Engineering and the Built Environment (EBE)

DST/NRF SARChI Chairs

6

Accredited journal units

111
(highest since 2010)

Income raised by contracts

R144m

10% increase in research contracts

2014
495

2015
546

NRF ratings

55

1 P rated

2 A rated

NEW NRF A RATINGS since June 2015

Prof Gerald Nurick

Internal AWARDS

Dr Megan Becker – 2015 College of Fellows Young Researcher.

Dr Sebastian Skatulla and Dr Kirsten Corin were awarded the Claude Leon Merit Award for Early-Career Researchers.

Dr Abimbola Windapo received the EBE Research Award for being the most prolific publisher in EBE in 2014.

Prof Gerald Nurick received the EBE Professorial Research Award for showing the best-ranked research profile over a five-year research period.

External AWARDS

Prof Alison Lewis – Water Research Commission award in the category of New Products and Services for Economic Development.

Dr David Ikumi from the Department of Civil Engineering and Dr Amir Patel from the Department of Electrical Engineering are recipients of the Claude Leon Merit Award for Early-Career Researchers.

The Radar Remote Sensing Group won a Gold Award at the AVI Aerospace Convention during October 2015, for its work on ‘green’ sensors not requiring new spectrum for detecting aircraft.
HIGHLIGHTS from June 2015 to June 2016

New leadership appointments

Prof Alison Lewis was appointed as dean from 1 June 2015.

Prof Dee Bradshaw was appointed the Minerals Beneficiation DST/NRF SARChI chair.

Prof Patricia Kooyman is the new DST/NRF SARChI chair in Nano Materials for Catalysis.

New initiatives

Future Water Institute.

UCT-Nedbank Real Estate Research Unit.

Research groupings highlights

A team from the Industrial Computational Fluid Dynamics Research Group in the Department of Mechanical Engineering has broken the longstanding Class A Water Rocket World Altitude Record, by a massive 33%.

Prof Sue Harrison from the Department of Chemical Engineering, director of the Centre for Bioprocess Engineering Research, holds the DST/NRF SARChI Chair in Bioprocess Engineering and is a finalist in two categories for the 2015/2016 NSTF Awards.

Dr Manya Mooya’s book Real Estate Valuation Theory: A critical appraisal was published, only the second book to be published in the Department of Construction Economics and Management. It was published by Springer, an esteemed publisher in the scientific world.

Moses Kiliswa received the KEYS award for the best paper presentation at the Advances in Cement and Concrete Technology in Africa 2016 International Conference, which took place in Dar-es-Salaam, Tanzania.

Moses is a PhD candidate under the supervision of Assoc Prof Hans Beushausen of the Concrete Materials and Structural Integrity Research Unit in the Department of Civil Engineering.

Four EBE staff were finalists in the NSTF Awards:

- Prof Harald Winkler, Department of Mechanical Engineering: NSTF-GreenMatter Award.
- Lumkani Fire Detection Team, UCT: research leading to innovation.
- Prof Ed Boje from the Department of Electrical Engineering: research leading to innovation.
- Dr Melinda Griffiths, Department of Chemical Engineering: TW Kambule Awards: emerging researchers.

Adele Boadzo, a 2015 electrical engineering master’s graduate, has been selected as a 2016 Mandela Washington Fellow. She completed her BSc in electrical engineering in 2010 and her MSc in 2015, under the supervision of Dr Sunetra Chowdhury.

HyPlat

South Africa is a step closer to realising the full potential of its enormous platinum reserves with the launch of a spin-off company, HyPlat, able to manufacture high-quality components for the international hydrogen fuel cell industry. Hydrogen fuel cells are a promising source of clean energy that can be used to provide off-the-grid power to rural schools, hospitals or to provide back-up power for telecommunication and data centres. A key component is platinum, which the country generally exports only as a raw material.

All this is set to change with the commercialisation of technology developed in the Department of Chemical Engineering and Mintek in Randburg under the umbrella of HySA Catalysis.

HySA Catalysis was set up as one of three centres of competence by Hydrogen South Africa (HySA), a flagship project of the Department of Science and Technology (DST) to add value to the estimated upwards of 80% of world reserves in platinum group metals that South Africa holds.

HySA has set itself an ambitious target of becoming a major player in sales of fuel cell materials and components by 2020, while an academic goal is to develop a knowledge pool of highly skilled South African scientists and engineers equipped to work in this sector.

POSTGRADUATES (end-2015)

976 Master’s students
235 Master’s graduates
250 PhD students
25 PhD graduates

30 POSTDOCS (end-2015)
DOCTORAL GRADUATIONS

Source: Doctoral Degrees Board

A.E.J. BOGAERS (MECHANICAL ENGINEERING)
Efficient and robust partitioned solution schemes for fluid-structure interactions
Supervised by Professor D. Reddy, Associate Professor T. Franz and Professor S. Kok (external)

J.P. DE VILLIERS (ELECTRICAL ENGINEERING)
Design and application of an automated system for camera photogrammetric calibration
Supervised by Professor F. Nicolls

S.S. DESTA (CONSTRUCTION ECONOMICS & MANAGEMENT)
The management of construction processes in developing countries: a case study of the Ethiopian Roads Authority
Supervised by Professor K. Cattell

L.N. FISHER-JEFFES (CIVIL ENGINEERING)
The viability of rainwater and stormwater harvesting in the residential areas of the Liesbeek River Catchment, Cape Town
Supervised by Professor N. Armitage

R.W. FOCKE (ELECTRICAL ENGINEERING)
Investigating the Use of Interval Algebra to Schedule Mechanically Steered Multistatic Radars
Supervised by Professor M. Inggs

E. GOVENDER (CHEMICAL ENGINEERING)
Investigating the growth kinetics and colonisation of Acidithiobacillus ferrooxidans on whole low-grade chalcopyrite ore at various physico-chemical conditions at the agglomerate-scale
Supervised by Professor S. Harrison and Dr C. Bryan (external)

N. GOVENDER (ELECTRICAL ENGINEERING)
Active object recognition
Supervised by Associate Professor F. Nicholls

B.K. HAMILTON (ELECTRICAL ENGINEERING)
MURAC: A unified machine model for heterogeneous computers
Supervised by Professor M. Inggs and Dr H. So (external)

S. JONES (CHEMICAL ENGINEERING)
Mixing, mass transfer and energy analysis across bioreactor types in microalgal cultivation and lipid production
Supervised by Professor S. Harrison and Professor H. von Blottnitz

G. LELLOUCH (ELECTRICAL ENGINEERING)
Waveform design and processing techniques in OFDM radar
Supervised by Professor M. Inggs and Dr A. Mishra

F. MAASDORP (ELECTRICAL ENGINEERING)
Doppler-only target tracking for a multistatic radar exploiting FM band illuminators of opportunity
Supervised by Professor M. Inggs

J.R. MANLEY (ELECTRICAL ENGINEERING)
A scalable packetised radio astronomy imager
Supervised by Professor M. Inggs

D.G. MOGASHANA (CHEMICAL ENGINEERING)
The interplay between structure and agency: How academic development programme students ‘make their way’ through their undergraduate studies in engineering
Supervised by Professor J. Case and Dr K. Williams

E.K. MUNSHIFWA (CONSTRUCTION ECONOMICS & MANAGEMENT)
Property rights and the production of the urban built environment in Zambia
Supervised by Dr M.M. Mooya

D. NABAHO (CHEMICAL ENGINEERING)
Hydrogen spillover in the Fischer-Tropsch synthesis. The role of platinum and gold as promoters in cobalt-based catalysts
Supervised by Professor E. Van Steen

N.N. NGOEPE (CHEMICAL ENGINEERING)
Tracking the motion of particle-bubble aggregates using Positron Emission Particle Tracking
Supervised by Associate Professor A. Mainza

D.T.O. OYEDOKUN (ELECTRICAL ENGINEERING)
Geomagnetically Induced Currents (GIC) in large power systems including transformer time response
Supervised by Emeritus P.C. Gaunt and Associate Professor K. Folly

A. PATEL (ELECTRICAL ENGINEERING)
Understanding the motions of the Cheetah tail using robotics
Supervised by Professor M. Braae

