043.

Holmes, P.J. and Meadows, M.E. (eds) 2012. *Southern African Geomorphology: Recent Trends and New Directions*. 420pp. Bloemfontein: Sun Press. ISBN 9781920382025.

Chapters in books

Battersby-Lennard, J.E. 2012. Size matters: land restitution in Knysna. In R. Donaldson and L. Marais (eds), *Small Town Geographies in Africa: Experiences from South Africa and Elsewhere*, pp. 311-326. New York: Nova Science Publishers, Inc. U.S.A. ISBN 9781621000013.

- Battersby-Lennard, J.E. 2012. Urban food security and climate change: a system of flows. In B. Frayne, C. Moser, and G. Ziervogel (eds), *Climate Change, Assets and Food Security in Southern African Cities*, pp. 35-56. Abingdon, Oxon: Earthscan. ISBN 9780415696043.
- Cartwright, A., Oelofse, G., Parnell, S. and Ward, S. 2012. Climate at the city scale: the Cape Town climate think tank. In A. Cartwright, S. Parnell, G. Oelofse, and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 1-8. Abingdon, Oxon: Routledge. ISBN 9780415527583.
- Cartwright, A., Parnell, S. and Oelofse, G. 2012. Emerging lessons from the climate change think tank. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 263-270. Abingdon, Oxon: Routledge. ISBN 9780415 527583.
- Eckardt, F., Barker, C.H. and Meadows, M.E. 2012. Landscape inventories and remote sensing. In P. Holmes, and M. Meadows (eds), *Southern African Geomorphology: Recent Trends and New Directions*, pp. 373-399. Bloemfontein: Sun Press. ISBN 9781 920382025.
- Fig, D. 2012. Scientific, environmental and agricultural collaboration within the IBSA dialogue forum, 2003-2010. In S. Patel and T. Uys (eds), *Contemporary India and South Africa: Legacies, Identities, Dilemmas*, pp. 291-311. India: Routledge (Taylor & Francis Group). ISBN 9780415522991.
- Frayne, G.B., Moser, C. and Ziervogel, G. 2012. Constructing the climate change-asset adaptation-food security nexus for pro-poor urban development. In B. Frayne, C. Moser and G. Ziervogel (eds), *Climate Change, Assets and Food Security in Southern African Cities*, 186-197. Abingdon, Oxon: Earthscan. ISBN 9780415696043.
- Frayne, G.B., Moser, C. and Ziervogel, G. 2012. Understanding the terrain: the climate change, assets and food security nexus in southern African cities. In B. Frayne, Moser, and G. Ziervogel (eds), *Climate Change, Assets and Food Security in Southern African Cities*, pp. 1-34. Abingdon, Oxon: Earthscan. ISBN 9780415696043.
- Harris, R., Luger, S., Sutherland, C. and Tadross, M.A. 2012. Potential impact of climate change on coastal flooding: a case study of the Salt River, Cape Town. In A. Cartwright, S. Parnell, G. Oelofse, and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. pp. 38-72. Abingdon, Oxon: Routledge. ISBN 9780415527583.
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- Meadows, M.E. 2012. Landscapes and environmental change. In P. Holmes and M. Meadows (eds), *Southern African Geomorphology: Recent Trends and New Directions*, pp. 331-350. Bloemfontein: Sun Press. ISBN 9781920382025.
- Oguntunde, P.G. and Abiodun, B.J. 2012. Analysis of trend and periodicity in long-term annual rainfall time series of Nigeria. In D. Machiwal and M.K. Jha (eds), *Hydrologic Time Series Analysis: Theory and Practice*, pp. 249-272. Dordrecht: Springer. ISBN 9789400718609.
- Tadross, M.A., Taylor, A. and Johnston, P.A. 2012. Understanding Cape Town's climate. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward S (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 9-20. Abingdon, Oxon: Routledge. ISBN 9780415527583.
- Thomas, D., Twyman, C., Osbahr, H. and Hewitson, B.C. 2011. Adaptation to climate change and variability: farmer responses to intra-seasonal precipitation trends in South Africa. In C.J.R. Williams and D.R. Kniveton (eds), *African Climate And Climate Change: Physical, Social and Political Perspectives*, pp. 155-178. Dordrecht: Springer Science and Business Media B.V. ISBN 9789048138418.
- Ziervogel, G. and Parnell, S. 2012. South African coastal cities: governance responses to climate change adaptation. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 223-243. Abingdon, Oxon: Routledge. ISBN 9780415527583.

Articles in Peer-reviewed Journals

- Abiodun, B.J., Adeyewa, Z.D., Oguntunde, P.G., Salami, A.T. and Ajayi, V.O. 2012. Modeling the impacts of reforestation on future climate in West Africa. *Theoretical and Applied Climatology*, 110: 77-96.
- Anderson, P.M.L. and O'Farrell, P.J. 2012. An ecological view of the history of the City of Cape Town. *Ecology and Society*, 17(3): 28.
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- Baleta, H. and McDonnell, R. 2012. Water quality standards or carbon reduction: is there a balance? *Area*, 44(2): 217-225.
- Battersby-Lennard, J.E. 2012. Beyond the food desert: finding ways to speak about urban food security in South Africa. *Geografiska Annaler Series B-Human Geography*, 94(2): 141-159.
- Bradley, B.A., Estes, L.D., Hole, D.G., Holness, S., Oppenheimer, M., Turner, W.R., Beukes, H., Schulze, R.E., Tadross, M.A. and Wilcove, D.S. 2012. Predicting how adaptation to climate change could affect ecological conservation: secondary impacts of shifting agricultural suitability. *Diversity and Distributions*, 18: 425-437.
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- Chase, B.M., Scott, L., Meadows, M.E., Gil-Romera, G., Boom, A., Carr, A.S., Reimer, P.J., Truc, L., Valsecchi, V. and Quick, L. 2012. Rock hyrax middens: a palaeoenvironmental archive for southern African drylands. *Quaternary Science Reviews*, 56: 107-125.
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- Favre, A., Hewitson, B.C., Tadross, M.A., Lennard, C. and Cerezo-Mota, R. 2012. Relationships between cut-off lows and the semiannual and southern oscillations. *Climate Dynamics*, 38: 1473-1487.
- Foster, I.D.L., Rowntree, K., Boardman, J. and Mighall, T. 2012. Changing sediment yield and sediment dynamics in the Karoo uplands, South Africa: post-European impacts. *Land Degradation & Development*, 23: 508-522.
- Halladay, K., Malhi, Y. and New, N. 2012. Cloud frequency climatology at the Andes/Amazon transition: 1. Seasonal and diurnal cycles. *Journal of Geophysical Research-Atmospheres*, 117: D23102.
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- Kaseke, K.F., Mills, A.J., Henschel, J., Seely, M.K., Esler, K. and Brown, R. 2012. The effects of desert pavements (gravel mulch) on soil micro-hydrology. *Pure and Applied Geophysics*, 169: 873-880.
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- Mighall, T., Foster, I.D.L., Rowntree, K. and Boardman, J. 2012. Reconstructing recent land degradation in the semi-arid Karoo of South Africa: a palaeoecological study at Compassberg, Eastern Cape. *Land Degradation & Development*, 23: 523-533.
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- Mwalukomo, H. and Patel, Z. 2012. Chieftaincy and democratic local governance in rural South Africa: natural resources management in QwaQwa. *Development Southern Africa*, 29(2): 259-272.
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- Rahiz, M. and New, N. 2012. Spatial coherence of meteorological droughts in the UK since 1914. *Area*, 44(4): 400-410.
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- Ramutsindela, M.F. and Noe, C. 2012. Scalar thickening: wildlife management areas and conservation scales in southeast Tanzania. *Singapore Journal of Tropical Geography*, 33: 137-151.
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- Smit, W. and Parnell, S. 2012. Urban sustainability and human health: an African perspective. *Current Opinion in Environmental Sustainability*, 4: 443-450.
- Stager, J., Mayewski, P., White, J., Chase, B.M., Neumann, F.H., Meadows, M.E., King, C.D. and Dixon, D.A. 2012. Precipitation variability in the winter rainfall zone of South Africa during the last 1400yr linked to the austral westerlies. *Climate of the Past*, 8: 877-887.
- Thomas, D.S.G., Burrough, S.L. and Parker, A.G. 2012. Extreme events as drivers of early human behaviour in Africa? The case for variability, not catastrophic drought. *Journal of Quaternary Science*, 27(1): 7-12.
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- Van Niekerk, J. and Wynberg, R.P. 2012. The trade in *Pelargonium sidoides*: rural livelihood relief or bounty for the 'bio-buccaneers'? *Development Southern Africa*, 29(4): 530-547.
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Peer-reviewed published conference proceedings

Fisher-Jeffes, L., Carden, K., Armitage, N.P., Spiegel, A.D., Winter, K.J. and Ashley, R. 2012. Challenges facing implementation of water sensitive urban design in South Africa. In proceedings of 7th International Conference on Water Sensitive Urban Design: Building the Water Sensitive Community (WSUD Conference 2012), 21-23 February 2012, Melbourne, Australia. Melbourne: Engineers Australia. ISBN 9780858258952.

Doctoral dissertations

Browne, N. 2012. Model evaluation for seasonal forecasting over southern Africa. 110pp. Supervised by Hewitson, B.C.

Master's degrees (by research)

Barrett, L. 2012. An investigation of the rainfall-related and human-induced risk drivers that contributed to acute urban water scarcity: a case study of the urban water scarcity in the George Municipality from 2009-2010. MPhil Disaster Risk Science. 97pp. Supervised by Holloway, A.

Chasi, V. 2012. Tracing the progression of measles outbreak risk: an exploratory and descriptive study of the City of Cape Town, South Africa. MPhil Disaster Risk Science. 183pp. Supervised by Coetzee, D.J. and Holloway, A.

- Cooke, K. 2012. Urban food access: a study of the lived experience of food access within a low-income community in Cape Town. MSoc. 170pp. Supervised by Battersby-Lennard, J.E.
- Davey, J. 2012. The effects of invasive alien plants on cultural ecosystem services: tourism and recreation. MPhil Environmental Management. 136pp. Supervised by Anderson, P.M.L. and O'Farrell, P.J.
- Dhlembeu, R. 2012. Testing the use of the BASINS PLOAD model to simulate the quality of stormwater runoff from the Kuils River catchment, Cape Town. MSc. 118pp. Supervised by Winter, K.J.
- Georgeades, D. 2012. Environmental impact assessment follow-up in selected Cape Town case studies as an indicator of effectiveness. MSc. 164pp. Supervised by Hill, R.C.
- Greyling, S. 2012. Between the (In)formal and the (Il)legal: the 'permanent temporariness' of waiting for a house. MSocSci. 127pp. Supervised by Oldfield, S.E.
- Hove, T. 2012. A survey of South African environmental impact assessment legislation: recording the precautionary principle with retrospective environmental authorisation. MPhil Environmental Management. 79pp. Supervised by Glazewski, J.I.
- Hushlak, A. 2012. Integrating traditional ecological knowledge in South Africa's small-scale fisheries: the Olifants Estuary Gillnet Fishery. MPhil in Environmental Management. 133pp. Supervised by Sowman, H.
- Israel, A. 2012. The landscape pattern surrounding the Venda sacred site of Thathe forest. MPhil Environmental Management. 102pp. Supervised by Wynberg, R.P.
- Kinyanjui, R. 2012. Phytolith analysis as a palaeoecological tool for reconstructing mid-to late-pleistocene environments in the Olorgesailie basin, Kenya. MSc. 130pp. Supervised by Meadows, M.E.
- Lowman, M. 2012. The effectiveness of access and benefit-sharing legislation in South Africa: practical considerations for national regimes. MPhil Environmental Management. Supervised by Wynberg, R.P.
- Mambo, T., Holloway, A. 2012. An examination of changes in rainfall, streamflow and landcover: a case study of the Kandelaars catchment, Oudtshoorn, South Africa 1926-2008. MPhil Disaster Risk Science. 130pp. Supervised by Anderson, P.M.L.
- Marshak, M. 2012. Systems in transition: from waste to resource. A study of supermarket food waste in Cape Town. MSoc. 143pp. Supervised by Battersby-Lennard, J.E.
- Moreira Dias, D. 2012. 'Renewed promises: conservation for development in the KAZA, Angola'. MSc. 76pp. Supervised by Ramutsindela, M.F.
- Orangio, C. 2012. Barriers to flood risk adaptation: a case study of cross-scale collaboration in the informal settlement of Graveyard pond, Philippi. MSc. 75pp. Supervised by Ziervogel, G.
- Rumble, J. 2012. Collaborative environmental governance in agriculture: a case-study from the Breede Valley. MPhil Environmental Management. 120pp. Supervised by Hill, R.C.
- Takalani, T.E. 2012. A spatial analysis of the alternative admissions research project at the University of Cape Town, 2000-2005. MSc. 113pp. Supervised by Meadows, M.E.
- Van Breda, S. 2012. Improving partnership-based governance for special management areas: lessons from the nuwejaars wetland SMA. MPhil Environmental Management. 123pp. Supervised by Hill, R.C.
- Wagsaether, K. 2012. Preparing for the future: assessing the vulnerability of small-scale farmers in Bushbuckridge. MSc. 178pp. Supervised by Ziervogel, G.

