



FACULTY OF SCIENCE

Research in the Faculty of Science continues to go from strength to strength. Against a backdrop of the increasingly integrated nature of research, the past year saw our publication output grow and the international impact of our work improve.

DEAN'S REPORT

PROFESSOR ANTON LE ROEX



THE FACULTY'S RESEARCH OUTPUT CONTINUES TO GROW, BOTH IN QUANTITY AND QUALITY; ISI JOURNAL ARTICLES INCREASED BY SIX PERCENT OVER THE PREVIOUS YEAR.

164^{}
NRF-RATED RESEARCHERS

R113.42_M
VALUE OF RESEARCH
CONTRACTS

1 041^{}
REGISTERED POSTGRADUATES

The vast majority of staff in the Faculty of Science are actively involved in research programmes, and are located within 12 separate departments arranged on disciplinary grounds. There are 16 formal research units and centres within the Faculty of Science that are accredited by the University Research Committee. The faculty also supports 11 senior scholars, 10 DST/NRF SARCHI chairs, and 91 honorary research associates formally linked to departments.

These various staff, together with their postgraduate students, all contributed to the faculty's research output, which continues to grow, both in quantity and quality; ISI journal articles increased by six percent over the previous year.

A major development in 2013 was the merger of two previously separate departments, Botany and Zoology, to form the single Department of Biological Sciences. This important development reflects the change in nature of biological research where ecology, biodiversity and conservation biology increasingly reflect the integration of the previously separate disciplines of botany and zoology.

To facilitate their research, staff were successful in raising approximately R142 million from governmental and non-governmental sources, with income from the latter comprising close to R69 million of this total, 50% higher than that received in 2012. The number of research

contracts, at 226, was also significantly higher than in 2012 (145).

In addition, an injection of around R8 million from university sources was a very welcome relief to many in the faculty. Income 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 postgraduate and postdoctoral researchers continued to grow, with 388 PhD and 459 master's students registered in the faculty, and 153 postdoctoral fellows spread across the departments. The number of doctoral degrees awarded in 2013 was 59, and there were 142 master's degrees, 22% of the latter with distinction.

Two postgraduate students who excelled in their studies were James Lee-Thorp, Department of Mathematics and Applied Mathematics, who received the Southern Africa Association for the Advancement of Science (S2A3) Medal for his master's dissertation *Spectral Continuation Study of the Temporally Periodic Solitons of the Damped-Driven Nonlinear Schrödinger Equations*, and Dr Neil Hart, Department of Oceanography, who received the Faculty of Science PhD Medal for his thesis *Synoptic-scale Rainfall Patterns over Southern Africa: Scale interactions with large-scale modes of variability*.

The faculty strives to continually improve the international impact of its research. The latter can be gauged in a number of ways, one being the 2013 Quacquarelli Symonds World University Rankings by subject, where we were placed in the band of 101 to 150 top universities for the Biological Sciences and for Environmental Science, and in the band 50 to 100 for the Earth and Marine Sciences.

Another, wholly numerical, way to evaluate impact is to consider field normalised citation data. The 2013 Mouton Report (commissioned by UCT) showed that 14 science faculty disciplines have field normalised citation scores greater than 1 (which is the world average). It is also noteworthy that, in 11 of the 14 fields, the proportion of science faculty papers in the top 10% of cited articles worldwide is higher than the expected 10%. At a national level, some 40% of academic staff in the faculty are rated by the National Research Foundation as either international leaders (A-rated), or having strong international reputations (B-rated) or being outstanding young researchers with the potential to become world leaders (P-rated).

Staff in the science faculty continued to garner international and national recognition in 2013 for their

research contributions. Professor William Bond, Harry Bolus Professor of Botany, was elected as a Foreign Associate of the National Academy of Science in the USA (see p149). Professor Anusuya Chinsamy-Turan, head of the Department of Biological Sciences, was the recipient of the World Academy of Science Sub-Saharan Africa prize for the Public Understanding and Popularisation of Science.

THIS IMPORTANT
DEVELOPMENT REFLECTS
THE CHANGE IN NATURE
OF BIOLOGICAL RESEARCH
WHERE ECOLOGY,
BIODIVERSITY AND
CONSERVATION BIOLOGY
INCREASINGLY REFLECT
THE INTEGRATION OF THE
PREVIOUSLY SEPARATE
DISCIPLINES OF BOTANY
AND ZOOLOGY.



At a national level, Professor Kelly Chibale received the Medical Research Council Young Scientist Award (Silver Medal) in recognition of the excellence of his research in drug discovery, and specifically for leading the project team that discovered a potential new drug treatment for malaria (see p168).

Associate Professor Maano Ramutsindela, from the Department of Environmental and Geographical Science, received the prestigious National Research Foundation (NRF) Award for Transformation of the Science Cohort, which recognises black scientists for their efforts in overcoming challenges. The award is focused on transforming the science cohort to be more representative of South African demographics (see p149).

Dr Amanda Weltman, Department of Mathematics and Applied Mathematics, was awarded the Jubilee Silver Medal by the South African Institute of Physics. Professor Graeme Cumming, Department of Biological Sciences, won the prestigious S2A3 British–South Africa Association Medal (Silver) for his research on biodiversity and conservation biology (see p150).

Emeritus Associate Professor Jenny Day was awarded the South African Society of Aquatic Scientists Gold Medal – awarded on rare occasions in recognition of an exceptionally high standard of research in the aquatic sciences, or an exceptionally valuable contribution to the management, conservation or development of aquatic ecosystems or resources, over an extended period.


Within UCT, Dr Andrew Hamilton (Department of Physics) was the recipient of the College of Fellows Young Researcher Award for his research in high-energy particle physics, working in the ATLAS Collaboration at the European Centre for Nuclear Research (CERN) in Geneva.

THE ACADEMIC STAFF IS SUPPORTED BY MANY HIGHLY SKILLED AND DEDICATED ADMINISTRATIVE AND TECHNICAL STAFF.



The number and variety of research projects of international interest being undertaken by staff in the science faculty are too many to report on in this general, high-level introduction. Nevertheless, a glance through the list of publications emanating from the faculty provides insight into the many varied and exciting research projects that came to fruition during 2013.

In addition to research articles, books and book chapters that were published, three major international conferences were held at UCT and organised by staff in the faculty in 2013: the “Sixth International Conference: Hard and electromagnetic probes of high-energy nuclear collisions” (Theoretical Physics), the “Fourth Annual Symposium on Computing for Development” (Computer Science), and the Sixth International Conference on Information and Communication Technologies and Development (Computer Science). These important conferences contributed to improving our international visibility as a faculty.

The quality and research performance of the academic staff is supported by many highly skilled and dedicated administrative and technical staff. They make an invaluable contribution to the research endeavour of the faculty and without their skills, the range of exciting research activities reported on here would not be possible. 

FIRST LIGHT



Associate Professor Patrick Woudt from the Department of Astronomy has co-authored the first scientific paper based on observations performed with South Africa’s new KAT-7 radio telescope. The paper, which was accepted by the prestigious journal *Monthly Notices of the Royal Astronomy Society (MNRAS)*, was written with Dr Richard Armstrong, a UCT alumnus and Square Kilometre Array (SKA) South African Fellow at UCT, and Professor Rob Fender of the University of Southampton and a SKA visiting professor at UCT.

Titled “A Return to Strong Radio Flaring by Circinus X-1 Observed with the Karoo Array Telescope Test Array KAT-7”, the paper reports on observations of the neutron star binary Circinus X-1 in December 2011 and January 2012, which caught two successive bright radio flares from this unusual binary system. The project was a joint effort with the HartRAO radio telescope near Johannesburg and KAT-7.

South Africa is constructing MeerKAT, the 64-dish radio interferometer that serves as a precursor to the SKA. UCT researchers are leading four of the approved MeerKAT Key Science Projects, representing a quarter of MeerKAT time. One of these projects is the 3 000-hour ThunderKAT survey for astrophysical transients led by Associate Professor Woudt and Professor Fender, which will search for all types of radio bursts and flashes in KAT-7 and MeerKAT data on timescales from seconds to years.

Associate Professor Woudt obtained his PhD in Astronomy at UCT in 1998 and has published 74 peer-reviewed journal articles (27 as first author). His teaching and research career at UCT spans more than 12 years and includes supervising various BSc honours, MSc and PhD students. A member of the International Astronomical Union, Commission 19 (Astrophysics) of the International Union of Pure and Applied Physics and the Council of the South African Institute of Physics, he is the co-principal investigator of ThunderKAT.

FYNBOS CHAMPION GETS THE NOD FROM NAS

William Bond, the Harry Bolus Professor of Botany in the Department of Biological Sciences, has become just the fifth African scientist and third South African to be elected as a foreign associate of the United States' National Academy of Sciences (NAS). This award was, in particular, for his major contributions to the understanding of savannah grasslands and the role of fire in shaping their ecology.



Professor Bond, an ecologist with an interest in the processes that control large-scale vegetation, joins an elite group of eminent scientists from around the world. The NAS, which celebrated its 150th anniversary last year, is an independent body of approximately 2 200 members and 400 foreign associates. Nearly 200 members of this prestigious body are Nobel laureates.

Professor Bond and his colleagues in South Africa and elsewhere have shown that wildfires are a major force in shaping global vegetation – and have been for many millions of years.

“African vegetation is particularly interesting and challenging to study because of the complex interplay between climate, fire, large mammal herbivores, people, and increasing CO₂, the hidden hand of global change,” said the National Research Foundation (NRF) A-rated researcher.

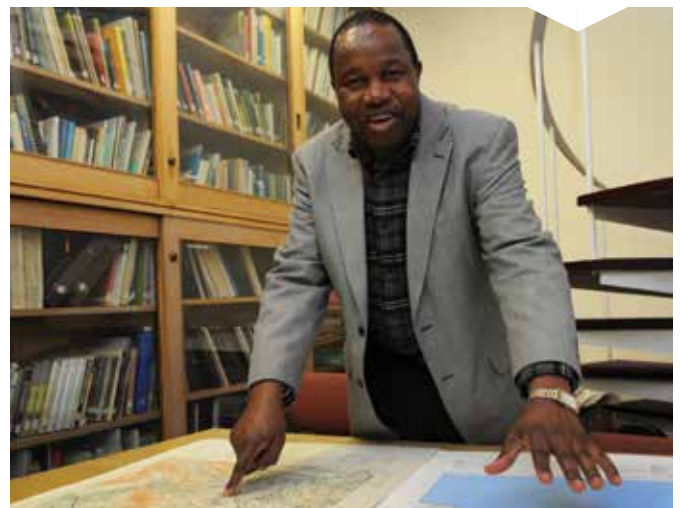
He joins Professor Richard Cowling, a conservation biologist at Nelson Mandela Metropolitan University, as the only two current South African foreign associates of the NAS. Africa (including Madagascar) has only four foreign associates. This year, Dr Meave Leakey from Kenya was also added as an associate.

AGAINST THE ODDS

Associate Professor Maano Ramutsindela of the Department of Environmental and Geographical Science won a National Research Foundation (NRF) Special Category Award in 2013 in recognition of his efforts in overcoming major challenges to get to where he is today. The award is focused on transforming the science cohort to be more representative of South African demographics.

As many black South Africans scientists can attest, the path to academic success is not always a smooth one. No-one knows this better than Associate Professor Ramutsindela. Born to a poor Limpopo family of seven children, he started his schooling at age nine in a mud building. After matriculating, he spent a year working as a full-time teacher assistant to raise money for his university fees. Studying under apartheid conditions when his alma mater (University of the North) was under siege by the South African security forces, Ramutsindela nonetheless managed 11 subject distinctions and went on to complete his honours degree, going abroad to do his PhD at Royal Holloway College of the University of London on a Canon Collins Trust Scholarship.

At UCT, he became one of the first group of social scientists to be awarded an NRF P-rating for young



researchers (usually under 40) in 2002, the first black geographer to edit the *South African Geographical Journal* and the first African to be elected a Fellow of the Society of South African Geographers. His work to transform the field has extended globally. As editorial board member for several leading journals, Associate Professor Ramutsindela is the representative of and voice for Africa on environmental and geographical matters. He has also earned international recognition, including the Distinguished Hubert H Humphrey Visiting Chair at Macalester College in the US.

IN THE HOT SEAT

Professor Daya Reddy has been elected as president of the Academy of Science of South Africa (ASSAf), a voluntary association of eminent South African scholars and scientists seeking to advance science in the country.



Professor Reddy, who holds the DST/NRF SARCHI Chair in Computational Mechanics in the Department of Mathematics and Applied Mathematics, was inaugurated as the president of the post late in 2012 and will hold it until 2016.

At ASSAf, he says he hopes to build on "the very solid foundation established by my predecessors". That will involve expanding the academy's international role, tackling substantive issues with kindred academies in Africa, the Americas, Asia and Europe. Another area he wants to expand is in relation to the academy's core mandate of providing evidence-based policy advice to government and other institutions, a commission in which Professor Reddy would like to see more ASSAf members involved.

In 2013, Professor Reddy also won the Georg Foster Research Award, worth €60 000, from the prestigious Alexander von Humboldt Foundation in Germany.

TWO BIRDS IN THE HAND

Conservation biologist Professor Graeme Cumming had reason to celebrate in 2013 with two top awards coming his way.

In June 2013, UCT's Pola Pasvolsky Chair in Conservation Biology clinched a prestigious NSTF-BHP Billiton TW Kambule award for his individual contributions to science, through research, over a period of five to 10 years.

Four months later, the Southern Africa Association for the Advancement of Science (S2A3) awarded him the British Association Medal (silver) for 2013. For the past 81 years, the S2A3 medal has been one of the highest awards made to young Southern African scientists for original research, and recognises outstanding capability and achievements in publications, discoveries or special skills.

"It's nice to have the recognition that what we're doing is important – and it's nice to give the work we do some publicity and prominence," says Professor Cumming.

Although Professor Cumming is based in the Percy FitzPatrick Institute of African Ornithology (Department of Biological Sciences), birds are only one focus of his broad range of research interests, which span landscape ecology, conservation biology, community ecology, resilience and complex systems theory. Among the programmes he runs is one on water birds and disease,



particularly avian influenza and avian malaria (birds are not vectors for human malaria) and potential vectors of human and avian influenza.

Avian flu has hit the ostrich industry hard. H5N2, a highly pathogenic strain, resulted in farmers culling large numbers of birds, particularly after the 2011 outbreak. To monitor this, Professor Cumming has been working with the state veterinarian on the movement of ostriches from farm to farm.

But much of his focus is on ducks as primary vectors of avian influenza. Using telemetry, ducks like Red-billed Teal and Egyptian Geese (which are actually a shelduck, a cross between a goose and a duck) are tagged to document their range and movements.

