

# Faculty of ENGINEERING & THE BUILT ENVIRONMENT



The Faculty of Engineering & the Built Environment continues to strive towards research excellence, and to strengthen its international profile.

## Dean's Report

**D**uring 2012, the faculty has seen an increase in the number of NRF-rated researchers to 46. There has also been a marked increase in publications in peer-reviewed, accredited journals, and the publication count is up from 71.36 units in 2005 to 94.67 units in 2011. With this reputation, the faculty has become the faculty of choice for a growing number of prospective postgraduate students. The number of postgraduate students registered in the faculty in 2012 totaled 1 040. Contracts from industry have steadily increased in number over the past years. In 2011, the faculty signed 299 contracts to the value of R94.2 million and in 2012 a total of 296 contracts, valued at R136.6 million, were awarded to the faculty.

In 2012, the South African National Roads Agency Limited funded a chair in Transport Studies in the Department of Civil Engineering. Eskom established two chairs, the first in the field of Energy Efficiency, housed in the Department of Mechanical Engineering, and the second in Materials Science, hosted by the Centre of Materials Engineering. In addition, the faculty has two new DST/NRF SARCHI Chairs – the first in Reaction Engineering, in the Department of Chemical Engineering, and the other in Industrial Computational Fluid Dynamics, in the Department of Mechanical Engineering.

The faculty has appointed three senior research scholars to assist in the mentoring of younger staff, and also to contribute to the research agenda of the faculty. As part of the AW Mellon Foundation's Visiting and Retired Scholars Mentorship project, the African Centre for Cities hosted Professor Margo Huxley, a retiree from the University of Sheffield, in the UK. The faculty continues to create a supportive and enabling environment for research and innovation, and it is particularly encouraging to note that nine new staff members joined the Emerging Researcher Programme during 2012. The programme ensures the transfer of essential research skills from experienced researchers to those academics who are establishing a research career.

PROFESSOR  
FRANCIS PETERSEN

Dean of Engineering &  
the Built Environment

The faculty had 21 registered postdoctoral research fellows in 2012. Four postdoctoral fellowships are available annually through faculty funds, to increase the number of postdoctoral fellows in the faculty. We believe that the role of postdoctoral fellows is critical to the development of the next generation of research scholars.

## Departments

School of Architecture, Planning  
and Geomatics

Department of Chemical  
Engineering

Department of Civil Engineering

Department of Construction  
Economics and Management

Department of  
Electrical Engineering

Department of  
Mechanical Engineering



### Highlights from 2012

- The Centre for Materials Engineering had a Geeble 3 800 installed thanks to an NRF special equipment award. Valued at more than R10 million, the Geeble 3 800 will place the centre at the forefront of research into the performance of materials during manufacture, allowing researchers to investigate novel materials processing.
- Aurecon has committed R2 million over the next five years to support postgraduate students in the Department of Civil Engineering.
- Professor Mark Alexander, Dr Hans Beushausen, and Mike Otieno (PhD student) from the Department of Civil Engineering were awarded the Wason Medal for Materials Research from the American Concrete Institute.
- Associate Professor Harro Von Blottnitz's Environmental and Process Systems Research Group, in the Department of Chemical Engineering, was awarded a R2.5 million grant by the NRF to support research into the emerging biogas innovation sector in South Africa.
- Professor Alison Lewis from the Department of Chemical Engineering was named Distinguished Woman Scientist: Physical and Engineering Sciences at the Department of Science and Technology Distinguished Women in Science Awards.
- Joyce Mwangama, Gladwell Nganga, and Lombe Mutale received fellowships from the Department of Science and Technology for their doctoral and master's studies.
- The African Centre for Cities co-hosted a workshop with the Stockholm Resilience Centre, aimed at gathering an African perspective for inclusion in the United Nations Environment Programme Convention on Biological Diversity's Cities and Biodiversity Outlook.
- C\*Change, the DST/NRF Centre of Excellence in Catalysis, hosted the Syngas Convention in association with Sasol and PetroSA. This was a first-of-its-kind convention, dedicated to synthesis gas conversion and brought together some of the world's top scientists and industry experts to build valuable international collaborations.
- Neehal Mooruth and Dr Rob van Hille, from the Department of Chemical Engineering, received the Water Institute of South Africa's award for the most outstanding contribution to industrial water technology.

The years ahead will remain exciting and demanding ones for the faculty, progressing on a journey of providing quality research output that can make an impact internationally.