A.K. RAIKWAR (ELECTRICAL ENGINEERING)
Scalable architectures of interconnect protocols in distributed base transceiver stations
Supervised by Dr A. Mishra

M.T. ROCKSTROH (MECHANICAL ENGINEERING)
Combustion characteristics of synthetic gasoline in modern charge boosted GDI Engines
Supervised by Professor A. Yates and Dr G. Floweday

H.V. SCHALEKAMP (CIVIL ENGINEERING)
Paratransit operators’ participation in public transport reform in Cape Town: a qualitative investigation of their business aspirations and attitudes to reform
Supervised by Associate Professor R. Behrens
F. SITAS (ARCHITECTURE & PLANNING)
Becoming otherwise: two thousand and ten reasons to live in a small town
Supervised by Professor E. Pieterse and Dr S. Daya

W.M. SMIT (ARCHITECTURE & PLANNING)
Transforming cities: analysing the recontextualization of discourses of the urban in post-apartheid Cape Town
Supervised by Professor S. Parnell

E.M. SMUTS (CHEMICAL ENGINEERING)
A methodology for coupled CFD-DEM modeling of particulate suspension rheology
Supervised by Professor D. Deglon and Professor C. Meyer (external)

M. TADIE (CHEMICAL ENGINEERING)
An electrochemical study of platinum group minerals
Supervised by Dr K. Corin

J. YAN (ELECTRICAL ENGINEERING)
Investigation of the impact of demand elasticity and system constraints on electricity market using extended Cournot approach
Supervised by Associate Professor K. Folly

PATENTS

Filed Applications


Granted Applications

School of Architecture, Planning and Geomatics
(Including the African Centre for Cities)

Research Report 2015
Director: Professor Tomá Berlanda

School Profile

Within the School of Architecture, Planning and Geomatics, research work includes conventional research and applied research as well as creative work. This takes place within the actively teaching divisions within the School, as well as within dedicated research units. In the Architecture and Planning programmes these research endeavours include areas of enquiry such as urban design, architectural design, architectural education, digital technology, contemporary architectural theory and practice, planning theory, urban conservation, urban transport policy and urban informality.

The ethos of this School is also strongly influenced by our context: the physical context, the city, and the broader social/cultural/economic context of the region and the country. We are committed to engage with these contexts in both a meaningful and critical way, not as abstract sites for investigation but rather as peopled places to which we can respond.

The Geomatics Division within the School undertakes research in a variety of areas. These include documentation, modelling and visualization of African heritage sites, close-range photogrammetry, laser scanning of architectural structures and remote sensing of the environment; issues relating to land surveying, ownership, registration and tenure; modelling of the shape of the Earth (geoid) using gravity and satellite data, applications of GPS and modelling of datum transformations in Africa; applications of remote sensing and geographic information systems (GIS) to urban, agricultural and environmental monitoring. Spatial data infrastructure (SDI) development for integrated development planning (IDP) in sub-Saharan African cities.

Research Units

African Centre for Cities

The African Centre for Cities (ACC) was established in 2007 as a signature research theme cutting across three Faculties (Engineering and the Built Environment, Science and Humanities). The mission of ACC is to facilitate critical urban research and policy discourses for the promotion of vibrant, democratic and sustainable urban development in the global South. ACC researchers undertake research and policy work on a wide range of urban issues in Cape Town, South Africa, Africa and the global South, and collaborate with a number of other institutions across the globe (for example, as part of the Mistra Urban Futures network). Over the past decade, ACC has established an impressive international profile and reputation as a dynamic home for analysis of urban problems and policies. Its interdisciplinary brand gives the ACC huge potential to facilitate urban conversations and inquiry throughout UCT.

School Statistics

Permanent and Long-Term Contract Staff

<table>
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<th>Position</th>
<th>Number</th>
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<tr>
<td>Professors</td>
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<td>Associate Professors</td>
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<td>Senior Lecturers</td>
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<td>Lecturers</td>
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<tr>
<td>Technical Support Staff</td>
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<td><strong>Total</strong></td>
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Emeritus Staff and Research Associates

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<tr>
<td>Emeritus Associate Professor</td>
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<tr>
<td>Research Associates</td>
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<td><strong>Total</strong></td>
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Students and Postdoctoral Fellows

<table>
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</thead>
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<tr>
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<tr>
<td>Doctoral</td>
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<tr>
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<tr>
<td>Honours</td>
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<tr>
<td>Undergraduates</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>586</strong></td>
</tr>
</tbody>
</table>

Research Fields and Staff

Permanent and Long-Term Contract Staff

**DR JANE BATTERSBY-LENNARD**
Senior Research Officer: African Centre for Cities. Urban food systems, food security and food policy. Geographies of food. Food policy discourses.

**PROFESSOR TOMÁ BERLANDA**
Professor and Director: Architecture, Planning & Geomatics

**DR MERCY BROWN-LUTHANGO**
Research Officer: African Centre for Cities. Human settlements issues i.e. management of urban land for integrated, sustainable human settlements, community development and involvement in infrastructure provision, informal settlement upgrading to reduce urban violence and improve safety. University-community engagement as co-production of knowledge, youth, identity and the city.

**MR FRANCIS CARTER**
Senior Lecturer: Architecture. Curriculum theory in relation to undergraduate built environment design programmes; theories of making, with reference to contemporary South African architecture; programming for new knowledge space

**MS LIZA CIROLIA**
Research Officer: African Centre for Cities. Specializes in human settlements and housing policy and institutions in African cities; theories and practices of spatial transformation; urban and public finance.

**ASSOCIATE PROFESSOR NICHOLAS COETZER**
Architecture. Architectural design; contemporary architectural history and theory; digital technology

**MR RODNEY CRONWRIGHT**
Part-time Lecturer – Geomatics Division

**MR ALBERTRUM CROWDER**
Lecturer: Architecture. Specializes in the area of cultural heritage conservation. His research focuses on the inherent values that people associate with their environment and the possibility for this to help promote sustainable cultural heritage conservation and development

**MS ANN DONALD**
Assistant Research Officer: African Centre for Cities. Application of remote sensing and geographic information systems for land and environmental management.

**MR JAMES DUMMY**
Assistant Research Officer: African Centre for Cities. African urban history, urban planning and planning education; African food security governance; case study research methodology

**MR KEVIN FELLINGHAM**
Senior Lecturer: Architecture. Interdisciplinary research, practice and design

**DR MATTEO FRASCHINI**
Senior Lecturer: BAS Programme

**DR RAMESH GOVIND**
Senior Lecturer: Geomatics Programme

**MR JONATHAN GREEN**
Adjunct Senior Lecturer – BAS Programme

**DR GARETH HAYSOM**
Research Officer: African Centre for Cities. Urban food systems and food system governance. Urban food security with a specific focus on food accessibility and utilisation. Current research focuses on food security in Southern Cities with a specific interest in secondary African cities.

**MR CLINTON HINDES**
Senior lecturer: Landscape Architecture. History and theory of landscape architectural design and its application to teaching and practice. Documenting the history of South African landscape architecture

**MR SIMON HULL**
Lecturer: Geomatics. Digital photogrammetry for heritage documentation, fields of land tenure reform, disaster management using remote sensing and GIS, heritage documentation, and improving education

**MR FADLY ISAACS**
Lecturer: Architecture. (Measuring) urban settlement quality, integrating strategic urban infrastructure investment

**MS TANIA KATZSCHNER**
Lecturer: Planning. Education for sustainable development, sustainable urban systems, creating
and nurturing educational systems that serves human needs while also protecting our resources for future generations, trans-disciplinarity and systems thinking.

**MS TARNA KLITZNER**  
Part time Lecturer – MLA Programme

**MS SIMONE LE GRANGE**  
Lecturer: Architecture. Architectural design, Academic Development Lecturer

**MR MICHAEL LOUW**  
Lecturer: Architecture. Sustainable architecture and urbanism, architectural history and materiality

**PROFESSOR IAIN LOW**  
Architecture. Space and transformation; critical thinking/ practice and the ‘re-writing’ of architectural type; post apartheid South African condition: urbanism, the ‘new’ public realm, contemporary dwelling and architectural pedagogy

**DR NANCY ODENDAAL**  
Senior Lecturer: Planning. Relationship between Information and Communication Technology and urban transformation, metropolitan planning, planning theory and infrastructural transitions in cities of the Global South. Commissioned research on planning and transformation, land use management and planning standards

**MS STELLA PAPANICOLAOU**  
Lecturer: Design, the tension between meaning and the production of space in architectural practice and education; developing tools for critical thinking to enhance the creative process in architectural education.