DOCTORAL GRADUATIONS

M.E.S. ABDELWAHAB (MATHEMATICS AND APPLIED MATHEMATICS)

Topics in modified gravity
Supervised by Professor P. Dunsby

A.H.A. ALFEDEEL (MATHEMATICS AND APPLIED MATHEMATICS)

The impact of inhomogeneity on the analysis of cosmological data
Supervised by Professor C. Hellaby

M.A.A. BAKHEET (MATHEMATICS AND APPLIED MATHEMATICS)

Two-patch herbivore/vegetation models with density-dependent migration
Supervised by Dr H. Laurie

E. BANDA (MOLECULAR AND CELL BIOLOGY)

Investigating the photoperiodic flowering of *impatiens balsamina* cv. Dwarf Bush flowered: for insights into the molecular basis for floral induction and reversion
Supervised by Dr L. Roden

F. BANDAMA (ARCHAEOLOGY)

The archaeology and technology of metal production in the Late Iron Age of the Southern Waterberg, Limpopo Province, South Africa
Supervised by Dr S. Chirikure and Dr S. Hall

O.K. BOYINBODE (COMPUTER SCIENCE)

Towards an interactive mobile lecturing model: a higher-level engagement for enhancing learning
Supervised by Dr A. Bagula and Associate Professor D. Ng'ambi

P. CHELLAN (CHEMISTRY)

The synthesis and study of multimetallic platinum group metal complexes as in vitro pharmacological agents
Supervised by Dr G. Smith and Professor K. Chibale

Y.S. CHEMERE (ARCHAEOLOGY)

Hominin technological behavior during the later middle Pleistocene in the Gademotta formation, main Ethiopian rift
Supervised by Dr D. Braun and Professor J. Sealy

C. CHEPKEN (COMPUTER SCIENCE)

Telecommuting in the developing world: a case of the day-labour market
Supervised by Professor E. Blake and Professor G. Marsden

E.R. CHIMUSA (MOLECULAR AND CELL BIOLOGY)

Mapping genes underlying ethnic differences in tuberculosis risk by linkage disequilibrium in the South African coloured population of the Western Cape
Supervised by Associate Professor N. Mulder

H.S. CLAYTON (CHEMISTRY)

Synthesis, structural studies, anticancer activity and computational studies of osmium arene complexes
Supervised by Associate Professor A. Hutton and Dr G.S. Smith

C. COLLINS (OCEANOGRAPHY)

The dynamics and physical processes of the Comoros Basin
Supervised by Professor C. Reason and Dr J. Hermes

O.E. CURTIS (BOTANY)

Management of critically endangered renosterveld fragments in the Overberg, South Africa
Supervised by Professor W. Bond and Dr S. Todd

C. EDMONDS-SMITH (CHEMISTRY)

The development of a process and quality control methods for conjugate vaccine against streptococcus pneumoniae serotype 1
Supervised by Associate Professor N. Ravenscroft and Dr S. Wilson

P.N. EZE (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

Reconstruction of environmental and climate dynamics using multi-proxy evidence from palaeosols of the Western Cape, South Africa
Supervised by Professor M. Meadows and Dr F. Eckardt

B.S. FRANK (ASTRONOMY)

The dynamics of molecular gas in nearby galaxies
Supervised by Professor C. Carignan, Professor W.J.G. de Block and Dr D. Sherperd

J. FREDERICK (MOLECULAR AND CELL BIOLOGY)

Genetic characterization of *Rhodococcus rhodochrous* ATCC BAA-870 with emphasis on nitrile hydrolysing enzymes
Supervised by Professor T. Sewell and Professor D. Brady

L.A. GIBSON (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

The application of the surface energy balance system model to estimate evapotranspiration in South Africa
Supervised by Dr F. Eckardt, Dr C. Jarman and Dr Z. Su

A.A. GIDELEW (MATHEMATICS AND APPLIED MATHEMATICS)

Beyond the concordance cosmology
Supervised by Professor P. Dunsby

S.W. GITAU (COMPUTER SCIENCE)

Designing ummeli a case for mediated design, a participatory approach to designing interactive systems for semi-literate users

Supervised by Professor G. Marsden and Dr J. Donner

B.J. GRIESHABER (MATHEMATICS AND APPLIED MATHEMATICS)

Locking-free discontinuous Galerkin methods for problems in elasticity, using linear and multilinear approximations

Supervised by Professor D. Reddy

J.F. GUAMBE (BIOLOGICAL SCIENCES)

An assessment of the use of nuclear microprobe techniques in pollution studies: quantification of elemental concentrations in fish scales

Supervised by Emeritus Professor J. Day and Professor M. Mars

I.F.M. HALO (OCEANOGRAPHY)

The Mozambique channel eddies: characteristics and mechanisms of formation

Supervised by Dr I. Ansorge, Dr P. Penven and Dr S. Bernard

C.D. JACK (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

A Lagrangian moisture source attribution model and analysis of southern Africa

Supervised by Professor B. Hewitson

D. JAPPIE-MAHOMED (CHEMISTRY)

Urinary glycosaminoglycans and their possible protective role in calcium oxalate kidney stone disease, with particular reference to the rarity of this condition in black South Africans: in vitro and in vivo investigations

Supervised by Professor A. Rodgers and Associate Professor N. Ravenscroft

B.S. KAPLAN (BIOLOGICAL SCIENCES)

In pursuit of panacea: mitigating human-baboon conflict in the Cape Peninsula, South Africa

Supervised by Associate Professor J. O'Riain

I.M. LADEIRA (COMPUTER SCIENCE)

Simulating storyteller-audience interactions in digital storytelling: questions, exchange structures & story objects

Supervised by Professor G. Marsden and Dr L. Green

M.C. LAIRD (ZOOLOGY)

Taxonomy, systematics and biogeography of South African actiniaria and corallimorpharia

Supervised by Professor C. Griffiths

B. MAGUNJE (PHYSICS)

Charge transport in printed silicon nanoparticle networks

Supervised by Professor D. Britton and Professor M. Härting

T. MAHAMO (CHEMISTRY)

Iminophosphine complexes of palladium and platinum: catalysis and metallacycloalkanes synthesis

Supervised by Dr G. Smith, Professor Dr K Lammertsma and Professor S.F. Mapolie

G.A. MAURE (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

Effects of biomass-burning aerosol loading on southern African climate

Supervised by Dr M. Tadross and Professor B. Hewitson

M.M. MOHAJANE (CHEMISTRY)

Dipeptides as potential anti-inflammatory drugs for rheumatoid arthritis

Supervised by Professor G. Jackson

R. MUGWANYA (COMPUTER SCIENCE)

Software support for creating mobile content for education

Supervised by Professor G. Marsden and Professor J. Traxler

A.A. MULLER (OCEANOGRAPHY) CROSS-SHORE

exchange in the northern Benguela and the related role of upwelling filaments

Supervised by Professor C. Reason, Dr V. Mohrholz and Dr M. Schmidt

G. MUNYUKI (CHEMISTRY)

Molecular mechanism of action of tyrocidine antimicrobial peptides using NMR spectroscopy and computational techniques

Supervised by Professor G. Jackson and Dr G. Venter

M.M.A. MUSTAFA (COMPUTER SCIENCE)

Mixed-language Arabic-English information retrieval

Supervised by Associate Professor H. Suleman

J.M. NYAGA (BIOLOGICAL SCIENCES)

Nutritional contribution of atmospheric deposition to the Strandveld vegetation of West Coast South Africa

Supervised by Professor M. Cramer, Associate Professor J.C. Neff and Associate Professor J.S. Compton

V. NYAU (MOLECULAR AND CELL BIOLOGY)

Nutraceutical antioxidant potential and polyphenolic profiles of the Zambian market classes of bambara groundnuts (*Vigna subterranea* L. Verdc) and common beans (*Phaseolus vulgaris* L.)

Supervised by Professor J. Farrant and Dr J.R. Rodrigues

A.M.K. NZIOKI (MATHEMATICS AND APPLIED MATHEMATICS)

A study of solutions and perturbations of spherically symmetric spacetimes in fourth order gravity

Supervised by Professor P. Dunsby

S.M. OKANGA (BIOLOGICAL SCIENCES)

Influences of host community, water quality and urbanization on avian malaria ecology in South Africa

Supervised by Professor G. Cumming and Professor P. Hockey

C.P. OLIVIER (MATHEMATICS AND APPLIED MATHEMATICS)

The direct scattering study of the parametrically driven nonlinear Schrödinger equation

Supervised by Dr N. Alexeeva

S.J. PERKINS (COMPUTER SCIENCE)

Field D* Pathfinding in weighted simplicial complexes

Supervised by Dr P. Marais and Dr J. Gain

R.M. PHAROAH (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

Sometimes I think the shack was better": examining flood-risk in subsidised housing areas in Cape Town

Supervised by Associate Professor S. Oldfield and Dr A. Holloway

L.J. QUICK (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

Late quaternary palaeoenvironments of the southern Cape, South Africa: palynological evidence from three coastal wetlands

Supervised by Professor M. Meadows and Dr B.M. Chas

A.F. RAJOELIMANANA (ASTRONOMY)

Long-term properties of X-ray binaries in the magellanic clouds

Supervised by Professor P.A. Charles and Professor B. Warner

W.M.L. ROBINSON (MATHEMATICS AND APPLIED MATHEMATICS)

Modeling the impact of the South African small pelagic fishery on African penguin dynamics

Supervised by Emeritus Professor D. Butterworth and Dr É. E Plagányi

M.I. SAMUELS (BOTANY)

Pastoral mobility in a variable and spatially constrained South African environment

Supervised by Professor T. Hoffman and Dr N. Allsopp

J.M. SHAW (ZOOLOGY)

Power line collisions in the Karoo: conserving Ludwig's bustard

Supervised by Associate Professor P. Ryan and Dr A. Jenkins

J.M. SHELTON (BIOLOGICAL SCIENCES)

Impacts of non-native rainbow trout on stream food webs in the Cape Floristic Region, South Africa: integrating evidence from surveys and experiments

Supervised by Emeritus Professor J. Day, Professor M.J. Samways and Dr S. Lowe

M.A. STANKIEWICZ (PHYSICS)

Physics of low and intermediate spin states of atomic nuclei in the mass A~160 region

Supervised by Professor D. Aschman and Dr R.A. Bark

H.C. STARK (MOLECULAR AND CELL BIOLOGY)

Targeted expression of the anti-HIV microbicide lectin griffithsin in maize and tobacco

Supervised by Professor E. Rybicki and Dr R. Chikwamba

J. TANGKUAMPIEN (COMPUTER SCIENCE)

A community-based approach to new medium integration in South African education: a combination of ICT4D process approach and ethnographic action research techniques

Supervised by Professor G. Marsden

A.M. THOMPSON (BIOLOGICAL SCIENCES)

Post-fledging begging and development in Southern pied babblers (*Turdoides bicolor*)

Supervised by Associate Professor P. Ryan and Dr N. Raihani

O.C. UMEH (MATHEMATICS AND APPLIED MATHEMATICS)

The influence of structure formation on the evolution of the universe

Supervised by Professor C. Clarkson and Professor G.F.R. Ellis

M.G. WALLACE (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

Modelling the impact of future climate change on subregional wheat production in the Western Cape

Supervised by Dr M. Tadross

S. WILLIAMS (ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE)

Beyond rights: developing a conceptual framework for understanding access to coastal resources at Ebenhaeser and Covie, Western Cape, South Africa

Supervised by Associate Professor M. Sowman and Professor T. Dietz

R.I. WILLIAMSON (OCEANOGRAPHY)

Estimating the spatial and temporal variability of primary production from a combination of in situ and remote sensing data: a southern Benguela case study

Supervised by Professor J. Field, Professor F.A. Shillington, Associate Professor A. Jarre and Dr A. Potgieter

Y. ZHANG (PHYSICS)

Applications of QCD sum rules at finite temperature
Supervised by Professor C. Dominguez and Professor A. Peshier

PATENTS

Filed applications

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Britton, D.T., Harting, M., Odo, A.E. Inkjet Printing of Nanoparticulate Functional Inks. National Phase Patent Application United States 12/995,916.

Chibale, K., Nchinda, A.T., Sturrock, E.D. Angiotensin I-Converting Enzyme (ACE) Inhibitors. National Phase Patent Application Canada 2,609,811.

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De Wit, M.J., Gilder, S.A. The Genesis of a Diamond. National Phase Patent Application South Africa 2011/09252.

Egan, T.J., Hunter, R., Zishiri, V.K. Quinoline Compounds Containing A Dibemethin Group. National Phase Patent Application ARIPO AP/P/2011/005602.

Hitzeroth, I.I., Maclean, J.M., Rybicki, E.P., Williamson, A-L. Expression of Proteins in Plants. National Phase

Patent Application China 200680014202.5.

Hitzeroth, I.I., Maclean, J.M., Rybicki, E.P., Williamson, A-L. Expression of Proteins in Plants. National Phase Patent Application United States 11/912,912.

Hunter, R., Kaschula, C.H., Parker, M.I. Organosulfur Compounds, a Method of Making Organosulfur compounds and their Use for Inhibiting the Growth of Tumor Cells. National Phase Patent Application United States 13/057,960.

Jardine, M.A., Makhubela, B.C.E., Smith, G.S. A Polymer Support. National Phase Patent Application South Africa 2012/02047.

Jardine, M.A., Makhubela, B.C.E., Smith, G.S. A Polymer Support. National Phase Patent Application United States 13/496,116.

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

Rybicki, E.P., Tanzer, F.L. Expression System Incorporating a Capsid Promoter Sequence as an Enhancer of a Cytomegalovirus Promoter. National Phase Patent Application ARIPO AP/P/2008/004476.

Rybicki, E.P., Tanzer, F.L. Expression System Incorporating a Capsid Promoter Sequence as an Enhancer. National Phase Patent Application United States 12/084,728.

Rybicki, E.P., Varsani, A.D. Chimaeric Human Papillomavirus 16 L1 Virus Like Particles and a Method for Preparing the Particles. National Phase Patent Application Canada 2,486,450.

DEPARTMENT OF ARCHAEOLOGY

Head of Department: Emeritus Professor John Parkington

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.

Departmental Statistics

Permanent and long-term contract staff

Emeritus Professor	1
Professor	1
Associate Professor	1
Senior Lecturers	2
Lecturers	3
Technical Support Staff	2
Administrative and Clerical Staff	1
Departmental Assistant	1
Lab Assistant	1
Total	13

Honorary staff

Honorary Research Associates	10
Total	10

Students

Postdoctoral	2
Doctoral	14
Masters	10
Honours	9
Undergraduates	628
Total	663

Research Fields and Staff

Permanent Academic staff

EMERITUS PROFESSOR JOHN PARKINGTON

Head of Department. Hunter-gatherers, palaeoenvironmental reconstruction and human ecology, prehistoric art, coastal archaeology

PROFESSOR JUDITH SEALY

Archaeometry, stable isotopes, precolonial southern Africa

ASSOCIATE PROFESSOR REBECCA ROGERS

ACKERMANN

Hominid evolution, variation, morphometrics, visualization and modelling, quantitative methods

DR DAVID BRAUN

Senior lecturer: Early Stone Age in eastern and southern Africa, stone artefact technology

DR SHADRECK CHIRIKURE

Senior lecturer: Archaeometallurgy, Iron Age, heritage studies

DR SIMON HALL

Senior lecturer: hunter-gatherers and farmers, Stone/Iron Age interaction, landscape sharing

DR RIASHNA SITHALDEEN

Lecturer: Primate biogeography using genetic techniques, academic development in the geosciences

DR DEANO STYNDER

Lecturer: African fauna, faunal analysis, ecomorphology, palaeoenvironments

DR ALEXANDRA SUMNER

Lecturer: Lithic analysis, human cognitive evolution

Emeritus Professor

PROFESSOR NIKOLAAS J. VAN DER MERWE

Isotopes, palaeodiets, palaeoenvironments, archaeometallurgy

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

DR ALEX MACKAY

Middle Stone Age, stone artefact technology

PROFESSOR TIM MAGGS

Iron Age archaeology in southern Africa

DR WEBBER NDORO

Heritage Studies

DR JAYSON ORTON

Later Stone Age, stone artefacts, cultural resource management

PROFESSOR LARISSA SWEDELL

Primatology

PROFESSOR SUSAN PFEIFFER

Biological anthropology

Postdoctoral Research Fellows

DR MARINA IGREJA

Stone tool use-wear analysis, techno-economic strategies, behavior of early modern humans.

DR ASHLEY COUTU

Isotope ecology, bio-archaeology, historical archaeology

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

DR BENJAMIN COLLINS

University of Toronto at Scarborough – Zooarchaeology, Middle and Later Stone Age

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Research Output

Chapters in books

Bandama, F. 2013. A reappraisal of Stone Age hunter gatherer research in Zimbabwe with a special focus on the later periods in eastern Zimbabwe. In M. Manyanga and S. Katsamudanga (eds), *Zimbabwean Archaeology in the Post-Independence Era*, pp. 17-35. Harare: SAPES Books. ISBN 9780797456341.

Braun, D.R., Levin, N., Roberts, D.L., Stynder, D.D., Forrest, F., Herries, A., Matthews, T., Bishop, L., Archer, W. and Pickering, R. 2013. Initial investigations of Acheulean hominin behaviour at Elandsfontein. In A.M.S. Jerardino, D.R. Braun and A. Malan (eds), *The Archaeology of the West Coast of South Africa*, pp. 10-23. Oxford: Archaeopress. ISBN 9781407311449.

Chirikure, S., Thondhlana, T.P. and Bandama, F. 2013. Pre-colonial mining and metal working in southern Africa: an overview with specific reference to Zimbabwe. In M. Manyanga and S. Katsamudanga (eds), *Zimbabwean Archaeology in the Post-Independence Era*, pp. 143-158. Harare: SAPES Books. ISBN 9780797456341.

Chirikure, S. 2013. The archaeology of African metalworking. In P. Michell and P. Lane (eds) *The Oxford Handbook of African Archaeology*, pp. 131-143. Oxford: Oxford University Press. ISBN 9780199569885. Deacon, J., Walker, S.J. and Wiltshire, N. 2013. Conservation of South Africa's West Coast archaeological heritage. In A.M.S. Jerardino, D.R. Braun and A. Malan (eds), *The Archaeology of the West Coast of South Africa*, pp. 155-163. Oxford: Archaeopress. ISBN 9781407311449.

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Mguni, S. 2013. God's termites' nests and trees as overlapping concepts in the Khoesan cosmology and belief system. In M. Manyanga and S. Katsamudanga (eds), *Zimbabwean Archaeology in the Post-Independence Era*, pp. 37-59. Harare: SAPES Books. ISBN 9780797456341.

