Science

12 **DST/NRF SARChI Chairs**

Accredited journal units **351**

R159m **Income raised by contracts**

47% **Increase** in rand value of contracts in 2015 over 2014, via 307 contracts from government and non-government sources, local and foreign

NRF ratings 171

7 P rated

19 A rated

NEW NRF A RATINGS since June 2015

Prof Bruce Hewitson
Prof Chris Reason
Prof Anusuya Chinsamy-Turan

Internal **AWARDS**

Prof Renée Kraan-Korteweg, from the Department of Astronomy, was named as one of six new UCT Fellows.

External **AWARDS**

Prof Michael Feast, Lifetime Achievement Award from NRF.

Assoc Prof Gina Ziervogel, a senior lecturer in the Department of Environmental and Geographical Science, and a research fellow in the African Climate and Development Initiative, won the Distinguished Young Women Researcher Award at the Women in Science Awards 2015.

Prof Peter Dunsby, Department of Mathematics and Applied Mathematics, was awarded the 2015/16 NSTF Award for research capacity development over the last five to 10 years.

Dr Robyn Pickering, a newly appointed lecturer in the Department of Environmental and Geological Science, was awarded a P rating by the NRF, one of only 12 awards across the country.

Emer Prof Jennifer Thomson, Department of Molecular and Cell Biology, was recently awarded a global Lifetime Achievement Award for Women in Science, by the United Nations Environment Programme (UNEP).

Emer Prof George Ellis, Department of Mathematics and Applied Mathematics, has been elected Doctor Honoris Causa by the Pierre and Marie Curie University in Paris. He will also receive an honorary degree from the University of the Witwatersrand.

HIGHLIGHTS from June 2015 to June 2016

New leadership appointments

Prof Jill Farrant, Department of Molecular and Cell Biology, new DST/NRF SARChI Chair, who was awarded a chair in systems biology studies on plant desiccation tolerance for food security.

Assoc Prof Amanda Weltman, Department of Mathematics and Applied Mathematics, new DST/NRF SARChI Chair, who was awarded a chair in physical cosmology.

New initiatives

Establishment of the URC-accredited Human Evolution Research Institute (HERI), under the directorship of **Assoc Prof Rebecca Ackermann**, Department of Archaeology.

Establishment of the URC-accredited interdisciplinary Human-Wildlife Institute, under the directorship of **Prof Justin O'Riain**, Department of Biological Sciences.

Significant research contributions

The Department of Agriculture, Forestry and Fisheries partnered with **Dr Serge Raemaekers,** from the Department of Environmental and Geographical Science, to launch a new fishing application called Abalobi.

Jeremy Midgley, Harry Bolus Professor of Botany, **Gary Bronner**, MSc student **Joseph White** and Steve Johnson (UKZN), have shown that, unexpectedly, free-ranging small mammals were intergral to dispersal of Ceratocaryum nuts.

Dr Robyn Pickering of the Department of Environmental and Geological Science. The million-year-old monkey: new evidence confirms the antiquity of a fossil primate from the Dominican Republic.

Prof Michael Meadows and postgraduate students from the departments of Environmental and Geographical Science and Geological Sciences have been involved in a major collaborative research project called RAiN (Regional Archives for Integrated iNvestigations), which investigates terrestrial and marine environmental archives in South Africa.

Prof Nicola Illing, students **Stephen Schlebusch** and **Zoe Gill**, Department of Molecular and Cell Biology, and Dr Walter L Eckalbar provide new insights on limb development, based on a decade of research on bats.

Major research grants

Prof Bruce Hewitson (environmental and geographical science): R26 million

The project 'Future Resilience for African CiTies And Lands' (FRACTAL) is a large international consortium funded by the UK, for which Climate System Analysis Group is the lead partner.

Prof Ed Rybicki (molecular and cell biology): R12 million

The Biopharming Research Unit obtained funding of R12 million from the Technology Innovation Agency for a three-year project, with the CSIR and the University of Pretoria, on developing plant-made vaccines to similar RNA viruses causing bluetongue disease in sheep and African horse sickness in horses.

Prof Kelly Chibale (chemistry): R 6.8 million

This research grant was received from the Celgene Corporation for the development of optimised leads against tuberculosis.

Prof Kelly Chibale (chemistry): R23 million

This research grant from the Strategic Health Innovation Partnerships (SHIP) unit of the Medical Research Council is for development of optimised leads against malaria, TB and non-communicable diseases.

Prof Sue Parnell (environmental and geographical science): R8.9 million

This consortium grant to the Urban ARK project is to address vulnerability and hazard assessments, the root causes and historical trajectories of risk, governance and planning.

POSTGRADUATES (end-2015)

481 Master's students

142 Master's graduates

415 PhD students

63 PhD graduates

139 POSTDOCS (end-2015)

DOCTORAL GRADUATIONS

Source: Doctoral Degrees Board

T.B. ANDERSON (CHEMISTRY)
Towards the synthesis of the unusual monosaccharides found in the *Shigella sonnei* O-antigen and analysis of *Shigella flexneri* 2a glycoconjugate vaccine samples
Supervised by Associate Professor D.W. Gammon and Associate Professor N. Ravenscroft

D.C.Z. ARENDSE (ZOOLOGY)
Experimental cultivation of the South African scallop, Pectin sulcicostatus
Supervised by Emeritus Professor C. Griffiths and Dr G. Pitcher

F.H. BALETA (ENVIRONMENTAL & GEOGRAPHICAL SCIENCE)
The concept of shared risk in public and private sector water security: a case study of Grabouw and the Elgin Valley, Western Cape, South Africa
Supervised by Dr K. Winter

C.G.G. BELTRAN (MOLECULAR & CELL BIOLOGY)
Proteomic investigation of the immune response of the South African abalone, Haliotis midae
Supervised by Associate Professor V. Coyne

R. COOPER (ZOOLOGY)
Systems modelling of the South African offshore demersal hake trawl fishery: an economic perspective
Supervised by Associate Professor A. Jarre

R. COZETT (CHEMISTRY)
Studies on the use of peptide auxiliaries in the meso-desymmetrization of epoxides, and the kinetic resolution of secondary alcohols
Supervised by Professor R. Hunter

S.M. CURTIS (MOLECULAR & CELL BIOLOGY)
Enhanced phylogenetic analysis and targeted search for the genus Kribbella
Supervised by Dr P. Meyers

O.R. DAVIES (ZOOLOGY)
Taxonomy, phylogeny and biogeography of cisticolas (Cisticola spp.)
Supervised by Professor T.M. Crowe

F. ELMAGBARI (CHEMISTRY)
Synthesis and design of ligand copper complexes as anti-inflammatory drugs
Supervised by Professor G.E. Jackson

S. FAKIER (CHEMISTRY)
The effect of inositol-hexakisphosphate (phytate) on urinary risk factors for calcium oxalate urolithiasis in South African population groups with different kidney stone risk profiles: theoretical modelling, in vitro crystallisation experiments and in vivo human studies
Supervised by Professor A. Rogers and Professor G. Jackson

Y. GOVENDER (MOLECULAR & CELL BIOLOGY)
Role of the glucocorticoid receptor and HIV-1 Vpr in inflammatory gene expression and HIV-1 LTR transcription in response to dexamethasone and progestogens
Supervised by Professor J.P. Hapgood and Dr C. Avenant

D.T. GUZHA (MOLECULAR & CELL BIOLOGY)
Investigating the biological roles of the HSPRO genes in Arabidopsis thaliana
Supervised by Dr R. Ingle

D.C. GWYNNE-EVANS (BOTANY)
Systematics of Hermannia L. (Malvaceae): a taxonomic review of the genus
Supervised by Professor T. Hedderson

A. HAMMOUDA (CHEMISTRY)
Development of copper peptide complexes as anti-inflammatory drugs
Supervised by Professor G.E. Jackson

I.E. IREKA (APPLIED MATHEMATICS)
Computational analysis of non-isothermal flow of non-Newtonian fluids
Supervised by Dr T. Chinyoka

R. KAMIES (MOLECULAR & CELL BIOLOGY)
A proteomic approach to investigate the response of TEF (eragrostis tef) to drought
Supervised by Dr S. Rafudeen and Professor J. Farrant

I.K. KEMP (MOLECULAR & CELL BIOLOGY)
Identification and preliminary characterization of the 2,5-diphenyloxazole biosynthetic pathway in Streptomyces polyantibioticus SPRT
Supervised by Dr P. Meyers

E.V.M. KIGONDU (CHEMISTRY)
Repurposing chlorpromazine and its metabolites for antituberculosis drug discovery
Supervised by Professor K. Chibale and Associate Professor D.F. Warner

M. KUMAR (CHEMISTRY)
Design, synthesis and biological evaluation of verapamil analogues, reversed isoniazids and hybrid efflux pump inhibitors against Mycobacterium tuberculosis
Supervised by Professor K. Chibale

K.A. LAWAL (ENVIRONMENTAL & GEOGRAPHICAL SCIENCE)
Understanding the variability and predictability of seasonal climates over West and Southern Africa using climate models
Supervised by Dr B. Abiodun and Dr D.A. Stone (external)

M.C. LEWIS (ZOOLOGY)
Behavioural and isotope ecology of marine-foraging chacma baboons (Papio ursinus) on the Cape Peninsula, South Africa
Supervised by Professor M.J. O'Riain and Dr A.G.West

P.M. MAISTRY (BOTANY)
Aspalathus and Podalyria legumes balance acquisition of phosphorus and nitrogen for growth in nutrient poor fynbos soils
Supervised by Dr S. Chimphango and Associate Professor A.M. Muasya

B.S. MALAUENE (ZOOLOGY)
Environmental influences on banana shrimps of the Sofala Bank, Mozambique Channel Supervised by Associate Professor C. Moloney, Dr M.J. Roberts, Dr F. Marsac and Dr C. Lett

D.H. MAPHISA (STATISTICAL SCIENCES)
Towards adaptive management of high-altitude grasslands: Ingula as a case study
Supervised by Associate Professor R. Altwegg and Emeritus Professor L. Underhill

L.C. MATSINHA (CHEMISTRY)
Aqueous phase catalysis using mono– and bimetallic transition metal complexes
Supervised by Associate Professor G. Smith, Dr G.A. Venter and Professor S.F. Mapolie (external)

C.C. MBOGO (COMPUTER SCIENCE)
Scaffolding java programming on a mobile phone for novice learners
Supervised by Professor E. Blake and Associate Professor Hussein Suleman

E.S. MCGREGOR (ZOOLOGY)
Assessing the implementation efficacy of an ecosystem approach to Fisheries management in the South African sardine fishery
Supervised by Associate Professor A. Jarre

E. MEHDINEZHAD (MATHEMATICS)
The annihilation graphs of commutator posets and lattices
Supervised by Professor G. Janelidze

A.O. MEQUE (ENVIRONMENTAL & GEOGRAPHICAL SCIENCE)
Investigating the link between southern African droughts and global atmospheric teleconnections using regional climate models
Supervised by Dr B. Abiodun

B. MONGWANE (APPLIED MATHEMATICS)
Problems in cosmology and numerical relativity
Supervised by Professor P.K. Dunsby and Dr B.O. Osano

A. MSUTU (CHEMISTRY)
New methodology for the organocatalyzed α-animation reaction
Supervised by Professor R. Hunter

T. MUTABAZI (ASTRONOMY)
The distance to the Norma cluster and its relation to the great attractor region
Supervised by Dr S. Blyth and Professor P.A. Woudt

D. NGUMBU MUHUNGA (CHEMISTRY)
Synthesis of side-chain-modified mycothiol analogues incorporating carbazole quinones, and evaluation as inhibitors of enzymes in the *Mycobacteria*
Supervised by Associate Professor D.W. Gammon

L.J. ODENDAAL (ZOOLOGY)
Sensory divergence among populations of a southern African endemic horseshoe bat (Chiroptera: Rhinolophidae): a multidisciplinary approach
Supervised by Professor D. Jacobs

A. OMAR (CHEMISTRY)
Interactions of ferriprotoporphyrin IX with neutral lipids and detergents: insights into their role in β-haematin formation
Supervised by Professor T.J. Egan

S.E. OSIMA (ENVIRONMENTAL & GEOGRAPHICAL SCIENCE)
Understanding a high resolution regional climate model's ability in simulating tropical East Africa climate variability and change
Supervised by Professor B. Hewitson and Dr M. Stendel (external)

T. PATHMATHAS (PHYSICS)
Granular flow modelling of rotating drum flows using positron emission particle tracking
Supervised by Dr I. Govender