**PROFESSOR EDGAR PIETERSE**  
Director: African Centre for Cities, and holder of a DST/NRF SARChI Research Chair. Promoting new approaches to urban development in South Africa and Africa, in collaboration with partners from the global South.

**PROFESSOR GORDON PIRIE**  
Deputy Director: African Centre for Cities. Main area of research is transport infrastructure and mobility. Currently examining infrastructure provision in colonial cities in Africa, and the way in which that became a foundation of risk exposure in contemporary cities.

**MR JULIAN RAXWORTHY**  
Senior Lecturer – MLA Programme

**DR TOM SANYA**  
Senior Lecturer: Architecture. Sustainable Habitat Innovations (SusHI), systems theory in sustainable architecture evaluation with particular focus on Africa. Sustainability evaluation tool (emerging from PhD). Design and making Epistemology – in Search of an Afro-centric perspective via the African Informal Settlement

**MS LESLEY SIBANDA**  
Research Officer: African Centre for Cities. Life cycle assessment; analysis of externalities of urban food systems.

**MS MELINDA SILVERMAN**  
Senior Lecturer – MArch Programme

**DR GEORGE SITHOLE**  
Senior Lecturer: Laser altimetry, photogrammetry, 3D object reconstruction

**MS CAROLINE SKINNER**  
Senior Lecturer: African Centre for Cities. Informal economy/sector, labour markets, gender, policy analysis, urban economic development, urban social movements.

**ASSOCIATE PROFESSOR JULIAN SMIT**  
Geomatics. Application of remote sensing, photogrammetry and geographic information systems for land and environmental management

**DR WARREN SMIT**  
Senior Research Officer: African Centre for Cities. Urban governance, urban planning, housing policy, urban health.

**ASSOCIATE PROFESSOR ALTA STEENKAMP**  
Director: School of Architecture, Planning & Geomatics. History and theory of Southern African architecture and its relation to the global environment

**ADJUNCT ASSOC PROF STEPHEN TOWNSEND**  
Convenor – M Phil in Conservation of the Built Environment

**PROFESSOR VANESSA WATSON**  
Planning. Planning theory; governance; housing; urbanization; large city planning

**MR MICHAEL WENTWORTH**  
Adjunct Senior Lecturer – BAS Programme

**ASSOCIATE PROFESSOR JENNY WHITTAL**  
Geomatics. Land tenure and cadastral systems, specialising in land for the urban poor and fiscal cadastral systems and reform

**DR TANJA WINKLER**  
Senior Lecturer: Planning. Current research interests include critically assessing “the voice of the poor” in urban governance and public decision making processes. Ongoing research on civil society, poverty, and inner city regeneration.
Emeritus Staff

**EMERITUS PROFESSOR JULIAN COOKE**
Contemporary South African architecture

**EMERITUS PROFESSOR DAVID DEWAR**
Former Deputy Dean of the Faculty of Engineering and the Built Environment; BP Chair of Planning; urban structure and form; place making; informal housing; housing policy; informal economic development; public space; regional planning and development

**EMERITUS PROFESSOR LUCIEN LE GRANGE**
Urban Conservation Policy; Urban Design; Mission Settlements in South Africa; Documenting modern architecture in Cape Town. Contemporary Architecture – Theory and Practice

**EMERITUS PROFESSOR FABIO TODESCHINI**
Architect, City Planner, Urban Designer, Heritage Practitioner

**EMERITUS PROFESSOR HEINZ RÜTHER**
Digital close range and aerial photogrammetry; precise engineering surveying; geographic information systems; visualisation and 3D modelling

**EMERITUS ASSOCIATE PROFESSOR CHARLES MERRY**
Earth's gravity field; global positioning system; coordinate transformations.

Research Associates

**MR BARRIE GASSON**
Ecologically sustainable cities; regional planning and development

**DR HENRIK ERNSTSON**

**MS KIM GURNEY**

Postdoctoral Fellows

**DR KONI BENSON**
African Centre for Cities – Research in African, gender, oral, and urban history. In particular, the urbanization of poverty, development and displacement, women in resistance movements, demobilization, feminist collaborative praxis and the politics of oral history

**DR JACQUELINE BOREL-SALADIN**
African Centre for Cities – Analysis of urban poverty and unemployment trends

Contact Details

Postal Address: School of Architecture, Planning and Geomatics, University of Cape Town, Private Bag X3, Rondebosch, 7701, Republic of South Africa

Architecture: Tel: +21 21 650 2374 and Fax: +27 21 650 2383
Planning: Tel: +27 21 650 2359 and Fax: +27 21 650 2383
Geomatics: Tel: +27 21 650 3577 and Fax: +27 21 650 3572
Website: [http://www.apg.uct.ac.za](http://www.apg.uct.ac.za)

RESEARCH OUTPUT

Authored books


Edited books


Chapters in books


Benson, K. and Meyer, F. 2015. “Writing my history is keeping me alive”: politics and practices of collaborative history writing. In S. van Schalkwyk and P. Gobodo- Madikizela (eds), A Reflexive


Articles in peer-reviewed journals


**Peer-reviewed published conference proceedings**

**Department of Chemical Engineering**

(Including the Centre for Bioprocess Engineering Research (CeBER), the Centre for Catalysis Research (CAT), the Centre for Minerals Research (CMR), the Centre for Research in Engineering Education, the Crystallization and Precipitation Research Unit, the -DST/NRF Centre of Excellence in Catalysis, c*change and the HySA/catalysis - DST Hydrogen Catalysis Centre of Competence)

**Research Report 2015**

Head of Department: Professor Eric van Steen

**Departmental Profile**

The vision of the Department of Chemical Engineering is to be “A Beacon in Education and Research”, which we aim to fulfil through our combined undergraduate and postgraduate programmes. Both the undergraduate and postgraduate programmes are recognised nationally and internationally for their high quality graduates. Furthermore, the undergraduate programme is accredited by the Engineering Council of South Africa, and through the Washington accord internationally.

Our postgraduate programme is the largest academic research activity in Chemical Engineering in Africa and is based on a strong link between fundamental research and its application to the solution of industrial and applied problems.

Research within the department takes place within University-accredited research groupings, including the Centre for Bioprocess Engineering Research (CeBER), the Centre for Catalysis Research, the Centre for Minerals Research, the Centre for Research in Engineering Education and the Crystallization and Precipitation Research Unit, and also in the Environmental Process and Systems Engineering Research Group and Process Modelling Research Group.

The Chemical Engineering Department also hosts the DST-NRF Centre of Excellence in Catalysis c*change, the DST Hydrogen Catalysis Centre of Competence HYSA/Catalysis, the South African Minerals to Metals Research Institute (SAMRI), four DST/NRF SARChI chairs: Minerals Beneficiation, Bioprocess Engineering, Nano-Materials for Catalysis and Reaction Engineering, as well as the Anglo American Platinum Chair in Minerals Processing.