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Braun, D.R., Levin, N.E., Stynder, D.D., Herries, A.I.R., Archer, W., Forrest, F., Roberts, D.L., Bishop, L.C., Matthews, T., Lehmann, S.B., Pickering, R. and Fitzsimmons, K. 2013. Mid-Pleistocene hominin occupation at Elandsfontein, Western Cape, South Africa. *Quaternary Science Reviews*, 82: 145-166.

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AD rain control site in the Shashe-Limpopo confluence area of South Africa. *Azania-Archaeological Research in Africa*, 48(1): 111-132.

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de Ruiter, D.J., DeWitt, T.J., Carlson, K.B., Brophy, J.K., Schroeder, L., Ackermann, R.R., Churchill, S.E. and Berger, L.R. 2013. Mandibular remains support taxonomic validity of *Australopithecus sediba*. *Science*, 340(6129): 1232997(4pp).

Djagoun, C.A.M.S., Codron, D., Sealy, J.C., Mensah, G.A. and Sinsin, B. 2013. Stable carbon isotope analysis of the diets of West African bovids in Pendjari Biosphere Reserve, Northern Benin. *South African Journal of Wildlife Research*, 43(1): 33-43.

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- Koleini, F., Prinsloo, L., Schoeman, M., Pikirayi, I. and Chirikure, S. 2013. Characterization of the corrosion layer on iron archaeological artefacts from K2 (825-1220 AD), an archaeological site in South Africa. *Studies in Conservation*, 58(3): 274-282.
- Lin, S.C., Rezek, Z., Braun, D.R. and Dibble, H.L. 2013. On the utility and economization of unretouched flakes: the effects of exterior platform angle and platform depth. *American Antiquity*, 78(4): 724-745.
- Orton, J., Mitchell, P., Klein, R., Steele, T. and Horsburgh, K. A. 2013. An early date for cattle from Namaqualand, South Africa: implications for the origins of herding in southern Africa. *Antiquity*, 87: 108-120.
- Orton, J. 2013. Geometric rock art in western South Africa and its implications for the spread of early herding. *South African Archaeological Bulletin*, 68(197): 27-40.
- Parkington, J.E., Rigaud, J., Poggenpoel, C.A., Porraz, G. and Texier, P. 2013. Introduction to the project and excavation of Diepkloof rock shelter (Western Cape, South Africa): a view on the Middle Stone Age. *Journal of Archaeological Science*, 40: 3369-3375.
- Parkington, J.E., Fisher, J. and Kyriacou, K. 2013. Limpet gathering strategies in the Later Stone Age along the Cape West Coast, South Africa. *Journal of Island & Coastal Archaeology*, 8: 91-107.
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- Porraz, G., Parkington, J.E., Rigaud, J., Miller, C., Poggenpoel, C.A., Tribolo, C., Archer, W., Cartwright, C., Charrié-Duhaut, A., Dayet, D., Igreja, M., Mercier, N., Schmidt, P., Verna, C. and Texier, P. 2013. The MSA sequence of Diepkloof and the history of southern African Late Pleistocene populations. *Journal of Archaeological Science*, 40(9): 3542-3552.
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- Schmidt, P., Porraz, G., Slodczyk, A., Bellot-gurlet, L., Archer, W. and Miller, C. 2013. Heat treatment in the South African Middle Stone Age: temperature induced transformations of silcrete and their technological implications. *Journal of Archaeological Science*, 40: 3519-3531.
- Stynder, D.D. and Kupczik, K. 2013. Tooth root morphology in the early Pliocene African bear *Agriotherium africanum* (Mammalia, Carnivora, Ursidae) and its implications for feeding ecology. *Journal of Mammalian Evolution*, 20: 227-237.
- Sumner, T.A. 2013. A refitting study of late Early to Middle Stone Age lithic assemblages from the site of Kudu Koppie, Limpopo Province, South Africa. *Journal of African Archaeology*, 11(2): 133-153.
- Texier, P., Porraz, G., Parkington, J.E., Rigaud, J., Poggenpoel, C.A. and Tribolo, C. 2013. The context, form and significance of the MSA engraved ostrich eggshell collection from Diepkloof Rock Shelter, Western Cape, South Africa. *Journal of Archaeological Science*, 40: 3412-3431.
- Tribolo, C., Mercier, N., Douville, E., Joron, J., Reyss, J., Rufer, D., Cantin, N., Lefrais, Y., Miller, C., Porraz, G., Parkington, J.E., Rigaud, J. and Texier, P. 2013. OSL and TL dating of the Middle Stone Age sequence at Diepkloof Rock Shelter (South Africa): a clarification. *Journal of Archaeological Science*, 40: 3401-3411.
- Van Der Merwe, N.J. 2013. Isotopic ecology of fossil fauna from Olduvai Gorge at ca 1.8 Ma, compared with modern fauna. *South African Journal of Science*, 109(11/12): 2013-0105(14pp).
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- Will, M., Parkington, J.E., Kandel, A.W. and Conard, N. 2013. Coastal adaptations and the Middle Stone Age lithic assemblages from Hoedjiespunt 1 in the Western Cape, South Africa. *Journal of Human Evolution*, 64: 518-537.

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.

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	5
Total	13.1

Honorary & Emeritus Staff

Honorary Professor	1
Total	1

Affiliated Researchers

Honorary Professors	3
Honorary Academic	1
Total	4
Postdoctoral Fellows	15
Total	15

Students

Doctoral	18
Masters (Research)	1
Masters (NASSP Dissertation)	15
Masters (NASSP Coursework)	14
Honours (NASSP)	16
Undergraduate	153
Total	217

Research Fields and Staff

Permanent Academic 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.

ADJUNCT PROFESSOR PATRICIA WHITELOCK

Joint SAAO/UCT position: Galactic structure, stellar evolution, Local Group galaxies, long period variable and symbiotic stars.

ASSOCIATE PROFESSOR PATRICK A. WOUTD

Deputy Head of Department: Cataclysmic variable stars, ultra-compact binaries, high time domain astrophysics.

DR KURT VAN DER HEYDEN

Senior Lecturer Director NASSP (from 1 July 2013): 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.

Emeritus Professor/Senior Scholar

EMERITUS DISTINGUISHED PROFESSOR BRIAN WARNER

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

Contract Staff

PROFESSOR ROB FENDER

Visiting SKA Professor: X-ray binaries, neutron stars, black holes, accretion discs, 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 discs.

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 (until 30 June 2013), Co-director ACGC
Theoretical cosmology and gravity.

Honorary Professor Ted Williams (Director, SAAO)
Galaxy dynamics

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 MICKAËL CORIAT

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

DR MICHELLE CLUVER

Galaxy evolution as traced by interactions in the group environment

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 TANA JOSEPH

Extra galactic x-ray binaries

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.

DR LEE TOWNSEND

X-ray binaries, massive stars and magellanic clouds.

Contact Details

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Research Output

Chapters in books

Feast, M.W. 2013. Galactic distance scales. In T.D. Oswalt (ed), *Planets, Stars and Stellar Systems*, pp. 829-877. Netherlands: Springer Netherlands. ISBN 9789400756113.

Articles in peer-reviewed journals

Angus, G., Diaferio, A., Famaey, B. and Van Der Heyden, K. 2013. Cosmological simulations in MOND: the cluster scale halo mass function with light sterile neutrinos. *Monthly Notices of the Royal Astronomical Society*, 436: 202-211.

Appleton, P.N., Guillard, P., Boulanger, F., Cluver, M.E., Ogle, P., Falgarone, E., Pineau des Forts, G., O'Sullivan, E., Duc, P.-A., Gallagher, S., Gao, Y., Jarrett, T., Konstantopoulos, I., Lisenfeld, U., Lord, S., Lu, N., Peterson, B.W., Struck, E., Sturm, E., Tuffs, R., Valchanov, I., van der Werf, P. and Xu, K.C. 2013. Shock-enhanced C+ emission and the detection of H2O from the Stephan's Quintet group-wide shock using HERSCHEL. *Astrophysical Journal*, 777(66): (16pp) DOI: 10.1088/0004-637X/777/1/66.

Armstrong, R., Fender, R., Nicolson, G.D., Ratcliffe, S., Linares, M., Horrell, J., Richter, L., Schurch, M., Coriat, M., Woudt, P.A., Jonas, J., Booth, R. and Fanaroff, B. 2013. A return to strong radio flaring by Circinus X-1 with the Karoo array telescope test array KAT-7. *Monthly Notices of the Royal Astronomical Society*, 433: 1951-1957.

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DEPARTMENT OF BIOLOGICAL SCIENCES

(Including the Bolus Herbarium, The Plant Conservation Unit, The Percy FitzPatrick Institute of African Ornithology DST/NRF Centre of Excellence, The Marine Research Institute and The Animal Demography Unit, ADU)

Head of Department: Professor Anusuya Chinsamy-Turan

Departmental Profile

The Department of Biological Sciences was established in 2013 as a result of the merger between the long standing Botany and Zoology Departments. Our aim is to be recognised as a high quality biodiversity research and teaching department, with strong interdisciplinary research that understands and manages biodiversity resources in the face of climate change both locally and globally.

Thirty three academic staff, several research associates and at least 32 support staff make up our staff complement. In addition there are 43 postdoctoral research fellows, and 223 postgraduate students, 26 Honours students and 982 undergraduate students. Our Department is home to The Percy FitzPatrick Institute for African Ornithology, a DST/NRF Centre of Excellence, as well as to the Animal Demography Unit, the Bolus Herbarium and library, and the Plant Conservation Unit. The Seaweed Unit of the Department of Environmental Affairs & Tourism Chief Directorate: Fisheries Branch, Inshore Research is also housed in our Department, under Hon A/Prof Robert J Anderson. The Marine Research Institute (Ma-Re) is jointly hosted by our department and the Department of Oceanography.

The vision of the **Percy FitzPatrick Institute for African Ornithology** is to be a leading international research and postgraduate training institute in the fields of ornithology and conservation biology, with particular emphasis on African issues. To achieve this, the Institute undertakes scientific studies involving birds that contribute to the theory and practice affecting the maintenance of biological diversity and the sustained use of biological resources. Current research programmes can be broadly placed within the themes of Characterising Biodiversity, Evolutionary Ecology and Maintaining Biodiversity. The Institute is home to the Niven Library, which holds Africa's most comprehensive collection of ornithological books and papers.

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.

The mission of the **Animal Demography Unit** is to contribute to the understanding of animal populations, especially population dynamics, and thus provide input to their conservation. They achieve this through mass participation projects, long term monitoring, innovative statistical modelling and population-level interpretation of results. The emphasis is on the curation, analysis, publication and dissemination of data.

Located within an academic environment, the focus of the Bolus Herbarium is to aid in the teaching and research of the diversity of the southern African flora, particularly that of the Cape Floristic Region. With a collection of over 350,000 specimens, it is the third largest herbarium in South Africa and the third largest university Herbarium in the southern Hemisphere. The collection is recognized for its superb representation of the Cape Flora and the large number of type specimens housed.

The **Marine Research Institute** (Ma-Re) exists as an interdepartmental (and interfaculty) network linking staff and postgraduate students involved in marine research at UCT. Its research activities typically require the production of knowledge that draws on inputs (in planning) and outputs (based on specialist knowledge) that span disciplines and are problem-/ solution-oriented. To date, there has been good progress made in research arenas involving social-ecological systems linked to fisheries, in the development and use of indicators to track marine ecosystem changes, and in the use of satellite data, biophysical modelling and field measurements to understand variability in marine primary production in the region.

Besides the above focused research units, our department also hosts South African Research Chairs in Evolution and Systematics, and in Marine Ecology and Fisheries, and there are several other smaller groups that coordinate independent research on animals and plants in terms of conservation, ecology, evolution, systematics, physiology and their response to global climate change. A central theme that binds our research is our unique geographical location which we consider as a gateway to terrestrial biodiversity, as well as to the Atlantic, Indian, Southern and Antarctic oceans.

Departmental Statistics

Permanent and long-term contract staff

Professors	10
Associate Professors	13
Senior Lecturers	4
Lecturers	6
Scientific Staff	4
Technical Support Staff	7
Administrative and Clerical Staff	21
Contract Research Staff	11
Total	76

Honorary Staff

Honorary Professors	5
Honorary Assoc. Professors	3
Honorary Research Associates	36
Emeritus Professors	5
Emeritus Associate Professors	3
Total	52

Research Affiliates	13
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Students

Postdoctoral	43
Doctoral	92
Master's	131
Honours	26
Undergraduate	562
Total	1274

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).

PROFESSOR JOHN J. BOLTON

The biodiversity, biogeography, ecology, systematics and resource use of marine algae; marine aquaculture

PROFESSOR WILLIAM J. BOND

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

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 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

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.

PROFESSOR JEREMY MIDGLEY

Plant ecology; evolutionary biology; forest ecosystem dynamics.

ASSOCIATE PROFESSOR COLIN ATTWOOD

Marine protected areas; line fish population ecology.

ASSOCIATE PROFESSOR MICHAEL D. CRAMER

Physiology; ecophysiology; plant nutrition.

ASSOCIATE PROFESSOR EDMUND FEBRUARY

Senior Lecturer: palaeoecology; ecophysiology.

ASSOCIATE PROFESSOR LINDSEY GILLSON

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

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

ASSOCIATE PROFESSOR COLEEN MOLONEY

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

ASSOCIATE PROFESSOR JUSTIN O'RIAIN

Social mammals; behavioural ecology; vertebrate reproduction

ASSOCIATE PROFESSOR MIKE PICKER

Insect ecology; insect biodiversity

ASSOCIATE PROFESSOR PETER RYAN

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

ASSOCIATE PROFESSOR ANTHONY G. VERBOOM

Senior Lecturer: Plant systematics, ecophysiology, biogeography.

DR ARJUN AMAR

Raptor research, Rarity & conservation of African birds

DR JACQUELINE 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

DR SAMSON B. CHIMPHANGO

Lecturer: Physiology; nitrogen fixation.

DR LESEGO KHOMO

Lecturer: Soil Science

DR LAWRENCE KRUGER

Lecturer: Savanna ecology, particularly elephant impacts on vegetation structure, biodiversity consequences.

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

DR A. MUTHAMA MUASYA

Senior Lecturer: plant systematics; molecular systematics; biogeography.

DR ADAM WEST

Lecturer: Ecophysiology, climate change, stable isotopes.

Emeritus Professors /Senior Scholars

EMERITUS PROFESSOR/SENIOR SCHOLAR

GEORGE BRANCH

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

EMERITUS PROFESSOR/ SENIOR SCHOLAR

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/SENIOR SCHOLAR

LES UNDERHILL

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

EMERITUS PROFESSOR JOHN FIELD

Former Director Marine Research Institute

EMERITUS PROFESSOR W R SIEGFRIED

Former Director of the Percy FitzPatrick Institute

Emeritus Associate Professors

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

Technical and Administrative Support Staff

TERRY H TRINDER-SMITH – PRINCIPAL SCIENTIFIC OFFICER

CORNELIA KLAKE – PRINCIPAL SCIENTIFIC OFFICER

DAWOOD HATTAS – PRINCIPAL SCIENTIFIC OFFICER

LIESL PHIGELAND – CHIEF SCIENTIFIC OFFICER

GREGORY DUGGAN – SENIOR SCIENTIFIC OFFICER

ANDREA PLOS – PRINCIPAL TECHNICAL OFFICER

CHRIS TOBLER – PRINCIPAL TECHNICAL OFFICER

GONZALO AQUILAR – PRINCIPAL TECHNICAL OFFICER

GEORGE DU PLESSIS – CHIEF TECHNICAL OFFICER

PETRA MULLER – CHIEF TECHNICAL OFFICER

MICHAEL BROOKS – SENIOR TECHNICAL OFFICER

DESMOND BARNES – SENIOR TECHNICAL OFFICER

ROB LITTLE – MANAGER: DST/NRF CENTRE FOR EXCELLENCE

SAROJINI I PILLAY – ADMIN MANAGER

NATALIE JODAMUS – SAP ADMINISTRATOR

TANIA CELESTE JANSEN – SENIOR SECRETARY

SORAYA ABRAHAMS – SENIOR SECRETARY

TAMARA NOZEWU – SENIOR SECRETARY

ELLENOR SALO – SENIOR SECRETARY

SANDY SMUTS - ADMINISTRATIVE ASSISTANT

ANTHEA STAIN – ADMINISTRATIVE ASSISTANT

GRANVILLE FAULMANN – WORKSHOP/ DEPARTMENTAL ASSISTANT

NAZLI DAVIDS – DEPARTMENT ASSISTANT

GUGULETHU NJ GININDZA - DEPARTMENT ASSISTANT

ZAMIKAYA JIKUMLAMBO – LABORATORY ASSISTANT

SUSAN KUYPER – EXECUTIVE ASSISTANT

HILARY BUCHANAN – ADMINISTRATIVE ASSISTANT

ANTHEA LINKS – ADMINISTRATIVE ASSISTANT

MARGARET KOOPMAN – NIVEN LIBRARY MANAGER

CHARLENE J CHRISTIAN – HERBARIUM ASSISTANT

RENE A NAVARRO – INFORMATIONS SYSTEMS CONSULTANT

HANS-DIETER OSCHADLEUS – RINGING CO-COORDINATOR

VINCENT MORAN – CONSULTANT

MRS GILLIAN SMITH - MARINE BIOLOGY

Contract Research Staff

DR LYNNE J SHANNON

DR HENNING WINKER - ASSESSMENT OF FISH STOCKS

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.