W.F. PETERSEN (CHEMISTRY)
Methodology studies on the synthesis of chiral, non-racemic azaquaternary centres
Supervised by Professor R. Hunter

M.C.R. PHILIBERT (PHYSICAL OCEANOGRAPHY)
A comparative study of nitrogen uptake and nitrification rates in sub-tropical, polar and upwelling waters

Supervised by Dr H. Waldron and Dr D.R. Clark (external)

I.S.S. PINTO (ENVIRONMENTAL & GEOGRAPHICAL SCIENCE)
Future changes in extreme rainfall events and circulation patterns over southern Africa
Supervised by Professor B. Hewitson and Dr C. Lennard

T. RAKOTONIAINA (MATHEMATICS)
On the computational strength of Ramsey's theorem
Supervised by Professor V. Brattka and Professor H.-P. Kunzi

P. RAMASU (MATHEMATICS)
Internal monoid actions in a carte-sian closed category and higher-dimensional group automorphisms
Supervised by Professor G. Janelidze

R. RANDRIAMANAKOTO (ASTRONOMY)
Formation of young massive star clusters: a high-resolution multi-wavelength study of intensely star-formation galaxies
Supervised by Dr K.J. Van Der Heyden

M.E.T. RAT (ZOOLOGY)
Dominance, social organisation and cooperation in the sociable weaver (Philetairus socius)
Supervised by Professor P. Ryan, Dr R. Cova (external), Dr Doutrelant (external) and Dr R.E.R. van Dijk (external)

R.M. RAY (MOLECULAR & CELL BIOLOGY)
Differential effects of progestogens on HIV-1 replication and host gene expression in primary PBMCs and cervical tissue explants
Supervised by Professor J. Hapgood and Dr C. Avenant

G. REGNARD (MOLECULAR & CELL BIOLOGY)
Development of a potential challenge model and plant-produced vaccine candidate for beak and feather disease virus
Supervised by Dr I.I. Hitzeroth

M. ROTHMAN (BOTANY)
The phylogeny, biology and biogeography of the Southern African kelps Ecklonia maxima and Laminaria pallida
Supervised by Professor J. Bolton, Professor R. Anderson and Dr L. Mattio

L. SCHROEDER (ARCHAEOLOGY)
The evolution and diversification of Pleistocene Homo
Supervised by Associate Professor B. Ackermann

R. SHOKO (MOLECULAR & CELL BIOLOGY)
A proteomic investigation of the rhizomes of the resurrection fern, Mohria caffrorum (L.) Desv in response to desiccation
Supervised by Professor J. Farrant and Dr S. Rafudeen

G. SSEKAKUBO (COMPUTER SCIENCE)
Refactoring learning management systems for multi-device use in developing countries
Supervised by Associate Professor H. Suleman and Professor G. Marsden

P.A. VIANELLO (PHYSICAL OCEANOGRAPHY)
A qualitative and physical analysis of processes around the Mascarene plateau
Supervised by Associate Professor M. Rouault and Associate Professor I. Ansorge

K. WATERMEYER (ZOOLOGY)
Ecosystem implications of the recent southward shift of key components in the southern Benguela
Supervised by Professor A. Jarre

L. WEHMEYER (MOLECULAR & CELL BIOLOGY)
The glucocorticoid receptor plays a central role in mammalian reproduction and signal integration in pituitary gonadotropes
Supervised by Professor J. Hapgood

K.J. WICHT (CHEMISTRY)
Discovery of benzamides and triarylimidazoles active against plasmodium falciparum via haemozoin inhibition: high throughput screening, synthesis and structure-activity relationships
Supervised by Professor T.J. Egan and Professor R.Hunter

C.O. YINKA-BANJO (COMPUTER SCIENCE)
Development of cooperative behavioural model for autonomous multi-robots system deployed to underground mines
Supervised by Dr B.A. Bagula

PATENTS

Filed Applications

Aderem, A., Hanekom, W. A., Hraha, T., Janjic, N., Ochsner, U., Penn-Nicholson, A., Scriba, T.J., Sterling, D., Thompson, E.G., Zak, D. E. Biomarkers for Detection of Tuberculosis Risk. Provisional Patent Application United States 62/159,011.

Aderem, A., Hanekom, W. A., Penn-Nicholson, A., Scriba, T.J., Thompson, E.G., Zak, D. E. Biomarkers for Prospective Determination of Risk for Development of Active Tuberculosis. Provisional Patent Application United Kingdom 1519872.4.

Arendze-Bailey, B.L., Ellick, T.N., Iyer, K., Iyer, R., Rafudeen, M.S., Thomson, J.A. Promotor

Derivado Que Pode Ser Induzido Por Estresse. National Phase Patent Application Brazil BR1120150048978.

Arendze-Bailey, B.L., Ellick, T.N., Iyer, K., Iyer, R., Rafudeen, M.S., Thomson, J.A. Stress Inducible Derivative Promoter. National Phase Patent Application Canada 2,883,151.

Arendze-Bailey, B.L., Ellick, T.N., Iyer, K., Iyer, R., Rafudeen, M.S., Thomson, J.A. Stress Inducible Derivative Promoter. National Phase Patent Application China 201380047042.4.

Arendze-Bailey, B.L., Ellick, T.N., Iyer, K., Iyer, R., Rafudeen, M.S., Thomson, J.A. Stress Inducible Derivative Promoter. National Phase Patent Application South Africa 2015/01618.

Arendze-Bailey, B.L., Ellick, T.N., Iyer, K., Iyer, R., Rafudeen, M.S., Thomson, J.A. Stress Inducible Derivative Promoter. National Phase Patent Application United States 14/426,445.

Ashkani, J., Naidoo, K.J. Genetic Biomarkers and Method for Evaluating Cancers. PCT Patent Application PCT PCT/IB2015/057916.

Atkinson, R., Meyers, A.E., Rybicki, E.P. Production of a Crimean-Congo Haemorrhagic Fever Virus Diagnostic and Vaccine Composition. Provisional Patent Application Britain 1509753.8.

Cabrera, D.G., Chibale, K., Paquet, T., Street, L.J., Waterson, D., Witty, M.J. New Anti-malarial Agents. Provisional Patent Application Europe 15 176 514.6.

Chibale, K., Waterson, D., Witty, M.J., Younis, Y. Anti-Malarial Agents. National Phase Patent Application Hong Kong 15103337.9.

Driver, C, Hunter, R., Parker, M.I. Radiopharmaceutical Conjugate. National Phase Patent Application Argentina P 150103118.

Driver, C, Hunter, R., Parker, M.I. Radiopharmaceutical Conjugate. PCT Patent Application PCT PCT/IB2015/057378.

Gain, J.E., Marais, P.C., Merry, B.C. Systems and methods for synthesising a terrain. Provisional Patent Application Britain 1507471.9.

Jacobs, M., Jardine, M.A. Tricyclic Derivatives. National Phase Patent Application China 201380061666.1.

Jacobs, M., Jardine, M.A. Tricyclic Derivatives. National Phase Patent Application India 3088CHENP2015.

Jacobs, M., Jardine, M.A. Tricyclic Derivatives. National Phase Patent Application Russia 2015125300.

Jacobs, M., Jardine, M.A. Tricyclic Derivatives. National Phase Patent Application South Africa 2015/03466.

Jardine, M.A. Modified Chitosan for Argentation Chromatography. National Phase Patent Application South Africa 2015/02777.

Jardine, M.A., Khonde, L.P. Process for Synthesizing Ergothioneine and Related Compounds. PCT Patent Application PCT PCT/IB2015/001668.

Meyers, A.E., Rybicki, E.P., Van Zyl, A.R. Synthetic BTV VP2 Fusion Protein. Provisional Patent Application United Kingdom 1514648.3.

Meyers, A.E., Rybicki, E.P., Van Zyl, A.R. Synthetic BTV VP2 Multiepitope Peptide Vaccine. Provisional Patent Application United Kingdom 1514652.5.

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Chibale, K., Waterson, D., Witty, M.J., Younis, Y. Anti-Malarial Agents. National Phase Patent Application South Africa 2014/06786.

Hitzeroth, I.I., Maclean, J.M., Rybicki, E.P., Williamson, A-L. Expression of Proteins in Plants. Divisional Patent Application United States 13/753,196.

Jardine, M.A., Makhubela, B.C.E., Smith, G.S. A Polymer Support. National Phase Patent Application China 201080040614.2.

Jardine, M.A., Makhubela, B.C.E., Smith, G.S. A Polymer Support. National Phase Patent Application Europe 10842020.9.

Rybicki, E.P., Tanzer, F.L. Expression System Incorporating a Capsid Promoter Sequence as an Enhancer of a Cytomegalovirus Promotor. National Phase Patent Application India 4927/DELNP/2008.

Department of Archaeology

Research Report 2015

Head of Department: Associate Professor Simon Hall

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 the emergence of our species, 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

Professor	1
Associate Professor	3
Lecturers	4
Contracts	1
Technical Support Staff	2
Administrative and Clerical Staff	1
Departmental Assistant	1
Lab Assistant	1
Total	**14**

Emeritus and Honorary Staff

Emeritus Professors	2
Emeritus Associate Professor	1
Honorary Research Associates	11
Total	**14**

Students and Postdoctoral Fellows

Postdoctoral Fellows	7
Doctoral	14
Masters	19
Honours	5
Undergraduates	271
Total	**316**

Research Fields and Staff

Permanent staff

HEAD OF DEPARTMENT: ASSOCIATE PROFESSOR SIMON HALL
Historical archaeology and the Iron Age in southern Africa

PROFESSOR JUDITH SEALY
Archaeometry, stable isotopes, palaeoenvironments, precolonial southern Africa

ASSOCIATE PROFESSOR REBECCA ROGERS ACKERMANN
Hominid evolution, variation, morphometrics, visualization and modelling, quantitative methods

ASSOCIATE PROFESSOR SHADRECK CHIRIKURE
Archaeometallurgy, Iron Age, heritage studies

DR DOMINGO CARLOS SALAZAR-GARCIA
Lecturer: Biogeochemical analysis, palaeodiet reconstruction mobility and subsistence patterns

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 JAYNE WILKINS
Lecturer: Lithic analysis, Middle Stone Age, early modern human adaptation, prehistoric weapons

Contract Staff

DR DAVID BRAUN
Adjunct Professor: Early Stone Age in eastern and southern Africa, stone artefact technology

Emeritus Professors

EMERITUS PROFESSOR JOHN PARKINGTON
Hunter-gatherers, palaeoenvironmental reconstruction and human ecology, prehistoric art, coastal archaeology

EMERITUS PROFESSOR NIKOLAAS J. VAN DER MERWE
Isotopes, palaeodiets, palaeoenvironments, archaeometallurgy

Emeritus Associate Professor

EMERITUS ASSOCIATE PROFESSOR A. SMITH
Prehistoric pastoralism, origins of food production, ethnohistory

Honorary Research Associates

DR BENJAMIN COLLINS
Zooarchaeology, Middle and Later Stone Age

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 SUSAN PFEIFFER
Biological anthropology

DR JOSE DE PRADA-SAMPER
Folklore studies, indigenous narratives, Bleek and Lloyd archive

DR ALEXANDRA SUMNER
Lecturer: Lithic analysis, human cognitive evolution

PROFESSOR LARISSA SWEDELL
Primatology

Postdoctoral Fellows

DR FOREMAN BANDAMA
Archaeometallurgy, Iron Age archaeology, ceramics, historical archaeology

DR PAUL CAVALIER
Proton magnetometry and the detection of buried objects and features

DR ASHLEY COUTU
Isotope ecology, bio-archaeology, historical archaeology

DR CHABI ADÉYÈMI MARC SYLVESTRE DJAGOUN
Wildlife ecology, stable isotopes

DR NONHLANHLA DLAMINI
Bioarchaeology, human skeletal remains, archaeology of farming communities in Africa

DR KATHARINE KYRIACOU
Nutritional analyses of foods and their relationship to modern human evolution

DR TERRENCE RITZMAN
Human evolution, hybridization, non-adaptive evolutionary process

Distinguished Visitors

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

PROFESSOR JACK FISHER
Montana State University – Faunal remains in archaeology

DR ALEX MACKAY
Australian National University – Pleistocene lithic technology

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

PROFESSOR PIERRE-JEAN TEXIER
CNRS-Valbonne France – Prehistory

Contact Details

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RESEARCH OUTPUT

Authored books

Chirikure, S. 2015. Metals in Past Societies: A Global Perspective on Indigenous African Metallurgy. 166pp. London: Springer. ISBN 9783319116402.