**Departmental Statistics**

**Permanent and Long-Term Contract Staff**

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<tr>
<th>Position</th>
<th>Count</th>
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<tr>
<td>Professors</td>
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<tr>
<td>Senior Lecturers/Senior Research Officers</td>
<td>15</td>
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<tr>
<td>Lecturers/Research Officers</td>
<td>8</td>
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<tr>
<td>Contract Lecturers</td>
<td>4</td>
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<tr>
<td>Technical and Scientific Staff</td>
<td>29</td>
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<td>Administrative Support Staff</td>
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<td><strong>Total</strong></td>
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**Emeritus, Honorary and Adjunct Staff**

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<td>Honorary Professors</td>
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<td>Adjunct Associate Professor</td>
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<tr>
<td>Honorary Research Associates</td>
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**Students and Postdoctoral Fellows**

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<tr>
<td>Postdoctoral Fellows</td>
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<tr>
<td>Doctoral</td>
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<tr>
<td>Masters</td>
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<tr>
<td>BSc(Eng)</td>
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<td><strong>Total</strong></td>
<td><strong>727</strong></td>
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**Research Fields and Staff**

**Permanent and Long-Term Contract Staff**

**MS NASEEBA ABBAS**
Centre for Catalysis Research, HYSA/Catalysis – Investigation of non-carbon support materials for platinum electrocatalysts in polymer electrolyte fuel cells

**DR LAWRENCE BBOSA**
Centre for Minerals Research – Ore breakage, numerical simulation techniques such as the Discrete Element Method (DEM) for simulation
of comminution devices; validation through experimental techniques such as Positron Emission Particle Tracking (PEPT)

**DR MEGAN BECKER**  
Centre for Minerals Research – Process mineralogy, practical study of minerals associated with the processing of ores, concentrates and smelter products for the development and optimisation of metallurgical flow sheets

**MR PAUL BEPWSA**  
Centre for Minerals Research – Metal accounting, comminution

**DR SHARON BLAIR**  
Centre for Catalysis Research, Director HySA/Catalysis – Technology transfer

**MR WALTER BÖHRINGER**  
Centre for Catalysis Research – Acid catalysis

**DR JENNIFER BROADHURST**  
Minerals to Metals Signature Theme – Interdisciplinary approaches to the responsible and sustainable development of mineral resources, effective management of mine wastes and primary metal processing residues

**DR ROALD BROSIUS**  
Centre for Catalysis Research – Diesel selective and gasoline/kerosene selective catalytic synthetic fuel processes; noble metal promoted zeolite catalysts for Fischer-Tropsch compatible hydrocracking catalysts; hierarchically and/or nano-structured zeolite catalysts for combined FT synthesis and fuels upgrading in micro-channel and continuously stirred tank reactors

**PROFESSOR JENNI CASE**  
Higher education with a focus on science and engineering programmes, South African higher education and academic development, student learning in university, contemporary pedagogical and curricular innovation, race, class and gender in higher education, sociology of knowledge, research methods and methodology

**DR JESSICA CHAMIER**  
Centre for Catalysis Research, HySA/Catalysis – Materials development in catalysts and catalyst support materials in fuel cells. Electrospinning and synthesis of nanowires and nanomaterials; Electrochemical evaluation and characterisation

**PROFESSOR MICHAEL CLAEYS**  
Centre for Catalysis Research, Director DST/NRF Centre of Excellence in Catalysis (c*change) – Fischer-Tropsch synthesis, in-situ catalyst characterisation, nano-materials

**DR KIRSTEN CORIN**  
Centre for Minerals Research – Flotation chemistry

**PROFESSOR DAVID DEGLON**  
Anglo American Platinum Chair in Minerals Processing, Director of the Centre for Minerals Research – Computational fluid dynamics and flotation cell modelling; conventional mechanical flotation cells and novel flotation cells; particle-bubble contacting in turbulent multi-phase flow environments, with the emphasis on fine particles; use of computational methods for modelling fluid flow and an understanding of non-Newtonian slurry rheology

**DR MARIJKE FAGAN-ENDRES**  
Centre for Bioprocess Engineering Research – Heap bioleaching; biofloation; biological isothermal micro-calorimetry; MRI and X-ray CT

**DR CARYN FENNER**  
Centre for Bioprocess Engineering Research – Production of affordable, modern fine chemicals and commodity bioproducts, product optimisation, and induction; production of industrial enzymes with commercial applications; environmental sustainability of biocatalytic processes, cascade reactions with respect to green chemistry and the development and optimisation of bio-analytical techniques

**DR NICO FREDERIK FISCHER**  
Centre for Catalysis Research, DST-NRF Center of Excellence in Catalysis c*change –Heterogeneous catalysis research with a focus on synthesis gas conversion reactions. Development and application of in situ material characterization techniques

**PROF JACK FLETCHER**  
Director of the Centre for Catalysis Research, Contract Director National Hydrogen Catalysis Competence Centre (HySA/Catalysis) – catalysis by noble metals, zeolite catalysed conversion of phenol and derivatives, wax hydrocracking, shape selectivity in zeolites and molecular sieves, hydrogen processors, and fuel cells

**MR MARTIN HARRIS**  
Centre for Minerals Research – Flotation circuit modelling

**PROFESSOR SUE HARRISON**  
SA Research Chair in Bioprocess Engineering, Director of the Centre for Bioprocess Engineering Research – Interaction of micro-organisms with the environment; microbial ecology and community dynamics in planktonic and sessile environments; energy efficient reactor systems; biokinetics, metabolic modelling of biomass and bioproducts; and integrated bioprocess systems. The above is applied to the fields of: alkane biotechnology, biomanufacture of pigments, enzymes and nutraceuticals, yeast handling, mineral bioleaching through heap and tank processes, Acid Mine Drainage (AMD) prevention, AMD remediation
through sulphate reduction, wastewater bioprocessing, algal bioprocesses for bioenergy and fine chemicals, bioprocess design, and evaluation for sustainable process engineering

MR HILTON HEYDENRYCH
Crystallization & Precipitation Research Unit – Development of a systematic approach for the treatment of effluent water streams using multi-criteria evaluations and comparisons of simulated processes to develop new heuristic principles for the design of water treatment processes. Chemical engineering education–curriculum design and the analysis of throughput issues

DR ROBERT HUDDY
Centre for Bioprocess Engineering Research – Microbiology, molecular biology, metagenomics, biological isothermal micro-calorimetry; mineral biotechnology; microbial ecology, biological sulphate reduction, bioremediation of thiocyanate contaminated wastewater effluent

MR NABEEL HUSSAIN
Centre for Catalysis Research, HySA/Catalysis – Design and development of catalytic components and devices for low temperature fuel cells

DR ADENIYI ISAFIADE
Environmental and Process Systems Engineering – Process design and optimisation

DR MADELYN JOHNSTONE-ROBERTSON
Centre for Bioprocess Engineering Research – Enzyme production, wastewater biorefineries, biopolymer production, integrated bioprocess development, fungal pigments, and bioreactor technology

PROFESSOR PATRICIA JANE KOOYMAN
SA Research Chair in Nanomaterials for Catalysis, Centre for Catalysis Research – nanomaterials synthesis and characterization, electron microscopy

DR PIETER LEVECQUE
Centre for Catalysis Research, HySA/Catalysis – Electrocatalysts for fuel cells and high throughput catalyst preparation

PROFESSOR ALISON LEWIS
Director of the Crystallization & Precipitation Research Unit – Industrial precipitation and crystallization, recovery of value from effluent streams, water treatment through crystallization, Eutectic Freeze Crystallization, product and particle analysis; process analysis and control for optimised product quality; crystallization process development; aqueous chemistry modelling of speciation, thermodynamic equilibria, hydrodynamic and population balance modelling of precipitation systems

MR NIELS LUCHTERS
Centre for Catalysis Research, HySA/Catalysis – High throughput experimentation, parallel preparation of heterogeneous catalysts, and high throughput methodology for fuel processing research

MR ARTHUR MABENTSELA
Centre for Minerals Research – Numerical and physical modelling of pyrometallurgical operations

PROFESSOR AUBREY MAINZA
Centre for Minerals Research – Comminution, classification, CFD/DEM modelling, PEPT

DR BELINDA MCFADZEAN
Centre for Minerals Research – Flotation chemistry

PROFESSOR KLAUS MÖLLER

PROFESSOR JOCHEN PETERSEN
Centre for Bioprocess Engineering Research – Hydrometallurgy, especially heap (bio) leaching of low-grade minerals, heap reactor characterization and modelling, bioreaching processes

MS TOKOLOHO RAMPAI
Centre for Minerals Research – Carbide MAX phases composites with cubic boron nitride ceramics, pyrometallurgy

MS JEANETTE SWEET
Centre for Minerals Research – Comminution circuit optimisation and design, flotation circuit optimisation, technology transfer

DR SIEW TAI
Centre for Bioprocess Engineering Research – High-value bioproducts, vaccines and biopharmaceuticals; bioreactor design, cell culture in bioreactors; beer and wine fermentation; metabolic engineering, systems biology

MR SHIRO TANAKA
Centre for Catalysis Research, HySA/Catalysis – Materials and devices research for hydrogen fuel cells