Department of Geological Sciences

HEAD OF DEPARTMENT: PROFESSOR STEPHEN RICHARDSON

Departmental Profile

Research in the Department of Geological Sciences covers a wide range of disciplines. The Department has strengths in geochemistry, structural geology and tectonics, igneous and metamorphic petrology, sedimentology, marine geology, economic geology and petroleum geophysics. General research interests include: global tectonics and geodynamics with emphasis on Gondwana geology; oceanic and continental igneous processes and the geochemical evolution of the underlying mantle; kimberlites and the genesis of diamonds; evolution of the Kaapvaal craton and gold genesis; paleoenvironments; marine geoscience and sedimentary geochemistry. Analytical facilities include X-ray fluorescence, X-ray diffraction, electron microprobe, fluid inclusion stage, stable isotope extraction lines and

access to a stable isotope mass spectrometer, quadrupole (single collector) and magnetic sector (multi-collector) inductively coupled plasma mass spectrometers (solution and laser analysis) and associated clean laboratories.

Departmental Statistics

Permanent and long-term contract staff

| | |
|---------------------------------|----|
| Professors | 3 |
| Associate Professors | 2 |
| Senior Lecturers | 3 |
| Lecturers | 2 |
| Technical Support Staff | 13 |
| Administrative & Clerical Staff | 2 |
| Total | 25 |

Honorary staff

| | |
|------------------------------|---|
| Honorary Research Associates | 2 |
| Emeritus Professors | 1 |

Students

| | |
|---------------|-----|
| Postdoctoral | 1 |
| Doctoral | 8 |
| Master's | 28 |
| Honours | 16 |
| Undergraduate | 482 |
| Total | 535 |

Research Fields and Staff

Permanent staff

PROFESSOR STEPHEN RICHARDSON

Head of Department; Isotope geochemistry; geochronology; diamonds; continental mantle evolution.

PROFESSOR ANTON LE ROEX

Dean of Science; Igneous geochemistry; analytical geochemistry; mantle evolution.

PROFESSOR CHRIS HARRIS

Stable isotope geochemistry; igneous petrology.

ASSOCIATE PROFESSOR JOHN COMPTON

Low-temperature and sedimentary geochemistry; marine geology.

ASSOCIATE PROFESSOR DAVID REID

Precambrian crustal evolution and metallogeny; carbonatites; isotope geochemistry.

MR GEORGE SMITH

Senior Lecturer; petroleum geophysics.

DR EMESE BORDY

Senior Lecturer: Sedimentology

DR PHIL JANNEY

Senior Lecturer: Igneous petrology; analytical geochemistry

DR JOHANN DIENER

Lecturer; Metamorphic petrology.

DR AKE FAGERENG

Lecturer; Structural geology.

Honorary staff

EMERITUS PROFESSOR JOHN GURNEY

Upper mantle research, diamonds, diamond exploration and instrumental analysis of minerals

Honorary Research Associates

PROFESSOR HARTWIG FRIMMEL

Metamorphic petrology

DR WENDY TAYLOR

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Research output

Articles in Peer-reviewed Journals

Barker, A.K., Troll, V.R., Ellam, R.M., Hansteen, T.H., Harris, C., Stillman, C.J. and Andersson, A. 2012. Magmatic evolution of the Cadamasto seamount, Cape Verde: beyond the spatial extent of EM1. *Contributions to Mineralogy and Petrology*, 163: 949-965.

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- Rowe, C.D., Fagereng, A., Miller, J. and Mopani, B.M. 2012. Signature of coseismic decarbonation in dolomitic rocks of the Naukluft thrust, Namibia. *Earth and Planetary Science Letters*, 333: 200-210.
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- Wallace, L.M.W., Fagereng, A. and Ellis, S.E. 2012. Upper plate tectonic stress state may influence interseismic coupling on subduction megathrusts. *Geology*, 40(10): 895-898.
- Zhao, H.Z., Jiang, S.J., Frimmel, H.E., Dai, B.D. and Ma, L.M. 2012. Geochemistry, geochronology and Sr-Nd-Hf isotopes of two mesozoic granitoids in the Xiaqingling gold district: implication for large-scale lithospheric thinning in the north China craton. *Chemical Geology*, 294-295: 173-189.

Doctoral dissertations

Razak, N. 2012. An investigation into the effectiveness of a controlled source electromagnetic survey in locating petroleum resources offshore Equatorial Guinea. Supervised by Smith, G.C.

Master's degrees (by research)

Backeberg, N. 2012. Petrogenesis of the False Bay Dyke Swarm, Cape Peninsula, South Africa. MSc. Supervised by Reid, D.

Bergh, E. 2012. A one-year, postfire record of element deposition and cycling in the Kogelberg sandstone fynbos mountain ecosystem of the Western Cape, South Africa. MSc. Supervised by Compton, J.

Faber, C. 2012. Insights into the processes of felsic melt migration through the mid-crust; an integrative approach from the central zone of the Damara belt, Namibia. MSc. Supervised by Diener, J.

Maaake, L. 2012. Source of the suspended load, upper Orange river, South Africa. MSc. Supervised by Compton, J. and Rogers, J.

MacHutchon, M. 2012. The geological evolution and sedimentary dynamics of Hout Bay, South Africa. MSc. Supervised by Compton, J.

MacLennan, S. 2012. Structural, geophysical and geochemical characterisation of a Mesoproterozoic paleosuture zone, Barberton Greenstone Belt, South Africa. MSc. Supervised by de Wit, M.

Ntholi, T. 2012. In situ purification of acid mine drainage using low enthalpy geothermal energy and sulphate reducing bacteria in the abandoned deep gold mines of South Africa. MSc. Supervised by de Wit, M.

Scharf, T. 2012. Denudation rates and geomorphological analysis in the Cape fold belt. MSc. Supervised by de Wit, M. and Codilean, A.

Viglietti, P. 2012. Life after extinction: palaeoenvironments of the earliest Triassic lower Katberg formation, including the origin of *Lystrosaurus* bonebeds from the Karoo Basin, South Africa. MSc. Supervised by Compton, J. and Smith, R.

Department of Mathematics and Applied Mathematics

(Including the Cosmology and Gravity Group, the Laboratory of Foundational Aspects of Computer Science (FACS-Lab), the Marine Resource Assessment and Management Group (MARAM), Industrial Mathematics, and the Topology Research Group)

HEAD OF DEPARTMENT: ASSOCIATE PROFESSOR VASCO BRATTKA (UP UNTIL 30 JUNE 2012)

(Acting Head of Department: Professor Hans-Peter Kunzi (as of 01 July 2012))

Departmental Profile

The Department of Mathematics and Applied Mathematics houses a number of research groups and individual activities which, in total, cover a large part of the mathematical spectrum. Examples are: cosmology and relativity, computational and applied mechanics, marine resource assessment and management, rangeland modelling, industrial mathematics, foundational aspects of computer science, topology, category theory, nonlinear mathematical physics, functional analysis, cryptography, string theory, financial mathematics and algebra. The Department has active research collaboration with other groups in the country and abroad. There is a strong postgraduate program, with M.Sc. and Ph.D. students in a variety of fields. A number of staff have NRF A-ratings and B-ratings. The Department has a good technical and administrative infrastructure, and regularly hosts visitors from abroad. More information can be found on the website www.mth.uct.ac.za.

Departmental Statistics

Permanent and long-term contract staff

| | |
|-----------------------------------|----|
| Professors | 8 |
| Associate Professors | 4 |
| Senior Lecturers | 10 |
| Lecturers (full-time) | 14 |
| Senior Scholar | 1 |
| Research Staff | 3 |
| Technical Support Staff | 3 |
| Administrative and Clerical Staff | 12 |
| Total | 55 |

Honorary staff

| | |
|---|---|
| Emeritus Professors | 5 |
| Emeritus Associate Professor | 1 |
| Visiting Professor and Principal research officer | 1 |
| Research Associate | 2 |
| Total | 9 |

Students

| | |
|---------------|------|
| Postdoctoral | 12 |
| Doctoral | 35 |
| Master | 70 |
| Honours | 13 |
| Undergraduate | 7476 |
| Total | 7606 |

Research Fields and Staff

Permanent and long-term contract staff

PROFESSOR IGOR BARASHENKOV

Nonlinear waves and solitons; nonlinear dynamics; mathematical physics

PROFESSOR BRUCE BASSETT

Observational and theoretical cosmology; nonlinear optimization. Research astronomer at the South African Astronomy Observatory and senior researcher, African Institute of Mathematical Sciences

PROFESSOR DOUG BUTTERWORTH

Director, Marine Resource Assessment and Management Group (MARAM); particular focus on South African fisheries, northwest Atlantic fisheries, southern bluefin tuna, Antarctic whale and krill resources

PROFESSOR KATHY DRIVER

Special functions, orthogonal polynomials and approximation theory

PROFESSOR PETER DUNSBY

Director of the National Astrophysics and Space Science Programme; Co-Director of the Astrophysics, Cosmology and Gravitation Centre; cosmological perturbations; cosmic microwave background anisotropies; gravitational lensing; inflationary cosmology; cosmological magnetic fields; on-line mathematics education

PROFESSOR GEORGE JANELIDZE

Category theory, Algebra, Topology, Sets and Logic

PROFESSOR HANS-PETER KÜNZI

Topology, orders, categories, combinatorics and their applications in analysis and algebra; particular focus being the theory of asymmetric topology; leader of topology and category theory research group

PROFESSOR DAYA REDDY

South African Research Chair in Computational Mechanics Director, UCT Centre for Research in Computational and Applied Mechanics (CERECAM); mathematical and computational aspects of continuum mechanics; the finite element method

ASSOCIATE PROFESSOR VASCO BRATTKA

Computable Analysis, Effective descriptive set Theory, Algorithmic Randomness

ASSOCIATE PROFESSOR CHRISTOPHER GILMOUR

Pointfree topology and sigma-frames; categorical topology

ASSOCIATE PROFESSOR CHARLES HELLABY

General relativity; cosmology; gravity

ASSOCIATE PROFESSOR ALEXANDAR IANOVSKY

Dynamical systems – finite and infinite dimensions; differential geometric methods in the theory of dynamical systems

DR PETER BRUYNS

Senior Lecturer; group theory; permutation groups

DR CHRISTOPHER CLARKSON

Senior Lecturer; cosmology; gravitational waves; non-linear perturbation theory; braneworlds -black holes; quasi-normal modes

DR JURIE CONRADIE

Senior Lecturer; functional analysis; vector lattices; von Neumann algebras; non-commutative function spaces; mathematics education

DR FRANCOISE EBOBISSE BILLE

Senior Lecturer, calculus of variations; PDE; mathematical and computational aspects of continuum mechanics; the finite element method

DR DAVID ERWIN

Senior Lecturer; classical, applied and algebraic graph theory

DR JOHN FRITH

Senior Lecturer; frame theory; topos theory; categorical topology; mathematical education

DR HENRI LAURIE

Senior Lecturer; mathematical biology, in particular ecology; industrial mathematics; mathematics education

DR JEFF MURUGAN

Senior Lecturer; string theory, quantum gravity, neurophysics

DR ANNELIESE SCHAUERTE

Senior Lecturer; frame and biframe theory; categorical topology; uniform and quasi-uniform structures

DR AMANDA WELTMAN

Senior Lecturer, string theory, cosmology, gravity

DR NORA ALEXEEVA

Lecturer; nonlinear dynamics and solitons; pattern formation in reaction-diffusion systems; synchronization of chaotic systems

DR MARGARET ARCHIBALD

Lecturer; analysis of algorithms and combinatorics

DR MARK BERMAN

Lecturer, group theory, universal algebra, set theory and model theory

DR TIRIVANHU CHINYOKA

Lecturer; computational fluid dynamics

DR EBRAHIM FREDERICKS

Lecturer; lie symmetries analysis of stochastic differential equations; lie symmetries analysis of partial differential equations; lie symmetries analysis of ordinary differential equations; applying lie symmetries to fluid mechanics, applying lie symmetries to mathematics of finance

DR ROBERT MARTIN

Lecturer, functional analysis; operator theory

DR ANDRIY POTOTSKYY

Lecturer; stochastic processes and equations. Applications in Biology and Physics

MR KENNETH RAFEL

Lecturer; mathematics education

DR JESSE RATZKIN

Lecturer, geometric analysis

DR NEILL ROBERTSON

Lecturer; functional analysis; locally convex spaces; descriptive set theory; infinite-dimensional holomorphy

DR DEON SOLOMONS

Lecturer; thermodynamics of spacetime; Interference and diffraction phenomena in gravitational lensing; structure formation in the universe; theories of higher order gravity

DR HOLGER SPAKOWSKI

Lecturer; theoretical computer science; computational complexity

DR CHRISTINE SWART

Lecturer; cryptography

DR VITALI VOUGALTER

Lecturer, nonlinear analysis, partial differential equations, mathematical biology

Senior Research Scholar

Emeritus Distinguished Professor George Ellis

Distinguished Professor of complex systems; cosmology and general relativity theory; emergence and functioning of complex systems, including the human brain; science policy; mathematics and science education and religion; social indicators

Research staff**DR ANABELA BRANDÃO**

Senior Research Officer, MARAM; Southern Ocean toothfish assessment; SA west coast rock lobster surveys; minke whales, SA abalone assessment.