Parkington, J.E. and Dlamini, N. 2015. First People: Ancestors of the San. 142pp. Cape Town: Creda Communications. ISBN 9780620639972.

Soodyall, H., Deacon, J., Lombard, M. and Parkington, J.E. 2015. Journeys of Discovery: Stories of Human Innovation in Africa. 40pp. Pinelands, South Africa: SKA. ISBN 9780620657464.

Chapters in books

Tortosa, A., Emili, J., Marlasca Martín, R., Rodrigo, M.J., Jordá Pardo, J.F. and Salazar-Garcia, D.C., Morales Pérez, J.V. and Pérez Ripoll, M. 2015. Llisses, orades i alguna anguila. L'Ictiofauna mesolítica de les Coves de Santa Maira (Castell De Castells, La Marina Alta, Alacant). In A. Sanchi, I. Joseph and L. Pascual (eds), Preses Petites I Grups Humans en el Passat, pp. 121-138. Valencia: Museu de Prehistòria. ISBN 9788477957348.

Chirikure, S. 2015. "Do as I say and not as I do". On the gap between good ethics and reality in African archaeology. In A. Haber and N. Shepherd (eds), After Ethics: Ancestral Voices and Post- Disciplinary Worlds in Archaeology, pp. 27-37. New York: Springer. ISBN 9781493916887.

Chirikure, S. and Sinamai, A. 2015. World history from the seabed: rescuing a Portuguese shipwreck off the coast of Namibia. In S. Tripati (ed), Shipwrecks Around the World, pp. 114-130. New Delhi: Delta Book World. ISBN 9788192624440.

Silva-Pinto, V. and Salazar-Garcia, D.C. 2015. Bioarqueología de un cementerio huaqueado. In P. Mendez-Quiros Aranda and V. Silva-Pinto (eds), Poblados Maiceros y Arquitectura Funeraria en el Valle de Lluta (1200-1600 d.C.), pp. 87-110. University of Tarapacá. ISBN 9789563589085.

Smith, A.B. 2015. Repatriation begins at home: violence against South Africa's underclass, a colonial legacy that needs closure. In A. Mayor, V. Négri and E. Huysecom (eds), African Memory in Danger- Mémoire Africaine en Péril, pp. 52-60. Frankfurt: Africa Magna Verlag. ISBN 9783937248509.

Articles in peer-reviewed journals

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Department of Astronomy

Research Report 2015

Head of Department: Associate Professor Patrick Woudt

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, cosmic magnetism), 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 Astronomy department hosts two SARChI chairs – one in Astrophysics and Space Science (DST/NRF) and one in Extragalactic Multi-wavelength Astronomy (SKA) – and recently appointed a joint UWC/UCT SKA chair. The 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 MeerKAT surveys and science with the SKA are central to the Astronomy department's focus on Big Data and data intensive astrophysics.

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

In 2015, the Inter-University Institute for Data Intensive Astronomy (IDIA) was established (**www.idia.ac.za**) under the directorship of Prof Russ Taylor. Prof Taylor hold a joint UCT/UWC SKA chair, and is an expert on Big Data and data intensive astrophysics, particularly in relation to the Square Kilometre Array.

Associate Professor Woudt was promoted to professor and Dr Sarah Blyth was promoted to senior lecturer with effect of 1 January 2016. In 2015, the Astronomy department had 10 postdoctoral fellows, 25 PhD students and 11 MSc research students. The NASSP postgraduate cohort of 2015 consisted for 15 coursework Masters students and 11 BSc Honours students.

Departmental Statistics

Permanent and Long-Term Contract Staff

Professors	4
Associate Professor	1
Senior Lecturer	1.5
Lecturer	1
Visiting SKA Professor	0.1
Administrative Staff	6
Total	**13.6**

Emeritus and Honorary Staff

Emeritus Professor/Senior Scholar	1
Honorary Professor	1
Honorary Research Associate	1
Honorary Professors (affiliated)	3
Honorary Academic (affiliated)	1
Total	**7**

Students and Postdoctoral Fellows

Postdoctoral Fellows	10
Doctoral	25
Masters (Research)	1
Masters (NASSP Dissertation)	10
Masters (NASSP Coursework)	15
Honours (NASSP)	11
Undergraduate	182
Total	**254**

Research Fields and Staff

Permanent Staff

ASSOCIATE PROFESSOR PATRICK A. WOUDT
Head of Department: Cataclysmic variable stars, ultracompact binaries, high time domain astrophysics

PROFESSOR RENÉE C. KRAAN-KORTEWEG
Co-director ACGC: Large-scale structures and streaming motions in the nearby Universe, the Zone of Avoidance, systematic HI-surveys, evolution and transformation of galaxies.

PROFESSOR CLAUDE CARIGNAN
SKA SARChI Chair: Galaxy dynamics and dark matter; astronomical instrumentation and techniques

PROFESSOR THOMAS JARRETT
DST/NRF SARChI Chair: Galaxy evolution and star formation, large-scale structure and bulk-flow motions in the local Universe, astrophysical databases and large data sets

PROFESSOR RUSS TAYLOR
Joint UCT/UWC SKA Chair: Cosmic magnetism; data intensive astrophyscis

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

DR KURT VAN DER HEYDEN
Senior Lecturer: Deputy Head of Department, NASSP Director,Supernovae and Supernova remnants, systematic HI surveys, clusters of galaxies, X-ray spectroscopy

DR VANESSA MCBRIDE
Senior Lecturer: Joint SAAO/UCT position, X-ray binaries, Magellanic Clouds

DR SARAH BLYTH
Lecturer: Large-scale structure, galaxy evolution and galaxy clusters, HI-surveys

Emeritus Professor/Senior Scholar

EMERITUS DISTINGUISHED PROFESSOR BRIAN WARNER (SENIOR SCHOLAR)
Cataclysmic variable stars, white dwarf stars, history of astronomy

Honorary Staff

PROFESSOR ROB FENDER (VISITING SKA PROFESSOR)
X-ray binaries, neutron stars, black holes, accretion disks, radio transient surveys

HONORARY PROFESSOR MICHAEL W. FEAST & HONORARY RESEARCH ASSOCIATE
Stellar evolution, Galactic structure, long-period variable stars, distance scale

DR MATTHEW SCHURCH
Honorary Research Associate
Cataclysmic variables and X-ray binaries

Honorary Staff (affiliated)

HONORARY PROFESSOR PHIL A. CHARLES (UNIVERSITY OF SOUTHAMPTON)
Cataclysmic variables, X-ray binaries, neutron stars, black holes, accretion disks

HONORARY PROFESSOR ERWIN DE BLOK (ASTRON, NL)
Dark matter in disk galaxies, low-surface brightness galaxies, HI surveys, the interstellar medium in nearby galaxies, evolution of dark galaxies

HONORARY PROFESSOR TED WILLIAMS (DIRECTOR, SAAO)
Galaxy dynamics

PROFESSOR PETER DUNSBY (UCT, MATHEMATICS AND APPLIED MATHEMATICS)
Honorary Academic, Co-director ACGC
Theoretical cosmology and gravity

Postdoctoral Fellows

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 LIZ BARTLETT
X-ray emitting massive binaries

DR LUKE CHAMANDY
Cosmic magnetism

DR NATHAN DEG
Galaxy dynamics, N-body simulations

DR ED ELSON
Dynamical and star formation studies of nearby galaxies, simulations of HI data sets

DR TANA JOSEPH
Extragalactic X-ray binaries

DR YANNICK LIBERT
Observations and modelling of circumstellar environments around AGB stars

DR CHRISTINA MAGOULAS
Multi-wavelength and WISE infrared properties of nearby galaxies in the local Universe

DR LEE TOWNSEND
Multi-wavelength observations and dynamics of massive X-ray binaries

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RESEARCH OUTPUT

Chapters in books

Blyth, S., van der Hulst, J.M., Verheijen, M.A.W., Members, H.I.S.W.G., Catinella, B., Fraternali, F., Haynes, M.P., Hess, K.M., Koribalski, B.S., Lagos, C., Meyer, M., Obreschkow, D., Popping, A., Power, C., Verdes-Montenegro, L. and Zwaan, M. 2015. Exploring neutral hydrogen and galaxy evolution with the SKA. Advancing Astrophysics with the Square Kilometre Array, pp. 611-632. Cheshire, UK: Dolman Scott Ltd for SKA Organisation. ISBN 9781909204706.

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Articles in peer-reviewed journals

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Department of Biological Sciences

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

Research Report 2015

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 inter-disciplinary research that understands and manages biodiversity resources in the face of global change both locally and globally.

Thirty academic staff, over 70 research associates and at least 31 support staff make up our staff complement. In addition there are 38 postdoctoral research fellows, and 210 postgraduate students, 26 Honours students and 699 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 Agriculture, Forestry and Fisheries: 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 Understanding Biodiversity,

Evolutionary Ecology and Maintaining Biodiversity. The Institute is home to the Niven Library, which holds Africa's most comprehensive collection of ornithological literature.

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 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	8
Associate Professors	12
Senior Lecturers	7
Lecturers	4
Scientific Staff	5
Technical Support Staff	5
Administrative and Clerical Staff	20
Contract Research Staff	17
Total	**78**

Emeritus and Honorary Staff

Honorary Professors	5
Honorary Assoc. Professors	3
Honorary Research Associates	45
Emeritus Professors	7
Emeritus Associate Professors	2
Research Affiliates	11
Total	**73**

Students and Postdoctoral Fellows

Postdoctoral Fellows	30
Doctoral	89
Masters	91
Honours	22
Undergraduate	1012
Total	**1244**

Research Fields and Staff

Permanent Academic Staff

PROFESSOR ANUSUYA CHINSAMY-TURAN

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

PROFESSOR JOHN J. BOLTON
The biodiversity, biogeography, ecology, systematics and resource use of marine algae; marine aquaculture

PROFESSOR GRAEME CUMMING (JAN-JUNE 2015)
Pola Pasvolsky Chair of Conservation Biology. Landscape ecology, conservation biology, community ecology, resilience and complex systems theory

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

PROFESSOR JUSTIN O'RIAIN
Social mammals; behavioural ecology; vertebrate reproduction

PROFESSOR PETER RYAN
Director of the Percy FitzPatrick Institute of African Ornithology
Seabird-fishery interactions; avian evolutionary biology; marine pollution; behavioural ecology; island conservation

ASSOCIATE PROFESSOR COLIN ATTWOOD
Marine protected areas; line fish population ecology.

ASSOCIATE PROFESSOR MICHAEL CRAMER
Physiology; ecophysiology; plant nutrition

ASSOCIATE PROFESSOR EDMUND FEBRUARY
Palaeoecology; savanna ecology

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 MICHAEL 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 MIKE PICKER
Insect ecology; insect biodiversity

ASSOCIATE PROFESSOR ANTHONY G. VERBOOM
Plant systematics, ecophysiology, biogeography

ASSOCIATE PROFESSOR A. MUTHAMA MUASYA
Plant systematics; molecular systematics; biogeography

DR ARJUN AMAR
Senior Lecturer: Raptor research, Rarity & conservation of African birds

DR ROBERT THOMSON
Senior Lecturer: behavioural, community and evolutionary ecology

DR JACQUELINE BISHOP
Senior 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

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

DR DEENA PILLAY
Senior Lecturer: Marine benthic ecology, estuarine ecosystems, biological interactions

DR ADAM WEST
Senior Lecturer: Ecophysiology, climate change, stable isotopes

DR CECILE REED
Lecturer: Marine parasitology, freshwater ecology

DR SAMSON B. CHIMPHANGO
Lecturer: Physiology; nitrogen fixation, plant and soil nutrition, climate change

DR LAWRENCE KRUGER
Lecturer: Savanna ecology, particularly elephant impacts on vegetation structure, biodiversity consequences

DR ROISIN KELLY-LAUBSCHER
Lecturer: Science ADP; biology education, academic literacies, cardioprotection

Emeritus Professors/Senior Scholars

EMERITUS PROFESSOR TIM CROWE
Evolution, natural history, cladistics, game birds and game bird management, biogeography

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 CHARLES GRIFFITHS
Aquatic invasive alien species; biodiversity and endemicity patterns of African marine fauna; coastal marine ecology; amphipod taxonomy

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/SENIOR SCHOLAR JOHN FIELD
Marine Biology; Oceanography; Climate Change, Benguela ecosystem

EMERITUS PROFESSOR W R SIEGFRIED
Former Director of the Percy FitzPatrick Institute

EMERITUS PROFESSOR WILLIAM J. BOND
Plant ecology: evolutionary biology; conservation biology; fire and community dynamics