PROFESSOR ERIC VAN STEEN
Centre for Catalysis Research, DST-NRF Centre of Excellence in Catalysis c*change – Fischer-Tropsch synthesis, nano-materials, molecular modelling of heterogeneous catalytic systems, reaction kinetics

MR ANDRE VAN DER WESTHUIZEN
Centre for Minerals Research – Comminution and fine particle processing
PROFESSOR HARRO VON BLOTTNITZ
Environmental and Process Systems Engineering
- Industrial ecology, life cycle assessment, material flow analysis, recycling systems organic waste valorisation with a focus on biogas, all applied to questions of resource-efficient and clean production, also in informal settings. Engineering education for sustainable development. Sustainable mineral resource development

MR JASON GORDON WATERS
Centre for Minerals Research – Comminution and classification optimisation, and slurry rheology

DR REINIER WILLEM WEBER
Centre for Catalysis Research – Business Support Manager

MS JENNIFER WIESE
Centre for Minerals Research – Flotation Chemistry

Emeritus, Honorary and Adjunct Staff

EMERITUS PROFESSOR CYRIL O’CONNOR
Centre for Minerals Research – Flotation chemistry

HONORARY PROFESSOR DEE BRADSHAW
Centre for Minerals Research

ADJUNCT PROFESSOR PAUL DEMPSEY

HONORARY RESEARCH ASSOCIATE DR MELINDA GRIFFITHS
Centre for Bioprocess Engineering Research – Process improvements and economics of large-scale production of Spirulina and other micro-algae

HONORARY RESEARCH ASSOCIATE DR ROB VAN HILLE
Centre for Bioprocess Engineering Research – Mineral biotechnology, algal biotechnology, microbial ecology, carbon cycling, sulphide chemistry and bioremediation, acid mine drainage retention treatment, anaerobic digestion, bioenergy

ADJUNCT PROFESSOR SANDY LAMBERT
Centre for Minerals Research

ADJUNCT PROFESSOR JEREMY WILSON MANN
Centre for Minerals Research

ADJUNCT ASSOCIATE PROFESSOR PHILIPPA NOTTEN
Environmental and Process Systems Engineering – Life Cycle Assessment (LCA)

HONORARY RESEARCH ASSOCIATE DR MELISSA ANNE PETERSEN
Centre for Catalysis Research, HySA/Catalysis – Molecular modelling of catalytic systems

HONORARY PROFESSOR JIM PETRIE

ADJUNCT PROFESSOR WYNAND ANDRE VAN DYK
Risk management, process optimisation and project management

HONORARY RESEARCH ASSOCIATE DR CHRISTOPHER DENNIS WOOLARD
Fuels research, Sasol Advanced Fuels Laboratory

ADJUNCT PROFESSOR DAVID WRIGHT
Chemical Engineering, strategy, internal and external review, curriculum, design

Postdoctoral Fellows

DR MUHAMMAD ASHRAF
Centre for Catalysis Research, HySA/Catalysis – fuel processing

DR SUNDARAM BABU
Centre for Catalysis Research, HySA/Catalysis – Fischer Tropsch synthesis.

DR PALESA DIALE
Centre for Bioprocess Engineering Research - water pollution control and remediation from acid mine drainage

DR JUAREZ AMARAL FILHO
Centre for Bioprocess Engineering Research - Environmental issues related to processing, discard and disposal of mineral wastes and effluents; effective management, processing, characterization and use of mineral wastes; mine water reuse and recycling; acid rock drainage prediction, evaluation, minimization, mitigation and downstream uses.

DR JACK V. FLETCHER
Centre for Catalysis Research, HySA/Catalysis – Micro-channel reactors

DR MARC FÜRST
Centre for Catalysis Research – Detailed analysis of iron-based Fischer-Tropsch product using GCxGC chromatography.

DR ELAINE GOVENDER
Centre for Bioprocess Engineering Research – Application and optimisation of mineral (bio) leaching processes in heap and tank reactor systems, with focus on mineral-microbe interaction and the modelling of microbial transport facilitated through solution flow dynamics. Application of bioprocess engineering principles in the treatment of waste electronic and electrical equipment (WEEE) for value recovery.

DR ATHANASIOS KOTSIOPOULOS
Centre for Bioprocess Engineering Research – Liquid-mineral contacting for the optimisation of heap leaching and prevention of acid rock drainage.
**RESEARCH OUTPUT**

**Authored books**


**Articles in peer-reviewed journals**


Case, J.M., Fraser, D., Kumar, A. and Itika, A. 2015. The significance of context for curriculum development in engineering education: a case study across three


Petersen, M., Cariem, M., Claeyts, M.C. and Van Steen, E.W.J. 2015. A DFT perspective of potassium promotion of χ-Fe5C2(1 0 0). Applied Catalysis A-General, 496: 64-72.


Peer-reviewed published conference proceedings


Department of Civil Engineering

(Including Centre for Transport Studies (CTS) and Concrete Materials and Structural Integrity Research Unit (CoMSIRU))

Research Report 2015

Head of Department: Professor Neil Armitage

Departmental Profile

The Department of Civil Engineering currently has an establishment of 16 permanent full-time academic positions and 2 research officers, supported by a dedicated complement of 19 technical and administrative staff. It offers a four-year BSc (Civil Engineering) degree programme and several taught postgraduate programmes, as well as supervised research studies leading to Master’s and Doctoral degrees. The current enrolment is about 457 undergraduate students, 258 postgraduates and 3 postdoctoral Fellows – giving a total of 718 students.

Postgraduate teaching and research is conducted within the framework of well-established research groups in the areas of Structural Engineering and Mechanics, Geotechnical Engineering, Concrete Materials and Technology, Hydraulic Engineering, Water Quality Engineering, Urban Water Management, Urban Engineering and Management, Transport Studies and GIS. Members of staff also interact with research groups in other departments, such as the Centre for Research in Computational and Applied Mechanics (CERECAM) and the Africa Centre for Cities (ACC). The Department has fruitful collaborative links with several local and overseas universities, and with local industry. Much of the work done by members of staff finds application in industry.

The high quality of the research undertaken by the Department is evidenced by the considerable number of peer-reviewed publications in ISI-accredited international journals produced by members of staff annually, and the international recognition that members of staff enjoy in their areas of research. Members actively participate on the committees of local professional bodies, provide expert advice to industry, and serve on the editorial and advisory boards of various international journals and conferences.

Departmental Statistics

Permanent and Long-Term Contract Staff

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<th>Position</th>
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<tr>
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Emeritus and Honorary Staff

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<td>Emeritus Associate Professors</td>
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Students and Postdoctoral Fellows

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<td>Postdoctoral Fellows</td>
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<td>Masters and Diplomas</td>
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<tr>
<td>Other – (Non degree/Diploma)</td>
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<tr>
<td>Undergraduate</td>
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<td><strong>Total</strong></td>
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</table>

Research Fields and Staff

Permanent and Long-Term Contract Staff

PROFESSOR MARK ALEXANDER
Concrete durability and deterioration; concrete materials; concrete service life; sustainability of concrete construction; applications to structural design and construction

PROFESSOR NEIL ARMITAGE
Urban water management including: water sensitive urban design (WSUD), sustainable drainage systems (SUDS) and the provision of water services to informal settlements
ASSOCIATE PROFESSOR ROGER BEHRENS
Paratransit integration and improvement; travel behavior change; non-motorised transportation; urban form- public transport relationships

ASSOCIATE PROFESSOR HANS BEUSHAUSEN
Concrete materials; structural engineering; repair of concrete structures

DR KIRSTY CARDEN
Urban water management; sustainability assessment; integrated approaches geared towards sustainable urban development and water sensitive cities

MS FARIIDAH CHEBET
Geotechnical engineering; ground improvement; waste minimization; advanced soil mechanics

PROFESSOR GEORGE EKAMA
Chemical and biological wastewater treatment; physical and biological process modelling

DR DAVID IKUMI
Mathematical modelling of wastewater treatment systems; nutrient recovery from waste; improvement on efficiency of water use

DR DENIS KALUMBA
Geotechnical engineering; ground improvement, waste minimization, foundations/soils interaction, electrokinetics, geosynthetics, and soil remediation