DR CARRYN DE MOOR

Senior Research Officer, MARAM; S.A. sardine and anchovy assessment and management

DR SUSAN HOLLOWAY

Senior Research Officer, MARAM; S.A. west and south coast rock lobster and horse mackerel assessment; whale management procedures

DR KENNETH HUGHES

Honorary Research Associate; number theory; algebra; algebraic geometry; topological quantum field theory; p-adic analysis, nil-theta functions

DR ÉVA PLAGÁNYI-LLOYD

Honorary Research Associate; multispecies modelling; Fisheries assessment and management ecological modeling, S.A. abalone assessment

Distinguished visitors**EMERITUS PROFESSOR BERNHARD BANASCHEWSKI**

McMaster University, Hamilton, Ontario, Canada – pointfree topology; partially ordered algebraic systems; applied category theory

PROFESSOR ROY MAARTENS, Director of Institute of Cosmology and Gravitation, University of Portsmouth, UK – Relativity, Cosmology, Gravity

Honorary staff**EMERITUS PROFESSOR RONALD BECKER**

Differential equations (bifurcations, abstract equations); theory of algorithms (graph partitioning, sorting networks) and Mathematical Finance

EMERITUS PROFESSOR GUILLAUME BRÜMMER

Topology and category theory group; categorical topology; asymmetric topology and uniformity

EMERITUS DISTINGUISHED PROFESSOR GEORGE ELLIS

Distinguished Professor of complex systems; cosmology and general relativity theory; emergence and functioning of complex systems, including the human brain; science policy; mathematics and science education; metaphysics of cosmology and its connections to ethics and religion; social indicators

EMERITUS PROFESSOR KEITH HARDIE

Homotopy theory; algebraic topology; digital topology; categorical topology

EMERITUS ASSOCIATE PROFESSOR RONALD CROSS

Functional analysis; unbounded linear operators; linear relations

PROFESSOR PATRICIA WHITELOCK

Visiting Professor and Principal Research Officer; SAO

DR DAVID RICHARDSON

Research Associate; Rangeland Modelling Group; modelling grazing animal production systems; relations between complex and simple models

PROFESSOR JOHN WEBB

Mathematical competitions and Olympiads; popularisation of mathematics

Postdoctoral Fellows

DR ALVARO DE LA CRUZ

Cosmology

DR RITUPARNO GOSWAMI

Cosmology

DR NIMA KHOSRAVI

Early universe cosmology including inflation and its generalisations

DR OLAWANLE PATRICK LAYENI

CERECAM: Moving boundary problems and variational inequalities

DR PATRICE OKOUMA

Constraints on dark energy from current and future cosmological observations including SKA

DR PRINA PATEL

Cosmology

DR ROBERT POLTIS

Works in particle physics and cosmology and in particular is studying the interface of the two looking at various tests of theoretical physics that can be done using observational cosmology

DR XAVIER ROY

Works on the averaging and backreaction problems in cosmology. This involves finding a self-consistent manner in which to smooth a spacetime, and make predictions for cosmology.

DR MARINA SEIKEL

Cosmology

DR PARAMJEET SINGH

Numerical analysis of conservation laws with fading memory in the research area of numerical analysis of partial differential equations

DR PER ERIC SUNDIN

String theory and Cosmology

DR ROCKHEE SUNG

Cosmology

Contact Details

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Research output

Authored books

Ellis, G.F.R., Maartens, R. and MacCallum, M.A.H. 2012. 622pp. Relativistic Cosmology. UK: Cambridge University Press. ISBN 9780521381154.

Edited books

Ellis, G.F.R., Stein, D.J., Thomas, K. and Meintjes, E.M. (eds) 2012. Substance Use and Abuse in South Africa. 394pp. Cape Town: UCT press. ISBN 9781919895291.

Murugan, J., Weltman, A. and Ellis, G.F.R. (eds) 2012. Foundations of Space and Time Reflections on Quantum Gravity. 437pp. USA: Cambridge University Press. ISBN 9780521114400.

Chapters in books

De Mello K.R. and Murugan, J. 2012. Emergent spacetime. In J. Murugan, A. Weltman, G.F.R. Ellis (eds), Foundations of Space and Time Reflections on Quantum Gravity, pp. 164-184. USA: Cambridge University Press. ISBN 9780521114400.

Ellis, G.F.R. 2012. Multiverses, science, and ultimate causation. In R.D. Holder and S. Mitton (eds), Georges Lematre: Life, Science and Legacy, pp. 125-144. London: Springer Heidelberg New York Dordrecht London. ISBN 9783642322549.

Kunzi, H. and Makitu Kivuvu, C. 2011. Quietness in arbitrary quasi-uniform spaces. In J. Rodriguez-Lopez and S. Romaguera (eds), Asymmetric Topology and its Application, pp. 137-178. Rome: Aracne editrice S.r.l. ISBN 9788854847521.

Murugan, J., Weltman, A. and Ellis, G.F.R. 2012. The problem with quantum gravity. In J. Murugan, A. Weltman and G.F.R. Ellis (eds), Foundations of Space and Time Reflections on Quantum Gravity, pp. 1-7. USA: Cambridge University Press. ISBN 9780521114400.

- Reddy, B.D. and McBride, A.T. 2012. Introduction to finite element analysis and recent developments. In A. Patanaik (ed.), *Modelling and Simulation in Fibrous Materials*, pp. 1-28. New York: Nova Science Publishers, Inc. ISBN 9781621001164.
- Stein, D.J., Ellis, G.F.R., Thomas, K. and Meintjes, E.M. 2012. Introduction: substance use and abuse in South Africa. In E. Stein, K. Thomas and E.M. Meintjes (eds), *Substance Use and Abuse in South Africa*, pp. 1-9. Cape Town: UCT press. ISBN 9781919895291.
- Weltman, A., Murugan, J. and Ellis, G.F.R. 2012. Conversations in string theory. In J. Murugan, A. Weltman and G.F.R. Ellis (eds), *Foundations of Space and Time Reflections on Quantum Gravity*, pp. 419-434. USA: Cambridge University Press. ISBN 9780521114400.
- ### Articles in Peer-reviewed Journals
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- Abdelwahab, M., Goswami, R. and Dunsby, P.K.S. 2012. Cosmological dynamics of fourth-order gravity: a compact view. *Physical Review D*, 85: 083511.
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- Abou Salem, W., Chen, T. and Vougalter, V. 2012. On the well-posedness of the semi-relativistic Schrödinger-Poisson system. *Dynamics of Partial Differential Equations*, 9(2): 121-132.
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- Allender, E. and Spakowski, H. 2012. Avoiding simplicity is complex. *Theory of Computing Systems*, 51: 282-296.
- Anchordoqui, L., Dai, D., Fairbairn, M., Landsberg, G. and Stojkovic, D. 2012. Vanishing dimensions and planar events at the LHC. *Modern Physics Letters A*, 27(4): 1250021.
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- Archibald, M.L., Knopfmacher, A. and Mansour, T. 2012. Variation statistics on compositions. *Fundamenta Informaticae*, 117: 1-17.
- Barashenkov, I.V., Suchkov, S.V., Sukhorukov, A.A., Dmitriev, S.V. and Kivshar, Y.S. 2012. Breathers in PI-symmetric optical couplers. *Physical Review A*, 86: 053809(1 -12).
- Bertacca, D., Maartens, R., Raccanelli, A. and Clarkson, C.A. 2012. Beyond the plane-parallel and Newtonian approach: wide-angle redshift distortions and convergence in general relativity. *Journal of Cosmology and Astroparticle Physics*, 10: 025.
- Bradley, M., Dunsby, P.K.S., Forsberg, M. and Keresztes, Z. 2012. Density growth in Kantowski-Sachs cosmologies with cosmological constant. *Classical and Quantum Gravity*, 29: 095023.
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- Brandao, A.D.G. and Butterworth, D.S. 2012. Concerning demographic limitations on the population growth rate of West Australian (breeding stock D) humpback whales. *Journal of Cetacean Research and Management*, 3: 201-208.
- Brattka, V., de Brecht, M. and Pauly, A. 2012. Closed choice and a uniform low basis theorem. *Annals of Pure and Applied Logic*, 163: 986-1008.
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- Ellis, G.F.R. 2012. On the limits of quantum theory: contextuality and the quantum-classical cut. *Annals of Physics*, 327: 1890-1932.
- Ellis, G.F.R. 2012. Top-down causation and emergence: some comments on mechanisms. *Journal of the Royal Society Interface*, 2: 126-140.
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- Frith, J.L. and Schauerte, A. 2012. An asymmetric approach to filters in strict extensions and quotients. *Acta Mathematica Hungarica*, 137(1-2): 82-103.
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Nzioki, A., Dunsby, P.K.S., Goswami, R. and Carloni, S. 2012. Strong gravitational lensing in $f(R)$ gravity. In J.B. Jimenez, J.A.R. Cembranos, A. Dobado, A.L. Maroto and A. de la Cruz-Dombriz (eds), Towards New Paradigms: Proceeding of the Spanish Relativity Meeting 2011, 29 August - 2 September 2011, Madrid, Spain. USA: American Institute of Physics. ISBN 9780735410602.

Doctoral dissertations

Mabula, M. 2012. Compactness in asymmetrically normed lattices. 180pp. Supervised by Conradie, J.

Mohamed, H.B.H. 2012. Properties of solutions of the equations for generalised Oldroyd-B fluids. 200pp. Supervised by Reddy, B.

Okouma, P. 2012. Aspects of dark energy and cosmic curvature. 140pp. Supervised by Bassett, B.A.

Otafudu, O.O. 2012. Convexity in quasi-metric spaces. 140pp. Supervised by Kunzi, H.-P.

Rademeyer, R.A. 2012. The evolution of management procedures for the South African hake resource in the 2000s. 140pp. Supervised by Butterworth, D.S.

Master's degrees (by research)

Birch, T. 2012. Algorithmic randomness on computable metric spaces and hyperspaces. MSc Mathematics. 85pp. Supervised by Brattka, V.

Calder-Potts, G. 2012. Review of current radiometer technology with suggestions for future South African satellites. MSc Astrophysics & Space-Science. 160pp. Supervised by Dunsby, P. and Inggs, M.

Clarke, A. 2012. A study of distance and the baryon acoustic oscillations in curved spacetimes. MSc Astrophysics & Space Science. 80pp. Supervised by Bassett, B.A.

Conradie, P. 2012. Photon trajectories in a void dominated universe. MSc Astrophysics & Space Science. 85pp. Supervised by Dunsby, P.

Giovannoni, G. 2012. Complex projective space- the final frontier. MSc Applied Mathematics. 160pp. Supervised by Murugan, J.

Goldberg, T. 2012. Regular and chaotic dynamics of the resonantly driven wobbling kink. MSc Applied Mathematics. 85pp. Supervised by Barashenkov, I.

Lee-Thorp, J. 2012. Spectral continuation study of the temporally periodic solitons of the damped-driven nonlinear Schrodinger equations. MSc Applied Mathematics. 85pp. Supervised by Barashenkov, I.

Mbewu, J. 2012. Computational modelling of cardiac function and myocardial infarction. MSc Applied Mathematics. 80pp. Supervised by Reddy, B.D.

Njau, M. 2012. Finite activity jump models for option pricing. MSc Mathematics of Finance. 160pp. Supervised by Becker, R.

Richardson, N. J.N. 2012. An investigation into aspects of rate-independent single crystal plasticity. MSc(Eng) Mechanical. Supervised by Reddy, B.D.

Sikhonde, M. 2012. A study of chameleon-photon mixing from pulsars. MSc Astrophysics & Space Science. 85pp. Supervised by Weltman, A.

Walters, A. 2012. Constructing realistic Szekeres models from initial and final data. MSc Astrophysics & Space-Science. 160pp. Supervised by Hellaby, C.

Wilson, B. 2012. Robust Bayesian portfolio optimisation: Higher moments and the distorting effects of constraints. MSc. Supervised by Witten, G.

In addition to the research outputs listed further above, contributions ranging across book reviews to popular articles were made. The Marine Research Assessment and Management Group (MARAM) provided 105 technical papers to the scientific working groups of the Fisheries Branch of the Department of Agriculture, Forestry and Fisheries related to the management of South African marine resources, and to other United States and international fisheries management organisations.