Emeritus Associate Professors

EMERITUS ASSOCIATE PROFESSOR JENNY DAY
Former Director of the Freshwater Research Unit: freshwater ecology; bioasessment; 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
Dr Cornelia Klak – Principal Scientific Officer
Dr Dawood Hattas – Principal Scientific Officer
Liesl Phigeland – Chief Scientific Officer
Dr Hans- Dieter Oschadleus – Chief Scientific Officer
Andrea Plos – Principal Technical Officer
Gonzalo Aquilar – Principal Technical Officer
George du Plessis – Chief Technical Officer
Petra Muller – Chief Technical Officer
Desmond Barnes – Senior Technical Officer
Dr Rob Little – Manager: DST/NRF Centre for Excellence
Sarojini I Pillay – Admin Manager
Natalie Jodamus – SAP Administrator
Tania C Jansen – Senior Secretary
Soraya Abrahams – Senior Secretary
Vuyiwe Bathaka – Senior Secretary
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Granville Faulmann – Workshop/Departmental Assistant
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Daphne Meyer – Department Assistant
Zamikaya Jikumlambo – Laboratory Assistant
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Charlene J Christians – Herbarium Assistant
Rene A Navarro – Information Systems Specialist
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Dr Laura Blamey – NRF Research career advancement fellow; Nearshore marine ecology and ecological modelling
Heath Beckett – Research Assistant
Johan Carstens – Research Assistant
Dr Susan Cunningham – Lecturer

Shaamielah Davids – Research Technician
Jessica Greenston – Research Officer
Fiona Impson – Development of insect agents for biological control of alien invasive plants.
Samuel Jack – Research Assistant
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V.C. Moran – Research Officer
Frances Morling – Research Assistant
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Cooperative breeding and sociality in birds (Sociable Weaver Research Project)

DR ANDREW JENKINS
Raptor research programme, rarity and conservation of African birds

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Interactions between plants and megaherbivores

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Systematics and Biogeography

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

DR LIZANNE ROXBURGH
Rarity and conservation of African birds

DR CLAIRE 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 DONALDSON
Biodiversity

PROFESSOR PETER LINDER
Systematics; taxonomy; evolutionary biology

Honorary Associate Professors

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ASSOCIATE PROFESSOR RES ALTWEGG
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Offshore marine science

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

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River health monitoring

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

DR TOM FLOWER
Behavioural ecology

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Landscape ecology, community ecology, resilience and complex systems theory, 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

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DR PERCY HULLEY
Marine Biology

DR KENNETH HUTCHINGS
Marine Biology

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DR STEVE KIRKMAN
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Conservation planning/policy & wildlife welfare

DR KATYA LUDYNIA
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DR KRISTINE MACIEJEWSKI (AUG–DEC)
Spatial ecology, conservation planning

DR HEATHER MALAN
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DR LYDIANE MATTIO
Seaweed Molecular systematics

DR BARBARA PATERSON
Development of electronic decision support tools for the management of natural resources

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

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DR MAGDALENA REMISIEWICZ
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Cooperative breeding and sociality in birds (including the Pied Babbler Research Project)

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DR GILLIAN SCOTT
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DR ARMIN SEYDACK
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DR ROB SIMMONS
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DR KERRY SINK
Mapping of Marine biodiversity

DR JASPER SLINGSBY
Global change impacts on fynbos

PROF CHARLES STIRTON
Plant systematics

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DR HELGA VAN DER MERWE
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DR HANS VERHEYE
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DR LAUREN WALLER
Penguin research

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

PROFESSOR GRAEME CUMMING (JULY–DEC)
Coral Reef Ecology

DR RITA COVAS (AUG–DEC)
Cooperative breeding and sociality in birds

DR DAWIT GHEBREHIWET

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RESEARCH OUTPUT

Authored books

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Department of Chemistry

(Including the Centre for Supramolecular Chemistry Research, the UCT Drug Discovery and Development Centre (H3D), the MRC/UCT Drug Discovery & Development Research Unit and the Scientific Computing Research Unit)

Research Report 2015

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. Synthetic studies are carried out in organic, organometallic and co-ordination chemistry, to develop and apply new methodology, and to prepare biologically active compounds, novel catalysts and components of new materials. 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. 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 the four UCT-accredited research units named above. Ten academic staff members currently hold NRF ratings. Active international associations are maintained by collaborative projects with 33 countries on six continents. In terms of numbers, the strongest links are with the USA, Italy, UK, Sweden, Switzerland, Germany and India.

Departmental Statistics

Permanent and Long-Term Contract Staff

Professors	6
Associate Professors	5
Senior Lecturers	2
Lecturers	5
Senior Scholars	3
Research Officers	10
Scientific Officers	14
Technical Officers	12
Research Staff	3
Support Staff	9
Administrative and Clerical Staff	9
Total	**78**

Emeritus Staff

Emeritus Professors	**2**

Students and Postdoctoral Fellows

Postdoctoral Fellows	25
Doctoral	54
Masters	28
Honours	18
Undergraduates	1123
Total	**1248**

Research Fields and Staff

Permanent and Long-Term Contract Staff

PROFESSOR SUSAN A. BOURNE
Head of Department. Professor of Physical Chemistry; Supramolecular chemistry; crystal engineering.

PROFESSOR TIMOTHY J. EGAN
Jamison Professor of Inorganic Chemistry: Bioinorganic chemistry of the malaria parasite.

PROFESSOR ROGER HUNTER
Mally Professor of Organic Chemistry; Synthesis: indole alkaloids; calixarenes; p-block synthetic methodology.

PROFESSOR KELLY CHIBALE
SARChI in Drug Discovery: Drug discovery; medicinal chemistry.

PROFESSOR KEVIN J. NAIDOO
SARChI in Scientific Computing: Scientific Computing – free energy calculations – reaction dynamics; code acceleration and general purpose graphical processing units; computational glycomics; cancer genomics and chemical glycobiology.

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

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; electrochemistry; chemical nomenclature.

ASSOCIATE PROFESSOR NEIL RAVENSCROFT
Physicochemical analysis of biologicals; carbohydrates; glycoconjugate and protein vaccines.

ASSOCIATE PROFESSOR GREGORY S. SMITH
Organometallic synthesis; catalysis; bio-organometallic chemistry; polynuclear transition metal complexes; metal-containing polymers and dendrimers.

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

DR SARAH WILSON
Senior Lecturer: Academic teacher.

DR CATHERINE H. KASCHULA
Lecturer: medicinal, synthetic and biological chemistry. Developing the potential of natural products in cancer prevention and treatment.

DR CLIVE OLIVER
Lecturer: mixed-ligand metal-organic frameworks; large supramolecular assemblies; crystallography; thermal analysis; gas and liquid sorption.

DR SUTHANANDA N. SUNASSEE
Lecturer: Organic chemistry, plant/marine/microbial natural products chemistry.

DR GERHARD A. VENTER
Lecturer: computational chemistry; intermolecular interactions; ionic liquids.

DR KARL WILKINSON
Lecturer: Physical chemistry; computational chemistry; high performance computing; metal-organic frameworks and porous materials.

Senior Scholars

PROFESSOR MINO R. CAIRA
Solid state chemistry; polymorphism; solvatomorphism; drug-cyclodextrin inclusion; co-crystallization; enantiomeric separation.

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.

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.

Research Officers

DR GREG S. BASARAB
Principal Research Officer, H3D: Medicinal Chemistry: malaria and tuberculosis

DR LESLIE STREET
Principal Research Officer: Medicinal chemistry; malaria and tuberculosis

DR JOE EYERMANN
Chief Research Officer: Head of Computer Aided Drug Discovery (CADD)

DR SANDEEP GHORPADE
Chief Research Officer: Medicinal chemistry; tuberculosis

DR RUDOLF MUELLER
Chief Research Officer: Medicinal chemistry; malaria and tuberculosis

DR CHRISTOPHER BARNETT
Research Officer: Scientific Computing; Glycoinformatics; data analytics and visualisation; cancer

DR RICHARD KLAUS GESSNER
Research Officer: Medicinal chemistry; tuberculosis

DR TANYA PAQUET
Research Officer: Medicinal chemistry; malaria

DR RENIER VAN DER WESTHUYZEN
Research Officer: Medicinal chemistry; tuberculosis

DR SUSAN WINKS
Research Officer: Medicinal Chemistry; tuberculosis

NRF RCA Fellows

DR DYANNE CRUICKSHANK
Supramolecular chemistry; X-ray diffraction; material science; hosting systems; enhancing molecular functionality; photochromism.

DR BANOTHILE MAKHUBELA
Development of water-soluble metallodendrimers for biphasic catalysis and as novel bioorganometallic drugs.

Postdoctoral Fellows

DR LAUREN ARENDSE
CADD approaches and enzymology of Angiotensin Converting Enzyme inhibitors.

DR JAHANSHAH ASHKANI
Glycan structures from gene expression data, based on glycosyltransferase reactions in breast cancer.

DR EUSTINA BATISAI
Synergistic effects in host-guest selectivity.

DR CHRISTEL BRUNSCHWIG
Reactive Metabolites and Drug Drug interactions.

DR WERNER CROUS
Development of link atoms for polar bonds.

DR RAJDIP DEY
Development of microporous metal-organic frameworks.

DR PUMEZA GOGWANA
Development of copper peptide complexes as anti-inflammatory drugs.

DR MAHESWARA RAO GOKADA
Novel methodology for the synthesis of natural product chiral, a-tertiary amine motifs.

DR KRISHNA K GOVENDER
Improvement and application of hybrid quantum classical simulations to hypervalent molecular systems.

DR PRESHENDREN GOVENDER
The design and development of novel PGM dendritic multinuclear complexes for use in medicinal biotechnology.

DR LEIGH LOOTS
Supramolecular beneficiation of new drug candidates.

DR NIGEL AMINAKE MAKOAH
Assay development with aspects of in vitro /in vivo drug metabolism & pharmacokinetics (DMPK).

DR CHRISTIANE MUSWAMBA-NDAY
Neuroprotective effects of flavonoids nanoparticles against metal ion-induced oxidative stress in Alzheimer's disease.

DR DENIS MUHUNGA NGUMBU
Hit to lead medicinal chemistry progression of antimycobacterial hits.

DR MATTHEW NJOROGE
Drug metabolism and pharmacokinetics.

DR. ANEESA OMAR
NMR analysis of polysaccharide and glycoconjugate vaccines.

DR ELUMALAI PAVADAI
Discovery of anti-infective drugs through pharmacophore-based approaches.

DR KAILASH PAWAR
Medicinal chemistry; malaria.

DR WADE PETERSEN
Medicinal chemistry; tuberculosis.

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

DR SANDILE SIMELANE
Medicinal chemistry; tuberculosis.

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

DR TAMERYN STRINGER
Development of novel bioorganometalic antimamarials.

DR KATHRYN WICHT
Medicinal chemistry; malaria.

DR COLIN WILSON
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RESEARCH OUTPUT

Chapters in books

Berti, F. and Ravenscroft, N. 2015. Characterization of Carbohydrate Vaccines by NMR Spectroscopy. In B. Lepenies (ed), Carbohydrate-based vaccines in Volume 1331 of Methods in Molecular Biology, pp. 189-209. New York: Springer Science + Business Media. ISBN 9781493928736.

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Department of Computer Science

Research Report 2015

Head of Department: Associate Professor Sonia Berman

Departmental Profile

The Computer Science Department has two main research themes: Information and Communication Technology for Development (ICT4D) and High Performance Computing (HPC). ICT4D is a multi-disciplinary field that 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 may 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 computationally intensive discipline-specific computing applications. For example, the time required to perform a molecular simulation of drug interaction might be reduced from years to months, or the production of digital 3D content may occur in real time rather than requiring minutes to generate. A major theme of HPC research is a focus on computationally intensive grand-challenge problems that would otherwise require infeasibly long times to compute a solution.

The Department hosts several research centres. 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. As ICT is an enabling technology, and thus highly cross-disciplinary, this centre also includes staff from diverse UCT departments, such as Information Systems and Film and Media. The Hasso-Plattner Institute (Germany) funds African PhD students working in Computer Science as part of the Hasso-Plattner Research School in Computer Science for Africa (CS4A). The Centre of Excellence in Broadband Networks and their Applications, funded by Telkom and its affiliates, includes UCT's Communications Research Group in Electrical Engineering and the Departments of Computer Science at UCT and at Stellenbosch University. The department has also recently signed a collaboration agreement with the CSIR regarding the establishment of a node of the Centre for Artificial Intelligence Research (CAIR) at UCT. CAIR conducts research in foundational and applied aspects of Artificial Intelligence. It is based at the CSIR with nodes at a number of South African universities. The UCT node of CAIR hosts the UCT-CSIR Chair in Artificial Intelligence.