PROFESSOR PILATE MOYO
Structural analysis and design, structural dynamics and vibration analysis-, structural integrity assessment, structural health monitoring and vibration testing

DR HERRIE SCHALEKAMP
Road-based public transport policy and regulation; institutional and operational reform processes in passenger transport systems; qualitative methods of investigation in the transport arena

DR SEBASTIAN SKATULLA
Multiscale methods; biomechanics; electromechanics; meshfree methods; high-performance computing

ASSOCIATE PROFESSOR MARIANNE VANDERSCHUREN
Assessment of urban transport systems; urban transport decision-making; transport policy

ASSOCIATE PROFESSOR MARK VAN RYNEVELD
Urban engineering; infrastructure planning and settlement planning; sanitation; capacity building/ engineering education

PROFESSOR KOBUS VAN ZYL
Water distribution systems including: hydraulic modelling, pressure and leakage; water demand; reliability of bulk supply systems; smart metering

MS NICKY WOLMARANS
Academic development; teaching and learning; mechanics of solids

PROFESSOR ALPHOSE ZINGONI
Shell structures; space structures; structural mechanics; applications of group theory; finite element modelling; vibration and structural dynamics; structural analysis and design

ASSOCIATE PROFESSOR MARK ZUIDGEEST
Pedestrian activity on highways; transport network design; location-allocation modelling; land-use transport interaction models; transport-related social exclusion; climate change and transport; walkability assessment

Emeritus Associate Professors
Associate Professor Mike De Kock
Associate Professor Romano del Mistro
Associate Professor Renier Oelof Heckroodt
Associate Professor Frederic Anthony Kilner
Associate Professor Abyn Dereck Sparks

Honorary Research Associates
Dr Edward Beukes
Mr Vernon Collis
Dr Sifiso Nhleko
Dr Lisa Kane
Professor Manu Santhanam

Postdoctoral Fellows
Dr Fulvio Busatta
Dr Bjorn Höhlig
Dr Inês Ngassam

Contact Details
Postal Address: Department of Civil Engineering, New Engineering Building, University of Cape Town, Private Bag X3, Rondebosch, 7701
Telephone: +27 21 650 2584
Fax: +27 21 650 1455
Email: civ-snape@uct.ac.za
Website: http://www.civil.uct.ac.za/
**RESEARCH OUTPUT**

**Authored books**


**Articles in peer-reviewed journals**


**Peer-reviewed published conference proceedings**


Department of Construction Economics and Management

Research Report 2015

Head of Department: Associate Professor Kathy Michell

Departmental Profile

Research and allied scholarly work in the Department falls under two broad themes of property and construction. Five research groups examine issues related to infrastructure delivery, construction industry development, wellness in construction, emerging property markets, and facilities management. A number of cross cutting themes provide diversity and smaller research interest groups; these themes include sustainability, project management, human development, property markets and property valuations, procurement, entrepreneurship, and teaching and learning. The Department is home to the recently formed UCT-Nedbank Urban Real Estate Research Unit.

Strong research links exist with academic institutions in the United Kingdom, Italy, United States of America, Nigeria, Central and East Africa, as well as with institutions within South Africa. During 2015, papers were presented at key local and international conferences in South Africa, Kenya, United Kingdom, Northern Ireland and Greece. In addition, a number of papers were published in peer-reviewed local and international journals, frequently with international co-authorship, underlining the Department’s international profile and collaborative research philosophy.

The Department continues its engagement with local and international professional organisations; industry; and government and state organisations. Research endeavours by individual staff have been good in terms of higher degree graduates, attracting research funding, and research outputs. The staff received research funding from a variety of sources in 2015, namely: the University Research Committee (URC), the National Research Foundation (NRF), the Construction Industry Development Board (cidb), and Nedbank Corporate and Investment Bank (Property Finance Division). In addition, the department boasts a “B2” and a “C2” NRF-rated researchers.

Departmental Statistics

Permanent and Long-Term Contract Staff

<table>
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<tr>
<th>Role</th>
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<tr>
<td>Professors</td>
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<tr>
<td>Associate Professors</td>
<td>3</td>
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<tr>
<td>Senior Lecturers</td>
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<tr>
<td>Lecturer</td>
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<td>Administrative and Clerical Staff</td>
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<tr>
<td>Departmental Assistant</td>
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<td><strong>Total</strong></td>
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Students

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<th>Level</th>
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<td>Doctoral</td>
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<td>Undergraduate</td>
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<td><strong>Total</strong></td>
<td><strong>516</strong></td>
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</tbody>
</table>

Research Fields and Staff

Permanent Staff

PROFESSOR KS CATTELL
Head of Department: Value management; workplace facilities management; learning spaces; the impact of HIV/AIDS on the South African construction industry; corruption in the construction industry; and stress management for built environment professionals

PROFESSOR PA BOWEN
The impact of HIV/AIDS on the South African construction industry; and work-life balance and stress management for built environment professionals

ASSOCIATE PROFESSOR KA MICHELL
Facilities management as a social and community enterprise in low-income areas of cities; urban facilities management; sustainable urban development; corporate real estate; work space planning and management in buildings
ASSOCIATE PROFESSOR F VIRULY
Urban economics; property development; property feasibility studies; property and building cycles; property and the macro economy; econometric forecasting of the commercial and residential property markets; institutions and the structure of property markets

ASSOCIATE PROFESSOR A WINDAPO
Contractor performance and development studies; housing procurement and development studies; risk and quality management processes on construction projects; and health, safety and environmental issues

MRS E EDWARDES
Senior Lecturer: Education in construction studies; enhancement of skills required for construction studies

MRS K EVANS
Senior Lecturer: Property investment and Finance; SA Listed Property Market, REITs, new listing, performance and value, mergers and acquisitions, international investment and financing; Property Valuation, reducing the property appraisal bias with decision support systems; Property investment in a mixed asset portfolio

MR I JAY
Senior Lecturer: Project Management – particularly in the area of project strategy and project portfolio (programme) management; application of value models to portfolio balancing, and enterprise wide project management structures and systems; value management with a particular focus on client values, determination of project measures of success (success criteria) and modelling of client values

MRS K LE JEUNE
Senior Lecturer: Gender related issues within the built environment professions; the green building movement; service learning and application in construction education; social responsibility and construction education; innovation in the Quantity Surveying profession

MR M MASSYN
Senior Lecturer: Skills and competencies of SME’s within the construction industry; delivery and financing systems applied in low income housing; informality in housing development; application of a project management office within the public sector

MR R MCGAFFIN
Senior Lecturer: The relationship between land economics and planning; property markets and value-capture; housing and affordable housing markets

DR M MOOYA
Senior Lecturer: Informal/low income property markets; property market processes; property valuation theory and practice, epistemology and methodology in property market research

DR N TUAN
Senior Lecturer: Systems theory in project management; multi-criteria decision making managing complexity in engineering systems and organisations

MR S NURICK
Lecturer: Green building and its link to corporate real estate, with specific focus on facilities management, property finance and valuation; stakeholder engagement and perceptions of green building features and initiatives

MR U ORDOR
Lecturer: Strategic urban facilities management and its application to the challenges in the interface between urban design and urban management

MS A STREET
Lecturer: Social learning spaces; designing curricula and learning spaces for better retention of knowledge

Contact Details
Postal Address: Department of Construction Economics & Management, University of Cape Town, Private Bag X3, Rondebosch, 7701, South Africa
Telephone: +27 21 650 3443
Fax: +27 21 689 7564
Email: Marelda.Fagliodin@uct.ac.za
Website: http://www.cons.uct.ac.za

RESEARCH OUTPUT

Edited books

Chapters in books
**Articles in peer-reviewed journals**


**Peer-reviewed published conference proceedings**


Surveying & Construction Management, Faculty of Natural & Agricultural Sciences, University of the Free State. ISBN 9780868868349.


Department of Electrical Engineering

Research Report 2015

Head of Department: Professor Edward Boje

Departmental Profile

The Department of Electrical Engineering aims at producing graduates who are capable of becoming leaders in their chosen fields and to engage in relevant and innovative research. It has a full-time staff complement of 25 academics and 13 technical and administrative support staff and a current student registration of 1021. Three popular undergraduate degrees are offered namely; Mechatronics, Electrical Engineering and Electrical & Computer Engineering, which are all accredited by the Engineering Council of South Africa and which are recognized internationally.