Department of Molecular And Cell Biology

HEAD OF DEPARTMENT: ASSOCIATE PROFESSOR VERNON COYNE

Departmental Profile

The Department has interests and expertise in diverse areas of biology. The problem of desiccation in plants is being tackled by a combination of physiological and molecular approaches. "Biofarming" research involves the expression of pharmaceutically-important proteins in plants and insect cells, including vaccine candidates for human and animal diseases such as bluetongue, human papillomaviruses, human rotavirus and psittacine beak and feather disease. Plant biotechnology research for plant improvement is focused on developing virus-resistant and drought-tolerant crops and the molecular basis of nickel hyperaccumulation in plants. Plant defence responses are studied in both model and crop plants. Circadian rhythms and their role in plant development and responses, as well as sports performance in humans, are studied. Eukaryotic gene expression projects include the role of chromatin modifications in regulating the rhythms of gene expression and gene expression during neuronal differentiation and stress. Basic mechanisms underlying the regulation of gene expression are studied in human cells and in *Plasmodium*, with a view to pinpointing *Plasmodium*-specific mechanisms that can be exploited to develop novel anti-malarial drugs. Misfolding of DNA sequences is being investigated as a possible cause of inheritable mental diseases. In addition, the actions of mammalian hormones, synthetic contraceptives and steroid receptors are being investigated with a view to understanding mechanisms,

integration of signalling pathways and role in HIV pathogenesis. Research on viral pathogenesis includes virus-host genomic and proteomic interaction studies for Maize streak virus, and protein structure-function studies of the envelope protein and its role in HIV transmission. Evolutionary biology projects focus on mechanisms that shape both genomic and population-level diversity, as well as evolution of limb development in bats. Molecular virology studies focus on the genetic diversity and molecular biology of single-stranded DNA viruses of plants and animals, of the marine virome, and of papillomaviruses of primates and humans. Structural studies are being carried out by electron microscopy and X-ray crystallography on a number of proteins, including glutamine synthetase and members of the nitrilase superfamily, to obtain insights necessary for rational drug and industrial enzyme design. Research in marine biotechnology includes genetic and proteomic studies of the immune response of the abalone (*Haliotis midae*) and the stress and disease response systems of the commercially important seaweed *Gracilaria gracilis*. In addition, probiotics are being developed to improve the growth rate and disease resistance of farmed abalone. Research in microbiology includes molecular-genetic investigations of industrially and medically important anaerobic bacteria such as *Corynebacterium*, *Bacteroides fragilis*, *Bifidobacterium* and the fibre-degrading bacteria in the ostrich gut. The taxonomy of antibiotic-producing actinobacteria is being investigated. The Department also runs an analytical facility (amino acid analysis, DNA sequencing, DNA synthesis, DNA microarrays and protein identification). The instrumentation in the facility consists of HPLCs, a GC MS/MS and LC-ESI QTOF and MALDI instruments for mass spectrometry.

Departmental Statistics

Permanent and Long-Term Contract Staff

| | |
|-----------------------------------|----|
| Professors | 4 |
| Associate Professors | 3 |
| Senior Lecturers | 4 |
| Lecturers | 4 |
| Research Staff | 10 |
| Technical Support Staff | 7 |
| Administrative and Clerical Staff | 5 |
| Total | 37 |

Honorary Staff

| | |
|---------------------|---|
| Honorary Professors | 2 |
| Total | 2 |

Students

| | |
|---------------|-----|
| Postdoctoral | 13 |
| Doctoral | 43 |
| Master's | 26 |
| Honours | 22 |
| Undergraduate | 282 |
| Total | 386 |

Research fields and staff

Permanent Staff

ASSOCIATE PROFESSOR VERNON COYNE

Head of Department; Marine biotechnology

PROFESSOR JILL FARRANT

Desiccation tolerance; resurrection plants; seeds; plant physiology; molecular biology; systems biology

PROFESSOR JANET HAPGOOD

Molecular mechanisms of cell signalling and eukaryotic gene regulation via steroid receptors: role in HIV pathogenesis, immune and reproductive function

PROFESSOR NICOLA ILLING

Evolution of development; regulation of gene expression; limb development, comparative genomics

PROFESSOR EDWARD RYBICKI

Plant- and tissue culture-derived vaccines; oceanic viromics; Human papillomavirus (HPV); rotavirus; bluetongue virus; Beak and feather disease virus; geminivirus; Maize streak virus; molecular virology; molecular biotechnology

ASSOCIATE PROFESSOR VAL ABRATT

Bacteroides fragilis; nitrogen metabolism; virulence; metronidazole; DNA damage and repair; Bifidobacterium; Lactobacillus; probiotics

ASSOCIATE PROFESSOR SHARON REID

Gram-positive and anaerobic bacteria; Clostridium acetobutylicum; Bifidobacterium; Lactobacillus, gene regulation of nitrogen- and carbon-substrate utilisation; probiotics; molecular systematics; biofuels

DR ROBERT INGLE

Senior lecturer; interactions between plants and their environment (plant innate immunity, metal hyperaccumulating plants)

DR PAUL MEYERS

Senior lecturer; actinobacteria; family Streptosporangiaceae; Amycolatopsis; Kribbella; Streptomyces; bacterial taxonomy; bioprospecting; novel antitubercular antibiotics

DR COLLEEN O'RYAN

Senior lecturer; molecular and population genetics; genetics of neurodevelopmental disorders

DR LAURA RODEN

Senior Lecturer; flowering time and photoperiodism; plant and human circadian rhythms; regulation of plant gene expression; plant molecular biology; Arabidopsis genetics

DR THOMAS OELGESCHLÄGER

Lecturer; molecular mechanisms of RNA polymerase II transcription regulation in eukaryotes; core promoter-selective transcription regulation mechanisms; transcription regulation in Plasmodium falciparum

DR SUHAIL RAFUDEEN

Lecturer; abiotic stress tolerance in plants; signalling and regulation of plant gene expression during stress; plant molecular biology; proteomics (protein expression profiling, protein mining); Xerophyta viscosa; maize; Tef

DR JERRY RODRIGUES

Lecturer; protein chemistry; drug discovery; plant desiccation tolerance; polyphenol research

DR ZENDA WOODMAN

Lecturer; HIV: structure-function and viral fitness; biochemical analysis of envelope's role in HIV pathogenesis

Honorary Staff

EMERITUS PROFESSOR HORST KLUMP

Energy landscapes of dynamic ensembles of rolling triplet repeat bulge loops: implications for DNA expansion associated with mental-disease states

EMERITUS PROFESSOR JENNIFER THOMSON

Transgenic maize for resistance to the African Maize streak virus and tolerance to drought

Contract Research Staff

DR GARETH EVEREST

Postdoctoral fellow; antimycobacterial antibiotic drug discovery; actinobacterial characterisation; phylogeny of the family Pseudonocardiaceae; alternative taxonomic marker genes

DR BRUNA GALVÃO

Postdoctoral fellow; discovery and characterisation of novel putative virulence factors of the human opportunistic pathogen Bacteroides fragilis; membrane-associated adhesins; cell surface appendages; proteases

DR KERRY GORDON

Postdoctoral fellow; HIV-1 envelope structure and function; understanding the glycosylation requirements of HIV-1 envelope during transmission

DR INGA HITZEROTH

Senior Research Officer; plant-derived vaccines; Human Papillomaviruses (HPV), Beak and Feather disease virus (BFDV), Rotavirus and Influenza virus

DR SUZANNE HUDDY

Postdoctoral fellow; plant and algal biotechnology; plant-produced enzymes and pharmaceuticals; plant and algal tissue culture and transformation studies; Influenza

DR KERSHINI IYER

Postdoctoral fellow; plant biotechnology; promoter studies of stress-associated genes from *Zea mays* and *Xerophyta viscosa*

DR REVEL IYER

Chief Research Administrator; agricultural biotechnology; plant molecular biology; plant transgenics

DR BRIAN KULLIN

Postdoctoral fellow; *Clostridium difficile* (epidemiology, factors involved in host colonisation and mechanisms of antibiotic resistance); oxalate utilisation by probiotic gut bacteria (possible role in kidney stone prevention)

DR ANN MEYERS

Research Officer; plant-produced proteins, monoclonal antibodies and vaccines; bluetongue virus; Rift Valley fever virus; Crimean Congo haemorrhagic fever virus

DR SHANE MURRAY

Lecturer; crop genomics and transcriptomics; resistance in maize and grapevine to pathogens (fungi, viruses and phytoplasma)

DR CHRISTIANE M. NDAY

Postdoctoral fellow; identification of blood biomarkers for drug abusers with a history of psychosis using RNA sequencing technology

DR LYNTHIA PAUL

Research assistant; *Bacteroides fragilis* metronidazole resistance; mutational analysis; metronidazole uptake; flotillin; DNA recombination and repair genes

DR MAYA PFAFF

Postdoctoral fellow; marine virology; plankton ecology; metagenomics; microbial oceanography (understanding the role of viruses in the Southern Ocean carbon cycle and the formation, maintenance and termination of harmful algal blooms)

DR DIONNE SHEPHERD

Research Officer; virology and plant biotechnology; development of maize streak virus resistant maize; maize streak virus diversity; plant-virus interactions

DR MICHELE TOMASICCHIO

Postdoctoral fellow; glucocorticoid receptor (GR) transcriptional signalling; cross talk between HIV-1 Vpr and the GR in transcriptional regulation of host genes

Research Highlights**AWARDS**

Professor Janet Hapgood was awarded a Grand Challenges Explorations grant by the Bill & Melinda Gates Foundation (www.uct.ac.za/mondaypaper/?id=9404).

SIGNIFICANT PUBLICATIONS

Emeritus Professor Horst Klump was a co-author on a paper in the *Journal of the American Chemical Society* (2011 impact factor: 9.907) that investigated the role of "bulge loops" in the generation of mutations that result in expanded stretches of repetitive DNA sequences (expansion mutations). Since expansion mutations are associated with a variety of human genetic disorders, such as Huntington's disease, knowing more about bulge-loop behaviour may help researchers to understand expansion mutations (<http://www.ncbi.nlm.nih.gov/pubmed/22397401>).

Contact Details

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Web: <http://www.mcb.uct.ac.za>

Research output**Chapters in books**

Farrant, J.M. and Moore, J.P. 2012. A systems-based molecular biology analysis of resurrection plants for crop and forage improvements in arid environments. In N. Tuteja, S. Gill, A.F. Tubercio and R. Tuteja (eds), *Improving Crop Resistance to Abiotic Stress*, pp. 399-418. Germany: Wiley-Blackwell Publishing, Inc. ISBN 9783527328406.

Farrant, J.M., Cooper, K.L. and Nell, J. 2012. Desiccation tolerance. In S. Shabala (ed.), *Plant Stress Physiology*, pp. 238-265. Wallingford, UK: CAB International. ISBN 9781845939953.

Articles in Peer-reviewed Journals

- Abdalla, K. and Rafudeen, M.S. 2012. Analysis of nuclear proteome of the resurrection plant xerophyta viscosa in response to dehydration stress using iTRAQ with 2DLC and tandem mass spectrometry. *Journal of Proteomics*, 75: 2361-2374.
- Agrawal, G.K., Sarkar, A., Agrawal, R., Ndimba, B.K., Tanou, G., Dunn, M.J., Kieselbach, T., Cramer, R., Wienkoop, S., Chen, S., Rafudeen, M.S., Deswal, R., Barkla, B.J., Weckwerth, W., Heazlewood, J.L., Renaut, J., Job, D., Chakraborty, N. and Rakwal, R. 2012. Boosting the globalization of plant proteomics through INPPO: current developments and future prospects. *Proteomics*, 12: 359-368.
- Beckett, M., Loreto, F., Velikova, v., Brunetti, C., Di Ferdinando, M., Tattini, M., Calfapietra, C. and Farrant, J.M. 2012. Photosynthetic limitations and volatile and non-volatile isoprenoids in the poikilochlorophyllous resurrection plant xerophyta humilis during dehydration and rehydration. *Plant Cell and Environment*, 35: 2061-2074.
- Botha, S., Meyers, A.E. and Coyne, V.E. 2012. Transformation of lacZ using different promoters in the commercially important red alga, *Gracilaria gracilis*. *African Journal of Biotechnology*, 11(8): 1879-1885.
- Broadley, S., Gumbart, J., Weber, B.W., Marakalala, M., Steenkamp, D.J. and Sewell, B.T. 2012. A new crystal form of MshB from mycobacterium tuberculosis with glycerol and acetate in the active site suggests the catalytic mechanism. *Acta Crystallographica Section D-Biological Crystallography*, 68: 1450-1459.
- Chopera, D., Cotton, L.A., Zawaira, A., Mann, J.K., Ngandu, N., Ntale, R., Carlson, J.M., Mlisana, K., Woodman, Z.L., de Assis Rosa, D., Martin, E., Miura, T., Pereyra, F., Walker, B.D., Gray, C., Martin, D.P., Ndungu, T., Brockman, M.A., Abdool-Karim, S., Brumme, Z.L., Williamson, C. and Caprison 002 Acute Infection Study Team. 2012. Intersubtype differences in the effect of a rare p24 gag mutation on HIV-1 replicative fitness. *Journal of Virology*, 86(24): 13423-13433.
- Curtis, S. and Meyers, P. 2012. Multilocus sequence analysis of the actinobacterial genus *Kribbella*. *Systematic and Applied Microbiology*, 35: 441-446.
- Dayaram, A., Opong, A., Jaschke, A., Hadfield, J., Baschiera, M., Dobson, R.C.J., Offei, S.K., Shepherd, D.N., Martin, D.P. and Varsani, A. 2012. Molecular characterisation of a novel cassava associated circular ssDNA virus. *Virus Research*, 166: 130-135.
- Ehlers, M.R.W., Gordon, K., Schwager, S. and Sturrock, E.D. 2012. Shedding the load of hypertension: the proteolytic processing of angiotensin-converting enzyme. *SAMJ South African Medical Journal*, 102(6): 461-464.
- Kunorozva, L., Stephenson, K., Rae, D. and Roden, L.C. 2012. Chronotype and PERIOD3 variable number tandem repeat polymorphism in individual sports athletes. *Chronobiology International*, 29(8): 1004-1010.
- Lotter-Stark, H., Rybicki, E.P. and Chikwamba, R. 2012. Plant made anti-HIV microbicides-a field of opportunity. *Biotechnology Advances*, 30: 1614-1626.
- Lynch, A.G., Meyers, A.E., Williamson, A.-L. and Rybicki, E.P. 2012. Stability studies of HIV-1 Pr55gag virus-like particles made in insect cells after storage in various formulation media. *Virology Journal*, 9: 210.
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Volker, J., Gindikin, V., Klump, H., Plum, G.E. and Breslauer, K. 2012. Energy landscapes of dynamic ensembles of rolling triplet repeat bulge loops: implications for DNA expansion associated with disease states. *Journal of the American Chemical Society*, 134: 6033-6044.