## DOCTORAL GRADUATIONS

### M.S. AHMAD (MECHANICAL ENGINEERING)

*Study of dynamic behaviour of multilayered structures subjected to blast loading*

Supervised by Professor G. Nurick

### O.S. AZEEZ (CHEMICAL ENGINEERING)

*Supply and target-based superstructure synthesis of heat and mass exchange networks*

Supervised by Associate Professor D. Fraser

### L.E.K. CHALEMBA (ELECTRICAL ENGINEERING)

*Topology-aware multicasting in phased mobile ad hoc networks for e-learning*

Supervised by Dr A. Murgu and Professor M.E. Dlodlo

### G. EVEZARD (MECHANICAL ENGINEERING)

*An innovative rapid compression machine in theory and practice*

Supervised by Professor A. Yates and Mr T. Cloete (International Labour Resource and Information Group)

### C. GERETTO (MECHANICAL ENGINEERING)

*The effects of different degrees of confinement on the deformation of square plates subjected to blast loading*

Supervised by Professor G. Nurick and Dr S.C. Kim Yuen

### Y. GHORBANI (CHEMICAL ENGINEERING)

*On the progression of leaching from large particles in heaps*

Supervised by Associate Professor J. Petersen, Dr M. Becker, Dr A. Mainza and Professor J.-P. Franzidis

### M. JOHNSTONE-ROBERTSON (CHEMICAL ENGINEERING)

*Influence of enzyme location and culture rheology on the optimisation of glucose oxidase production by *Aspergillus niger* NRRL-3 and *Penicillium* sp. CBS120262*

Supervised by Professor S.T.L. Harrison and Professor K.G. Clarke (Stellenbosch University)

### A. KOTSIPOULOS (CHEMICAL ENGINEERING)

*Development of an unsteady state model for the tank bioleaching of sulphide mineral concentrates in flow reactor systems*

Supervised by Dr R. Rawatlal and Emeritus Professor G. Hansford (deceased)

### C.V. MADELL (ARCHITECTURE AND PLANNING)

*Local economic development, business stimulation and poverty reduction in poor urban areas: the disjuncture between state policies and household survival strategies in*

*the case of Heideveld, Cape Town*

Supervised by Professor V. Watson

### J.T. MARKS (MECHANICAL ENGINEERING)

*Kolb interrupted: an investigation into students' experience of an experiential learning approach to entrepreneurship education*

Supervised by Associate Professor B. Collier-Reed and Professor J. Case

### R.P. MOGOROSI (CHEMICAL ENGINEERING)

*Metal support interactions on Fe-based Fischer-Tropsch catalysts*

Supervised by Professor E. van Steen

### M.M.Z.E. MOHAMMED (ELECTRICAL ENGINEERING)

*Automated signature generation for zero-day polymorphic worms using a double-honeynet*

Supervised by Professor H.A. Chan

### M.M.A. MUSLAM (ELECTRICAL ENGINEERING)

*Host mobility management with identifier-locator split protocols in hierarchical and flat networks*

Supervised by Professor H.A. Chan

### M.J. RAPSON (ELECTRICAL ENGINEERING)

*An extensible computational cochlear modelling framework*

Supervised by Professor J.C. Tapson and Ms R.A. Verrinder

### C. SHAW (MECHANICAL ENGINEERING)

*Learning systemic management practice*

Supervised by Associate Professor T. Ryan

### L.C. SMITH (CHEMICAL ENGINEERING)

*The effect of selected academic development programmes on the academic performance of academic development students at a South African university: An empirical analysis*

Supervised by Associate Professor J. Case, Professor D.M. Fraser, Associate Professor C. van Walbeek, and Dr V. Ranchhod

### A.F. UDEMANS (MECHANICAL ENGINEERING)

*Business Architecture Tool (BAT): Development and assessment of a systems framework to guide organisations from concept to delivery, in terms of creating deeper and meaningful integration across processes and functions*

Supervised by Associate Professor T. Ryan

### A.A. VAN DER BYL (ELECTRICAL ENGINEERING)

*A parallel processing framework for spectral based computations*

Supervised by Professor M. Inggs and Professor R. Wilkinson (Department of Electrical Engineering, Cape Peninsula University of Technology)



## PATENTS

### FILED APPLICATIONS

**BACON, T. AND MCNAUGHT, A.M.**

*Prosthesis with Underactuated Prosthetic Fingers.*  
PCT Patent Application PCT PCT/IB2012/056637