In addition, the department has several smaller 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 parallel computing technologies (especially General Purpose GPU approaches) and visualization methods to generate efficient solutions for computational problems in the areas of graphics and computational science (particularly radio astronomy and computational chemistry). The Network and Information Security Laboratory focusses on algorithms and systems for safe and secure information access.

Departmental Statistics

Permanent and Long-Term Contract Staff

Professors	3
Associate Professors	5
Senior Lecturers	5
Lecturer	1
Scientific and Technical Staff	3
Administrative and Support Staff	4
Total	**21**

Adjunct and Honorary Staff

Adjunct Professors	1
Adjunct Senior Lecturers	1
Honorary Professors	3
Total	**4**

Students and Postdoctoral Fellows

Postdoctoral Fellows	2
Doctoral	32
Master's	95
Honours	50
Undergraduate	1224
Total	**1403**

Research Fields and Staff

Permanent 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 THOMAS MEYER
Artificial Intelligence, Knowledge Representation and Reasoning, Logic based Ontologies

PROFESSOR ROB SIMMONDS
Parallel and distributed Computing

ASSOCIATE PROFESSOR HUSSEIN SULEMAN
Digital Libraries; Information Retrieval; Internet technology; Educational Technology

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

ASSOCIATE PROFESSOR PATRICK MARAIS
Computer Graphics; Image Processing, GPU Computing

ASSOCIATE PROFESSOR JAMES GAIN
Computer graphics, virtual reality

DR ANNE KAYEM
Senior Lecturer: Information Security

DR MARIA KEET
Senior Lecturer: Logic-based knowledge representation, ontology development, biological data characteristics and granularity

DR MELISSA DENSMORE
Senior Lecturer: ICTD, HCI, Health Informatics, Mobile Health

DR BRIAN DERENZI
Lecturer: ICT4D, ict4chw, Mobile Health, Supervisory systems, Behaviour change, Data quality, Community empowerment

DR MMAKI JANTJIES
Lecturer: Educational technology

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

Scientific and Technical Officers

MR STEPHAN JAMIESON
Senior Scientific Officer

MR CRAIG BALFOUR
Computer Systems Administrator

MR SAMUEL CHETTY
Computer Systems Administrator

Postdoctoral Fellows

DR SIMON PERKINS
High Performance Computing for Radio Astronomy

DR HENDRANUS VERMEULEN
Serious Games and Gamification

Adjunct and Honorary Professors

HONORARY PROFESSOR JUDITH BISHOP
Software Engineering; Programming Languages; Distributed Systems

HONORARY PROFESSOR MATT JONES
Human-Computer Interaction, Information Retrieval, World Wide Web

HONORARY PROFESSOR YVONNE ROGERS
Human-Computer Interaction, Interaction Design, Cognitive Science

ADJUNCT PROFESSOR ANDREW HUTCHISON
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RESEARCH OUTPUT

Chapters in books

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Department of Environmental and Geographical Science

Research report 2015

Head of Department: Professor Michael 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 seven 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 Africa, Asia, Europe, North America, and South America. 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 on a wide range of topics, some of which are within more formally established research groups, including the Climate System Analysis Group (CSAG), which applies core

research to meet the knowledge needs of responding to climate variability and change; the 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. There is a fourth emerging research grouping on Social and Environmental Dimensions of the Bio-economy.

Departmental Statistics

Permanent and Long-Term Contract Staff

Professors	4
Associate Professors	3
Senior Lecturers	4
Lecturers	4
Research Staff	23
Research Associates	4
Administrative & Support Staff	16
Total	**58**

Emeritus and Honorary Staff

Emeritus Professor	1
Honorary Professors	3
Total	**4**

Students and Postdoctoral Fellows

Postdoctoral Fellows	10
Doctoral	47
Masters	92
Honours	30
Undergraduates	810
Total	**989**

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

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

ASSOCIATE PROFESSOR SOPHIE OLDFIELD
Political and Economic Geography

DR BABATUNDE ABIODUN
Senior Lecturer: Atmospheric Science, Climatology

DR FRANK ECKARDT
Senior Lecturer: Geomorphology, Remote Sensing

DR RICHARD HILL
Senior Lecturer: Environmental Assessment and Management

DR GINA ZIERVOGEL
Senior Lecturer: Vulnerability and Adaptation

DR PIPPIN ANDERSON
Lecturer: Post-graduate co-ordinator

DR SHARI DAYA
Lecturer: Gender, Modernity

DR SERGE RAEMAEKERS
Lecturer: Small-scale Fisheries Governance

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

DR MARK TADROSS
Permanent Part-time Academic: Climate Change Variability and Regional Impacts

DR PIOTR WOLSKI
Senior Research Officer: Hydrology

DR OLIVIER CRESPO
Research Officer: Agricultural and Water Research Modelling

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

DR CHRIS LENNARD
Research Officer: Atmospheric Science

MS ANNA STEYNOR
Research Officer: Stakeholder Engagement

MS MATHILDA JACI VAN NIEKERK
Junior Research Fellow: Biodiversity and Livelihoods

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MS KATE KLOPPERS
Research Assistant: Climate Data Analysis

DR LORENA PASQUINI
Lecturer EGS/ACDI: Climate Change Adaptation

MS KATINKA WAAGSAETHER
Chief Scientific Officer: Climate Change Variability and Adaptation

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Atmospheric Science

DR TRISTAN HAUSER
Uncertainty Quantification and Statistical Modelling

DR KELLY KIRSTEN-SARDINHA
Quaternary Science

DR HENRIETTA NYAMNJOH
Migration and Transnationalism

DR KAZEEM OARE OKOSUN
Epidemiological Modelling and Climate Impact

DR LAURA PEREIRA
Bio-Economy, Climate Change

DR IZIDINE SULEMANE DE SOUZA PINTO
Climate Analysis for Decision Scale Information

DR LYNNE QUICK
Quaternary Science

DR OLIVER JOHN SCHULTZ
Governance, Small-scale Fisheries

DR ALEX SHABALA
Climate Modelling and Analysis

DR JACQUELINE SUNDE
Customary Law, Small-scale Fisheries

DR SAMANTHA WILLIAMS
Coastal and Small-scale Fisheries

DR MODATHIR ABDALLA ZAROUG
Climate Change Adaptation

Honorary Professors

PROFESSOR JOHN BOARDMAN
Soil Erosion, Land Degradation

PROFESSOR JONATHAN CRUSH
International Migration, Transnationalism

PROFESSOR DAVE THOMAS
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RESEARCH OUTPUT

Chapters in books

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Department of Geological Sciences

Research Report 2015

Head of Department: Professor Chris Harris

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, stratigraphy, marine geology, economic geology and 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	1
Senior Lecturers	3
Lecturers	3
Senior Research Officer	1
Technical Support Staff	11
Administrative & Clerical Staff	2
Total	**24**

Emeritus and Honorary staff

Honorary Research Associates	4
Emeritus Professors	1
Emeritus Associate Professors	3
Total	**8**

Students and Postdoctoral Fellows

Postdoctoral Fellows	3
Doctoral	10
Masters	32
Honours	15
Undergraduate	340
Total	**400**

Research Fields and Staff

Permanent staff

PROFESSOR CHRIS HARRIS
Head of Department: Stable isotope geochemistry; igneous petrology.

PROFESSOR STEPHEN RICHARDSON
Isotope geochemistry; geochronology; diamonds; continental mantle evolution.

PROFESSOR ANTON LE ROEX
Dean of Science: Igneous geochemistry; analytical geochemistry; mantle evolution.

ASSOCIATE PROFESSOR JOHN COMPTON
Low-temperature and sedimentary geochemistry; marine geology.

DR EMESE BORDY
Senior Lecturer: Sedimentology

DR JOHANN DIENER
Senior Lecturer: Metamorphic petrology.

DR PHIL JANNEY
Senior lecturer: Igneous geochemistry; analytical geochemistry; cosmochemistry

DR LYNNETTE GREYLING
Lecturer: Mineralised copper and gold systems, fluid inclusion microthermometry

DR BETH KAHLE
Lecturer: Geophysics; active faulting, uplift history; history of active structures

DR ALASTAIR SLOAN
Lecturer: Structural geology

Emeritus Staff

EMERITUS PROFESSOR JOHN GURNEY
Upper mantle research, diamonds, diamond exploration and instrumental analysis of minerals

EMERITUS ASSOCIATE PROFESSOR ANDY DUNCAN
Igneous Petrology; X-Ray Flourescence Spectroscopy

EMERITUS ASSOCIATE PROFESSOR DAVID REID
Economic geology

EMERITUS ASSOCIATE PROFESSOR JAMES WILLIS
X-Ray Flourescence Spectroscopy

Honorary Research Associates

PROFESSOR HARTWIG FRIMMEL
Metamorphic petrology

DR WENDY TAYLOR
Paleontology

DR ROBYN PICKERING
Isotope geochemistry

DR AKE FAGERENG
Structural geology

Contact Details

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Website: http://www.geology.uct.ac.za/

RESEARCH OUTPUT

Chapters in books

Meadows, M.E. and Compton, J.S. 2015. Table Mountain: wonder of nature at the foot of Africa. In S. Grab and J. Knight (eds), Landscapes and Landforms of South Africa, pp. 95-102. Switzerland: Springer International Publishing Switzerland. ISBN 9783319035598.

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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 Algebra Research Group, Topology and Algebra Research Group and the Laboratory for Quantum gravity and strings.)

Research Report 2015

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	5
Senior Lecturers	10
Lecturers	15
Research Staff	3
Technical Support Staff	1
Administrative and Clerical Staff	10
Total	**50**

Emeritus and Honorary Staff

Emeritus Professors	6
Emeritus Associate Professor	2
Senior Scholars	3
Visiting Professor and Principal Research Officer	1
Honorary Research Associates	6
Honorary Member	1
Total	**19**

Students and Postdoctoral Fellows

Postdoctoral Fellows	15
Doctoral	33
Master	58
Honours	11
Undergraduate	7203
Total	**7320**

Research Fields and Staff

Permanent 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 algebra research group

PROFESSOR IGOR BARASHENKOV
Nonlinear waves and solitons; nonlinear dynamics; mathematical physics

PROFESSOR BRUCE BASSETT
Observational and theoretical cosmology; machine learning, astrostatistics and nonlinear optimization

PROFESSOR PETER DUNSBY
Co-Director of the Astrophysics, Cosmology and Gravitation Centre; cosmological perturbations; cosmic microwave background anisotropies; gravitational lensing; inflationary cosmology; cosmological magnetic fields;teaching with technology

PROFESSOR GEORGE JANELIDZE
Category theory, Algebra, Topology, Sets and Logic; leader of category theory and algebra research group

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

ASSOCIATE PROFESSOR PETER BRUYNS
Senior Lecturer; group theory; permutation groups

ASSOCIATE PROFESSOR CHRISTOPHER CLARKSON
Theoretical Cosmology – relativistic perturbation theory, dark energy, gravitational lensing

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

ASSOCIATE PROFESSOR JEFF MURUGAN
String theory; quantum gravity; neurophysics; mathematical physics

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

DR FILIP COOLS (LEFT 2 JUNE 2015)
Senior lecturer: algebraic geometry, commutative algebra and combinatorics

DR DAVID ERWIN
Senior Lecturer: classical, applied and algebraic graph theory

DR JOHN FRITH
Senior Lecturer: frame theory; topos theory; categorical topology; mathematical education

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

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

DR FRANCESCO G. RUSSO
Senior Lecturer: Topology, Group theory, Homology, Lie theory, Geometric measure theory, Mathematical models in music

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

DR HARIS SKOKOS
Senior Lecturer: nonlinear dynamical systems, chaotic dynamics, Hamiltonian systems and computational mathematics

DR AMANDA WELTMAN
Senior Lecturer: string theory, cosmology, gravity

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

DR TIRI CHINYOKA
Lecturer: modelling and analysis of complex fluids and flows

DR ALVARO DE LA CRUZ-DOMBRIZ
Lecturer: observational and theoretical cosmology, dark matter, cosmological perturbations, gravity

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 TAMAR JANELIDZE-GRAY
Lecturer: Category theory, general and homological algebra

MS MARIOLA KIROVA
Lecturer: mathematics education

DR ROBERT MARTIN
Lecturer: functional analysis; operator theory

MR RUAN MOOLMAN
Lecturer: mathematics education at tertiary level (as well as engineering and science education); metacognitive skills and critical thinking skills of tertiary mathematics students; the role of affective factors on tertiary mathematics students' performance in the learning and teaching of mathematics; curriculum development in tertiary mathematics education and formative assessment studies and its uses in improvement student performance and autonomy