Williamson, A.-L., Rybicki, E.P., Shephard, E.G., Gray, G., Bekker, L., Downing, K.J. and Williamson, C. 2012. South African HIV-1 vaccine candidates the journey from the bench to clinical trials. *SAMJ South African Medical Journal*, 102(6): 452-455.

Doctoral dissertations

Boom, T. 2012. A biological study of the cellular response to heat stress in the South African alga *Gracilaria gracilis*. 255pp. Supervised by Coyne, V.E.

Botha, S. 2012. Development of a transformation protocol and cell culture system for the commercially important species of red macroalgae, *Gracilaria gracilis*. 272pp. Supervised by Coyne, V.E.

Du Plessis, S. 2012. Molecular characterisation of selected gastrointestinal microbiota in South Africa HIV-positive patients during HAART. 189p. Supervised by Abratt, V.R.

Du Toit, E. 2012. The development of probiotics for use in the ostrich farming industry in South Africa. 217pp. Supervised by Reid, S.J.

Monjane, A. 2012. Analysis of recombination and evolution of maize streak virus. 177pp. Supervised by Rybicki, E.P.

Moodley, C. 2012. Molecular characterization of ABC-type multi-drug efflux systems in *Bifidobacterium longum* subsp. *Longum* T JCM 1217. 122pp. Supervised by Abratt, V.R.

Naidoo, R. 2012. Investigation of the *Gracilaria gracilis* proteome response to nitrogen limitation. 196pp. Supervised by Coyne, V.E.

Nicholson, S. 2012. The molecular characterisation of the *recA* locus in the opportunistic pathogen *Bacteroides fragilis*. 128pp. Supervised by Abratt, V.R.

Reddy, A. 2012. Characterisation of the effect of stress on nitrogen metabolism in the commercially important agarophyte, *Gracilaria gracilis*. 223pp. Supervised by Coyne, V.E.

Smart, M. 2012. Flowering in protea: a molecular and physiological study. 194pp. Supervised by Roden, L.C.

Stathopoulos, S. 2012. The tangled history of olfaction in African mole-rats, *Bathyergidae*: insights from olfactory receptor genes. 114pp. Supervised by O’Ryan, C.

Master's degrees (by research)

Brito, D. 2012. Evolution of the ZRS and the regulation of SHH expression in the forelimbs of bats. MSc. 100pp. Supervised by Illing, N.

Diener, A. 2012. Identification of the CIR1 resistance gene in *Arabidopsis thaliana*. MSc. 113pp. Supervised by Ingle, R.A.

Duvenage, L. 2012. Expression and purification of beak and feather disease virus capsid protein in tobacco using elastin-like polypeptide fusions. MSc. 122pp. Supervised by Hitzeroth, I.I.

Grantham, N. 2012. Modulation of GR transcriptional signalling by HIV-1 Vpr: insights into regulation by progesterins. MSc. 176pp. Supervised by Hapgood, J.

Ellick, T. 2012. Investigation of XvSap promoters from the resurrection plant, *Xerophyta viscosa*. MSc. 135pp. Supervised by Rafudeen, M.S.

Department of Oceanography

(Including the Nansen-Tutu Centre for Marine Environmental Research and the Research Diving Unit)

HEAD OF DEPARTMENT: PROFESSOR CHRIS REASON

Departmental Profile

The Department of Oceanography is the only such Department in sub-Saharan Africa, and is the major focus for research in physical oceanography, atmospheric science, ocean circulation, and climate in South Africa and elsewhere in Africa. The Department has research groupings in sea-going observations, satellite marine remote sensing, coastal oceanography, ocean and atmospheric modelling, marine and coastal meteorology, severe weather, the science underpinning operational oceanography, and climate variability and change. Six scientists in the Department have been favourably evaluated in the review process of the National Research Foundation. Active international associations are maintained by collaborative projects with the Netherlands, France, Germany, Spain, the UK, Australia, USA and Canada. The Department maintains close contact with marine science activities in the governmental, private and academic sectors in South Africa and into Africa. The UCT Research Diving Unit (RDU) is housed within the Department and is fully equipped with a decompression

chamber and compressor. Most scientific diving at UCT is carried out in conjunction with the RDU.

Departmental Statistics

Permanent and Long-term Contract Staff

| | |
|-----------------------------------|----|
| Professors | 2 |
| Senior Lecturer | 2 |
| Lecturer | 1 |
| Research Staff | 2 |
| Technical Support Staff | 2 |
| Administrative and Clerical Staff | 2 |
| Total | 11 |

Honorary Staff

| | |
|------------------------------|----|
| Emeritus Professor | 2 |
| Honorary Professor | 1 |
| Honorary Research Associates | 13 |
| Total | 16 |

Students

| | |
|----------------------|-----|
| Postdoctoral Fellows | 4 |
| Doctoral | 27 |
| Master's | 35 |
| Honours | 13 |
| Undergraduate | 148 |
| Total | 227 |

Research Fields and Staff

Permanent Staff

PROFESSOR C.J.C. REASON

Head of Department, Southern Hemisphere climate variability and change, Coastal and mesoscale meteorology, regional oceanography, modelling

PROFESSOR F.A. SHILLINGTON

Shelf oceanography, satellite marine remote sensing

DR I.J. ANSORGE

Senior Lecturer; Southern Ocean

DR H.N. WALDRON

Senior Lecturer; environmental oceanography

DR J. VEITCH

Lecturer; Benguela upwelling system, modelling

DR R. ROMAN

Senior Scientific Officer; satellite marine remote sensing

MR P. TRUTER

Diving Supervisor; ocean diving

ADMINISTRATIVE OFFICER

Mrs C. Khai

RESOURCE CENTRE OFFICER

Mrs N. Jabaar

Contract Research Staff**DR M. ROUAULT**

Ocean-atmosphere interaction

DR BJORN BACKEBERG

Regional ocean modeling, data assimilation

Emeritus Professors**PROFESSOR G.B. BRUNDRIT**

Operational oceanography

PROFESSOR J.G. FIELD

Marine Research Institute

Honorary Professors**PROFESSOR L.V. SHANNON**

Benguela ecosystem

Honorary Research Associates**DR S. BERNARD**

Optical oceanography

DR D. BYRNE

Agulhas Current

DR C. DUNCOMBE RAE

Coastal ocean dynamics

DR J. HERMES

Regional ocean modelling

DR P. MONTEIRO

Environmental oceanography

DR A. MAVUME

Tropical cyclones

DR M.J. KRUG

Agulhas current, remote sensing

DR K. BROWN

Marine ecologist

DR N.C. FAUCHEREAU

Climate Variability

DR K. HUTCHINGS

Fisheries specialist

DR R.W. LESLIE

Fisheries biologist

DR C. RUIZ-SEBASTIAN

Marine ecologist

DR C.J. ROY

Fisheries oceanography, upwelling systems

Postdoctoral Fellows**DR F. DUFOIS**

Coastal oceanography

Dr S. Swart

Southern ocean Biogeochemistry

Dr A. Tagliabue

Southern ocean Biogeochemistry

Dr A. Treasure

Ecological modeling, Southern ocean

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UCT web: <http://www.uct.ac.za>**Research output****Chapters in books**

Ansorge, I.J., Froneman, P. and Durgadoo, J.V. 2012. The marine ecosystem of the sub-Antarctic, Prince Edward Islands. In A. Cruzado (ed.), *Marine Ecosystems*, 61-76. Croatia: Intech. ISBN 9789535101765.

Articles in Peer-reviewed Journals

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- Dufois, F. and Rouault, M. 2012. Sea surface temperature in False Bay (South Africa): towards a better understanding of its seasonal and inter-annual variability. *Continental Shelf Research*, 43: 24-35
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- Matthews, M., Bernard, S. and Robertson, L. 2012. An algorithm for detecting trophic status (chlorophyll-), cyanobacterial-dominance, surface scums and floating vegetation in inland and coastal waters. *Remote Sensing of Environment*, 124: 637-652.
- McIntyre, T., Ansorge, I.J., Bornemann, H., Plotz, J., Tosh, C. and Bester, U. 2012. Elephant seal foraging dives do indeed track prey distribution, but temperature influences the distribution of prey: reply to Boersch-Supan et al. *Marine Ecology-Progress Series*, 461: 299-303.
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- Philippon, N., Rouault, M., Richard, Y. and Favre, A. 2012. The influence of ENSO on winter rainfall in South Africa. *International Journal of Climatology*, 32: 2333-2347.
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- Swart, S., Thomalla, S.J., Monteiro, P.M.S. and Ansorge, I.J. 2012. Mesoscale features and phytoplankton biomass at the GoodHope line in the Southern ocean during austral summer. *African Journal of Marine Science*, 34(4): 511-524.
- Swart, S., Chang, N., Fauchereau, N., Joubert, W., Lucas, M.I., Mtshali, T., Roychoudhury, A., Tagliabue, A., Thomalla, S.J., Waldron, H.N. and Monteiro, P.M.S. 2012. Southern ocean seasonal cycle experiment 2012: seasonal scale climate and carbon cycle links. *South African Journal of Science*, 108(3/4): 1-3.
- Tagliabue, A., Mtshali, T., Aumont, O., Bowie, A.R., Klunder, M.B., Roychoudhury, A.N. and Swart, S. 2012. A global compilation of dissolved iron measurements: focus on distributions and processes in the Southern ocean. *Biogeosciences*, 9: 2333-2349.

Peer-reviewed published conference proceedings

- Atkinson, L., Jarre, A.C., Shannon, L. and Field, J. 2012. Evidence for shifts in demersal fish populations on the west coast of South Africa: 1986 to 2009. In G.H. Kruse, et al. (eds), *Proceedings of the Symposium Ecosystem 2010: Global Progress on Ecosystem-Based Fisheries Management*, 8-11 November 2010, Alaska. Alaska: Alaska Sea Grant. ISBN 9781566121668.
- Byfield, V., Bernard, S., Dobson, M., Edwards, A.J., Louw, D.C., Oben, B.M., Robinson, I.S., Shaghude, Y. et al. 2012. Bilko and African capacity development in coastal and marine remote sensing. In: *Geoscience and Remote Sensing Symposium (IGARSS)*, 22-27 July 2012, Munich. Munich: IEEE International. ISBN 978146731160

Dufois, F., Rouault, M. 2012. The inter-annual variability of sea surface temperature in False Bay and the southern Benguela system. In: 28th Annual SASAS Conference Proceeding 2012. Bridging the gap, 26-27 September 2012, Cape Town (South Africa). Cape Town: South African Society for Atmospheric Sciences (SASAS).

Rouault, M., Roy, S.S. and Balling, R.C. 2012. The diurnal cycle of rainfall in South Africa in the austral summer. In: 28th Annual SASAS Conference Proceeding 2012. Bridging the gap, 26-27 September 2012, Cape Town (South Africa). Cape Town: South African Society for Atmospheric Sciences (SASAS).

Doctoral dissertations

Blamey, R.C. 2012. Mesoscale Convective Complexes oversouthern Africa. 295pp. Supervised by Reason, C.J.C.

Halo, I.F.M., Penven, P. 2012. The Mozambique Channel eddies: characteristics and mechanisms of formation. 200pp. Supervised by Ansorge, I. and Penven, P.

Hart, N., 2012. Synoptic-scale rainfall patterns over southern Africa: scale-interactions with large-scale modes of variability. 92pp. Supervised by Reason, C.J.C. and Fauchereau, N.

Nehama, F. 2012. Modelling the Zambezi River plume using the Regional Oceanic Modelling System. 177pp. Supervised by Reason, C.J.C.