The Department prides itself on its close working relationship with industry, a partnership that allows it to remain at the cutting edge of electrical engineering trends and developments worldwide. Research in the Department covers a wide range of topics:

• Computational Electronics
• Control Engineering
• Image Processing and Vision Systems
• Instrumentation
• Machines and Power Electronics
• Nuclear Power
• Power Engineering
• Remote Sensing and Radar
• Robotics
• Space Technology
• Telecommunications


The Department offers coursework-based postgraduate programmes, specifically designed to support industry and catering towards industry professionals who wish to pursue full-time or part-time study. The courses are generally block lectured, with time between lecture sessions allowing students to absorb the material and to work on assignments. The programmes are Nuclear Power, Radar and Electronic Defence, Space Technology and Telecommunications.

Departmental Statistics

Permanent and Long-Term Contract Staff

<table>
<thead>
<tr>
<th>Position</th>
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<tr>
<td>Professors</td>
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<td>Associate Professors</td>
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<td>Senior Scholars</td>
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<td>Technical Support Staff</td>
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Emeritus and Honorary Staff

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Students and Postdoctoral Fellows

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<td>Postdoctoral Fellows</td>
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<tr>
<td>Undergraduate</td>
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</table>

Research Fields and Staff

Head of Department

PROFESSOR EDWARD BOJE
Control Systems and Mechatronics
Professors

**PROFESSOR ALIREZA BAGHAI-WADJI**
Computational Electronics

**PROFESSOR MICHAEL INGGS**
Radar Remote Sensing; Synthetic Aperture Radar; Software Defined Radio; Parallel Computing

**PROFESSOR PETER MARTINEZ**
Space Science and Technology, Astrophysics, Space Policy and Space Law

**PROFESSOR PRAGASEN PILLAY**
Electrical Machines and Drives

Associate Professors

**ASSOCIATE PROFESSOR PAUL BARENSE**
Electrical Machines, Electric Drives and Condition Monitoring

**ASSOCIATE PROFESSOR MQHELE DLODLO**
Wireless Communication Systems, Software-defined Radio, Cognitive Radio, Video Streaming

**ASSOCIATE PROFESSOR KOMLA FOLLY**
Power System Stability and Control; Renewable Energy; Smart Grid; Computational Intelligence

**ASSOCIATE PROFESSOR RIANA GESCHKE**
Microwave and Millimeter-wave Engineering

**ASSOCIATE PROFESSOR AZEEM KHAN**
Electrical Machines, Electric Drives and Wind Energy Systems

**ASSOCIATE PROFESSOR FRED NICOLLS**
Image Processing, Signal Processing and Computer Vision

**ASSOCIATE PROFESSOR DANIEL O’HAGAN**
Multistatic, Bistatic, Commensal, Propagation and Antennas

**ASSOCIATE PROFESSOR ANDREW WILKINSON**
Signals and Image Processing; Radar; SAR Interferometry; Tomography, Bayesian Interference; Inverse Problems; RF Power Amplifiers

Senior Lecturers

**DR SUNETRA CHOWDHURY**
Renewable Energy Systems, Distributed Generation, Power System protection, Microgrids and Smartgrids

**DR OLABISI FALOWO**
Communication Networks

**MR SAMUEL GINSBERG**
Digital Systems

**DR MOIN HANIF**
Power Electronics Converters and Control, Photovoltaic Power Conditioning, Renewable Integration Issues

**DR AMIT MISHRA**
Radar Signal Processing and Machine Learning and Expert System

**DR ALEXANDRU MURGU**
Telecommunications, Networks, IP and Network Reliability

**MRS RENEE’ SMIT**
(Academic Development); Engineering Education, Philosophy of Engineering and Technology

Lecturers

**MRS KEHINDE AWODELE**
Power System Reliability, Demand Side Management, Distributed Generation, Renewable Energy and Smart Grids.

**MS JOYCE MWANGAMA**
Computer Networks, Network Applications, Future Internet Technologies

**DR DAVID OYEDOKUN**
Renewable Energy, Geomagnetically-induced Currents, Transformers and Power Systems Stability

**DR AMIR PATEL**
Bio-Inspired Robotics

**MR MOHOHLO TSOEU**
Systems, Measurements & Instrumentation, Robotics, Computational Intelligence and Industrial Automation

**MS ROBYN VERRINDER**
Robotics, Control and Instrumentation

**DR SIMON WINBERG**
High Performance Computing, FPGA systems, and Software Defined Radio

Emeritus Professors

**PROFESSOR MARTIN BRAINT**
Multivariable Control; Mineral Extraction Control Applications; Computer-based Education

**PROFESSOR GERHARD DE JAGER**
Image Processing; Machine Vision and Image Compression

**PROFESSOR BARRY DOWNING**
Microwave Systems and Circuits
Chapters in books


Articles in peer-reviewed journals


Peer-reviewed published conference proceedings


Baghai-Wadji, A.R. 2015. Exponential regularization of EM dyadic Green’s functions via Green’s function-


Gao, M. and Awodele, K.O. 2015. Investigation of power electronics solutions to power quality


Ogunleye, B.S. and Murgu, A. 2015. A novel model for WiMAX frequency spectrum virtualization and network federation. In R. Aguero et al. (eds), Proceedings of 6th International Conference,


Department of Mechanical Engineering

(Including the following recognized research groupings: Blast Impact and Survivability Research Unit (BISRU), the Centre for Materials Engineering (CME), the Centre for Research in Computational and Applied Mechanics (CERECAM) and the Energy Research Centre (ERC))

Research Report 2015

Head of Department: Professor Robert Knutsen

Departmental Profile

The Department of Mechanical Engineering hosts strong academic and technical expertise that underpins its thriving postgraduate activity and cutting edge research work. The Department is committed to creating intellectual capital, growing human expertise and contributing to industry through critical research and development. The programmes are led by a professional staff of experienced academics and practitioners, many of whom are recognised as world leaders in their fields. These programmes are geared to educate and train high calibre engineers for a professional career. A key objective of the Department is to be the centre of expertise in South Africa in its areas of research, to provide a link between industry and academia, and to provide postgraduate training in such a form that its graduates make a real contribution to South African industries and the global environment.

The Department offers a range of postgraduate programmes from Honours through to PhD level, designed to appeal to anyone who wishes to broaden their knowledge and develop research based skills for their future careers. There are options available for fully project-based qualifications and also for more structured Masters programmes (comprising coursework and a smaller research project component). Whichever option is pursued, students are carefully guided through their projects by experts in their chosen research area.

Some areas of research currently being explored include: bio-engineering; high performance machining and manufacturing process optimization; flight dynamics, formation flight and parafoil research; materials characterisation at very high strain rates; blast resistant structures; human body response to blast and impact events; metal alloy development and deformation processing; composite materials processing; computational solid, structural and particulate mechanics; computational fluid dynamics; 3-D aeroelastic modelling for transonic flight; free-surface modelling technology; parallel mesh generation for multi-physics applications; heat transfer; poverty alleviation, energy and developmental needs; power plant process modelling; materials behaviour in power plant; climate change mitigation; engineering management and systems theory; non-destructive evaluation of materials and structures; robotics; and engineering education research.