DR BOB OSANO
Lecturer: theoretical cosmology, General Relativity and Mathematics education

DR JESSE RATZKIN
Lecturer: geometric analysis

DR JUANA SANCHEZ ORTEGA
Lecturer: associative and nonassociative dialgebras, polynomial identities for nonassociative structures, computer algebra, lie algebras, Leavitt path algebras, (multi) linear algebra, algebraic combinatorics

DR JONATHAN SHOCK
Lecturer: string theory, mathematical biology, neuroscience and symbolic computation

DR HOLGER SPAKOWSKI
Lecturer: theoretical computer science; computational complexity

DR CHRISTINE SWART
Lecturer: cryptography

MR THOMAS VAN HEERDEN
Lecturer: mathematics education, assessment, sociologyof education

Temporary Lecturer with collaborations

PROFESSOR NIC HEIDEMAN
Senior Lecturer: Mathematics education

Senior Scholars

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

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 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; philosophy of cosmology; 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; minke and fin whale population modelling

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

Honorary Research Associates

ASSOCIATE PROFESSOR VASCO BRATTKA
Honorary Research Associate: Computability theory, effective descriptive set theory; algorithmic randomness

DR HELENA GEROMONT
Honorary Research Associate: Fisheries management procedure (MP) development

DR ÉVA PLAGÁNYI-LLOYD
Honorary Research Associate; multispecies modelling; fisheries assessment and management ecological modeling, S.A. abalone assessment

DR ANDRIY POTOTSKYY
Honorary Research Associate: 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:

DR REBECCA RADEMEYER
Honorary Research Associate: MARAM; Fisheries assessment and management

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

Distinguished Visitors

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

PROFESSOR SHAMIT KACHRU
Professor of Physics at Stanford University with research interests in String Thoery, Cosmology and Mathematical Physics

PROFESSOR HORATIU NASTASE
Senior member of the IFT in Sao Paulo, Brazil with research interests in string Theory and Mathematical Physics

Emeritus and 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 KATHY DRIVER
Special functions, orthogonal polynomials and approximation theory

EMERITUS ASSOCIATE PROFESSOR CHRISTOPHER GILMOUR
Pointfree topology and sigma-frames; categorical topology

EMERITUS PROFESSOR JOHN WEBB
Mathematics education and outreach to schools; mathematics competitions and Olympiads; Director, UCT Mathematics Competition

EMERITUS ASSOCIATE PROFESSOR RONALD CROSS
Functional analysis; multivalued linear operators

PROFESSOR PATRICIA WHITELOCK
Visiting Professor and Principal Research Officer; SAAO

DR ANTOINE TAMBUE
Adjunct Lecturer: AIMS ARETE junior research chair, numerical analysis for PDEs and SPDEs, fluid flow in porous media, computational finance and stochastic calculus

Postdoctoral Fellows

DR MICHEAL ABBOTT
String Theory

DR VINCENT BOUILLOT
Cosmology

DR VINICIUS BUSTI
Cosmology

DR PHILIPPE DUBARD
Nonlinear waves, solitons and rogue waves

DR PIERRE FLEURY
Cosmology, gravitational lensing

DR SHEIKH SHAJIDAL HAQUE
Cosmology and gravity and string theory

DR DAVID JACOBS
Cosmology

DR EMANUEL MALEK
String Theory

DR FRANCK KALALA MUTOMBO
Efficient time-stepping methods for multiphase flows

DR ORLANDO LUONGO
Universe kinematics, model-independent reconstruction of dark energy, theoretical cosmology and cosmography, extended theories of gravity

DR CRISTHIAM LOPEZ ARCOS
String Theory

DR MICHELLE MACDEVETTE
Computational Fluid Dynamics

DR LORENZO REVERBERI
Modified gravity, observational and theoretical cosmology, cosmography, dark energy, gravitational instability

DR DIEGO SAEZ GOMEZ
Cosmology

DR XIAODONG XU
Cosmology and gravity

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RESEARCH OUTPUT

Chapters in books

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Department of Molecular and Cell Biology

Research report 2015

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, fungal-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 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. 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 and plant desiccation tolerance. 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. Research in marine biotechnology includes genetic and proteomic studies of the immune response of the abalone (*Haliotis midae*), the development of a phage display library of dusky kob antibody genes for vaccine production against emerging diseases of this farmed indigenous fish. 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 (DNA synthesis, DNA microarrays and protein identification). The instrumentation in the facility consists of HPLCs, a GC MS/MS, LC-ESI QTOF and MALDI instruments for mass spectrometry and a fluorescent microscope for the live imaging of cells.

Departmental Statistics

Permanent and Long-Term Contract Staff

Professors	3
Associate Professors	3
Senior Lecturers	4
Lecturers	3
Research Staff	8
Technical Support Staff	10
Administrative and Clerical Staff	5
Departmental Assistant	5
Total	**41**

Emeritus Staff

Emeritus Professors	**2**

Students and Postdoctoral Fellows

Postdoctoral Fellows	12
Doctoral	28
Masters	33
Honours	19
Undergraduates	191
Total	**283**

Research Fields and Staff

Permanent staff

ASSOCIATE PROFESSOR VERNON COYNE
Head of Department: marine biotechnology; abalone immune system; abalone stress and disease response; abalone haemocyte proteome; abalone probiotics; fish vaccine production; phage display; aquaculture

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; bat limb development; plant desiccation tolerance; comparative plant genomics

PROFESSOR EDWARD RYBICKI
Plant and tissue culture-derived vaccines; oceanic viromics; Human papillomavirus (HPV); rotavirus; bluetongue virus; Beak and feather disease virus; geminivirus expression vectors; molecular virology; molecular biotechnology

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: regulation of innate immunity by the circadian clock, molecular basis of nickel hyperaccumulation, mechanisms of vegetative desiccation tolerance

DR PAUL MEYERS
Senior lecturer: actinobacterial taxonomy; family *Streptosporangiaceae*; *Microbispora*; *Nonomuraea*; *Kribbella*; bioprospecting; novel antitubercular antibiotics

DR COLLEEN O'RYAN
Senior lecturer: genotype-phenotype association of Autism Spectrum Disorders; genetics; epigenetics; population genetics

DR SUHAIL RAFUDEEN
Senior 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 LAURA RODEN
Senior lecturer: plant and human circadian rhythms; flowering time and photoperiodism; circadian regulation of plant defences; chronotype, performance and obesity

DR THOMAS OELGESCHLÄGER
Lecturer: molecular mechanisms of RNA polymerase II transcription regulation in eukaryotes; transcription regulation in the malaria parasite *Plasmodium falciparum*

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

Research Contract Staff

DR LARA DONALDSON
NRF Research Career Advancement Fellow: plant responses to salinity and osmotic stress; plant signal transduction (hormones and second messengers); transcriptomics; cross-tolerance to multiple stresses (abiotic and biotic)

DR INGA HITZEROTH
Senior research officer: plant-derived vaccines; Human Papillomaviruses (HPV); Beak and feather disease virus (BFDV); rotavirus and Influenza virus

DR ANN MEYERS
Research officer: plant-produced proteins: horseradish peroxidase, monoclonal antibodies and vaccines; Bluetongue virus; Rift Valley fever virus; Foot-and-mouth disease virus

DR SHANE MURRAY
Lecturer: crop genomics and transcriptomics; resistance in maize to fungal pathogens

Emeritus Professors

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

Postdoctoral Research Fellows

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 MEGAN HENDRIKSE
Human papillomavirus (HPV) pseudovirion neutralization assay; second generation vaccines (HPV)

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

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 RENATE LAMPRECHT
Human papillomavirus; recombinant protein production; biopharming; therapeutic vaccine development; pseudovirion-based neutralisation assays; tissue culture

DR HAPILOE MARANYANE
Bluetongue virus; plant-based expression; virus-like particles; protein-body vaccines

DR MICHELLE MARITZ
Steroid receptor signalling; hormone contraception; progestins; antiretrovirals (ARVs); immune function; HIV replication; female genital tract

DR ROSEMARY MEGGERSEE
Fish vaccine production; phage display library; aquaculture

DR JEFFREY ROHLAND
Biomaterial design using actinobacterial tyrosinases; actinobacterial laccase gene discovery and cloning; actinobacterial taxonomy and characterisation

DR SOFIA STATHOPOULOS
Autism; DNA methylation

DR ALTA VAN ZYL
Human papillomavirus; plant-based expression; virus-like particles; vaccines

Contact Details

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RESEARCH OUPUT

Chapters in books

Ingle, R.A. 2015. Histidine. In J.P.F D'Mello (ed), Amino Acids in Higher Plants, pp. 251-261. United Kingdon: CABI. ISBN 9781780642635.

Kullin, B., Reid, S.J. and Abratt, V.R. 2015. The use of probiotic bacteria to treat recurrent calcium oxalate Kidney Stone Disease. In D. Lange (ed), The Role of Bacteria in Urology, pp. 63-76. Switzerland: Springer International Switzerland. ISBN 9783319177311.

Meyers, A.E., Rybicki, E.P. and Hitzeroth, I.I. 2015. Plant-produced virus-like particles. In K.L. Hefferon (ed), Plant-derived Pharmaceuticals, pp. 76-90. New York: CABI. ISBN 9781780643434.

Articles in peer-reviewed journals

Adriaenssens, E.M., Van Zyl, L., De Maayer, P., Rubagotti, E., Rybicki, E.P., Tuffin, M.I. and Cowan, D.A. 2015. Metagenomic analysis of the viral community in Namib Desert hypoliths. Environmental Microbiology, 17(2): 480-495.

Assefa, K., Cannarozzi, G., Girma, D., Kamies, R., Chanyalew, S., Plaza-Wuthrich, S., Blosch, R., Rindisbacher, A., Rafudeen, M.S. and Tadele, Z. 2015. Genetic diversity in tef [Eragrostis tef(Zucc.) Trotter]. Frontiers in Plant Science, 6: 177(13pp). DOI: 10.3389/fpls.2015.00177.

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Huddy, R. and Coyne, V.E. 2015. Characterisation of the role of an alkaline protease from Vibrio midae SY9 in enhancing the growth rate of cultured abalone fed a probiotic-supplemented feed. Aquaculture, 448: 128-134.

Huddy, S., Meyers, A.E. and Coyne, V.E. 2015. Regeneration of whole plants from protoplasts of Gracilaria gracilis (Gracilariales,Rhodophyta). Journal of Applied Phycology, 27: 427-435.

Ingle, R.A., Stoker, C., Stone, W., Adams, N., Smith, R., Murray, G., Carre, I., Roden, L.C. and Denby, K. 2015. Jasmonate signalling drives time-of-day differences in susceptibility of Arabidopsis to the fungal pathogen Botrytis cinerea. Plant Journal, 84: 937-948.

Kullin, B., Meggersee, R.L., D'Alton, J., Galvao, B., Rajabally, M.N., Whitelaw, A.C., Bamford, C., Reid, S.J. and Abratt, V.R. 2015. Prevalence of gastrointestinal pathogenic bacteria in patients with diarrhoea attending Groote Schuur Hospital, Cape Town, South Africa. SAMJ South African Medical Journal, 105(2): 121-125.

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2015. Retinoic acid-independent expression of Meis2 during autopod patterning in the developing bat and mouse limb. EvoDevo, 6: 6(13pp). DOI: 10.1186/s13227-015-0001-y.

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Meggersee, R.L. and Abratt, V.R. 2015. The occurrence of antibiotic resistance genes in drug resistant Bacteroides fragiles isolates from Groote Schuur Hospital, South Africa. Anaerobe, 32: 1-6.

Meyers, P. 2015. Analysis of recombinase A (recA/RecA) in the actinobacterial family Streptosporangiaceae and identification of molecular signatures. Systematic and Applied Microbiology, 38(8): 567-577.

Molojwane, E., Adams, N., Sweetlove, L. and Ingle, R.A. 2015. Heterologous expression of mitochondria-targeted microbial nitrilase enzymes increases cyanide tolerance in Arabidopsis. Plant Biology, 17: 922-926.

Moodley, C., Reid, S.J. and Abratt, V.R. 2015. Molecular characterisation of ABC-type multidrug efflux systems in Bifidobacterium longum. Anaerobe, 32: 63-69.

Nyau, V., Prakash, S., Rodrigues, J.D.E.A. and Farrant, J.M. 2015. Antioxidant activities of bambara groundnuts as assessed by FRAP and DPPH assays. American Journal of Food and Nutrition, 3(1): 7-11.