**TOMA, V.N.**

*Stabilised and Activated Metal Cluster Complex Based Catalysts and their Preparation.*  
PCT Patent Application PCT PCT/IB2012/056681

**BOONZAIR, J.A., HENDRICKS, M.R. AND VICATOS, G.**

*Transport Distraction Apparatus.*  
PCT Patent Application PCT PCT/IB2012/056664

**BRIJLAL, Y., JOHN, L.R. AND SIVARASU, S.**

*Hand Exoskeleton.*  
Provisional Patent Application South Africa 2012/08238

**BURTON, S.G., DAVIDS, L.M. AND ZWANE, E.N.**

*A Hydroxytyrosol Compound.* National Phase Patent Application China 201080052708.1

**BURTON, S.G., DAVIDS, L.M. AND ZWANE, E.N.**

*A Hydroxytyrosol Compound.* National Phase Patent Application Europe 10818478.9

**BURTON, S.G., DAVIDS, L.M. AND ZWANE, E.N.**

*A Hydroxytyrosol Compound.* National Phase Patent Application Japan 2012-530349

**BURTON, S.G., DAVIDS, L.M. AND ZWANE, E.N.**

*A Hydroxytyrosol Compound.* National Phase Patent Application South Africa 2012/02288

**BURTON, S.G., DAVIDS, L.M. AND ZWANE, E.N.**

*A Hydroxytyrosol Compound.* National Phase Patent Application United States 13/497,483

**CLAEYS, M.C.M.**

*Compression Seal Fitting for Tubes and Other Elongate Elements.* Provisional Patent Application South Africa 2012/04359

**CLAEYS, M.C.M. AND FISCHER, N.F.**

*Sample Presentation Device for Radiation-Based Analytical Equipment.* Continuation-in-Part Patent Application United States 13/659,082

**CLAEYS, M.C.M. AND FISCHER, N.F.**

*Sample Presentation Device for Radiation-Based Analytical Equipment.* PCT Patent Application PCT PCT/IB2012/053438

**GINSBERG, S.I.**

*Adjustable Picture Hanger.*  
Provisional Patent Application South Africa 2012/05031

GINSBERG, S.I., PARSONS, A.T. AND VICATOS, G.  
*An Endoprosthesis.* PCT Patent Application PCT PCT/  
 IB2012/053247

GOLOVINS, E.  
*A Method for Improving Channel Estimation Performance  
 in dynamic spectrum access multicarrier systems.* National  
 Phase Patent Application China 201080055508.1

GOLOVINS, E.  
*A Method for Improving Channel Estimation Performance  
 in dynamic spectrum access multicarrier systems.* National  
 Phase Patent Application South Africa 2012/03925

GOLOVINS, E.  
*A Method for Improving Channel Estimation Performance  
 in dynamic spectrum access multicarrier systems.*  
 National Phase Patent Application United States 13/514,346

LUSILAO-ZODI, G-A. AND MORRISON, N.  
*A System and Method for Estimating Round-Trip Time in  
 Telecommunication Networks.*  
 National Phase Patent Application Britain  
 GBxPCTIB2011/000393

LUSILAO-ZODI, G-A. AND MORRISON, N.  
*A System and Method for Estimating Round-Trip Time in  
 Telecommunication Networks.*  
 National Phase Patent Application China 201180010384.X

LUSILAO-ZODI, G-A. AND MORRISON, N.  
*A System and Method for Estimating Round-Trip Time in  
 Telecommunication Networks.*  
 National Phase Patent Application South Africa 2012/05903

LUSILAO-ZODI, G-A. AND MORRISON, N.  
*A System and Method for Estimating Round-Trip Time in  
 Telecommunication Networks.*  
 National Phase Patent Application United States 13/579,253

VICATOS, G.  
*Rotating Hinge Knee Prosthesis.*  
 Provisional Patent Application South Africa 2012/01641

## GRANTED APPLICATIONS

BRADSHAW, D.J. AND NEWELL, A.J.H.  
*Sulfidisation Process and Apparatus for Enhanced Recovery  
 of Oxidised and Surface Oxidised Base and Precious Metal  
 Minerals.*  
 National Phase Patent Application China 200780042453.9

BURTON, S.G., DAVIDS, L.M. AND ZWANE, E.N.  
*A Hydroxytyrosol Compound.*  
 National Phase Patent Application South Africa 2012/02288