Wainman, C. 2012. Estimating the upper ocean vertical temperature structure from surface temperature as applied to the southern Benguela. 135pp. Supervised by Shillington, F.A.

Department of Physics

HEAD OF DEPARTMENT: ASSOCIATE PROFESSOR
ANDY BUFFLER

Departmental Profile

The Department of Physics is accommodated in the R W James Building, which houses research laboratories equipped for nuclear physics, X-ray stress determination, computational physics and nanoelectronics production. Additional facilities available to the Department are provided within the building by the Electron Microscope Unit (Scanning Electron Microscope and Transmission Electron Microscope), and at iThemba LABS (200 MeV cyclotron, a 5 MeV Van de Graaff accelerator used for ion beam analysis, including a nuclear microprobe, high

resolution X-ray diffraction, and PET scanners adapted for positron emission particle tracking).

Major areas of interest include:

1. Experimental nuclear physics at iThemba LABS (D G Aschman, A Buffler, R W Fearick, M R Nchodu): (a) Gamma ray spectroscopy with the AFRODITE array; (b) Giant resonance reactions with the magnetic spectrometer; (c) Fast neutron physics
2. Theoretical Physics (J W A Cleymans, C A Dominguez, W A Horowitz, A Peshier, S M Perez, H W G Weigert, S M Wheaton and R D Viollier): (a) Research within the Centre for Theoretical and Mathematical Physics; (b) Structure of elementary particles; (c) Weak interactions; (d) Quantum Electrodynamics and Chromodynamics in vacuum at extreme temperatures and densities; (e) Renormalization group equations (Color Glass Condensate); (f) Nonlinear effects in QCD at high densities; (g) Phenomenology of heavy ion reactions; (h) Quark gluon plasma; (i) Nuclear structure and models
3. Experimental high energy physics (J W A Cleymans, R W Fearick, A Hamilton): (a) Research within the UCT-CERN Research Centre; (b) Relativistic heavy ion collisions within the ALICE collaboration at CERN; (c) High energy proton-proton collisions within the ATLAS collaboration at CERN
4. Nanophysics and solid state physics (M D Blumenthal, D T Britton, C M Comrie and M Härting): (a) Research within the Nanosciences Innovation Centre; (b) Structural and electrical properties of thin films; (c) X-ray diffraction studies of strain fields and residual stress analysis; (d) Single electron transport and interactions
5. Applied Physics (A Buffler, I Govender, M R Nchodu, S W Peterson, S M Wheaton): (a) Positron Emission Particle Tracking at PEPT Cape Town, iThemba LABS; (b) Particulate flow and interaction characterization in engineering and biological systems by computational and mechanistic modelling; (c) Radiation transport modelling in industrial and medical systems; (d) Applied nuclear physics using neutrons; (e) Geo-neutrino detection (EARTH collaboration)
6. Tertiary physics education (M S Allie, A Buffler and D Taylor): (a) Curriculum design and evaluation; (b) Role of language; (c) Understanding of measurement and uncertainty; (d) Modelling and visualization

Departmental Statistics

Permanent and Long Term Contract Staff

| | |
|---------------------|---|
| Professor | 3 |
| Associate Professor | 6 |
| Senior Lecturer | 2 |
| Lecturer | 5 |
| Part-time Lecturer | 1 |

| | |
|-------------------------------|----|
| Technical Staff | 4 |
| Administrative Staff | 4 |
| Departmental & Lab Assistants | 4 |
| Total | 30 |

Research Staff

| | |
|------------------------------|----|
| Honorary Professor | 1 |
| Emeritus Professor | 5 |
| Emeritus Associate Professor | 3 |
| Honorary Research Associate | 1 |
| Total | 10 |

Students

| | |
|---------------|------|
| Doctoral | 27 |
| Master's | 15 |
| Honours | 2 |
| Undergraduate | 1540 |
| Total | 1584 |

Staff and Research Fields

Permanent Staff

ASSOCIATE PROFESSOR A BUFFLER, HEAD OF DEPARTMENT

Experimental Nuclear Physics, Physics Education

ASSOCIATE PROFESSOR M S ALLIE (CHED)

Physics Education

PROFESSOR D G ASCHMAN

Experimental Nuclear Physics

ASSOCIATE PROFESSOR M D BLUMENTHAL

Solid State Physics

PROFESSOR D T BRITTON

Solid State Physics

ASSOCIATE PROFESSOR R W FEARICK

Experimental Nuclear Physics

DR I GOVENDER

Senior Lecturer; Applied Physics

DR A HAMILTON

Lecturer; Experimental Particle Physics

ASSOCIATE PROFESSOR M HÄRTING

Solid State Physics

DR W A HOROWITZ

Lecturer; Theoretical Particle Physics

MR G LEIGH

Part-time Lecturer

DR M R NCHODU

Lecturer; Experimental Nuclear Physics

PROFESSOR A PESHIER

Theoretical Physics

DR S W PETERSON

Lecturer; Applied Nuclear Physics

MS D TAYLOR (CHED)

Lecturer; Physics Education

ASSOCIATE PROFESSOR H W G WEIGERT

Theoretical Physics

DR S M WHEATON

Senior Lecturer; Computational Physics

Research Staff

EMERITUS PROFESSOR F D BROOKS

Experimental Nuclear Physics

EMERITUS PROFESSOR J W A CLEYMANS

Senior Research Associate, Theoretical Physics

ASSOCIATE PROFESSOR C M COMRIE

Solid State Physics

EMERITUS PROFESSOR C A DOMINGUEZ

Theoretical Particle Physics

PROFESSOR F E LUBBEN, (HRA)

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Theoretical Nuclear Physics

EMERITUS ASSOCIATE PROFESSOR P SPARGO

History of Science

EMERITUS PROFESSOR R D VIOLIER

Theoretical Particle Physics and Astrophysics

Honorary Research Associates

Dr Girma Gonfa, Haramaya University, Ethiopia

Dr Evariste Minani, Kigali Institute of Education, Rwanda

Professor Marcelo Loewe, University of Mainz, Germany

Professor Karl Schilcher, University of Mainz, Germany

Distinguished Visitors

Mr Stephan Gohl, Germany
 Professor Herbert Spiesberger, University of Mainz, Germany
 Professor Karl Schilcher, University of Mainz, Germany
 Dr Shadrack Nsengiyumva, University of Johannesburg, SA
 Dr Peter Egelhof, GSI, Germany
 Dr Zvi Citron, Weizmann Institute, Israel
 Dr Arnaud Ferrari, Uppsala University, Sweden
 Professor Sergio Colafrancesco, Wits University, SA
 Professor John Wood, Georgia Tech, USA
 Dr Neven Bilic, Boskovic Institute, Croatia
 Professor Daya Reddy, UCT & CERECAM
 Dr Habarulema, Dr De Villiers, Dr Oyeyemi and Ms Tshisaphungo, The South African National Space Agency
 Associate Professor Patrick Woudt, Astronomy Dept., UCT
 Dr Jeff Murugan, UCT Applied Math
 Professor Kristian Müller-Nedebock, University of Stellenbosch
 Dr Danish Azmi, University of Cape Town
 Dr Hugo Touchette, Queen Mary, University of London, UK
 Professor Ronald Bieniek, Missouri University of Science and Technology, USA
 Dr Gyorgy Wolf, KFKI Budapest, Hungary
 A. Oga & F. Adam, Greenpeace Africa
 Professor David Wolfe, University of New Mexico, US
 Professor Ketevi Assamagan, Brookhaven Nat Lab, US
 Professor Raju Venugopalan, Brookhaven Nat Lab, US
 Mr Chris Powell, UCT & Lawrence Berkeley Nat Lab, US
 Professor Gregory Beaucage, Director of NanoPower Africa and University of Cincinnati, USA
 Dr Jan Ilavsky, Argonne National Laboratory, USA
 Dr Greg Smith, Oak Ridge National Laboratory, USA
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Research output

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Department of Statistical Sciences

HEAD OF DEPARTMENT: ASSOCIATE PROFESSOR CHRISTIEN THIART

Departmental Profile

Statistical sciences are defined to include the traditional concepts of statistics as well as allied areas such as operation management research and decision modeling. The department is located academically in both the Faculties of Science and Commerce. Research within the department covers econometrics and financial modeling, biodiversity modelling, mathematical and theoretical statistics, operational research, reliability and geostatistics.

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| Senior Lecturers | 7 |
| Lecturers | 6 |
| Emeritus Professor | 3 |
| Emeritus Associate Professor | 1 |
| Scientific Officer | 1 |
| Administrative and Clerical Staff | 6 |
| Total | 29 |

Students

| | |
|------------------------------|------|
| Doctoral | 10 |
| Master's | 18 |
| Postgraduate service courses | 89 |
| Honours | 21 |
| Undergraduate | 4076 |
| Total | 4214 |

Research Fields and Staff

Permanent staff

PROFESSOR GRAHAM BARR

Econometrics and economic forecasting; financial modeling; problem gambling analysis.

PROFESSOR DAVE BRADFIELD

Financial modelling.

PROFESSOR TIM DUNNE

Generalized linear models; statistical methods in education and psychology.

EMERITUS PROFESSOR RENKUAN GUO

Reliability and quality; imprecise spatial analysis.

EMERITUS PROFESSOR LINDA HAINES

Optimal experimental design; extreme value theory; modelling count data; time series.

EMERITUS PROFESSOR THEODOR STEWART

Multicriteria decision analysis and multiobjective optimization; resource allocation and management.

ASSOCIATE PROFESSOR CHRISTIEN THIART

Head of Department; GIS and spatial modeling; mixed linear models.

ASSOCIATE PROFESSOR FRANCESCA LITTLE

Statistical modeling; Biostatistic; longitudinal Data analysis; Analysis of Causality; Analysis of time to event.

ASSOCIATE PROFESSOR SUGNET LUBBE

Multivariate statistics; Graphical displays; Biplots.

EMERITUS ASSOCIATE PROFESSOR JUNE JURITZ

Biostatistics, hierarchical generalised mixed models.

DR BIRGIT ERNI

Senior Lecturer; environmetrics; biometrics; generalized linear models; spatial statistics.

DR JUWA NYIRENDA

Senior Lecturer; operations research; management studies; simulation and Heuristics.

DR LEANNE SCOTT

Senior Lecturer; decision analysis; statistical methods in the social sciences and local government; operations research in developing countries.

MR KARL STIELAU

Senior Lecturer; sampling, ecological statistics and probability models.

DR IAN DURBACH

Senior Lecturer; decision analysis; risk and uncertainty.

DR FREEDOM GUMEDZE

Senior Lecturer; biostatistics; mixed linear models; longitudinal data analysis; survival analysis.

DR MELVIN VARUGHESE

Senior Lecturer; ecological modelling, statistical analysis of cosmological data; diffusion processes.

MR ALLAN CLARK

Lecturer; Bayesian analysis; Extreme value theory; Econometric modelling

MR GREG DISTILLER

Lecturer; biostatistics; statistical ecology.

DR MIGUEL LACERDA

Lecturer; bioinformatics; stochastic processes.

MS SHEETAL SILAL

Lecturer; Mathematical modeling of infectious disease; public health.

MR DOMINIQUE KATSHUNGA

Lecturer; Professional teacher; multivariate analysis; financial modelling.

MS HANNAH KROON

Lecturer; Professional teacher.

Contact Details

Postal address: Department of Statistical Sciences,
University of Cape Town, Private Bag X3, Rondebosch, 7701

Telephone: +27 21 650 3219

Fax: +27 21 650 4773

Web: <http://www.uct.ac.za/depts/stats/>

UCT General enquiries: +27 21 650 9111

UCT web: <http://www.uct.ac.za>

Research output**Articles in Peer-reviewed Journals**

Altwegg, R., Broms, K., Erni, B., Barnard, P., Midgley, G.F. and Underhill, L.G. 2012. Novel methods reveal shifts in migration phenology of barn swallows in South Africa. *Proceedings of the Royal Society B-Biological Sciences*, 279: 1485-1490.

Beach, R.A., Wilkinson, K., Gumedze, F.N. and Khumalo, N. 2012. Baseline sebum IL-1 is higher than expected in afro-textured hair: a risk factor for hair loss? *Journal of Cosmetic Dermatology*, 11: 9-16.

Beach, R.A., Wilkinson, K., Gumedze, F.N. and Khumalo, N.P. 2012. Sebum transforming growth factor B1 induced by hair products. *Archives of Dermatology*, 148(6): 764-766.

Distiller, G., Altwegg, R., Crawford, R., Klages, N.T.W. and Barham, B. 2012. Factors affecting adult survival and inter-colony movement at the three South African colonies of Cape gannet. *Marine Ecology-Progress Series*, 461: 245-255.

Dunne, T.T., Long, C., Craig, T.S. and Venter, E. 2012. Meeting the requirements of both classroom-based and systemic assessment of mathematics proficiency: the potential of Rasch measurement theory. *Pythagoras*, 33(3): 19.

Durbach, I.N. and Stewart, T.J. 2012. A comparison of simplified value function approaches for treating uncertainty in multi-criteria decision analysis. *Omega-International Journal of Management Science*, 40: 456-464.