Nyau, V., Prakash, S., Rodrigues, J.D.E.A. and Farrant, J.M. 2015. HPLC-PDA-ESI-MS identification of polyphenolic phytochemicals in different market classes of common beans (Phaseolus vulgaris L.). International Journal of Biochemistry, 8(4): 1-11.

Nyau, V., Prakash, S., Rodrigues, J.D.E.A. and Farrant, J.M. 2015. Idenfication of nutraceutical phenolic compounds in bambara groundnuts (Vigna subterranea L.Verdc) by HPLC-PDA-ESI-MS. British Journal of Applied Science & Technology, 6(1): 77-85.

Oppong, A., Offei, S.K., Ofori, K., Adu-Dapaah, H., Lamtey, J., Kurenbach, B., Walters, M., Shepherd, D.N., Martin, D.P. and Varsani, A. 2015. Mapping the distribution of maize streak virus genotypes across the forest and transition zones of Ghana. Archives of Virology, 160(2): 483-492.

Pera, F., Mutepfa, D., Khan, A., Els, J., Mbewana, S., van Dijk, A.A., Rybicki, E.P. and Hitzeroth, I.I. 2015. Engineering and expression of a human rotavirus candidate vaccine in Nicotiana benthamiana. Virology Journal, 12: 205(11pp). DOI: 10.1186/S12985-015-0436-8.

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Regnard, G., Boyes, R.S., Martin, R.O., Hitzeroth, I.I. and Rybicki, E.P. 2015. Beak and feather disease viruses circulating in Cape parrots (Poicepahlus robustus) in South Africa. Archives of Virology, 160: 47-54.

Rohland, J. and Meyers, P. 2015. Streptomyces fractus sp. nov., a novel streptomycete isolated from the gut of a South African termite. Antonie Van Leeuwenhoek International Journal of General and Molecular Microbiology, 107: 1127-1134.

Rybicki, E.P. 2015. A top ten list for economically important plant viruses. Archives of Virology, 160: 17-20.

Sheward, D., Ntale, R., Garrett, N.G., Woodman, Z.L., Abdool Karim, S.S. and Williamson, C. 2015. HIV-1 superinfection resembles primary infection. Journal of Infectious Diseases, 212: 904-908.

Smart, M. and Roden, L.C. 2015. Protea hybrid 'Carnival' (P.compacta x P.neriifolia) expresses multiple copies of a LEAFY homologue involved in floral and vegetative development. South African Journal of Botany, 98: 52-63.

Tameris, M.D., Hokey, D.A., Nduba, V., Sacarlal, J., Laher, F., Kiringa, G., Gondo, K., Lazarus, E., Gray, G.E., Nachman, S., Mahomed, H., Downing, K.J., Abel, B., Scriba, T., McClain, J., Pau, M.G., Hendriks, J., Dheenadhayala, V., Ishmukhamedov, S., Luabeya, K.K.A., Geldenhuys, H.D., Shepherd, B., Blatner, G., Cardenas, V., Walker, R., Hanekom, W.A., Sadoff, J.C., Douoguih, M., Barker, L. and Hatherill, M. 2015. A double-blind, randomised, placebo-controlled, dose-finding trial of the novel tuberculosis vaccine AERAS-402, an adenovirus-vectored fusion protein, in healthy, BCG-vaccinated infants. Vaccine, 33: 2944-2954.

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Thomson, J.A. 2015. Prospects for the utilization of genetically modified crops in Africa. Canadian Journal of Plant Pathology-Revue Canadienne de Phytopathologie, 37(2): 152-159.

Walwyn, D., Huddy, S. and Rybicki, E.P. 2015. Techno-economic analysis of horseradish peroxidase production using a transient expression system in nicotiana benthamiana. Applied Biochemistry and Biotechnology, 175: 841-854.

Woodenberg, W.R., Pammenter, N.W., Farrant, J.M., Driouich, A. and Berjak, P. 2015. Embryo cell wall properties in relation to development and desiccation in the recalcitrant-seeded Encephalartos natalensis (Zamiaceae) Dyer and Verdoorn. Protoplasma, 252: 245-258.

Department of Oceanography

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

Research Report 2015

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 favorably 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

Permanent and Long-Term Contract Staff

Professor	1
Associate Professor	2
Senior Lecturer	1
Lecturer	1
Research Staff	2
Technical Support Staff	2
Administrative and Clerical Staff	2
Total	**11**

Emeritus and Honorary Staff

Emeritus Professor	3
Honorary Research Associate	11
Honorary Professor	1
Total	**15**

Students and Postdoctoral Fellows

Postdoctoral Fellows	2
Doctoral	33
Masters	16
Honours	15
Undergraduate	167
Total	**233**

Research Fields and Staff

Permanent Staff

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

ASSOCIATE PROFESSOR MARCELLO VICHI
Biogeochemical modelling

ASSOCIATE PROFESSOR ISABELLE ANSORGE
Southern Ocean dynamics

DR HOWARD WALDRON
Senior Lecturer: biogeochemical oceanography

DR SARAH FAWCETT
Lecturer: **Sargasso Sea**, **Southern Ocean**, **Subpolar North Atlantic**, **Coastal upwelling**

Research Contract Staff

ASSOCIATE PROFESSOR MATHIEU ROUAULT
Principal Research Officer: Ocean-atmosphere interaction

DR BJORN BACKEBERG
Regional ocean modeling, data assimilation

Emeritus Professors

PROFESSOR GEOFFREY BRUNDRIT
Operational oceanography

PROFESSOR FRANK SHILLINGTON
Shelf oceanography, satellite marine remote sensing

Honorary Professor

PROFESSOR VERE SHANNON
Benguela ecosystem

Honorary Research Associates

DR STEWART BERNARD
Optical oceanography

PROFESSOR DEIDRE BYRNE
Agulhas current

DR CHRISTOPHER DUNCOMBE RAE
Coastal ocean dynamics

DR JULIET HERMES
Regional ocean modelling

DR PEDRO MONTEIRO
Biogeochemical oceanography

DR ALBERTO MAVUME
Tropical cyclones

DR MARJOLAINE KRUG
Agulhas current, remote sensing

DR TARRON LAMONT
Coastal oceanography, remote sensing

DR SEBASTIAN SWART
Southern ocean and gliders

DR KYLE BROWN
Marine ecologist

DR SANDY THOMALLA
Southern Ocean bio-optics and the biological carbon pump

Postdoctoral Fellows

DR ANNE TREASURE
Ecological modeling, Southern ocean

DR THOMAS RYAN-KEOGH
Ocean circulation modelling

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RESEARCH OUTPUT

Chapters in books

Halo, I. 2015. The oceans role in the hydrological cycle. In P. Jos (ed), Western Indian Ocean: Regional State of the Coast Report, pp. 187-197. Nairobi, Kenya: UNEP-Nairobi Convention. ISBN 9780620678254.

Articles in peer-reviewed journals

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Ansorge, I.J., Jackson, J.M., Reid, K., Durgadoo, J.V., Swart, S. and Eberenz, S. 2015. Evidence of a southward eddy corridor in the south-west Indian ocean. Deep-Sea Research Part II-Topical Studies in Oceanography, 119: 69-76.

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Barrier, N., Deshayes, J., Treguier, A.-M. and Cassou, C. 2015. Heat budget in the North Atlantic subpolar gyre: impacts of atmospheric weather regimes on the 1995 warming event. Progress in Oceanography, 130: 75-90.

Blamey, L., Shannon, L., Bolton, J.J., Crawford, R., Dufois, F., Evers-king, H., Griffiths, C.L., Hutchings, L., Jarre, A.C., Rouault, M., Watermeyer, K. and Winker, H. 2015. Ecosystem change in the southern Benguela and the underlying processes. Journal of Marine Systems, 144: 9-29.

Bonnet, S., Berthelot, H., Turk-Kubo, K., Fawcett, S., Rahav, E., l'Helguen, S. and Berman-Frank, I. 2015. Dynamics of N2 fixation and fate of diazotroph-derived nitrogen in a low nutrient low chlorophyll ecosystem: results from the VAHINE mesocosm experiment (New Caledonia). Biogeosciences Discussions, 12: 19579-19626.

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Jarre, A.C., Hutchings, L., Kirkman, S.P., Kreiner, A., Tchipalanga, P.C.M., Kainge, P., Uanivi, U., van der Plas, A.K., Blamey, L., Coetzee, J.C., Lamont, T., Samaai, T., Verheye, H.M.S., Yemane, D., Axelsen, B., Stenevik, E.K., Ostrowski, M. and Loeng, H. 2015. Synthesis: climate effects on biodiversity, abundance anddistribution of marine organisms in the Benguela. Fisheries Oceanography, 24(Suppl 1): 122149. DOI: 10.1111/fog.12086.

Knapp, A.K., Fawcett, S., Martnez-Garcia, A., Leblond, N., Moutin, T.Y. and Bonnet, S. 2015. Nitrogen isotopic evidence for a shift from nitrate- to diazotroph-fueled export production in VAHINE mesocosm experiments. Biogeosciences Discussions, 12: 19901-19939.

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Nehama, F. and Reason, C.J.C. 2015. Morphology of the Zambezi River Plume on the Sofala Bank, Mozambique. Western Indian Ocean Journal of Marine Science, 13(1): 1-10.

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Philibert, M., Waldron, H.N. and Clark, D. 2015. A geographical and seasonal comparison of nitrogen uptake byphytoplankton in the Southern Ocean. Ocean Science, 11: 251-267.

Pitcher, G.C., Smith, M.E. and Probyn, T.A. 2015. Saldanha Bay, South Africa II: estimating bay productivity. African Journal of Marine Science, 37(4): 513-520.

Pous, S., Lazure, P. and Carton, X. 2015. A model of the general circulation in the Persian Gulf and in the Strait of Hormuz: intraseasonal to interannual variability. Continental Shelf Research, 94: 55-70.

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Mahomed, H., Cousins, T., Winter, K.J., Berhoozi, F., Kalule, B., Kruger, P., Govender, T. and Minakawa, N. 2015. Climate change is catchy – but when will it really hurt? SAMJ South African Medical Journal, 105(12): 1018-1023.

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Dieppois, B., Pohl, B., Rouault, M., New, N., Keenlyside, N. and Lawler, D. 2015. Decadal variability of summer Southern African rainfall. Proceedings of 31st Annual Conference of the South African society for atmospheric Sciences, 21-22 September 2015, Hennops River Valley, South Africa. South Africa: South African Society for Atmospheric Sciences (SASAS). ISBN 9780620678254.

Longandjo, G.N. and Rouault, M. 2015. Toward better understanding of interannual rainfall variability over central Africa and its relation with its surrounding tropical Oceans. Proceedings of 31st Annual Conference of the South African Society for Atmospheric Sciences, 21-22 September 2015, Hennops River Valley, South Africa. South Africa: South African Society for Atmospheric Sciences (SASAS). ISBN 9780620678254.

Rouault, M., Lbbecke, J., Illig, S. and Kounge, R. 2015. Origin, development and demise of a Benguela nino in the tropical Atlantic in 2010 and 2011. Proceedings of 31st Annual Conference of the South African Society for Atmospheric Sciences, 21-22 September 2015, Hennops River Valley, South Africa. South Africa: South African Society for Atmospheric Sciences (SASAS). ISBN 9780620678254.

Schilperoort, D.E., Krug, M., Rouault, M., Hansen, M. and Mouche, A. 2015. The effect of the Agulhas current on SAR derived wind fields. Proceedings of 31st Annual Conference of the South African Society for Atmospheric Sciences, 21-22 September 2015, Hennops River Valley, South Africa. South Africa: South African Society for Atmospheric Sciences (SASAS). ISBN 9780620678254.

Sovara, M., Engelbrecht, F., Reason, C.J.C., Deshayes, J. and Hermes, J.C. 2015. Simulations of the meridional overturning circulation using the parallel cubic ocean model (PCOM): the spin-up phase. Proceedings of 31st Annual Conference of the South African Society for Atmospheric Sciences, 21-22 September 2015, Hennops River Valley, South Africa. South Africa: South African Society for Atmospheric Sciences (SASAS). ISBN 9780620678254.