RESEARCH CONTRACTS  
**296**

VALUE OF RESEARCH  
 CONTRACTS  
**R136.62 million**

NRF-RATED RESEARCHERS  
**46**

SARCHI RESEARCH CHAIRS  
**6**

ACCREDITED RESEARCH  
 GROUPINGS  
**13**

DOCTORAL GRADUATIONS  
**18**

DHET-ACCREDITED JOURNALS  
**94.67 units**

PEER-REVIEWED PUBLICATIONS  
**389**

FILED PATENTS  
**22**

GRANTED PATENTS  
**2**

POSTGRADUATE STUDENTS  
**1090**

POSTGRADUATE FUNDING  
**R29 million**

POSTDOCTORAL RESEARCH  
 FELLOWS  
**21**

POSTDOCTORAL RESEARCH  
 FUNDING  
**R3.3 million**

## School of Architecture, Planning & Geomatics

(Including the African Centre for Cities)

DIRECTOR: ASSOCIATE PROFESSOR ALTA STEENKAMP

### 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; modeling of the shape of the Earth (geoid) using gravity and satellite data, applications of GPS and modeling 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.

### African Centre for Cities

Known colloquially by the acronym 'ACC', the Centre 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.

'CityLabs', a new model of engaged and applied research, were created to address pressing concerns in Cape Town, including flooding, urban health, densification, ecology, and climate change. New Labs on violence, culture and human settlements have been launched. The ACC partners with international research units studying food security, and women's informal employment. Honours for ACC include its (renewed) status as a UCT 'Signature Theme' and a Rockefeller Innovation Award.

### School Statistics

#### Permanent and Long-term Contract Staff

Professors	5
Associate Professors	4
Senior Lecturers	8
Lecturers	8
Technical Support Staff	9
Administrative Staff	8
Total	42

#### Students

Doctoral	17
Master's	118
Honours	44
Undergraduates	347
Total	526

### Research Fields and Staff

#### DR MAHMOUD ABDEL-GELIL

Senior Lecturer: Geomatics. Gravity data analysis, GPS, Geodesy and geophysics.

#### 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.

#### ASSOCIATE PROFESSOR NICHOLAS COETZER

Architecture. Architectural design; contemporary architectural history and theory; digital technology.

#### 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.

**KEVIN FELLINGHAM**

Senior Lecturer: Architecture. Interdisciplinary research, practice and design.

**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.

**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.

**FADLY ISAACS**

Lecturer: Architecture. (Measuring) urban settlement quality, integrating strategic urban infrastructure investment.

**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.

**SIMONE LE GRANGE**

Lecturer: Architecture. Architectural design, Academic Development Lecturer.

**MIKE 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.

**LIANA MULLER**

Lecturer: Landscape Architecture. Heritage and management of cultural landscapes, heritage landscapes and representation, specifically focussing on people's connection with the environment and landscape as an anchoring point for memory and meaning.

**PROFESSOR JO NOERO  
ARCHITECTURE.****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.

**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. Geographer, principal research field of transportation and travel.

**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.

**DR GEORGE SITHOLE**

Senior Lecturer: Laser altimetry, photogrammetry, 3D object reconstruction.

**ASSOCIATE PROFESSOR JULIAN SMIT**

Geomatics. Application of remote sensing, photogrammetry and geographic information systems for land and environmental management.

**ASSOCIATE PROFESSOR ALTA STEENKAMP**

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

**PROFESSOR VANESSA WATSON**

Planning. Planning theory; governance; housing; urbanization; large city planning.

**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.

**Research Associates****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 modeling.

**EMERITUS ASSOCIATE PROFESSOR CHARLES MERRY**

Earth's gravity field; global positioning system; co-ordinate transformations.

**MR BARRIE GASSON**

Ecologically sustainable cities; regional planning and development.

**Contact Details**

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Telephone and Fax:

Architecture: Tel: SA (21) 650-2374 and

Fax: SA (21) 650-2383

Planning: Tel: SA (21) 650-2359 and Fax: SA (21) 689-9466

Geomatics: Tel: SA (21) 650-3577 and Fax: SA (21) 650-3572

Webpage: <http://www.apg.uct.ac.za>

**Research output****Edited books**

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

Hindes, C., Muller, L. and Stoffberg, H. (eds) 2012. *South African Landscape Architecture: A Reader*. 292pp. South Africa: UNISA Press. ISBN 9781868886623.

**Chapters in books**

Bruyns, G. and Low, I. 2012. Formal and informal realities of urban design, civic action and agency in the South African city. In G. Bruyns and A. Graafland (eds), *African Perspectives - [South] Africa. City, Society, Space, Literature and Architecture*, pp. 260-267. Rotterdam: 010 Publishers Rotterdam. ISBN 9789064507977.