Durbach, I.N. 2012. An empirical test of the evidential reasoning approach's synthesis axioms. *Expert Systems with Applications*, 39: 11048-11054.

Durbach, I.N. and Stewart, T.J. 2012. Modeling uncertainty in multi-criteria decision analysis. *European Journal of Operational Research*, 223: 15.

Guo, R., Cui, Y. and Guo, D. 2012. Uncertainty statistics. *Journal of Uncertain Systems*, 6(3): 12.

Hlozek, R., Kunz, M., Bassett, B.A., Smith, M., Newling, J., Varughese, M., Kessler, R., Bernstein, J.P., Campbell, H., Dilday, B., Falck, B., Frieman, J., Kuhlmann, S., Lampeitl, H., Marriner, J., Nichol, R.C., Riess, A.G., Sako, M. and Schneider, D. 2012. Photometric supernova cosmology with beams and sdss-11. *Astrophysical Journal*, 752: 79.

Kabera, G.M., Haines, L.M. and Ndlovu, P. 2012. A note on the construction of locally D- and Ds-optimal designs for the binary logistic model with several explanatory variables. *Statistics & Probability Letters*, 82: 865-870.

Khumalo, N. and Gumedze, F.N. 2012. The adapted classification of male pattern hair loss improves reliability. *Dermatology*, 225(2): 110-114.

Khumalo, N. and Gumedze, F.N. 2012. Traction: risk factor or coincidence in central centrifugal cicatricial alopecia? *British Journal of Dermatology*, 167(5): 1191-1193.

London, L., Beseler, C., Bouchard, M.F., Bellinger, D., Colosio, C., Grandjean, P., Harari, R., Kootbodien, T., Kromhout, H., Little, F., Meijster, T., Moretto, A., Rohlman, D.S. and Stallones, L. 2012. Neurobehavioral and neurodevelopmental effects of pesticide exposures. *Neurotoxicology*, 33: 887-896.

Moshabela, M., Schneider, H., Silal, S.P. and Cleary, S. 2012. Factors associated with patterns of plural healthcare utilization among patients taking antiretroviral therapy in rural and urban South Africa: a cross-sectional study. *BMC Health Services Research*, 12: 1-12.

Mustart, P.J., Rebelo, A.G., Juritz, J.M. and Cowling, M. 2012. Wide variation in post-emergence desiccation tolerance of seedlings of fynbos proteoid shrubs. *South African Journal of Botany*, 80: 110-117.

Newling, J., Bassett, B.A., Hlozek, R., Kunz, M., Smith, M. and Varughese, M. 2012. Parameter estimation with Bayesian estimation applied to multiple species in the presence of biases and correlations. *Monthly Notices of the Royal Astronomical Society*, 421: 913-925.

Peter, J., Theron, G., Van Zyl Smit, R., Haripersad, A., Mottay, L., Kraus, S., Binder, A.B., Meldau, R., Hardy, A. and Dheda, K. 2012. Diagnostic accuracy of a urine lipoarabinomannan strip-test for TB detection in HIV-Infected hospitalised patients. *European Respiratory Journal*, 40(5): 1211-1220.

Roberts, L., Passmore, J., Mlisana, K., Williamson, C., Little, F., Bebell, L.M., Walzl, G., Abrahams, M.H., Woodman, Z.L.,

Abdool Karim, Q. and Abdool Karim, S. 2012. Genital tract inflammation during early HIV-1infection predicts higher plasma viral load setpoint in women. *Journal of Infectious Diseases*, 205: 194-203.

Sharp, C., Barr, G.D.I., Ross, D.A., Bhimani, R., Ha, C. and Vuchinich, R. 2012. Social discounting and externalizing behavior problems in boys. *Journal of Behavioral Decision Making*, 25(3): 239-247.

Silal, S.P., Penn-Kekana, L., Harris, B., Birch, S. and McIntyre, D.E. 2012. Exploring inequalities in access to and use of maternal health services in South Africa. *BMC Health Services Research*, 12: 12.

Scriba, T.J., Tameris, M.D., Smit, E., Van der Merwe, L., Hughes, J., Kadira, B., Mauff, K.A.L., Moyo, S., Brittain, N., Lawrie, A., Mulenga, H., de Kock, M., Makhethhe, L., van Rensburg, J.E., Gelderbloem, S., Veldsman, A., Hatherill, M., Geldenhuys, H.D., Hill, A.V.S., Hawkridge, A.J., Hussey, G.D., Hanekom, W.A., McShane, H. and Mahomed, H. 2012. A phase IIA trial of the new tuberculosis vaccine, MVA85A, in HIV- and/or mycobacterium tuberculosis-infected adults. *American Journal of Respiratory and Critical Care Medicine*, 185(7): 769-778.

Master's degrees (by research)

Anyogu, A. 2012. The use of problem structuring methods to explore the functioning and management of a selected NGO. Master's. Supervised by Scott, L.

Cecchini, L. 2012. Robben Island penguin pressure model: A decision support tool for an ecosystems approach to fisheries management. Master's. Supervised by Scott, L.

Gavine, L. 2012. The use of environmental damage schedules and conjoint analysis in environmental valuation and decision making. Master's. Supervised by Stewart, T.

Timm, A. 2012. An investigation of multidimensional scaling with an emphasis on the development of an R based graphical user interface for performing multidimensional scaling procedures. Master's. Supervised by Lubbe, S.

Department of Zoology

(Including the FitzPatrick Institute, DST/NRF Centre of Excellence, the Marine Research Institute and the Animal Demography Unit)

HEAD OF DEPARTMENT: PROFESSOR ANUSUYA CHINSAMY-TURAN

Department Profile

The Zoology Department houses the Marine Biology Research Centre (MBRC), the Percy FitzPatrick Institute, DST/NRF Centre of Excellence (PFIAO); the Freshwater Research Unit (FRU) and the Animal Demography Unit (ADU). Other smaller cogent groups co-ordinate research on mammals, palaeobiology, entomology and physiology. The Department hosts South African Research Chairs in Evolution and Systematics and in Marine Ecology and Fisheries. The Department has a large postgraduate school of some 173 master's and doctoral students and a significant portion of the research publications produced by UCT originate from Zoology.

Research interests of the MBRC include fisheries and coastal zone management, rocky shore ecology, seaweed and invertebrate biodiversity and systematics, the biology of the Benguela upwelling ecosystem, and biogeochemical cycles of the ocean, particularly of carbon and nitrogen, and how such cycles may be impacted by climate change. The PFIAO remains primarily involved in avian research, coupled with a strong emphasis on conservation biology. Research in the FRU focuses on the ecology of freshwater ecosystems, and on the conservation and management of rivers and wetlands. The Animal Demography Unit focuses on statistical ecology, with two strands of activities: a series of monitoring projects for birds, butterflies and reptiles, and a cohort of postgraduate students with statistics-rich research projects relating to various aspects of population dynamics. Other research in the department is centred around: the behaviour, ecology, physiology, systematics and evolutionary biology of a variety of small mammals (mole rats, golden moles, rodents, bats), seals and primates; palaeobiology and osteohistology, including factors that affect bone depositional rates in modern birds and reptiles and the biological signals recorded in fossil bones of non-mammalian therapsids, mammals, dinosaurs and other archosaurs; the systematics and biogeography of insects and insect ecology in arid ecosystems; biological control, especially the use of herbivorous insects to curb the seeding capacity and invasiveness of problematic Australian acacia species; and physiological studies on

how small peptide hormones produced in nerve cells regulate energy metabolism, growth, development and reproduction in insects and crustaceans and how astaxanthin and chitin can be used in an economically viable way to deal with so-called waste products of the rock lobster industry.

Departmental Statistics

Permanent and Long-term Contract Staff

| | |
|-----------------------------------|----|
| Professors | 7 |
| Associate Professors | 9 |
| Senior Lecturers | 2 |
| Lecturers | 4 |
| Research Staff | 16 |
| Library Manager | 1 |
| Technical Support Staff | 4 |
| Scientific Officers | 5 |
| Administrative and Clerical Staff | 5 |
| Laboratory Assistants | 1 |
| Total | 54 |

Honorary Staff

| | |
|-------------------------------|----|
| Research Associates | 34 |
| Emeritus Professors | 4 |
| Emeritus Associate Professors | 3 |
| Professors | 4 |
| Total | 45 |
| Contract staff | 16 |

Students

| | |
|---------------|-----|
| Postdoctoral | 38 |
| Doctoral | 69 |
| Master's | 104 |
| Honours | 16 |
| Undergraduate | 560 |
| Total | 787 |

Research Fields and Staff

Permanent Academic Staff

PROFESSOR ANUSUYA CHINSAMY-TURAN

Head of Department. Palaeobiologist. Undertakes comparative bone and teeth histology of extant and extinct vertebrates (such as dinosaurs, Mesozoic birds, pterosaurs, nonmammalian therapsids, as well as, more recent Pliocene vertebrates).

ASSOCIATE PROFESSOR COLIN ATTWOOD

Marine protected areas; line fish population ecology.

DR JACQUI BISHOP

Lecturer. Evolutionary biology and conservation genetics.

DR GARY BRONNER

Senior Lecturer; systematics, ecology and conservation biology of African small mammals, with emphasis on endemic and threatened golden moles; Scientific Editor: African Zoology

PROFESSOR CHARLES GRIFFITHS

Director of the Marine Biology Research Centre; aquatic invasive alien species; biodiversity and endemism patterns of African marine fauna; coastal marine ecology; amphipod taxonomy

ASSOCIATE PROFESSOR JOHN HOFFMANN

Integrating biological control into the management of alien invasive weeds in South Africa

ASSOCIATE PROFESSOR DAVID JACOBS

DST & NRF Research Chair in Animal Evolution and Systematics. Evolutionary biology; behavioural ecology, systematics and evolutionary development; bats and other mammals

ASSOCIATE PROFESSOR ASTRID JARRE

DST & NRF Research Chair in Marine Ecology & Fisheries. Ecosystem modeling: ecosystem approach to fisheries management, collaboration between social and natural scientists

ASSOCIATE PROFESSOR MIKE LUCAS

Honorary Research Fellowship, National Oceanography Centre, Southampton, UK. UCT: biological oceanography; biogeochemical cycling; phytoplankton dynamics, carbon/nitrogen cycling and climate change. Research in the Benguela upwelling, North and South Atlantic and Southern Ocean ecosystems. South African Surface Ocean Lower Atmosphere Study (SOLAS) SSC

DR HEATHER MARCO

Lecturer; Neuropeptide purification/biochemistry; crustacean neuroendocrinology & physiology; insect neuroendocrinology; Convenor of second year Form and function (Ecophysiology) course. Alexander von Humboldt Foundation Research Fellow

ASSOCIATE PROFESSOR COLEEN MOLONEY

Plankton ecology; ecosystem dynamics; fisheries ecology; ecological modelling.

ASSOCIATE PROFESSOR JUSTIN O'RAIN

Social mammals; behavioural ecology; vertebrate reproduction

ASSOCIATE PROFESSOR MIKE PICKER

Insect ecology; insect biodiversity

DR DEENA PILLAY

Lecturer; estuarine ecology; rocky-shore ecology; benthic ecology, biological interactions

DR CECILE C. REED

Lecturer; Aquatic Parasitology, freshwater ecology and conservation

PROFESSOR LES UNDERHILL

Director Animal Demography Unit. Interfaces statistics and biology, in applications of statistics in the biological sciences, particularly ornithology and ecology

PROFESSOR GRAEME CUMMING

Chair of Conservation Biology. Landscape ecology, conservation biology, community ecology, resilience and complex systems theory

PROFESSOR TIM CROWE

Evolution; systematics; gamebird management; sustainable utilization of wildlife

PROFESSOR PHIL HOCKEY

Director, Percy Fitzpatrick Institute of African Ornithology. Avian evolutionary biology; shorebirds; migration; community ecology; behaviour; ecology of rarity

ASSOCIATE PROFESSOR PETER RYAN

Seabird-fishery interactions; avian evolutionary biology; marine pollution; behavioural ecology; island conservation

DR ARJUN AMAR

Raptor research, Rarity & conservation of African birds

Technical and Administrative Support Staff

George du Plessis – Chief Technical Officer
 Granville Faulmann – Workshop/Departmental Assistant
 Phelisa Hans – Niven Library Assistant
 Tania Celest Jansen – PFIAO CoE Senior Secretary
 Natalie Jodamus – SAP Administrator
 Margaret Koopman – Niven Library Manager
 Shanaaz Manie – Administrative Officer
 Meg Ledeboer – Administrative Officer
 Petra Muller – Chief Technical Officer
 Jo-Wayne Palmer – Senior Secretary
 Soraya Abrahams – Senior Secretary

Liesl Phigeland – Senior Scientific Officer

Andrea Plos – Principal Technical Officer

Hilary Buchanan – Administrative Assistant

Anthea Links – Departmental Assistant

F A C Impson – Scientific Officer

C A Kleinjan – Scientific Officer

V C Moran – Scientific Officer

R A NAVARRO – SCIENTIFIC OFFICER

Chris Tobler – Principal Technical Officer

Contract Research Staff**MR DOUG HAREBOTTLE**

SABAP2 Project Manager. Movement data for waterbirds in the African Eurasian flyway.