Department of Physics

Research Report 2015

Head of Department: Professor Andy Buffler

Departmental Profile

The Department of Physics is accommodated in the R W James Building, which houses research laboratories equipped for nuclear physics, computational physics and nanoelectronics production. Additional facilities available to the Department are provided 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, and H W G Weigert), (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 (JWA Cleymans, T Dietel, A Hamilton and S Yacoob): (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 and 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	5
Senior Lecturer	5
Lecturer	4
Technical Staff	5
Administrative Staff	3
Departmental & Lab Assistants	3
Total	**28**

Emeritus and Honorary Staff

Emeritus Professor	4
Emeritus Associate Professor	4
Honorary Research Associate	5
Total	**13**

Students and Postdoctoral Fellows

Postdoctoral Fellows	5
Doctoral	33
Masters	25
Honours	27
Undergraduate	2038
Total	**2128**

Research Fields and Staff

Permanent Staff

PROFESSOR A. BUFFLER
Head of Department: Applied Nuclear Physics, Physics Education

PROFESSOR D.T. BRITTON
Nanophysics

PROFESSOR A. PESHIER
Theoretical High Energy Physics

ASSOCIATE PROFESSOR M.S. ALLIE (CHED)
Physics Education

ASSOCIATE PROFESSOR M.D. BLUMENTHAL
Solid State Physics and nanophysics

ASSOCIATE PROFESSOR M. HÄRTING
Nanophysics

ASSOCIATE PROFESSOR H.W.G. WEIGERT
Theoretical High Energy Physics

DR A. HAMILTON
Senior Lecturer: Experimental Particle Physics (ATLAS)

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 (ALICE)

DR W.A. HOROWITZ
Senior Lecturer: Theoretical High Energy Physics

DR S.W. PETERSON
Lecturer: Applied Nuclear Physics

DR D. TAYLOR (CHED)
Lecturer: Physics Education

DR S. YACOOB
Lecturer: Experimental Particle Physics (ATLAS)

Emeritus Staff

EMERITUS PROFESSOR D.G. ASCHMAN
Experimental Nuclear Physics

EMERITUS PROFESSOR J.W.A. CLEYMANS
Senior Scholar: Theoretical Physics

EMERITUS PROFESSOR C.A. DOMINGUEZ
Senior Scholar: Theoretical Physics

EMERITUS PROFESSOR R.D. VIOLLIER
Theoretical Particle Physics and Astrophysics

EMERITUS ASSOCIATE PROFESSOR R.W. FEARICK
Experimental Nuclear Physics

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 Research Associates

Professor J.A. Ayala, Universidad Nacional Autonoma de Mexico, Apartado, Mexico
Professor M. Loewe, Johannes Gutenberg-Universit, Mainz, Germany
Professor F.E. Lubben, University of York, York, UK
Professor K. Schilcher, Johannes Gutenberg-Universit, Mainz, Germany
Professor H. Spiesberger. Johannes Gutenberg-Universit, Mainz, Germany

Postdoctoral Students

Dr Katie Cole
Dr Claire Lee
Dr Razieh Morad
Dr Dieter Muller
Dr Max Richter

Distinquished Visitors

Prof Christine Lindstrom, Oslo & Akershus University College, Norway
Prof Kai Zuber, Technical University Dresden, Germany
Prof David Wolfe, University of New Mexico, USA

Prof Paul Papka, University of Stellenbosch, South Africa
Dr Francois Gelis, CEA-Saclay, France
Dr Adriana Marais, University of Kwazulu-Natal, South Africa
Dr Dieter Mueller, Bochum University, Germany
Prof Bryan Webber, University of Cambridge
Prof Filipe Freire, University College Utrecht
Prof Philippe Binder, University of Hawaii
Dr Koledov, Russian Academy of Sciences
Prof Smarajit Triambak, University of the Western Cape
Dr Jacobus Diener, University of Stellenbosch
Prof Christiane Helm, University of Greifswald, Germany
Dr Heinrich Woertche, INCAS3, The Netherlands

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Email: **head.physics@uct.ac.za**
Website: www.phy.uct.ac.za

RESEARCH OUTPUT

Chapters in books

Dominguez, C.A. 2015. Analytical determination of the QCD Quark masses. In H. Fritzsch and M. Cell-Man (eds), 50 Years of Quarks, pp. 287-313. Singapore: World Scientific Publ Co. Pty Ltd. ISBN 9789814618090.

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Ayala, A., Castano-Yepes, J.G., Dominguez, I. and Tejeda-Yeomans, M.E. 2015. Impact of the energy-loss spatial profile and shear-viscosity to entropy-density ratio for the Mach cone versus head-shock signals produced by a fast-moving parton in a quark-gluon plasma. Physical Review C, 92: 024910(11pp).

Ayala, A., Cobos-Martinez, J.J., Loewe, M., Tejeda-Yeomans, M.E. and Zamora, R. 2015. Finite temperature quark-gluon vertex with a magnetic field in the hard thermal loop approximation. Physical Review D, 91(1): 016007(9pp).

Ayala, A., Dominguez, C.A., Hernandez, L.A., Loewe, M. and Zamora, R. 2015. Magnetized effective QCD phase diagram. Physical Review D, 92: 096011(14pp).

Ayala, A., Dominguez, C.A., Hernandez, L.A., Loewe, M., Rojas, J.C. and Villavicenceio, C. 2015. Quark deconfinement and gluon condensate in a weak magnetic field from QCD sum rules. Physical Review D, 92: 016006(11pp).

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Chilukusha, D., Pineda-Vargas, C.A., Nemutudi, R., Habanyama, A. and Comrie, C.M. 2015. Microprobe PIXE study of Ni-Ge interactions in lateral diffusion couples. Nuclear Instruments & Methods in Physics Research Section B-Beam Interactions with Materials and Atoms, 363: 161-166.

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Kolbe, I. and Horowitz, W.A. 2015. Short path length energy loss in the Quark-Gluon plasma from pQCD. Journal of Physics: Conference series, 645: 012004(4pp). DOI: 10.1088/1742-6596/645/1/012004.

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Majola, S., Hartley, D.J., Riedinger, L.L., Sharpey-Schafer, J.F., Allmond, J.M., Beausang, C., Carpenter, M.P., Chiara, C.J., Cooper, N. and Curien, D. 2015. Observation of γ vibrations and alignments built on non-ground-state configurations in Dy-156. Physical Review C, 91: 034330(9pp).

Marques, L., Cleymans, J.W.A. and Deppman, A. 2015. Description of high-energy pp collisions using Tsallis thermodynamics: Transverse momentum and rapidity distributions. Physical Review D, 91: 054025(11pp).

McConnell, L. 2015. Using a classical gluon cascade to study the equilibration of a gluon-plasma. Journal of Physics: Conference series, 645: 012013(5pp).

Meiring, B. and Horowitz, W.A. 2015. Finite time calculations for hard parton production relevant to the quark-gluon plasma. Journal of Physics: Conference series, 645:012006(6pp). DOI: 10.1088/1742-6596/645/1/012006.

Meiring, B. and Horowitz, W.A. 2015. The energy momentum tensor associated with hard parton production in finite time. Journal of Physics: Conference series, 623: 012019(6pp).

Morad, R. and Horowitz, W.A. 2015. Jet nuclear modification factor from the adS/CFT correspondence. Journal of Physics: Conference series, 623: 012021(6pp).

Morad, R. and Horowitz, W.A. 2015. Jets of light hadrons via AdS/CFT correspondence. Journal of Physics: Conference series, 645: 012007(6pp). DOI: 10.1088/1742-6596/645/1/012007.

Mueller, D. and Semenov-Tian-Shansky, K.M. 2015. J = 0 fixed pole and D-term form factor in deeply virtual Compton scattering. Physical Review D, 92: 074025(10pp).

Muller, D., Polyakov, M.V. and Semenov-Tian-Shansky, K.M. 2015. Dual parametrization of generalized parton distributions in two equivalent representations. Journal of High Energy Physics, 2015: 52(51pp).

Smith, J. and Hamilton, A. 2015. ANA – A framework for building ATHENA on ARM. Journal of Physics: Conference series, 645: 012026(5pp).

Smith, J. and Hamilton, A. 2015. Massive affordable computing using ARM processors in high energy physics. Journal of Physics: Conference series, 608: 012001(5pp).

Valenzuela, D., Hernandez-Ortiz, S., Loewe, M. and Raya, A. 2015. Graphene transparency in weak magnetic fields. Journal of Physics A-Mathematical and Theoretical, 48: 065402(11pp).

Xu, C., Li, X.Q., Meng, J., Zhang, S.Q., Hua, H., Wang, S.Y., Qi, B., Liu, C., Xiao, Z.G., Li, H.J., Majola, S. and Stankiewicz, M. 2015. Spectroscopy of 76Se: prolate-to-oblate shape transition. Physical Review C, 91: 061303(6pp).

Peer-reviewed published conference proceedings

Peterson, S.W. and Jeyasugiththan, J. 2015. Monte Carlo simulation of secondary gamma production during proton therapy for dose verification purposes. In C. Engelbrecht and S. Karataglidis (eds), Proceedings of SAIP2014, the 59th annual conference of the South African Institute of Physics, 7-11 July 2014, Johannesburg. Johannesburg: The South African Institute of Physics (SAIP). ISBN 9780620653916.

Smith, J. and Hamilton, A. 2015. Parallel benchmarks for ARM processors in the high energy context. In Chris Engelbrecht and Steven Karataglidis (eds), Proceedings of SAIP2014, the 59th annual conference of the South African Institute of Physics, 7-11 July 2014, Johannesburg. Johannesburg: The South African Institute of Physics (SAIP). ISBN 9780620653916.

115 publications in 2015 associated with the ATLAS collaboration and ALICE collaboration at CERN are not reflected in the list above.

Department of Statistical Sciences

Research Report 2015

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, Biomedical Statistics, Statistical Ecology, Financial Modelling, Operations Research and Decision Modelling, Data Science and Statistics in Education. The department hosts the Statistics in Ecology, the Environment and Conservation (SEEC) research unit.

Departmental Statistics

Permanent and Long-Term Contract Staff

Professors	2
Associate Professors	4
Senior Lecturers	7
Lecturers	9
Scientific Officer	2
Administrative and Clerical Staff	6
Total	**30**

Emeritus and Honorary Staff

Emeritus Professor	4
Emeritus Associate Professor	1
Honorary Research Associates	4
Total	**9**

Students and Postdoctoral Fellows

Postdoctoral Fellows	5
Doctoral	18
Masters	36
Postgraduate service courses	51
Honours	20
Undergraduate	4421
Total	**4551**

Research Fields and Staff

Permanent 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

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 MIGUEL LACERDA
Senior Lecturer: Phylogenetics; Bioinformatics; Stochastic processes; Data Science

DR MELVIN VARUGHESE
Senior Lecturer: ecological modelling, statistical analysis of cosmological data; diffusion processes; Data Science

MR STEFAN BRITZ
Lecturer: Statistics in Sport, Multivariate statistics, Bayesian hierarchical modelling

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 CHUN-KAI HUANG
Lecturer: Probability Theory; Bayesian Theory; Financial Risk Modeling; Moment Problems; Extreme Value Theory; Sampling Theory

MR DOMINIQUE KATSHUNGA
Lecturer: Multivariate analysis; Copulas

DR 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

MS USHMA GALAL
Statistical Consultant

RESHMA KASSANJEE
Statistical Consultant

Contract staff

DR IAN DURBACH
Adjunct Senior Lecturer: decision analysis; risk and uncertainty

Emeritus Professors

PROFESSOR TIM DUNNE
Statistics for Measurement; statistical methods in education and psychology

EMERITUS PROFESSOR RENKUAN GUO
Reliability and quality; imprecise spatial analysis

EMERITUS PROFESSOR LINDA HAINES
Optimal experimental design; extreme value theory; modelling count data; time series

EMERITUS PROFESSOR THEODOR STEWART
Senior Scholar: Multicriteria decision analysis and multiobjective optimization; resource allocation and management

Emeritus Associate Professor

EMERITUS ASSOCIATE PROFESSOR JUNE JURITZ
Biostatistics, hierarchical generalised mixed models.

Postdoctoral Fellows

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

DR SANET HUGO
Analysis of biodiversity patterns, multivariate analyses, ecotones

DR RAQUEL GARCIA
Modelling of species distributions, climate change

DR NATASHA KARENYI
Analysis of marine biodiversity patterns, occupancy models, multi-species model

DR FRANCIS STROBBE
Development of biodiversity information tools

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 DAVID BORCHERS
Statistical ecology; Wildlife Population assessment; Distance sampling; Survey Design; Mark-recapture; Hidden Markov models in ecology; Sampling Theory; Spatial Modelling

DR HENNING WINKER
Fisheries stock assessment models, analysis of biodiversity data

DR JONATHAN COLVILLE
Analysis of biodiversity data, spatial data analysis

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Fax: +27 21 650 4773
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RESEARCH OUTPUT

Chapters in books

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