JOHANNA M LOT – RESEARCH ASSISTANT

CHRISTINE MOORE -PROJECT MANAGER: SPATIAL RESILIENCE OF PROTECTED AREAS

JOHAN C CARSTENS – RESEARCH ASSISTANT

SHAAMIELAH DAVIDS – RESEARCH TECHNICIAN

SAMUEL L JACK – RESEARCH ASSISTANT

Research Affiliates

PROF. P BLOOMER

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

A/PROF. R C K BOWIE

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

DR R COVAS

Cooperative breeding & sociality in birds (Sociable Weaver Research Project)

DR A JENKINS

Raptor research programme, rarity & conservation of African birds

PROF. A MCKECHNIE

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

DR C O'RYAN

Project Leader (Department of Molecular and Cell Biology, UCT)

DR L ROXBURGH

Rarity and conservation of African birds

DR C SPOTTISWOODE

Evolutionary ecology of avian clutch parasitism

Honorary Professors

PROFESSOR DAVID CUMMING

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

PROFESSOR LARRY HUTCHINGS

Marine fisheries

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.

ASSOCIATE PROFESSOR R J M CRAWFORD

Animal Demography Unit

ASSOCIATE PROFESSOR R ALTWEGG

Statistical ecology

Honorary Research Associates

DR A BALME

Carnivore Conservation

DR PAUL BARHAM

Penguin survival

DR P BARNARD

Birds & Environmental Change Partnership Programme, S A National Biodiversity Institute

DR N BERGH

Systematics

PROF D BORCHERS

Statistical ecology

DR P CARRICK

Restoration ecology

DR ROB CRAWFORD

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

DR H DALLAS

River health monitoring

DR M DE VILLIERS

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

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

Protea Ecophysiology

DR S KERWATH
Line fish research

DR S KIRKMAN

DR C KLAK
Aizoaceae curation/taxonomy

DR F KRUGER
Forest /Conservation/Ecology

DR H MALAN
Freshwater Research

DR Q MARTINS
Leopard conservation & human/wildlife conflict research

DR L MATTIO
Seaweed Molecular systematics

DR B PATERSON

DR L PICHEGRU
Island Closure Task Team (Department of Agriculture, Forests and Fisheries)

DR A R RIDLEY
Cooperative breeding and sociality in birds (including the Pied Babbler Research Project)

DR J-P ROUX
Benguela system

DR C SAVAGE
Coastal and estuarine ecosystems

DR G SCOTT
Traditional medicine plants

DR A SEYDACK
Forest ecology

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

DR J SLINGSBY
Global change impacts on fynbos

PROF C STIRTON
Plant systematics

DR S TODD
Land use/climate change impacts

DR L WALLER

DR R M WANLESS
Seabird conservation; island restoration; invasive alien species; mitigation measures for avoiding seabird bycatch in fisheries; marine protected areas and marine Important Bird Areas

DR I WIESEL

DR ANTHONY J WILLIAMS
Seabird biology and conservation; the status and distribution of seabirds in Latin America; synanthropic ecology

Postdoctoral Fellows

DR SANTIAGO ANDRES-SANCHEZ

DR MORAG AYERS

DR YAHKAT BARSHEP

DR ANNA BASTIAN

DR AMY BETZELBERGER

DR LAURA BLAMEY
Coastal and fisheries ecology

DR RUTLEDGE STEVE BOYES
Rarity and Conservation of African parrots

DR MARIETTE BRAND

DR AURORE CANOVILLE
Palaeobiology of early tetrapods

DR TRISTAN CHARLES-DOMINIQUE

DR VALERIE CLARK

DR T R COOK
Seabird Research

DR BOGDAN CRISTESCU

DR SUSAN CUNNINGHAM
Sub-lethal Effects of Climate Change on Desert Birds

DR SOFIE DE MEYER

DR ALETTA DE VOS
Spatial resilience of protected areas

DR SERENA DOOL

DR MARTHA FLOWER
Sexual selection in Pied Babblers

DR THOMAS PATRICK FLOWER

Behavioural ecology

DR FITSUM GEBRESELISSIE

Integrated population modelling

DR ELEANORE HELLARD

Circulation of avian malaria within communities of wetland-associated birds in southern Africa

DR GARETH PETER HEMPSON

DR SOPHIE ANNE KOHLER

DR ALAN LEE

Birds & Environmental Change

DR BENNY LEMAIRE

DR AINHOA LEZAMA OCHOA

DR KATRIN LUDYNIA

Namibian seabirds in the Benguela System

DR KRISTINE MACIEJEWSKI

Contribution of protected areas towards conservation of biodiversity

DR LYDIANE MATTIO

DR THABISO MICHAEL MOKOTJOMELA

DR RALF MULLERS

Conservation of the Shoebill

DR LLOYD NACKLEY

DR HILKKA NDJAULA

Modeling marine fisheries

DR RAGNA REDELSTORFF

DR TIMOTHY REID

Island Conservation & Seabird Research

DR RICHARD SHERLEY

Seabird biology

DR SANDY-LYNN STEENHUISEN

DR ANTJE STEINFURTH

Factors influencing the ecology of the African Penguin

DR GENEVIEVE THOMPSON

DR MALIKA VIRAH-SAWMY

DR NATASCHA VISSER

DR FLORIAN WELLER

DR KIRSTEN WIMBERGER

Animal behaviour

Research Output

Chapters in books

Anderson, T., Draper, K., Duggan, G., Green, L.J., Jarre, A.C., Rogerson, J., Ragaller, S. and Norton, M. 2013. Conservation conversations: improving the dialogue between fishers and fisheries science along the Benguela coast. In L. Green (ed), *Contested Ecologies: Dialogues in the South on Nature and Knowledge*, pp. 187-201. Cape Town: HSRC Press. ISBN 9780796924285.

Gade, G. and Marco, H. 2013. AKH/RPCH peptides. In *Handbook of Biologically Active Peptides*, pp. 185-190. Amsterdam: Academic Press. ISBN 9780123694423.

Herbstein, T.P.W., Froestad, J., Nel, D.C. and Shearing, C.D. 2013. Insurance, climate-risk and the barriers to change. *Business and Climate Change Governance: South Africa in comparative perspective*, pp. 156-172. Hampshire, England: Palgrave Macmillan. ISBN 9780230235977.

Midgley, J.J. and Bond, W.J. 2013. Plant adaptations to fire: an evolutionary perspective. In C. Belcher (ed), *Fire Phenomena and the Earth System. An Interdisciplinary Guide to Fire Science*, pp. 125-134. UK: Wiley-Blackwell. ISBN 9780470657485.

Pillay, D., Bownes, S.J. and Nel, H.A. 2013. Benthic invertebrates. In R. Perissinotto, D.D. Stretch and R.H. Taylor (eds), *Ecology and Conservation of Estuarine Ecosystems*, pp. 227-245. New York: Cambridge University Press. ISBN 9781107019751.

Articles in peer-reviewed journals

Abad, F.X., Busquets, N., Sanchez, A., Ryan, P.G., Majo, N. and Gonzalez-Solis, J. 2013. Serological and virological surveys of the influenza A viruses in Antarctic and sub-Antarctic penguins. *Antarctic Science*, 25(2): 339-344.

Abdala, F., Jasinowski, S. and Fernandez, V. 2013. Ontogeny of the early triassic cynodont thrinaxodon liorhinus (therapsida): dental morphology and replacement. *Journal of Vertebrate Paleontology*, 33(6): 1408-1431.

Achterberg, E.P., Moore, C.M., Henson, S.A., Steigenberger, S.S., Stohl, A., Eckhardt, S., Avendano, C., Cassidy, M., Hembury, D., Klar, J.K., Lucas, M.I., Macey, A.I., Marsay, C.M. and Ryan-Keogh, T.J. 2013.

- Natural iron fertilization by the Eyjafjallajökull volcanic eruption. *Geophysical Research Letters*, 40: 921-926.
- Alstrom, P., Barnes, K., Olsson, U., Barker, F., Bloomer, P., Khan, A.A., Qureshi, M.A., Guillaumet, A., Crochet, P.A. and Ryan, P.G. 2013. Multilocus phylogeny of the avian family Alaudidae (larks) reveals complex morphology evolution, non-monophyletic genera and hidden species diversity. *Molecular Phylogenetics and Evolution*, 69: 1043-1056.
- Altwegg, R., Doutrelant, C., Anderson, M., Spottiswoode, C.N. and Covas, R. 2013. Climate, social factors and research disturbance influence population dynamics in a declining sociable weaver metapopulation. *Oecologia*, 7: 413-425.
- Amosu, A.O., Robertson-Andersson, D.V., Maneveldt, G.W., Anderson, J. and Bolton, J.J. 2013. South African seaweed aquaculture: a sustainable development example for other African coastal countries. *African Journal of Agricultural Research*, 8(43): 5268-5279.
- Chambers, L., Altwegg, R., Barbraud, C., Barnard, P., Beaumont, L.J., Crawford, R.J.M., Durant, J.M., Hughes, L., Keatley, M.R., Low, M., Morellato, P.C., Poloczanska, E.S., Ruoppolo, V., Vanstreels, R.E.T., Woehler, E. and Wolfaardt, A.C. 2013. Phenological changes in the southern hemisphere. *PLoS One*, 8(10): e75514 DOI: 10.1371/journal.pone.0075514.
- Abadi, F., Botha, A. and Altwegg, R. 2013. Revisiting the effect of capture heterogeneity on survival estimates in capture-mark-recapture studies: does it matter? *PLoS One*, 8(4): e62636.
- Katz, E., Tolley, K.A. and Altwegg, R. 2013. Survival and abundance of Cape dwarf chameleons, *Bradypodion pumilum*, inhabiting a transformed, semi-urban wetland. *Herpetological Journal*, 23: 179-186.
- Amar, A., Koeslag, A. and Curtis, O. 2013. Plumage polymorphism in a newly colonized black sparrowhawk population: classification, temporal stability and inheritance patterns. *Journal of Zoology*, 289: 60-67.
- Authier, M., Peron, C., Mante, A., Vidal, P. and Gremillet, D. 2013. Designing observational biologging studies to assess the causal effect of instrumentation. *Methods in Ecology and Evolution*, 4: 802-810.
- Balme, G. and Hunter, L.T.B. 2013. Why leopards commit infanticide. *Animal Behaviour*, 86: 791-799.
- Barlow, R., Lamont, T., Britz, K. and Sessions, H. 2013. Mechanisms of phytoplankton adaptation to environmental variability in a shelf ecosystem. *Estuarine Coastal and Shelf Science*, 133: 45-57.
- Barquete, V., Ryan, P.G. and Strauss, V. 2013. Stable isotope turnover in blood and claws: a case study in captive African penguins. *Journal of Experimental Marine Biology and Ecology*, 448: 121-127.
- Barshep, Y. and Manu, S.A. 2013. Breeding phenology and moult of the endemic Bannerman's Weaver *Ploceus bannermani*. *Ostrich*, 84(3): 231-233.
- Barshep, Y., Underhill, L.G., Balachandran, S. and Pearson, D.J. 2013. Conditions on the non-breeding areas affect primary moult strategy of the curlew sandpiper *calidris ferruginea*. *Ardea*, 101: 13-22.
- Barshep, Y., Minton, C.D.T., Underhill, L.G., Erni, B. and Tomkovich, P. 2013. Flexibility and constraints in the moult schedule of long distance migratory shorebirds: causes and consequences. *Ecology and Evolution*, 3(7): 1967-1976.
- Bates, M.F. and Little, I. 2013. Predation on the eggs of ground-nesting birds by *Dasypeltis scabra* (Linnaeus, 1758) in the moist highland grasslands of South Africa. *African Journal of Herpetology*, 62(2): 125-134.
- Beale, C.M., van Rensberg, S., Bond, W.J., Coughenour, M., Fynn, F., Gaylard, A., Grant, R., Harris, B., Jones, T., Mduma, S., Owen-Smith, N. and Sinclair, A.R.E. 2013. Ten lessons for the conservation of African savannah ecosystems. *Biological Conservation*, 167: 224-232.
- Bennett, B. and Kruger, F.J. 2013. Ecology, forestry and the debate over exotic trees in South Africa. *Journal of Historical Geography*, 42: 100-109.
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- Best, L., Attwood, C.G., da Silva, C. and Lamberth, S.J. 2013. Chondrichthyan occurrence and abundance trends in False Bay, South Africa, spanning a century of catch and survey records. *African Zoology*, 48(2): 201-227.
- Bird, M., Mlambo, M. and Day, J.A. 2013. Macroinvertebrates as unreliable indicators of human disturbance in temporary depression wetlands of the south-western Cape, South Africa. *Hydrobiologia*, 720: 19-37.
- Bird, M., Day, J.A. and Rebelo, A.J. 2013. Physico-chemical impacts of terrestrial alien vegetation on temporary wetlands in a sclerophyllous sand fynbos ecosystem. *Hydrobiologia*, 711: 115-128.

- Blamey, L., Plaganyi-Lloyd, E.E. and Branch, G.M. 2013. Modeling a regime shift in a kelp forest ecosystem caused by a lobster range expansion. *Bulletin of Marine Science*, 89(1): 347-375.
- Blamey, L., Howard, J., Agenbag, J. and Jarre, A.C. 2012. Regime-shifts in the southern Benguela shelf and inshore region. *Progress in Oceanography*, 106: 80-95.
- Bled, F.H.B., Nichols, J.D. and Altwegg, R. 2013. Dynamic occupancy models for analyzing species' range dynamics across large geographic scales. *Ecology and Evolution*, 3(15): 4896-4909.
- Boast, L.K., Houser, A.M., Good, K. and Gusset, G.M. 2013. Regional variation in body size of the cheetah (*Acinonyx jubatus*). *Journal of Mammalogy*, 94(6): 1293-1297.
- Bolton, J.J., Davies-Coleman, M.T. and Coyne, V.E. 2013. Innovative processes and products involving marine organisms in South Africa. *African Journal of Marine Science*, 35(3): 449-464.
- Bonato, M., Evans, M.R., Hasselquist, D., Sherley, R., Cloete, S.W.P. and Cherry, M.I. 2013. Ostrich chick humoral immune responses and growth rate are predicted by parental immune responses and paternal colouration. *Behavioral Ecology and Sociobiology*, 67: 1891-1901.
- Borges, L., Bruneau, A., Cardoso, D., Crisp, M., Delgado-Salinas, A., Doyle, J.J., Egan, A., Herendeen, P.S., Hughes, C., Kenicer, G., Klitgaard, B., Koenen, E., Lavin, M., Lewis, G., Luckow, M., Mackinder, B., Malecot, V., Miller, J.T., Pennington, R.T., de Queiroz, L.P., Schrire, B., Simon, M.F., Steele, K., Torke, B., Wieringa, J.J., Wojciechowski, M.F., Boatwright, S., de la Estrella, M., de Freitas Mansano, V., Prado, D.E., Stirton, C.H. and Wink, M. 2013. Towards a new classification system for legumes: progress report from the 6th international legume conference. *South African Journal of Botany*, 89: 3-9.
- Bosch, A.C., Sigge, G.O., Kerwath, S.E., Cawthorn, D. and Hoffman, L.C. 2013. The effects of gender, size and life-cycle stage on the chemical composition of smoothhoundshark (*Mustelus mustelus*) meat. *Journal of the Science of Food and Agriculture*, 93: 2384-2392.
- Bourgeois, K., Wilson, J.W. and Dromzee, S. 2013. First records of the northern giant petrel *Macronectes halli* ashore on Gough Island. *Marine Ornithology*, 41: 135-136.
- Bowie, R.C.K., Cohen, C. and Crowe, T. 2013. Ptilopachinae: a new subfamily of the odontophoridae (Aves: Galliformes). *Zootaxa*, 3670(1): 97-98.
- Boyes, R.S. and Perrin, M. 2013. Access to cryptic arthropod larvae supports the atypical winter breeding seasonality of Meyer's parrot (*Poicephalus meyeri*) throughout the African subtropics. *Journal of Ornithology*, 154: 849-861.
- Branch, G.M., Bustamante, R.H. and Robinson, T. 2013. Impacts of a 'black tide' harmful algal bloom on rocky-shore intertidal communities on the west coast of South Africa. *Harmful Algae*, 24: 54-64.
- Browne, C., Maneveldt, G.W., Bolton, J.J. and Anderson, R.J. 2013. Abundance and species composition of non-geniculate coralline red algae epiphytic on the South African populations of the rocky shore seagrass *Thalassodendron leptocaula* M.C. Duarte, Bandeira & Romeiras. *South African Journal of Botany*, 86: 101-110.
- Browne, C., Milne, R., Griffiths, C.L., Bolton, J.J. and Anderson, R.J. 2013. Epiphytic seaweeds and invertebrates associated with South African populations of the rocky shore seagrass *Thalassodendron leptocaula* a hidden wealth of biodiversity. *African Journal of Marine Science*, 35(4): 523-531.
- Brumfitt, I., Chinsamy-Turan, A. and Compton, J.S. 2013. Depositional environment and bone diagenesis of the Mio/Pliocene Langebaanweg bonebed, South Africa. *South African Journal of Geology*, 116(2): 241-258.
- Chadwick, O.A., Roering, J.J., Heimsath, A.M., Levick, S.R., Asner, G.P. and Khomo, L. 2013. Shaping post-orogenic landscapes by climate and chemical weathering. *Geology*, 41(11): 1171-1174.
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- Cherel, Y., Jaeger, A., Alderman, R., Jaquemet, S., Richard, P., Wanless, R., Phillips, R.A. and Thompson, D.R. 2013. A comprehensive isotopic investigation of habitat preferences in nonbreeding albatrosses from the Southern Ocean. *Ecography*, 36: 277-286.
- Chinsamy-Turan, A., Chiappe, L.M., Marugan-Lobon, J., Gao, G. and Zhang, F. 2013. Gender identification of the Mesozoic bird *Confuciusornis sanctus*. *Nature Communications*, 4: 1381(5pp).
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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 Susan 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 Department has active research groups with strengths in Catalysis, Bioinorganic, Biophysical and Bioanalytical Chemistry, Synthetic Chemistry, Medicinal Chemistry, Supramolecular Chemistry, Scientific Computing and Chemical Glycobiology. 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 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	3
Senior Scholars	2
Research Officers	7
Scientific Officers	10
Technical Officers	8
Support Staff	10
Administrative and Clerical Staff	8
Total	62