MS FIONA IMPSON

Development of insect agents for biological control of alien invasive plants.

MS CARIEN KLEINJAN

Evaluation of insect agents used for biological control of alien invasive plants.

DR HEATHER MALAN

Aquatic pollution; water quality; wetlands, sustainable urban drainage.

DR DIETER OSCHADLEUS

SAFRING Project Coordinator. African Weaver birds

MRS DONELLA YOUNG

CAR Project Coordinator. Coordinated Avifaunal Roadcounts; Long term monitoring of large terrestrial birds in agricultural landscapes

MRS GILLY SMITH

MBRC Research Officer

MR OSCAR FRANK NOELS**MR MICHAEL BROOKS****MRS MARJA THEA WREN-SARGENT****RENE ALDREDO NAVARRO****SUSAN KUYPER****MR JACOBUS JAN CLAASEN****MS SHAAMIELAH DAVIDS****MR EMLYN RHYS**

ROB LITTLE

Manager, Centre of Excellence, Percy Fitzpatrick Institute of African Ornithology
Behavioural ecology, population genetics, management and utilization of gamebirds

MR DAVID NKOSI

PFAIO Research Assistant

MS KATE MEARES

PFAIO Ground-Hornbill project manager

Emeritus Professors**EMERITUS PROFESSOR GEORGE BRANCH**

Rocky-shore ecology; estuarine and lagoonal ecology; invertebrate fisheries management; fisheries policy; subsistence fisheries; impacts of diamond-mining; coastal ecology

EMERITUS PROFESSOR GERD GÄDE

Invertebrates; isolation and characterization of neuropeptides; intermediary metabolism; anaerobic metabolism; insect flight and its control by hormones; mode of action of invertebrate neuropeptide hormones; phylogeny; confirmation of expression of genome predicted neuropeptides by mass spectrometric methods; spectrometric methods; cloning of neuropeptide precursors and their cognate receptors

EMERITUS PROFESSOR JOHN FIELD

Director Marine Research Institute

EMERITUS PROFESSOR W R SIEGFRIED

Former Director of the Percy FitzPatrick Institute

EMERITUS ASSOCIATE PROFESSOR BRYAN DAVIES

River ecology; ecosystem processes; ecological effects of dams and rivers; wetland ecology

EMERITUS ASSOCIATE PROFESSOR JENNY DAY

Director of the Freshwater Research Unit; freshwater ecology; bioassessment; crustaceans; wetlands, particularly temporary and saline waters; conservation and management of inland water ecosystems; water chemistry and water quality

EMERITUS ASSOCIATE PROFESSOR JENNIFER JARVIS

Small and subterranean mammal ecophysiology and ethology

Honorary Professors**PROFESSOR DAVID CUMMINGS**

Influence of land use policy and practice on biodiversity and resilience in social-ecological systems

PROFESSOR LARRY HUTCHINGS

Marine fisheries

PROFESSOR R J M CRAWFORD

Animal Demography Unit

Honorary research associates**DR RES ALTWEGG**

Statistical ecology

DR LARA ATKINSON**DR PAUL BARHAM**

Penguin survival

DR R BARLOW**DR BARRY CLARK****DR ROB CRAWFORD**

Ecosystem approach to fisheries (as it relates to seabirds) and the conservation and suitable utilization of South Africa's seabirds

DR A COCKROFT**DR MARIENNE DE VILLIERS**

SARCA Project Manager. Diversity and distribution of reptiles in South Africa, Lesotho and Swaziland.

DR DEON DURHOLTZ

Fish ageing, squid ageing, fisheries management

DR D Y GHEBREHWET**DR DAVID GRÉMILLET**

Visiting Research Associate. Functional ecology of marine birds. Ecophysiology of marine birds facing global change; functional and evolutionary ecology; avian energetic; biotelemetry; impact of marine fisheries; polar ecosystems; Benguela upwelling ecosystem.

DR H J HAWKINS**DR JENNY HUGGETT****DR ALAN KEMP**

Natural history, behavioral ecology and systematics of birds, especially hornbills, and diurnal and nocturnal raptors

DR SVEN KERWATH

DR R W LESLIE

EMERITUS PROFESSOR CLIFF MORAN

DR B PATERSON

DR GRANT PITCHER

DR JEAN-PAUL ROUX

Benguela system

DR T SAMAAI

DR CARL VAN DER LINGEN

Pelagic fish, fish feeding ecology, pelagic fisheries management

DR H VERHEYE

DR ROSS WANLESS

Seabird conservation; island restoration; invasive alien species; mitigation measures for avoiding seabird bycatch in fisheries; population biology and demography for conservation; seabird and insular ecology, remote tracking of seabirds at sea, marine protected areas and marine Important Bird Areas; genetics, taxonomy and conservation of the Aldabra Rail; conservation and ecological applications of stable light isotopes

DR INGRID WIESEL

DR TONY WILLIAMS

Seabird biology and conservation; the status and distribution of seabirds in Latin America; synanthropic ecology

DR P BARNARD

Birds & Environmental Change Partnership Programme, South African National Biodiversity Institute

DR A R RIDLEY

Cooperative Breeding and Sociality in Birds (including the Pied Babbler Research Project)

DR R SIMMONS

Raptor Research, Life History Strategies, Seabird Research, Climate Change Vulnerability and Adaptation

DR R M WANLESS

Seabird Conservation

DR J P ROUX

DR I WIESEL

DR A J WILLIAMS

Postdoctoral Fellows

DR LAURA BLAMEY

Coastal and fisheries ecology

DR FLORENT BLED

Dynamic macroecology in conservation

DR RUTLEDGE BOYES

Rarity and Conservation of African parrots

DR T R COOK

Seabird Research

DR AURORE CANOVILLE

Palaeobiology of early tetrapods

DR SUSAN CUNNINGHAM

Sub-lethal Effects of Climate Change on Desert Birds

DR FITSUM GEBRESELASSIE

Integrated population modelling

DR KATRIN LUDYNIA

Namibian seabirds in the Benguela System

DR ROWAN MARTIN

Parrot biology and conservation

DR ANGELA MEAD

Marine biodiversity

DR HILKKA NDJAULA

Modeling marine fisheries

DR GRAEME OATLEY

Phylogenetics and biogeography of the African white-eyes

DR LORIEN PICHEGRU

Marine Protected Areas for seabird foraging effort

DR TIMOTHY REID

Island Conservation & Seabird Research

DR RICHARD SHERLEY

Seabird biology

DR ANTJE STEINFURTH

Factors influencing the ecology of the African Penguin

DR KIRSTEN WIMBERGER

Animal behaviour

DR HENNING WINKER

Assessment of Fish Stocks

DR YAHKAT BARSHEP**DR ANNA BASTIAN****DR FLORENT HERVE BLED****DR RUTLEDGE STEPHEN BOYES****DR TIMOTHEE ROMAULD COOK****DR SUSAN JANE CUNNINGHAM****DR ALETTA DE VOS**

Spatial resilience of protected areas

DR THOMAS PATRICK FLOWER

Behavioural ecology

DR GARETH PETER HEMPSON**DR TALI SONIA HOFFMAN****DR SOPHIE ANNE KOHLER****DR ALAN TRISTAM LEE**

Birds & Environmental Change

DR KATRIN LUDYNIA**DR KRISTINE MACIEJEWSKI****DR THABISO MICHAEL MOKOTJOMELA****DR RALF HUBERTUS MULLERS**

Conservation of the Shoebill

DR LORIEN CAROLINE PICHEGRU

Seabird foraging ecology

DR RAGNA REDELSTORFF**DR TIMOTHY ADAM REID**

Island Conservation & Seabird Research

DR RICHARD BRIAN SHERLEY**DR ANTJE STEINFURTH****RESEARCH AFFILIATES****DR GEORDIE RACTLIFFE**

River and wetland impact assessment, management plans, rehabilitation and biomonitoring; Western Cape river systems; role of disturbance in invertebrate community structure

DR HELEN DALLAS

Water quality and bioassessment; development and validation of appropriate biomonitoring tools for river health monitoring, and aquatic biodiversity and conservation; development of the National River Health Program; development of national water quality guidelines for aquatic ecosystems; effects of temperature on aquatic ecosystems

MS NANCY JOB

Wetlands (delineation, functional assessment and rating, mitigation, law and policy), land-use and zoning review, analysis of aerial photography, GIS and mapping. Assessment and classification of streams

MR DEAN OLLIS

Testing, use and development of 'tools' for the assessment of freshwater ecosystems. Management of water resources, and the incorporation of ecological assessment in Environmental Impact Assessment (EIA)

DR E G DAY**DR J M KING****P PASHNEE****DR P BLOOMER**

Project Manager, DST/NRF at the Percy FitzPatrick Institute, University of Pretoria

DR R C K BOWIE

Project Manager, DST/NRF at the Percy FitzPatrick Institute, University of California-Berkeley

DR R COVAS

Cooperative Breeding & Sociality in Birds (Sociable Weaver Research Project)

DR A MCKECHNIE

Project Manager, DST/NRF at the Percy FitzPatrick Institute, University of Pretoria

DR A MILEWSKI

Interactions between plants and megaherbivores

DR M PINEIRO DE MELO

Systematics and Biogeography

DR P PISTORIUS

Project Manager, DST/NRF at the Percy FitzPatrick Institute, NMMU

DR C O'RYAN**DR L ROXBURGH**

Rarity and Conservation of African Birds

DR C SPOTTISWOODE**Contact details**

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Web: www.zoology.uct.ac.za

UCT General Enquiries: +27 21 650 9111

UCT web: <http://www.uct.ac.za>

Research output**Edited books**

Chinsamy-Turan, A. (ed.) 2012. *The Forerunners of Mammals: Radiation, Histology, Biology*. 330pp. Bloomington, USA: Bloomington: Indiana University Press. ISBN 9780253356970.

Chapters in books

Botha-Brink, J., Abdala, F. and Chinsamy-Turan, A. 2012. The radiation and osteohistology of nonmammaliaform cynodonts. In A. Chinsamy-Turan (ed.), *Forerunners of Mammals: Radiation, Histology, Biology*, pp. 223-246. Bloomington, Indiana, USA: Indiana University Press. ISBN 9780253356970.

Chinsamy-Turan, A. and Ray, S. 2012. Bone histology of some Theriocephalians and Gorgonopsians, and evidence of bone degradation by fungi. In A. Chinsamy-Turan (ed.), *Forerunners of Mammals: Radiation, Histology, Biology*, pp. 199-221. Bloomington, Indiana, USA: Indiana University Press. ISBN 9780253356970.

Chinsamy-Turan, A. 2012. The microstructure of bones and teeth of nonmammalian therapsids. In A. Chinsamy-Turan (ed.), *Forerunners of Mammals: Radiation, Histology, Biology*, pp. 65-88. Bloomington, Indiana, USA: Indiana University Press. ISBN 9780253356970.

Cumming, G.S. 2012. The resilience of big river basins. In M. Fisher and S. Cook (eds), *Water, Food and Poverty in River Basins: Defining the Limits*, pp. 63-95. London, UK: Routledge (Taylor & Francis Group). ISBN 0415592070.

Hurum, J. and Chinsamy-Turan, A. 2012. The radiation, bone histology, and biology of early mammals. In A. Chinsamy-Turan (ed.), *Forerunners of Mammals: Radiation, Histology, Biology*, pp. 249-270. Bloomington Indiana, USA: Indiana University Press. ISBN 9780253356970.

Jasinoski, S. and Chinsamy-Turan, A. 2012. Biological inferences of the cranial microstructure of the dicynodonts *Oudenodon* and *Lystrosaurus*. In A. Chinsamy-Turan (ed.), *Forerunners of Mammals: Radiation, Histology, Biology*, pp. 149-176. Bloomington Indiana, USA: Indiana University Press. ISBN 9780253356970.

Langmore, N.E. and Spottiswoode, C.N. 2012. Host manipulation through visual trickery in avian brood parasites. In D.P. Hughes, J. Brodeur and F. Thomas (eds), *Host Manipulation by Parasites*, pp. 95-109. United Kingdom: Oxford University Press. ISBN 97801964224.

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Doctoral dissertations

- Barquete, V. 2012. Using stable isotopes as a tool to understand the trophic relationships and movements of seabirds off southern Africa. 184pp. Supervised by Ryan, P.G.
- Joseph, G. 2012. Understanding pattern-process relationships in a heterogeneous landscape: effects of large termitaria on diversity and disturbance regimes in Miombo woodlands of northern Zimbabwe. 169pp. Supervised by Cumming, G.S.
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Master’s degrees (by research)

Brito, D. 2012. Evolution of the ZRS and the regulation of SHH expression in the forelimbs of bats. MSc.100pp. Supervised by Illing, N.

Van Eeden, R. 2012. Foraging ecology of the African penguin *Spheniscus demersus* in relation to ocean physical processes. MSc. 96pp. Supervised by Pichegru, L.