The Mechanical Engineering Department also hosts the DST/NRF SARChI chair in Industrial Computational Fluid Dynamics

Departmental Statistics

Permanent and Long-Term Contract Staff

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>Professors</td>
<td>6</td>
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<tr>
<td>Associate Professors</td>
<td>6</td>
</tr>
<tr>
<td>Senior Lecturers</td>
<td>11</td>
</tr>
<tr>
<td>Lecturers</td>
<td>2</td>
</tr>
<tr>
<td>Part-time Lecturers</td>
<td>1</td>
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<tr>
<td>Academic Development Lecturer</td>
<td>1</td>
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<tr>
<td>Teaching Assistants</td>
<td>9</td>
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<tr>
<td>Technical Support Staff</td>
<td>9</td>
</tr>
<tr>
<td>Administrative and Clerical Staff</td>
<td>4</td>
</tr>
<tr>
<td>Workshop Apprentices (Temporary)</td>
<td>2</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
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Emeritus, Honorary and Adjunct staff

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>Emeritus Professors</td>
<td>3</td>
</tr>
<tr>
<td>Adjunct Professors</td>
<td>2</td>
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<tr>
<td>Honorary Professors</td>
<td>1</td>
</tr>
<tr>
<td>Honorary Research Associates</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>7</strong></td>
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Students and Postdoctoral Fellows

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<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Postdoctoral Fellows</td>
<td>3</td>
</tr>
<tr>
<td>Doctoral</td>
<td>41</td>
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<tr>
<td>Masters</td>
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<tr>
<td>PG Diploma</td>
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<tr>
<td>Honours</td>
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<tr>
<td>Undergraduates</td>
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</tr>
<tr>
<td>Occasional – Non degree PG</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>793</strong></td>
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</table>

Research Fields and Staff

Permanent staff

**ASSOCIATE PROFESSOR TUNDE BELLO-OCHENDE**
Convective and numerical heat transfer; thermodynamic optimisation, renewable and complex energy system, constructal theory and design

**ASSOCIATE PROFESSOR BRANDON COLLIER-REED**
Director of the Centre for Research in Engineering Education (CREE); the sociocultural characterization of the student experience; social aspects of technology; technological literacy of adolescents; podcasting in engineering education

**DR STEEVE CHUNG KIM YUEN**
Senior Lecturer; BISRU; response to blast loading, structural dynamics, crashworthiness

**MR TREVOR CLOETE**
Senior Lecturer; BISRU, CERECAM; deformation and tearing of blast loaded metal plates; high strain rate plasticity; constitutive modeling

**MR DIRK FINDEIS**
Senior Lecturer; non-destructive testing; portable ESPI and shearography

**DR SARAH GEORGE**
Senior Lecturer; CME, physical metallurgy.

**DR REUBEN GOVENDER**
Senior Lecturer; BISRU; high strain rate material characterisation; composite materials; blast and impact loading of structures and materials

**MR ERNESTO ISMAIL**
Senior Lecturer; BISRU, CERECAM; meshless methods, nonlinear elasticity

**PROFESSOR DORA KARAGIOZOVA**
Honorary Professor; BISRU; analytical and computational analysis of dynamic systems

**ASSOCIATE PROFESSOR FRANZ-JOSEF KAHLEN**
Lean/advanced manufacturing; laser materials processing; laser diagnostics

**DR BRUCE KLOOT**
Academic Development Lecturer; sociology of education; higher education studies; foundation and extended curriculum programmes; student success and progression

**ASSOCIATE PROFESSOR RAMESH KUPPUSWAMY**
Advanced manufacturing; micro/nano systems

**PROFESSOR ROBERT KNUTSEN**
Head of Department; Director, Centre for Materials Engineering; physical metallurgy; thermo-mechanical processing; texture; microstructure; microscopy

**PROFESSOR GENEVIEVE LANGDON**
Director, BISRU; CREE; blast response of structures and materials; high strain rate behaviour; structural impact

**PROFESSOR ARNAUD MALAN**
Computational Fluid Dynamics

**ASSOCIATE PROFESSOR HENNIE MOUTON**
Lecturer; control systems and related fields modelling and research

**DR MALEBOGO NGOEPE**
Lecturer; computational biomechanics

**PROFESSOR GERALD NURICK**
BISRU; structural impact; crashworthiness; high strain rates; impact biomechanics

**MR SA-AADAT PARKER**
Senior Lecturer; Mechanics of composite materials

**PROFESSOR CHRIS REDELINGHUYSE**
Autonomously guided parafoils, airliners in formation flight

**PROFESSOR PIETER ROUSSEAU**
EPPEI Specialization Centre in Energy Efficiency; thermofluids process modelling; analysis, design and optimization of power plants and thermofluid systems.
DR CORRINNE SHAW
Senior Lecturer; Engineering Management; management and engineering education, systems theory and practice

DR GEORGE VICATOS
Senior Lecturer; heat transfer and refrigeration; combined absorption and compression refrigeration cycles; bioengineering prosthesis design

ASSOCIATE PROFESSOR CHRIS VON KLEMPERER
Composite materials; processing and modelling of composite materials and structures

Contract staff

MS TRACY BOOYSEN
Lecturer; Electro Mechanical engineering, robotics and agents

DR WIM FULS
Senior Lecturer; research specialisation in energy efficiency; power plant process flow modeling

DR ANDREW MCBRIDE
Senior Research Officer: CERECAM and Applied Mechanics; Nonlinear continuum mechanics; plasticity; finite element method; granular systems

Adjunct Professors

PROFESSOR ANDY YATES
Adjunct Professor, SASOL Advanced Fuels Lab, engines and fuels

PROFESSOR LOUIS JESTIN
Power Generation systems design and operation

Emeritus Professors

PROFESSOR KEVIN BENNETT
Energy Research Centre; energy research

PROFESSOR JASSON GRYZAGORIDIS
CERECAM; heat transfer and refrigeration; combined absorption and compression refrigeration cycles; optical techniques in non-destructive testing; holographic interferometry; ESPI; shearography; materials properties evaluation

PROFESSOR ROBERT TAIT
Centre for Materials Engineering; fracture mechanics; fatigue; assessment of residual stresses in structural components; applied non-destructive testing

Honorary Research Associates

DR GARETH FLOWE DAY
SASOL Advanced Fuels Lab

Contract Research Staff

DR KATYE ALTIERI
Senior Research Officer, Energy & Climate Change

MR MOGAMAT AHJUM
Junior Research Fellow; ERC; energy systems analysis, Modelling

DR BOTHWELL BATIDZIRAI
Senior Research Officer; ERC; Energy, Poverty & Development

MR MICHAEL BOU LLE
Assistant Research Officer; ERC; energy & Climate Change

MS ANYA BOYD
Assistant Research Officer, ERC; energy, environment and climate change

MS CAETANO TARA
Research Officer, ERC; energy systems analysis, modelling

DR DE GROOT JISKA
Senior Research Officer, ERC; Energy, Poverty & Development

MR GRAHAM GARISEB
Energy Efficiency Engineer, ERC

MR ANDREW HIBBERD
Energy Efficiency Engineer, ERC; measurement and verification

MS ALISON HUGHES
Senior Research Officer, ERC; energy efficiency; energy modelling

MRS SAMANTHA KEEN
Research Officer; ERC; energy & Climate Change

MR RICHARD LARMOUR
Research Officer, ERC; Measurement and verification

DR ANDREW MARQUARD
Senior Research Officer, ERC; energy and climate change team

MS BRENDA MARTIN
Research Officer, ERC

MR BRYCE MCCALL
Junior Research Fellow, ERC; Energy systems analysis, Modelling
MS MASCHA MOORLACH
Energy Efficiency Engineer, ERC; measurement and verification

DR AMOS MADHLOPA
Senior Research Officer; ERC; new & renewable energy technologies

MR BRUNO MERVEN
Research Assistant; ERC; energy systems analysis, modelling

MR ALFRED MOYO
Research Officer, ERC; energy & climate change group

DR GISELA PRASAD
Chief Research Officer, ERC; energy, poverty and development

DR BRITTA RENNKAMP
Research Officer, ERC; energy and climate change

MRS MAMAHLOKO SENATLA
Research Officer, energy systems analysis & planning

DR DEBBIE SPARKS
Senior Research Officer, ERC; energy and climate change

MR ALISTAIR STEWART
Senior Energy Efficiency Engineer, ERC

MR ADRIAN STONE
Senior Research Officer, ERC; energy systems analysis, modelling

MS LOUISE TAIT
Research Officer; ERC; Energy, Poverty & Development

DR MARTA TORRES GUNFAUS
Chief Research Officer, ERC; climate change

MR HILTON TROLLIP
Senior Research Officer; ERC; Energy & Climate Change

Postdoctoral Fellows

DR JULIEN GHIGHI
Materials engineering specialisation

DR EDMUND CHIKIOKE OKOROIGWE
ERC

RESEARCH OUTPUT

Authored books

Edited books

Chapters in books

Articles in peer-reviewed journals


Peer-reviewed published conference proceedings