Honorary Staff

Emeritus Professors	3
Honorary Research Associates	3
Total	6

Students

Postdoctoral	25
Doctoral	59
Master's	24
Honours	18
Undergraduates	1504
Total	1630

Research Fields and Staff

Permanent Academic and long-term contract staff

PROFESSOR SUSAN A. BOURNE

Head of Department: 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.

PROFESSOR TIMOTHY J. EGAN

Bioinorganic chemistry of the malaria parasite.

PROFESSOR ROGER HUNTER

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

PROFESSOR GRAHAM E. JACKSON

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

PROFESSOR KEVIN J. NAIDOO

Scientific Computing – free energy calculations – reaction dynamics; code acceleration and general purpose graphical processing units; computational glycomics; cancer.

ASSOCIATE PROFESSOR BETTE DAVIDOWITZ

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

ASSOCIATE PROFESSOR DAVID W. GAMMON

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

ASSOCIATE PROFESSOR ALAN T. HUTTON

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

ASSOCIATE PROFESSOR NEIL RAVENSCROFT

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

DR ANWAR JARDINE

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

DR CATHERINE H KASCHULA

Lecturer: medicinal, synthetic and biological chemistry.

DR CLIVE OLIVER

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

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.

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.

Senior Scholars

PROFESSOR LUIGI R. NASSIMBENI

Physical chemistry; thermal analysis; kinetics; inclusion compounds.

PROFESSOR ALLEN L. RODGERS

Kidney stones; urine chemistry; calcium oxalate crystallization.

Research Associates

DR GAËLLE RAMON

Supramolecular chemistry, inclusion compounds, metal organic frameworks, crystal engineering

Honorary Research Associates

DR SHIRLEY C. CHURMS

Writing and communication within the discipline.

PROF RAYMOND J. HAINES

Organometallic chemistry.

DR ELIZABETH TIMME

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

Research Officers

DR YASSIR YOUNIS ADAM

Research Officer: Chemoinformatics and synthetic medicinal chemistry: design and synthesis of small molecules for biological evaluations using computer aided drug design (CADD).

DR CHRISTOPHER BARNETT

Research Officer: Scientific Computing; Glycoinformatics; data analytics and visualisation; cancer.

DR CHITALU C. MUSONDA

Senior Research Officer: Medicinal Chemistry, TB drug discovery & development; malaria drug discovery & development.

DR TANYA PAQUET

Research Officer: Synthetic organic chemistry; medicinal chemistry; malaria; drug design and development; hit-to-lead and lead optimisation.

DR LESLIE STREET

Principal Research Officer: Medicinal chemistry; malaria and tuberculosis.

DR RENIER VAN DER WESTHUYZEN

Research Officer: Parallel synthesis; medicinal chemistry; discovery of new drugs for treatment of infections by mycobacterium tuberculosis.

DR SUSAN WINKS

Research Officer: Synthesis; medicinal Chemistry; tuberculosis; drug discovery and development

Postdoctoral Fellows

DR YASSIR YOUNIS ADAM

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

DR NYARADZO CHIGORIMBO-TSIKIWA

Biocatalytic modification of natural compounds for metabolite analysis.

DR DYANNE CRUICKSHANK

Beneficiation of bioactive compounds via supramolecular chemistry.

DR MARLENE ELIZABETH ESPINOZA MORAGA

Hit to lead medicinal chemistry new chemotherapeutic agents against tuberculosis (TB).

DR TZU-SHEAN FENG

Hit to lead medicinal chemistry progression of antimycobacterial hits.

DR MOGAMAT RIEDAA GAMIELDIEN

Protein 3D Structure.

DR RICHARD KLAUS GESSNER

Hit to lead medicinal chemistry progression of antimycobacterial hits.

DR DIEGO GONZALEZ-CABRERA

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

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 BANOTHILE CHARITY EVENTS MAKHUBELA

Development of water-soluble metallo dendrimers for biphasic catalysis and as novel bioorganometallic drugs.

DR YEVGENY MOSKOVITZ

Coarse grained force field development for glycan folding.

DR GRACE MUGUMBATE

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

DR GADZIKANO MUNYUKI

Molecular dynamics of cyclic antibiotics.

DR DUBEKILE NYONI

The design and development of novel ruthenium, rhodium and iridium dendritic multinuclear complexes for use in medicinal bio- and nanotechnology.

DR RAGHAIAH PALLEPOGU

Supramolecular beneficiation of new drug candidates.

DR TANYA PAQUET

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

DR ELUMALAI PAVADAI

Drug design, feeding into medicinal chemistry and pre-clinical pharmacology.

DR MARIVEL SAMIPILLAI

Inclusion of picolines by bis-(3,3'-bis-(9-hydroxy-9-fluorenyl)-2,2'-binaphthyl): selectivity and structure.

DR RAJNI SHARMA

Development of novel antituberculosis molecules for computational drug design approaches..

DR KAWALJIT SIGH

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

DR CANDICE SOARES DE MELO

Hit to lead medicinal chemistry progression of antimycobacterial hits.

DR COLIN WILSON

Medicinal chemistry of new antituberculosis agents.

DR DAWIT WORKU

Porting molecular quantum code to high performance accelerators.

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Research Output

Chapters in books

De Villiers, K.A. and Egan, T.J. 2013. Iron(III) protoporphyrin IX and hemozoin: key targets in the chemotherapy of malaria. In G.C. Ferreira, K.M. Kadish, K.M. Smith and R. Guilard (eds), Handbook of Porphyrin Science with Applications to Chemistry, Physics, Materials Science, Engineering, Biology and Medicine, pp. 211-254. Singapore: World Scientific Publishing Co. Pte Ltd. ISBN 9789814407786.

Popa, M.M., Caira, M.R. and Dumitrascu, F. 2013. Pyrrolo [1,2-a] quinolines: synthesis and biological activity. In K.L. Ameta, R.P. Pawar, and A. Domb (eds), Bioactive Heterocycles: Synthesis and Biological Evaluation, pp. 19-40. USA: Nova Science Publishers, Inc. ISBN 9781622576364.

Rodgers, A. 2012. Epidemiology: South Africa and Sub-Saharan Africa. In J.J. Talati, H.-G. Tiselius, D.M. Albala and Z. Ye (eds), Urolithiasis basic science and clinical practice, pp. 67-71. London: Springer-Verlag London Limited. ISBN 9781447143833.

Articles in peer-reviewed journals

Adams, M., De Kock, C., Smith, P.J., Chibale, K. and Smith, G.S. 2013. Synthesis, characterization and antiplasmodial evaluation of cyclopalladated thiosemicarbazone complexes. Journal of Organometallic Chemistry, 736: 19-26.

Adams, M., De Kock, C., Smith, P.J., Malatji, P., Hutton, A.T., Chibale, K. and Smith, G.S. 2013. Heterobimetallic ferrocenylthiosemicarbazone palladium(II) complexes: synthesis, electrochemistry and antiplasmodial evaluation. Journal of Organometallic Chemistry, 739: 15-20.

Adams, M., Li, Y., Khot, H., De Kock, C., Smith, P.J., Land, K., Chibale, K. and Smith, G.S. 2013. The synthesis and antiparasitic activity of aryl- and ferrocenyl-derived thiosemicarbazone ruthenium(II)-arene complexes. Dalton Transactions, 42: 4677-4685.

Ambele, M.A., Sewell, B.T., Cummings, F.R., Smith, P.J. and Egan, T.J. 2013. Synthetic hemozoin (β -hematin) crystals nucleate at the surface of neutral lipid droplets that control their sizes. Crystal Growth & Design, 13: 4442-4452.

Andayi, W.A., Egan, T.J., Gut, J., Rosenthal, P.J. and Chibale, K. 2013. Synthesis, antiplasmodial activity, and β -hematin inhibition of hydroxypyridone-chloroquine hybrids. ACS Medicinal Chemistry Letters, 4: 642-646.

Bailey, C.M., Sullivan, T.J., Iyidogan, P., Tirado-Rives, J., Chung, R., Ruiz-Caro, J., Mohamed, E., Jorgensen,

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- Barton, B., Caira, M.R., Hosten, E.C. and McClelland. 2013. A computational, x-ray crystallographic and thermal stability analysis of TETROL and its pyridine and methylpyridine inclusion complexes. *Tetrahedron*, 69: 8713-8723.
- Bezuidenhout, D., Oosthuysen, A., Davies, N., Ahrenstedt, L., Dobner, S., Roberts, P. and Zilla, P. 2013. Covalent incorporation and controlled release of active dexamethasone from injectable polyethylene glycol hydrogels. *Journal of Biomedical Material Research-Part A*, 101A: 1311-1318.
- Bruno, F.P., Caira, M.R., Martin, E.C., Monti, G.A. and Sperandeo, N.R. 2013. Characterization and structural analysis of the potent antiparasitic and antiviral agent tizoxanide. *Journal of Molecular Structure*, 1036: 318-325.
- Chellan, P., Land, K.M., Shokar, A., Au, A., An, S.H., Taylor, D., Smith, P.J., Chibale, K. and Smith, G.S. 2013. Di- and trinuclear ruthenium-, rhodium-, and iridium-functionalized pyridyl aromatic ethers: a new class of antiparasitic agents. *Organometallics*, 32: 4793-4804.
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- Chiririwa, H., Moss, J.R., Hendricks, D., Meijboom, R. and Muller, A. 2013. Synthesis, characterisation and *in vitro* evaluation of palladium(II) iminophosphine complexes for anticancer activity. *Transition Metal Chemistry*, 38: 165-172.
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- Costa-Bauza, A., Grases, F., Fakier, S. and Rodriguez, A. 2013. A novel metal-dye system for urinary phytate detection at micro-molar levels in rats. *Analytical Methods*, 5: 3016-3022.
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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 molecular 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 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	3
Doctoral	28
Master's	99
Honours	47
Undergraduate	953
Total	1130

Research Fields and Staff

Permanent Academic Staff

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

PROFESSOR GARY MARSDEN
Mobile Interaction Design: ICT for Development

ASSOCIATE PROFESSOR JAMES GAIN
Computer Graphics: High Performance Computing;
Visualisation

ASSOCIATE PROFESSOR MICHELLE KUTTEL
Computational Science: Parallel Processing; Scientific
Visualisation and Design

ASSOCIATE PROFESSOR HUSSEIN SULEMAN
Digital Libraries; Information Retrieval; Internet
technology; High Performance Computing; Computer
Science Education

DR ANTOINE BAGULA
Senior Lecturer: Traffic Engineering; Network
Engineering; Network Security; Internet of Things

DR ANNE KAYEM
Lecturer: Information Security

DR HANH LE
Senior Lecturer: Networks; Distributed Computing

DR PATRICK MARAIS
Senior Lecturer: Computer Graphics; Image Processing,
GPU Computing

DR AUDREY MBOGHO
Senior Lecturer: Human Language Technologies;
e-Health; Intelligent Systems and User Interfaces

DR GEOFF NITSCHKE
Senior Lecturer: Artificial Intelligence; Co-evolution;
Robotics

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 CRAIG BALFOUR
Computer Systems Administrator

MR SAMUEL CHETTY
Computer Systems Administrator

Postdoctoral Fellows

DR BRUCE MERRY
Computer Graphics

DR SIMON PERKINS
High Performance Computing for Radio Astronomy

DR HENDRANUS VERMEULEN
Serious Games and Gamification

Adjunct and Honorary Professors

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Research Output

Articles in peer-reviewed journals

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DEPARTMENT OF ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE

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. In the past five years, much of the research in the department focused on climate change, adaptation and modelling; ecology and society; environmental impact assessment; palaeoenvironment, 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 49 institutions that are spread in six (6) 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). It has, through research themes mentioned above, engaged with policy and development, and played advisory roles in government and international bodies.

Structurally, the research enterprise in the department is diversified to accommodate various research cultures/approaches and interests. Academic staff members carry out research within and outside research nodes. There are three formally established research nodes, which include the Climate System Analysis Group (CSAG), which applies core research to meet the knowledge needs of responding to climate variability and change;

African Climate and Development Initiative (ACDI), which fosters interactions across disciplines at the University of Cape Town to enable improved understanding of the causes of climate change, the economic impact and the necessary policies to facilitate mitigation and adaptation; and the African Centre for Cities (ACC) which is an interdisciplinary research and teaching programme focusing on quality scholarship regarding the dynamics of sustainable urban processes in Africa, with an eye on identifying systemic responses. The fourth research grouping on Social and Environmental Dimensions of the Bio-economy is under way.

Departmental Statistics

Permanent and Long-term Contract Staff

Professors	3
Associate Professors	4
Senior Lecturers	4
Lecturers	4
Research Staff	16
Research Associates	3
Administrative & Support Staff	15
Total	49

Emeritus & Honorary Staff

Honorary Professors	3
Emeritus Staff	2

Students

Postdoctoral	9
Doctoral	38
Masters	65
Honours	23
Undergraduate	874
Total	1009

Research Fields and Staff

Permanent Academic Staff

PROFESSOR MIKE MEADOWS

Head of Department: Quaternary Environmental Change

PROFESSOR BRUCE HEWITSON

Chair in Climate Change
Atmospheric Science, Climatology

PROFESSOR SUE PARNELL

Urban Studies, Historical Geography

ASSOCIATE PROFESSOR SOPHIE OLDFIELD
Political and Economic Geography

ASSOCIATE PROFESSOR MAANO RAMUTSINDELA
Political Geography, Transnational Regionalism

ASSOCIATE PROFESSOR MERLE SOWMAN
Environmental Planning and Management, Coastal and
Small-Scale Fisheries Management

ASSOCIATE PROFESSOR RACHEL WYNBERG
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 BABATUNDE ABIODUN
Senior Lecturer: Atmospheric Science, Climatology

DR PIPPIN ANDERSON
Lecturer: Director of Graduate Studies

DR SHARI DAYA
Lecturer: Gender, Modernity

DR FRANK ECKARDT
Senior Lecturer: Geomorphology, Remote Sensing

DR RICHARD HILL
Senior Lecturer: Environmental Assessment and
Management

DR PETER JOHNSTON
Research Officer: Seasonal Forecasting Applications;
Climate Change

DR ZARINA PATEL
Senior Lecturer: Environmental governance and politics

DR. KEVIN WINTER
Lecturer: Environmental Management, Water
Resources, Monitoring and Evaluation

DR GINA ZIERVOGEL
Senior Lecturer: Vulnerability and Adaptation

Emeritus Staff

PROFESSOR RICHARD FUGGLE

Contract Research Staff

MR CHIMANGO HARA
Intern: Environmental Law

MR TICH MUKUNGA
Intern: Atmospheric Science

DR BRADLEY RINK
Human Geography

MS KIRSTEN SCOTT
Research Assistant: EIA, Social Scoping Reports

MS ANNA STEYNOR
Research Associate: Stakeholder Engagement

MS KATE SUTHERLAND
Research Assistant: Climate Data Analysis

MS CLAIRE VAN WYK
Intern: Atmospheric Science

DR PIOTR WOLSKI
Senior Researcher: Hydrology

Administrative and Support Staff

MRS SHARON ADAMS
Administrative Officer

MR ALDINO ARENDSE
Finance Officer
MRS SHARON BARNARD
Administrative Assistant

MS LISA COOP
Research Assistant

MR ROGER DUFFETT
IT Manager

MR TONY GEORGE
Library Assistant

MS FAHDELAH HARTLEY
Senior Secretary

MR SAYED HESS
Laboratory Technician

DR CHRIS JACK
Senior Scientific Technical Officer

MS VUYOKAZI MAFANYA
Senior Secretary

MR PHILLIP MUKWENHA
IT Assistant

MRS SHAADA REDDY
Librarian

MS SHAHIEDA SAMSODIEN
Senior Secretary

MS MATHILDA JACI VAN NIEKERK

Research Assistant

MS RUWANI WALAWEGE

Research Assistant

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 KAZEEM OARE OKOSUN

Epidemiological modelling and climate impact

DR SERGE RAEMAEKERS

Small-scale Fisheries Governance

DR SAMANTHA WILLIAMS

Coastal and Small-scale Fisheries

Honorary Professors

PROF JOHN BOARDMAN

Soil Erosion, Land Degradation

PROF JONATHAN CRUSH

International Migration, Transnationalism

PROF DAVE THOMAS

Arid Zone Geomorphology, Quaternary Science

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Research Output

Edited books

Elmqvist, T., Fragkias, M., Goodness, J., Gneralp, B., Marcotullio, P.J., McDonald, R.I., Parnell, S., Schewenius, M., Sendstad, M., Seto, K.C. and Wilkinson, C. (eds) 2013. *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities*. 755pp. Dordrecht: Springer Science & Business Media B.V. ISBN 9789400770874.

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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
Senior Research Officer	1
Technical Support Staff	11
Administrative & Clerical Staff	2
Total	24

Honorary staff

Honorary Research Associates	3
Emeritus Professors	1
Emeritus Associate Professors	2
Total	6

Students

Postdoctoral	1
Doctoral	9
Master's	22
Honours	16
Undergraduate	550
Total	598

Research Fields and Staff

Permanent staff

PROFESSOR STEPHEN RICHARDSON

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

PROFESSOR CHRIS HARRIS

Stable isotope geochemistry; igneous petrology.

PROFESSOR ANTON LE ROEX

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

ASSOCIATE PROFESSOR JOHN COMPTON

Low-temperature and sedimentary geochemistry; marine geology.

ASSOCIATE PROFESSOR DAVID REID

Economic geology; Precambrian crustal evolution; carbonatites; isotope geochemistry.

MR GEORGE SMITH

Senior Lecturer: Petroleum geophysics.

DR EMESE BORDY

Senior Lecturer: Sedimentology

DR PHIL JANNEY

Senior lecturer: Igneous geochemistry; analytical geochemistry; cosmochemistry

DR JOHANN DIENER

Lecturer: Metamorphic petrology.

DR AKE FAGERENG

Lecturer: Structural geology.

Honorary Research Associates

EMERITUS PROFESSOR JOHN GURNEY

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

EMERITUS ASSOCIATE PROFESSOR ANDY DUNCAN

Igneous Petrology; X-Ray Fluorescence Spectroscopy

EMERITUS ASSOCIATE PROFESSOR JAMES WILLIS

X-Ray Fluorescence Spectroscopy

PROFESSOR HARTWIG FRIMMEL

Metamorphic petrology.

DR WENDY TAYLOR

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Research Output

Articles in peer-reviewed journals

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2013. Miocene fluvial systems and palynofloras at the southwestern tip of Africa: implications for regional and global fluctuations in climate and ecosystems. *Earth-Science Reviews*, 124: 184-201.

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Nwaila, G., Becker, M.E., Ghorbani, Y., Petersen, J., Reid, D.L., Bam, L.C., de Beer, F. and Franzidis, J.-P. 2013. A geometallurgical study of the Witwatersrand gold ore at Carletonville, South Africa. In S. Dominy (ed), Proceedings of the Second AusIMM International Geometallurgy Conference (GeoMet 2013), 30 September - 2 October 2013, Brisbane, Australia. Carlton Victoria, Australia: The Australasian Institute of Mining and Metallurgy. ISBN 9781921522987.

Weis, F.W., Troll, V.R., Jonsson, E., Hogdahl, K.H., Barker, A.K., Harris, C., Millet, M.M. and Nilsson, K.N. 2013. Iron and oxygen isotope systematics of apatite-iron oxide cores in central Sweden. In E. Jonsson (ed), Proceedings of 12th Biennial SGA Meeting. Mineral Deposit Research for High-Tech World, 12-15 August 2013, Uppsala, Sweden. Sweden: Elanders Sweden AB. ISBN 9789174032079.

DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

(Including the Cosmology and Gravity Group, the Laboratory for Discrete Mathematics and Theoretical Computer Science (DMTCS Lab), the Marine Resource Assessment and Management Group (MARAM), the Centre for Research in Computational and Applied Mechanics (CERECAM), the Category Theory and Topology Research Group and the Laboratory for Quantum Gravity and Strings.)

Head of Department: Professor Hans-Peter Kunzi

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, discrete mathematics and theoretical 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	6
Associate Professors	4
Senior Lecturers	11
Lecturers (full-time)	14
Senior Scholar	2
Research Staff	5
Technical Support Staff	3
Administrative and Clerical Staff	11
Total	56

Honorary staff

Emeritus Professors	7
Emeritus Associate Professor	1
Visiting Professor and Principal research officer	1
Research Associate	2
Total	11

Students

Postdoctoral	13
Doctoral	33
Master	52
Honours	18
Undergraduate	7292
Total	7408

Research Fields and Staff

Permanent Academic and long-term contract staff

PROFESSOR HANS-PETER KÜNZI

Head of Department: 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 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 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; teaching and technology

PROFESSOR GEORGE JANELIDZE

Category theory, Algebra, Topology, Sets and Logic

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 CHRISTOPHER CLARKSON

Theoretical Cosmology – relativistic perturbation theory, dark energy, gravitational lensing

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 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 PETER BRUYNS

Senior Lecturer: group theory; permutation groups

DR FRANCOISE EBOBISSE BILLE

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

DR TIRI CHINYOKA

Lecturer: modelling and analysis of complex fluids and flows

DR JURIE CONRADIE

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

DR DAVID ERWIN

Senior Lecturer: classical, applied and algebraic graph theory

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 JOHN FRITH

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

MS MARIOLA KIROVA

Lecturer: mathematics education

DR HENRI LAURIE

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

DR ROBERT MARTIN

Lecturer: functional analysis; operator theory

DR JEFF MURUGAN

Senior Lecturer: string theory, quantum gravity, neurophysics. Deputy HOD and Head of Laboratory for Quantum Gravity and Strings

DR ANDRIY POTOTSKYY (LEFT THE DEPARTMENT 30 SEPTEMBER 2013)

Lecturer: rectification of brownian motion, directed transport of particles in molecular rectifiers; many body systems: non-equilibrium dynamical density functional theory; fluctuations and noise induced motion: stochastic differential equations, jump processes, collective phenomena in coupled stochastic networks; pattern formation in complex systems

MR KENNETH RAFEL

Senior Lecturer: mathematics education

DR JESSE RATZKIN

Lecturer: geometric analysis

DR NEILL ROBERTSON

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

DR ANNELESE SCHAUERTE

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

DR HARIS SKOKOS

Senior Lecturer: nonlinear dynamical systems, chaotic dynamics and computational mathematics

DR AMANDA WELTMAN

Senior Lecturer: string theory, cosmology, gravity

DR JONATHAN SHOCK

Lecturer: string theory, mathematical biology, neuroscience and symbolic computation

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

MR THOMAS VAN HEERDEN

Lecturer: nonlinear dynamics; mathematics education

Senior Scholars

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

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 PROFESSOR DOUG BUTTERWORTH

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

EMERITUS PROFESSOR KATHY DRIVER

Special functions, orthogonal polynomials and approximation theory

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; SAAO

DR DAVID RICHARDSON

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

PROFESSOR JOHN WEBB

Mathematics education

Postdoctoral Fellows

DR MICHAEL ABBOTT

String Theory

DR VINCENT BOUILLOT

Cosmology

DR VINICIUS BUSTI

Cosmology

DR ALVARO DE LA CRUZ DOMBRIZ

Cosmology

DR SUGUMI KANNO

Cosmology and String Theory

DR NIMA KHOSRAVI

Cosmology

DR MARC LILLEY

Cosmology

DR PATRICE OKOUMA

Cosmology

DR ROBERT POLTIS

Cosmology

DR XAVIER ROY

Cosmology

DR DIEGO SAEZ GOMEZ

Cosmology

DR PARAMJEET SINGH (UNTIL JULY 2013)

Mechanics and partial differential equations

DR PER ERIC SUNDIN (UNTIL OCTOBER 2013)

String Theory

Contact Details

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Research Output

Edited books

Han, W. and Reddy, B.D. (eds) 2013. Plasticity: Mathematical Theory and Numerical Analysis. 421pp. Second Edition. New York: Springer. ISSN 09396047.

Krasinski, A., Ellis, G.F.R. and MacCallum, M.A.H. (eds) 2013. Golden Oldies in General Relativity. Hidden gems. 489pp. Heidelberg: Springer. ISBN 9783642345043.

Chapters in books

Ellis, G.F.R. 2013. Kenotic ethics and SETI: a present-day view. In D.A. Vakoch (ed), Extraterrestrial Altruism. Evolution and Ethics in the Cosmos, pp. 223-229. The Frontiers Collection. Heidelberg: Springer. ISBN 9783642377495.

Jasinowski, S.C., Cluver, M.A. and Reddy, B.D. 2013. Anatomical plasticity in the snout of *Lystrosaurus*. In C.F. Kammerer, K.D. Angielczyk and J. Frobisch (eds), Early Evolutionary History of the Synapsida, pp. 139-149. New York Springer. ISBN 9789400768413.

Kunz, M., Hlozek, R., Bassett, B.A., Smith, M., Newling, J. and Varughese, M. 2013. BEAMS: separating the wheat from the chaff in supernova analysis. In J.M. Hilbe (ed), Astrostatistical Challenges for the New Astronomy, pp. 63-86. New York: Springer Heidelberg New York Dordrecht London. ISBN 9781461435075.

Articles in peer-reviewed journals

Abbott, M. 2013. Comment on strings in AdS₃ x S³ X S³ X S¹ at one loop. Journal of High Energy Physics, 2013(2): 1-33.

Abbott, M., Murugan, J., Sundin, P.E. and Wulff, L. 2013. Scattering in AdS₂/CFT₁ and the BES phase. Journal of High Energy Physics, 10(66): 066 DOI: 10.1007/JHEP10(2013)066.

Abbott, M. 2013. The AdS₃ x S³ x S³ x S¹ Hernandez-Lpez phases: a semiclassical derivation. Journal of Physics A-Mathematical and Theoretical, 46: 445401 (16pp) DOI: 10.1088/1751-8113/46/44/445401.

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- Aleman, A., Martin, R. and Ross, W.T. 2013. On a theorem of Livsic. *Journal of Functional Analysis*, 264: 999-1048.
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- Bamba, B., Odintsov, S. and Saez Gomez, D. 2013. Conformal symmetry and accelerating cosmology in teleparallel gravity. *Physical Review D*, 88: 084042 DOI: 10.1103/PhysRevD.88.084042.
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- Barashenkov, I.V., Jackson, G. and Flach, S. 2013. Blow-up regimes in the PT-symmetric coupler and the actively coupled dimer. *Physical Review A*, 88: 053817 (1-8).
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- Busti, V., Holanda, R.F.L. and Clarkson, C.A. 2013. Supernovae as probes of cosmic parameters: estimating the bias from under-dense lines of sight. *Journal of Cosmology and Astroparticle Physics*, 2013(11): 020(20pp) DOI: 10.1088/1475-7516/2013/11/020.
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Peer-reviewed published conference proceedings

- Abdelwahab, M., de la Cruz-Dombriz, A. and Dunsby, P.K.S. 2013. Cosmological tensor perturbations in theory beyond Λ CDM. *Proceedings of Conference on Multiverse and Fundamental Cosmology, Multicosmofun 2012*, 10-14 September 2012, Poland. USA: American Institute of Physics. ISBN 9780735411357.
- Campbell, A., Rafel, K.T.P. and Vezi, T.E. 2013. The use of technology in addressing the mathematics education crisis in South Africa. In Z. Davis and S. Jaffer (eds), *Proceedings of the 19th Annual Congress of the Association for Mathematics Education of South Africa (AMESA)*, 24-28 June 2013, Western Cape. Bellville, Cape Town, Western Cape: Association of Mathematics Education of South Africa (AMESA) ISBN 9780620567763.
- Yanovski, A.B. 2013. Expansions over adjoint solutions for the Caudrey-Beals-Coifman system with Z_p reductions of Mikhailov type. In I.M. Mladenov, A. Ludu and A. Yoshioka (eds), *Proceedings of Expansions Over Adjoint Solutions for the Caudrey-Beals-Coifman System with Z_p Reductions of Mikhailov Type*, 8-13 June 2012, Bulgaria. Sofia: Avangard Prima. 1314-3247.
- Zemlyanaya, E. and Alexeeva, N.V. 2013. Numerical study of travelling multi-soliton complexes in the ac-

driven NLS equation. Proceedings of 5th International Conference on Numerical Analysis and Applications, NAA 2012, 15-20 June 2013, Bulgaria. Cape Town: Springer. ISBN 9783642415142.

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. Metabolic fingerprinting of plants with potential medicinal properties is performed with a view to production of natural medicinal products. 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*). 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

Post-doctoral	13
Doctoral	39
Masters	21
Honours	19
Undergraduate	273
Total	365

Research fields and staff

Permanent Academic staff

ASSOCIATE PROFESSOR VERNON COYNE

Head of Department: Marine biotechnology

PROFESSOR JILL FARRANT

Desiccation tolerance; resurrection plants; seeds; plant physiology; molecular biology; systems biology; metabolic fingerprinting of medicinal plants

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: *actinobacterial taxonomy*; *family Streptosporangiaceae*; *Microbispora*; *Nonomuraea*; *Kribbella*; *bioprospecting*; novel antitubercular antibiotics

DR COLLEEN O'RYAN

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

DR LAURA RODEN

Senior Lecturer: plant and human circadian rhythms; flowering time and photoperiodism; circadian regulation of plant defences; chronotype and performance

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 and biotic 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 and Teaching staff

DR INGA HITZEROTH

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

DR KERSHINI IYER

Senior Scientific Officer: plant biotechnology; promoter studies and RNA silencing of stress-associated genes from *Zea mays*

DR REVEL IYER

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

DR ANN MEYERS

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

DR SHANE MURRAY

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

DR DIONNE SHEPHERD

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

Postdoctoral Fellows

DR GARETH EVEREST

Antimycobacterial antibiotic drug discovery; actinobacterial characterisation; phylogeny of the family *Pseudonocardia*; alternative taxonomic marker genes

DR BRUNA GALVÃO

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

DR SUZANNE HUDDY

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

DR RODRICK KATETE

Glycosylation profile of matching transmitter/founder and chronic subtype C HIV-1 gp140

DR BRIAN KULLIN

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 MARTHA NELSON-FLOWER

Molecular ecology; relatedness within cooperatively breeding groups; spatial genetics; ecological immunogenetics (investigating MHC in a cooperatively breeding bird)

DR NASHIED PETON

Expression, structural and functional analysis of the "LEAome" of the desiccation tolerant plant *Xerophyta humilis*

DR AMELIA REDDY

Agricultural biotechnology; plant and algal molecular biology; understanding how plants and algae respond to stress and the mechanisms required for surviving stressful conditions

DR MICHELE TOMASICCHIO

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

CONTACT DETAILS

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e-mail: ethne.liebenberg@uct.ac.za
Web: <http://www.mcb.uct.ac.za>

Research Output

Authored books

Thomson, J.A. 2013. Food for Africa. 172pp. Claremont, Cape Town: UCT press. ISBN 9781920499815.

Chapters in books

Duarte, J., Serufuri, J.-M.S., Mulder, N.J. and Blackburn, J. 2013. Protein function microarrays: design, use and bioinformatics analysis in cancer biomarker discovery and quantitation. In X. Wang (ed), Bioinformatics of Human Proteomics: 39-74. London: Dordrecht: Springer. ISBN 9789400758100.

Thomson, J.A. 2013. South Africa: an early adopter of GM crops. In A. Hodson (ed), Insights, Africa's Future... Can Biosciences Contribute? pp. 64-69. Cambridge: Banson. ISBN 9780956338761.

Articles in peer-reviewed journals

Africander, D., Louw, R. and Hapgood, J. 2013. Investigating the anti-mineralocorticoid properties of synthetic progestins used in hormone therapy. Biochemical and Biophysical Research Communications, 433: 305-310.

Agrawal, G.K., Sarkar, A., Righetti, P.G., Pedreschi, R., Carpentier, S., Wang, T., Barkla, B.J., Kohli, A., Ndimba, B.K., Bykova, N., Rampitsch, C., Zolla, L., Rafudeen, M.S., Cramer, R., Bindschedler, L.V., Tsakirpaloglou, N., Ndimba, R., Farrant, J.M., Renaut, J., Job, D., Kikuchi, S. and Rakwal, R. 2013. A decade of plant proteomics and mass spectrometry: translation of technical advancement to food security and safety issues. Mass Spectrometry Reviews, 32: 335-365.

Bolton, J.J., Davies-Coleman, M.T. and Coyne, V.E. 2013. Innovative processes and products involving marine organisms in South Africa. African Journal of Marine Science, 35(3): 449-464.

McGrath, M., De Villiers, G., Shephard, E.G., Hitzeroth, I.I. and Rybicki, E.P. 2013. Development of human papillomavirus chimaeric L1/L2 candidate vaccines. Archives of Virology, 158: 2079-2088.

- Chege, G., Burgers, W., Stutz, H., Meyers, A.E., Chapman, R.E., Kiravu, A., Bunjun, R., Shephard, E.G., Jacobs, W., Rybicki, E.P. and Williamson, A.-L. 2013. Robust immunity to an Auxotrophic Mycobacterium bovis BCG-VLP prime-boost HIV vaccine candidate in a nonhuman primate model. *Journal of Virology*, 87(9): 5151-5160.
- Cowan, D.A., Rybicki, E.P., Tuffin, M.I., Valverde, M.I. and Wingfield, M.J. 2013. Biodiversity: so much more than legs and leaves. *South African Journal of Science*, 109(11/12): 1-9.
- Duvenage, L., Hitzeroth, I.I., Meyers, A.E. and Rybicki, E.P. 2013. Expression in tobacco and purification of beak and feather disease virus capsid protein fused to elastin-like polypeptides. *Journal of Virological Methods*, 191: 55-62.
- ElSayed, A.I., Boulila, M. and Rafudeen, M.S. 2013. Investigation into the expression of sucrose transporters and sucrose phosphate synthase mRNA in different plant species. *Journal of Agricultural Research*, 2(1): 31-42.
- Everest, G., Le Roes-Hill, M., Omorogie, C., Cheung, S.-K., Cook, A.E., Goodwin, C. and Meyers, P. 2013. *Amycolatopsis umgeniensis* sp.nov., isolated from soil from the banks of the Umgeni river in South Africa. *Antonie Van Leeuwenhoek International Journal of General and Molecular Microbiology*, 103: 673-681.
- Everest, G., Curtis, S., De Leo, F., Urzi, C. and Meyers, P. 2013. *Kribbella albertanoniae* sp.nov., isolated from a Roman catacomb, and emended description of the genus *Kribbella*. *International Journal of Systematic and Evolutionary Microbiology*, 63: 3591-3596.
- Everest, G. and Meyers, P. 2013. *Micromonospora equina* sp.nov., isolated from soil from a racecourse. *International Journal of Systematic and Evolutionary Microbiology*, 63: 879-885.
- Hapgood, J. 2013. Immunosuppressive biological mechanisms support reassessment of use of the injectable contraceptive medroxyprogesterone acetate. *Endocrinology*, 154(3): 985-988.
- Huddy, S., Meyers, A.E. and Coyne, V.E. 2013. Protoplast isolation optimization and regeneration of cell wall in *Gracilaria gracilis* (Gracilariales, Rhodophyta). *Journal of Applied Phycology*, 25: 433-443.
- Husain, F., Veeranagouda, Y., Hsi, J., Meggersee, R.L., Abratt, V.R. and Wexler, H. 2013. Two multidrug-resistant clinical isolates of *Bacteroides fragilis* carry a novel metronidazole resistance *nim* Gene(*nim*J). *Antimicrobial Agents and Chemotherapy*, 57(8): 3767-3774.
- Ma, J., Christou, P., Chikwamba, R., Haydon, H., Paul, M., Ferrer, M., Ramalingam, S., Rech, E., Rybicki, E.P., Wigdorowitz, A., Yang, D. and Thangaraj, H. 2013. Realising the value of plant molecular pharming to benefit the poor in developing countries and emerging economies. *Plant Biotechnology Journal*, 11: 1029-1033.
- Moloney, C.L., Coyne, V.E., Griffiths, C.L., Scott, D. and Sowman, M. 2013. Society, marine ecosystems, innovation and change: current states of knowledge in South Africa. *African Journal of Marine Science*, 35(3): 359-360.
- Moore, J.P., Nguema-Ona, E., Vire-Gibouin, M., Sorensen, I., Willats, W., Driouich, A. and Farrant, J.M. 2013. Arabinose-rich polymers as an evolutionary strategy to plasticize resurrection plant cell walls against desiccation. *Planta*, 237: 739-754.
- Mortimer, E., Hitzeroth, I.I., Buys, A., Mbewana, S. and Rybicki, E.P. 2013. An H5N1 influenza DNA vaccine for South Africa. *South African Journal of Science*, 109: 0053(4pp) DOI: 10.1590/sajs.2013/20120053.
- Nelson-Flower, M., Hockey, P.A.R., O'Ryan, C., English, S., Thompson, A.M., Bradley, C., Rosenberg, R. and Ridley, M. 2013. Costly reproductive competition between females in a monogamous cooperatively breeding bird. *Proceedings of the Royal Society B-Biological Sciences*, 280(1762): 20130728 DOI:10.1098/rspb.2013.0728.
- Pineo, C., Hitzeroth, I.I. and Rybicki, E.P. 2013. Immunogenic assessment of plant-produced human papillomavirus type 16 L1/L2 chimaeras. *Plant Biotechnology*, 11: 964-975.
- Robertson, S., Hapgood, J. and Louw, A. 2013. Glucocorticoid receptor concentration and the ability to dimerize influence nuclear translocation and distribution. *Steroids*, 78: 182-194.
- Robertson, S., Rohwer, J., Hapgood, J. and Louw, A. 2013. Impact of glucocorticoid receptor density on ligand-independent dimerization, cooperative ligand-binding and basal priming of transactivation: a cell culture model. *PLoS One*, 8(5): e64831.
- Ruschhaupt, M., Martin, D.P., Lakay, F., Bezuidenhout, M.E., Rybicki, E.P., Jeske, H. and Shepherd, D.N. 2013. Replication modes of maize streak virus mutants lacking RepA or the RepA-pRBR interaction motif. *Virology*, 442: 173-179.
- Rybicki, E.P., Hitzeroth, I.I., Meyers, A.E., Dus Santos, M.J. and Wigdorowitz, a. 2013. Developing country applications of molecular farming: case Studies in South Africa and Argentina. *Current Pharmaceutical Design*, 19: 5612-5621.

Samuel, F.O., Segun, A., Baba, M.M. and Farrant, J.M. 2013. Oil of camelia sinensis inhibits pathogenic bacteria. *International Journal of Phytomedicine*, 5(2013): 163-172.

Scotti, L. and Rybicki, E.P. 2013. Virus-like particles produced in plants as potential vaccines. *Expert Review of Vaccines*, 12(2): 211-224.

Stanczyk, F.Z., Hapgood, J., Winer, S. and Mishell, D.R. 2013. Progestogens used in postmenopausal hormone therapy: differences in their pharmacological properties, intracellular actions, and clinical effects. *Endocrine Reviews*, 34(2): 171-208.

Thuenemann, E., Meyers, A.E., Verwey, J., Rybicki, E.P. and Lomonosoff, G. 2013. A method of rapid production of heteromultimeric protein complexes in plants: assembly of protective bluetongue virus-like particles. *Plant Biotechnology Journal*, 11: 839-846.

Thuenemann, E., Lenzi, P., Love, A.J., Taliany, M., Becares, M., Zuniga, S., Enjuanes, L., Zahmanova, G., Minkov, I.N., Matic, M., Noris, E., Meyers, A.E., Hattingh, A., Rybicki, E.P., Kiselev, O.I., Ravin, N.V., Eldarov, M., Skryabin, G. and Lomonosoff, G. 2013. The use of transient expression systems for the rapid production of virus-like particles in plants. *Current Pharmaceutical Design*, 19: 5564-5573.

Tomasichio, M., Avenant, C., Kotitschke, A., Ray, R. and Hapgood, J. 2013. The progestin-only contraceptive medroxyprogesterone acetate, but not norethisterone acetate, enhances HIV-1 Vpr-mediated apoptosis in human CD4+T Cells through the glucocorticoid receptor. *PLoS One*, 8(5): e62895.

Weber, B.W., Kimani, S., Varsani, A., Cowan, D.A., Hunter, R., Venter, G.A., Gumbart, J.C. and Sewell, B.T. 2013. The mechanism of the amidases - mutating the glutamate adjacent to the catalytic triad inactivates the enzyme due to substrate mispositioning. *Journal of Biological Chemistry*, 288(40): 28514-28523.

Patents

Williamson, A.-L., Rybicki, E.P., Maclean, J. and Hitzeroth, I.I. 2013. Expression of Proteins in Plants. Registered in: Cape Town. US Patent. Date registered: 29/01/2013. US 2013/0130314 A1.

DEPARTMENT OF OCEANOGRAPHY

(Including the Nansen-Tutu Centre for Marine Environmental Research, ICEMASA, 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 Norway, 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

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	2
Doctoral	26
Master's	20
Honours	9
Undergraduate	198
Total	255

Research Fields and Staff

Permanent Staff

PROFESSOR C.J.C. REASON

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

PROFESSOR F.A. SHILLINGTON

Shelf oceanography, satellite marine remote sensing

DR I.J. ANSORGE

Senior Lecturer: Southern Ocean

DR M. ROUAULT

Principal Research Officer: Ocean-atmosphere interaction

DR H.N. WALDRON

Senior Lecturer: biogeochemical oceanography

DR J. JACKSON-VEITCH

Lecturer: Benguela upwelling system, modelling

DR R ROMAN

Senior Scientific Officer: satellite marine remote sensing

MR P TRUTER

Diving Supervisor: ocean diving

MRS C. KHAI

Administrative Officer

MRS N. JABAAR

Resource Centre Officer

Emeritus Professors

PROFESSOR G.B. BRUNDRIT

Operational oceanography

PROFESSOR J.G. FIELD

Senior Scholar: Marine Research Institute

Contract Research Staff

DR BJORN BACKEBERG

Regional ocean modeling, data assimilation

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

Biogeochemical oceanography

DR A. MAVUME

Tropical cyclones

DR MJ KRUG

Agulhas current, remote sensing

DR T LAMONT

Coastal oceanography, remote sensing

DR S SWART

Southern ocean and gliders

DR NC FAUCHEREAU

Climate Variability

DR C RUIZ-SEBASTIAN

Marine ecologist

DR CJ ROY

Fisheries oceanography, upwelling systems

DR K BROWN

Marine ecologist

Postdoctoral Fellows

DR ANNE TREASURE

Ecological modeling, Southern ocean

DR ISSUFO HALO

Ocean circulation modelling

Contact Details

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University of Cape Town, Private Bag X3, Rondebosch,
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UCT General Enquiries: +27 21 650 9111

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

Research Output

Chapters in books

Flato, G., Marotzke, J., Abiodun, B.J., Braconnot, P., Chou, S.C., Collins, W., Cox, P., Driouech, F., Emori, S., Eyring, V., Forest, C.E., Gleckler, P.J., Guilyardi, E., Jakob, C., Kattsov, V., Reason, C.J.C. and Rummukainen, M. 2013. Evaluation of climate models. In T.F.Stocker, D. Qin, K.G. Plattner, et al. (eds), *Climate change 2013: The Physical Science Basis*, pp. 741-866. Cambridge: Cambridge University Press. ISBN 9781107661820.

Strub, P.T., Combes, V., Shillington, F.A. and Pizarro, O. 2013. Currents and processes along the Eastern boundaries. In G.Siedler, S. M. Griffies, J. Gould and J.A. Church (eds), *Ocean & Circulation and Climate: A 21st Century Perspective*, pp. 339-384. Amsterdam: Elsevier. ISBN 9780123918512.

Vera, C., Gutowski, W., Mechoso, C.R., Goswami, B.N., Reason, C.J.C., Thorncroft, C.D., Marengo, J.A., Hewitson, B.C., Hendon, H., Jones, C. and Lionello, P. 2013. Understanding and predicting climate variability and change at monsoon regions. In G. R. Asrar and J.W. Hurrell (eds), *Climate science for serving society: research, modeling and prediction priorities*, pp. 273-306. Dordrecht: Springer Science & Business Media B.V. ISBN 978 94 007 66914.

Articles in peer-reviewed journals

Allan, E.L., Froneman, P.W., Durgadoo, J.V., McQuaid, C., Ansorge, I.J. and Richoux, N.B. 2013. Critical indirect effects of climate change on sub-Antarctic ecosystem functioning. *Ecology and Evolution*, 3(9): 2994-3004.

Assmy, P., Smetacek, V., Montresor, M., Klaas, C., Henjes, J., Strass, V.H., Arrieta, J.M., Bathmann, U., Berg, G.M., Breitbarth, E., Cisewski, B., Friedrichs, L., Fuchs, N., Herndl, G.J., Jansen, S., Krägersky, S., Latasa, M., Peeken, I., Röttgers, R., Scharek, R., Schuller, S.E., Steigenberger, S.S., Webb, A. and Wolf-Gladrow, D. 2013. Thick-shelled, grazer-protected diatoms decouple ocean carbon and silicon cycles in the iron-limited Antarctic circumpolar current. *Proceedings of the*

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Barlow, R., Lamont, T., Britz, K. and Sessions, H. 2013. Mechanisms of phytoplankton adaptation to environmental variability in a shelf ecosystem. *Estuarine Coastal and Shelf Science*, 133: 45-57.

Blamey, R.C. and Reason, C.J.C. 2013. The role of mesoscale convective complexes in Southern Africa summer rainfall. *Journal of Climate*, 26: 1654-1668.

Bucciarelli, E., Ridame, C., Sunda, W.G., Dimier-Hugueney, C., Cheize, M. and Belviso, S. 2013. Increased intracellular concentrations of DMSP and DMSO in iron-limited oceanic phytoplankton *Thalassiosira oceanica* and *Trichodesmium erythraeum*. *Limnology and Oceanography*, 58(5): 1667-1679.

Currie, J., Lengaigne, M., Vialard, J., Kaplan, D.M., Aumont, O., Naqvi, S.W.A. and Maury, O. 2013. Indian Ocean dipole and El Niño/southern oscillation impacts on regional chlorophyll anomalies in the Indian Ocean. *Biogeosciences*, 10: 6677-6698.

Deshayes, J., Tréguier, A.-M., Barnier, B., Lecomte, A.-M., Le Sommer, J., Molines, J.-M., Penduff, T., Bourdall-Badie, R., Drillet, Y., Garric, G., Benshila, R., Madec, G., Biastoch, A., Böning, C.W., Scheinert, M., Coward, A.C. and Hirschi, J.J.-M. 2013. Oceanic hindcast simulations at high resolution suggest that the Atlantic MOC is bistable. *Geophysical Research Letters*, 40(12): 3069-3073.

Durgadoo, J.V., Loveday, B.R., Reason, C.J.C., Penven, P. and Biastoch, A. 2013. Agulhas leakage predominantly responds to the Southern Hemisphere westerlies. *Journal of Physical Oceanography*, 43(10): 2113-2131.

Field, J.G., Attwood, C.G., Jarre, A., Sink, K., Atkinson, L.J. and Petersen, S. 2013. Cooperation between scientists, NGOs and industry in support of sustainable fisheries: the South African hake *Merluccius* spp. trawl fishery experience. *Journal of Fish Biology*, 83: 1019-1034.

Fleddum, A., Atkinson, L.J., Field, J.G. and Shin, P. 2013. Changes in biological traits of macro-benthic communities subjected to different intensities of demersal trawling along the west coast of southern Africa. *Journal of the Marine Biological Association of the United Kingdom*, 93(8): 2027-2038.

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DEPARTMENT OF PHYSICS

Head of Department: Associate Professor A Buffler

Departmental Profile

The Department of Physics is accommodated in the R W James Building, which houses research laboratories equipped for nuclear physics, 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). The Department is also a member of both the ATLAS and ALICE collaborations at CERN.

Major areas of interest include:

1. Experimental nuclear physics at iThemba LABS (D G Aschman, A Buffler, R W Fearick): (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, 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, T Dietel, 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): (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.
6. Tertiary physics education (M S Allie, A Buffler, D Taylor and S M Wheaton): (a) Curriculum design and evaluation; (b) Role of language; (c) Understanding of measurement and uncertainty; (d) Modelling and visualization; (e) Computational Physics Education.

Departmental Statistics

Permanent and long term contract staff

Professor	3
Associate Professor	6
Senior Lecturer	3
Lecturer	5
Part-time Lecturer	0
Technical Staff	4
Administrative Staff	3
Departmental & Lab Assistants	4
TOTAL	28

Research staff

Honorary Professor	1
Emeritus Professor	5
Emeritus Associate Professor	3
Honorary Research Associate	3
TOTAL	12

Students

Doctoral	30
Master's	18
Honours	4
Undergraduate	1583
TOTAL	1635

Staff and Research Fields

Permanent Academic staff

ASSOCIATE PROFESSOR A BUFFLER

Head of Department: Experimental Nuclear Physics, Physics Education

PROFESSOR D G ASCHMAN
Experimental Nuclear Physics

PROFESSOR D T BRITTON
Nanophysics

PROFESSOR A PESHIER
Theoretical Physics

ASSOCIATE PROFESSOR M S ALLIE (CHED)
Physics Education

ASSOCIATE PROFESSOR M D BLUMENTHAL
Solid State Physics

ASSOCIATE PROFESSOR R W FEARICK
Experimental Nuclear Physics

ASSOCIATE PROFESSOR M HÄRTING
Nanophysics

ASSOCIATE PROFESSOR H W G WEIGERT
Theoretical Physics

DR I GOVENDER
Senior Lecturer: Applied Physics

MR G LEIGH
Senior Lecturer: Physics Education

DR S M WHEATON
Senior Lecturer: Computational Physics

DR T DIETEL
Lecturer: Experimental Particle Physics

DR A HAMILTON
Lecturer: Experimental Particle Physics

DR W A HOROWITZ
Lecturer: Theoretical Particle Physics

DR S W PETERSON
Lecturer: Applied Nuclear Physics

DR D TAYLOR (CHED)
Lecturer: Physics Education

Emeritus Professors

EMERITUS PROFESSOR J W A CLEYMANS
Senior Scholar: Theoretical Physics

EMERITUS PROFESSOR C A DOMINGUEZ
Senior Scholar: Theoretical Physics

EMERITUS PROFESSOR S M PEREZ
Theoretical Nuclear Physics

EMERITUS PROFESSOR R D VIOLLIER
Theoretical Particle Physics and Astrophysics

EMERITUS ASSOCIATE PROFESSOR C M COMRIE
Solid State Physics

EMERITUS ASSOCIATE PROFESSOR P E SPARGO
History of Science

EMERITUS ASSOCIATE PROFESSOR G ROBERTSON
Laser Physics

Honorary Professor

PROFESSOR Z VILAKAZI, ITHEMBA LABS

Honorary Research Associates

PROFESSOR M LOEWE, UNIVERSITY OF MAINZ,
GERMANY

PROFESSOR F E LUBBEN, UNIVERSITY OF YORK, UK

PROFESSOR K SCHILCHER, UNIVERSITY OF MAINZ,
GERMANY

Research Associate

DR GARY TUPPER, UNIVERSITY OF CAPE TOWN

Postdoctoral Fellows

DR DANISH AZMI
DR KATIE COLE
DR RUDOLF NEUSSL
DR MAX RICHTER

Distinguished visitors

PROF CHRISTINE LINDSTROM, OSLO & AKERSHUS
UNIVERSITY COLLEGE, NORWAY
PROF DAVID WOLFE, UNIVERSITY OF NEW MEXICO,
USA
DR MARIAGIOVANNA GIANFREDA; UNIVERSITY OF
SALENTO, ITALY
PROF ERASMUS DU TOIT, UNIVERSITY OF
STELLENBOSCH
DR NITHAYA CHETTY, UNIVERSITY OF PRETORIA
DR GERMAN MONTOYA, WITS
PROF JOHN WOOD, GEORGIA TECH, US
DR TONY PRICE, PRAVDA CONSORTIUM, UK
PROF BRUCE MELLADO GARCIA, WITS
DR TJAART KRUGER, UNIVERSITY OF PRETORIA
PROF WOLFGANG CHRISTIAN, DAVIDSON COLLEGE
– NC, USA
DR RALF NOLTE, PTB, GERMANY
DR FRANCOIS GELIS, CEA-SACLAY, FRANCE
PROF ROGER CASHMORE, UK ATOMIC ENERGY
AUTHORITY

DR HEATHER GRAY, CERN, SWITZERLAND
PROF LOUIS BRUCH, UNIVERSITY OF WISCONSIN, US
DR DIETER MUELLER, BOCHUM UNIVERSITY,
GERMANY
DR YORK SCHROEDER, BIELEFELD UNIVERSITY,
GERMANY
DR GUILLAUME BEUF, UNIVERSIDADE DE SANTIAGO
DE COMPOSTELA
PROF KAI ZUBER, DRESDEN UNIVERSITY, GERMANY
DR SUSANNE HEINICKE, UNIVERSITY OF OLDENBURG,
GERMANY
PROF HUBERT SPIESBERGER, UNIVERSITY OF MAINZ,
GERMANY
DR ANDREAS VON MANTEUFFEL, UNIVERSITY OF
MAINZ, GERMANY
PROFESSOR ALEJANDRO AYALA, UNIVERSITY
OF MEXICO
PROF JOSE PENARROCHA, UNIVERSITY OF
VALENCIA, SPAIN
PROF AGNES MOCSY, PRATT INSTITUTE, NY, USA
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YouTube: <http://www.youtube.com/uctphysics>

Research Output

Chapters in books

Cleymans, J.W.A. 2013. The thermal model and the
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Articles in peer-reviewed journals

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Cleymans, J.W.A., Lykasov, G.I., Parvan, A., Sorin, A.S.,
Teryaev, O.V. and Worku, D. 2013. Systematic properties
of the Tsallis distribution: energy dependence of
parameters in high energy p-p collisions. *Physics Letters
B*, 723: 351-354.

Comrie, C.M., Ahmed, A., Smeets, D., Demeulemeester,
D., Turner, S., van Tendeloo, G., Detavernier, C. and
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Physics*, 113(23): 234902(8pp) DOI: 10.1063/1.4811352.

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- Raji, A.T., Scandolo, S., Harting, M. and Britton, D.T. 2013. Probing the structure of iron at extreme conditions by X-ray absorption near-edge structure calculations. *High Pressure Research*, 33(1): 119-123.
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- Tupper, G.B., Govender, I., Mainza, A.N. and Plint, N. 2013. A mechanistic model for slurry transport in tumbling mills. *Minerals Engineering*, 43-44: 102-104.
- Publications (104 in 2013) associated with the ATLAS collaboration and ALICE collaboration at CERN are not reflected in the list above.

Peer-reviewed published conference proceedings

Cleymans, J.W.A. 2013. The Tsallis distribution for p - p collisions at the LHC. Proceedings of 2nd International Workshop on Discovery Physics at the LHC, (Kruger2012), 3-7 December 2012, Kruger, South Africa. South Africa: IOP Publishing Limited. ISBN 9781629930930.

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Nwosu, V., Allie, M.S., Demaree, D. and Deacon, A. 2013. A study of postgraduate students in an astrophysics bridging year: identifying contradictions in a complex system. In P.V. Engelhardt, A.D. Churukian, N.S. Rebello (eds), Proceedings of 2012 Physics Education Research Conference, 1-2 August 2013, Philadelphia, PA, USA. Melville, New York: American Institute of Physics. ISBN 9780735411340.

Peshier, A. 2013. Heavy-quark binary scattering in the quark-gluon plasma. Proceedings of 2nd International Workshop on Discovery Physics at the LHC, (Kruger2012), 3-7 December 2012, Kruger, South Africa. South Africa: IOP Publishing Limited. ISBN 9781629930930.

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Scriba, M.R., Britton, D.T. and Harting, M. 2013. Hot wire and spark pyrolysis as simple new routes to silicon nanoparticle synthesis. Proceedings of Nanostructured Materials and Nanotechnology V - 36th International Conference on Advanced Ceramics and Composites, ICACC 2012, 16 April, Daytona Beach, Florida. USA: Unknown. ISSN 1966219.

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Patents

Britton, D.T. and Haerting, M. 2013. Semiconducting Nanoparticles with Surface Modification. Registered in: Cape Town. United States Patent. Date registered: 15/01/2013. US 8 354 662 B2.

DEPARTMENT OF STATISTICAL SCIENCES

Head of Department: Associate Professor Francesca Little

Departmental Profile

The Department of Statistical Sciences at the University of Cape Town is committed to the development of the statistical sciences within and beyond the university. In its teaching, the department recognises that there are needs both to train professionals in the statistical sciences, and to provide quantitative and decision-making skills to students in other disciplines. In its research, the department seeks to maintain a balance between the development of theory and applications of that theory. Researchers in the department collaborate with colleagues in the health and biological sciences, education, finance and industry. The research within the department is diverse but can be broadly grouped into the areas of Statistical Theory, Biological Statistics, Financial Modelling, Social Statistics and Operations Research and Decision Modelling, and Analytics. The department hosts the recently established Statistics in Ecology, the Environment and Conservation (SEEC) research unit.

Departmental Statistics

Permanent and long-term contract staff

Professors	3
Associate Professors	4
Senior Lecturers	6
Lecturers	10
Emeritus Professor	3
Emeritus Associate Professor	1
Scientific Officer	2
Administrative and Clerical Staff	6
Total	34

Honorary staff

Honorary Research Associates	2
Total	2

Students

Doctoral	8
Master's	28
Postgraduate service courses	65
Honours	25
Undergraduate	4263
Total	4391

Research Fields and Staff

Permanent Academic staff

ASSOCIATE PROFESSOR FRANCESCA LITTLE

Head of Department: Biostatistics; Longitudinal Data Analysis; Survival Analysis; Analysis of Causality.

PROFESSOR GRAHAM BARR

Macroeconomic model building and financial time series analysis; problem gambling analysis; teaching with spreadsheets.

PROFESSOR DAVE BRADFIELD

Financial risk management; Robust Portfolio Construction; Structural role of Assets in achieving Pension Fund Mandates in South Africa

PROFESSOR TIM DUNNE

Statistics for Measurement; statistical methods in education and psychology.

ASSOCIATE PROFESSOR SUGNET LUBBE

Multivariate statistics; Graphical displays; Biplots.

ASSOCIATE PROFESSOR CHRISTIEN THIART

GIS and spatial modeling.

ASSOCIATE PROFESSOR RES ALTWEGG

Statistics for Ecology, the Environment and Conservation.

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; gambling; teaching with spreadsheets.

MR KARL STIELAU

Senior Lecturer: professional teacher.

DR FREEDOM GUMEDZE

Senior Lecturer: Biostatistics; mixed effect linear models; longitudinal data analysis; survival analysis.

DR MELVIN VARUGHESE

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

MR ALLAN CLARK

Lecturer: Bayesian analysis; Extreme value theory; Econometric modelling; Statistics for Ecology.

MR GREG DISTILLER

Lecturer: statistical ecology; capture-recapture models.

DR SEBNEM ER

Lecturer: Time series analysis; Panel data; Spatial statistics; Structural Equation Modeling;

MR DOMINIQUE KATSHUNGA

Lecturer: Multivariate analysis; Copulas.

MS HANNAH KROON

Lecturer: Professional teacher.

DR MIGUEL LACERDA

Lecturer: Phylogenetics; Bioinformatics; Stochastic processes.

MS SHEETAL SILAL

Lecturer: Mathematical modeling of infectious disease; public health.

DR JONAS STRAY

Lecturer: Optimization; Operations Research; Modeling for Sugar cane industry.

MR NEIL WATSON

Lecturer: Operations Research and Decision Modeling for Development.

Technical Staff

MS KATYA MAUFF

Statistical Consultant: Statistical modelling; Nonlinear Mixed Effect modelling; Multivariate Statistics.

MS USHMA GALAL

Statistical Consultant

Emeritus Professors

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

Senior Scholar: Multicriteria decision analysis and multiobjective optimization; resource allocation and management.

Emeritus Associate Professors

EMERITUS ASSOCIATE PROFESSOR JUNE JURITZ

Biostatistics, hierarchical generalised mixed models.

Contract staff

DR IAN DURBACH

Adjunct Senior Lecturer: decision analysis; risk and uncertainty.

Postdoctoral Research Fellows

DR THEONI PHOTOPOULOU

Analysis of animal telemetry data, Bayesian state-space models for animal movement, movement ecology, regression analysis.

DR GUILLAUME PERON

Honorary Research Associates

PROFESSOR ANESTIS ANTONIADIS

Inference on Stochastic Processes; Nonlinear Regression; Nonparametric Statistics; Wavelets in Statistics; Functional Data Analysis; Inverse Problems; Survival Analysis; Models in meteorology and climatology (Nuclear Agency, Grenoble); Statistical methods in Crystallography; Quality Control; Mixtures; Environmental Statistics; Statistical Analysis of Microarray Data; Sensitivity Analysis.

PROFESSOR DR GÜNTER SCHMIDT

Operations Research, Combinatorial Optimization, Conversion and Scheduling Problems, Financial Decision Support.

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Research Output

Chapters in books

Janssen, R., Joubert, A.R. and Stewart, T.J. 2013. A multi-criteria approach to equitable fishing rights allocation in South Africa's Western Cape. In P. J.H. van Beukering (ed), *Nature's Wealth. The Economics of Ecosystem Services and Poverty*, pp. 155-171. USA, NY: Cambridge Univ Press, Edinburgh Bldg, Shaftesbury Rd, Cambridge, England. ISBN 9781107698048.

Kunz, M., Hlozek, R., Bassett, B.A., Smith, M., Newling, J. and Varughese, M. 2013. BEAMS: separating the wheat from the chaff in supernova analysis. In J. M. Hilbe (ed), *Astrostatistical Challenges for the New Astronomy*, pp. 63-86. New York: Springer Heidelberg New York Dordrecht London. ISBN 9781461435075.

Articles in peer-reviewed journals

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Bled, F.H.B., Nichols, J.D. and Altwegg, R. 2013. Dynamic occupancy models for analyzing species' range dynamics across large geographic scales. *Ecology and Evolution*, 3(15): 4896-4909.

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- Flournoy, N.F., Haines, L.M. and Rosenberger, W. 2013. A graphical comparison of response-adaptive randomization procedures. *Statistics in Biopharmaceutical Research*, 5(2): 126-141.
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- Haines, L.M. 2013. A random walk approach for deriving exact expressions for probabilities associated with Efron's biased coin design. *South African Statistical Journal*, 47(2): 123-125.
- Heathfield, L.J., Lacerda, M., Nossek, C., Roberts, L.J. and Ramesar, R.S. 2013. Stargardt disease: towards developing a model to predict phenotype. *European Journal of Human Genetics*, 21(10): 1173-1176 DOI 10.1038/ejhg.2013.92.
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Stewart, T.J., French, S. and Rios, J. 2013. Integrating multicriteria decision analysis and scenario planning - review and extension. *Omega-International Journal of Management Science*, 41(4): 679-688.

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Varughese, M. and Pienaar, E. 2013. Statistical inference for a multivariate diffusion model of an ecological time series. *Ecosphere*, 4(8): 104(14pp).

Wheeler, M., De Villiers, M.S. and Altwegg, R. 2013. Effect of human disturbance on the behavioural

responses and offspring survival of grey-headed albatrosses *Thalassarche chrysostoma* at Subantarctic Marion Island. *African Journal of Marine Science*, 35(4): 533-543.

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Coetzer, R.L.J. and Haines, L.M. 2013. Optimal designs for multiple-mixture by process variable experiments. In D. Ucinski, A.C. Atkinson and M. Patan (eds), *Proceedings of the 10th International Workshop in Model-Oriented Design and Analysis*, 10-14 June 2013, Lagow Lubuski, Poland. Switzerland: Dordrecht: Springer Science & Business Media B.V. ISBN 9783319002170.