Bruyns, G. and Low, I. 2012. Reappropriation. In G. Bruyns and A. Graafland (eds), *African Perspectives - [South] Africa. City, Society, Space, Literature and Architecture*, pp. 290-299. Rotterdam: 010 Publishers Rotterdam. ISBN 9789064507977.

Cartwright, A., Oelofse, G., Parnell, S. and Ward, S. 2012. Climate at the city scale: the Cape Town climate think tank. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp.1-8. Abingdon, Oxon: Routledge. ISBN 9780415 527583.

Cartwright, A., Parnell, S. and Oelofse, G. 2012. Emerging lessons from the climate change think tank. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 263-270. Abingdon, Oxon: Routledge. ISBN 9780415 527583.

Cartwright, A., Cohen, B. and Liddell, D. 2012. Supporting city-scale decisions in the context of climate change: the case of the City of Cape Town. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 202-222. Abingdon, Oxon: Routledge. ISBN 9780415 527583.

Cartwright, A. and Brundrit, G. 2012. Understanding the risks to Cape Town of inundation from the sea. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 21-37. Abingdon, Oxon: Routledge. ISBN 9780415 527583.



- Coetzer, N.R. 2012. Narrative Space: three post-apartheid museums reconsidered. In S. Macleod, L. Hourston Hanks and J. Hale (eds), *Museum Making Narratives, Architectures, Exhibitions*, pp. 63-73. UK, USA and Canada: Routledge (Taylor & Francis Group). ISBN 9780415676021.
- Hindes, C. and Roos, G. 2012. Introduction and retrospective overview. In H. Stoffberg, C. Hindes and L. Muller (eds), *South African Landscape Architecture*, pp. 1-16. South Africa: UNISA Press. ISBN 9781868886746.
- Hindes, C. and Roos, G. 2012. Priming for added value: how the application of the principles of landscape urbanism to the redevelopment of Culemborg 'adds value' to the designed landscape. In H. Stoffberg, C. Hindes and L. Muller (eds), *South African Landscape Architecture: A Reader*, pp. 221-232. South Africa: UNISA Press. ISBN 9781868886623.
- Hindes, C. 2012. Structuring Thinking: Plotting a Way for More Active Engagement with Theory in Landscape Architecture. In H. Stoffberg, C. Hindes and L. Muller (eds), *South African Landscape Architecture: A Reader*, pp. 179-194. South Africa: UNISA Press. ISBN 9781868886623.
- Jooste, M. and Lewis, Y. 2012. Opportunities and challenges in establishing a low-carbon zone in the Western Cape Province. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 99-121. Abingdon, Oxon: Routledge. ISBN 9780415527583.
- Lewis, Y. and Borchers, M. 2012. Energy Scenarios for Cape Town: exploring the implications of different energy futures for the city up to 2050. In A. Cartwright, S. Parnell, G. Oelofse and S. Ward (eds), *Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town*, pp. 73-98. Abingdon, Oxon: Routledge. ISBN 9780415527583.
- Low, I. 2012. A Visual Perspective: Tradition, Culture and Education of an African Architecture and Urbanism. In G. Bruyns and A. Graafland (eds), *African Perspectives - [South] Africa. City, Society, Space, Literature and Architecture*, pp. 158-163. Rotterdam: 010 Publishers Rotterdam. ISBN 9789064507977.
- Low, I. 2011. Design, build, research (DBR) - an insoluble problem? In L. Farber (eds), *On Making: Integrating Approaches to Practice-Led Research in Art and Design*, pp. 305-314. Johannesburg: Faculty of Art, Design and Architecture, University of Johannesburg. ISBN 9780620497381.
- Low, I. 2012. Housing. In C.G. Crysler, S. Cairns and H. Heynen (eds), *The SAGE Handbook of Architectural Theory*, pp. 711-724. London: SAGE Publications. ISBN 9781412946131.
- Low, I. 2011. Nostalgia for the specific southern Africa, local culture and global pressures. In *Atlas Architectures of the 21st Century Africa and Middle East*, pp. 14-81. Spain: Fundacion BBVA. ISBN 9788492937196.
- Low, I. and Bruyns, G. 2012. Pondering (South) African urban development. oppositions and correlations. In G. Bruyns and A. Graafland (eds), *African Perspectives - [South] Africa. City, Society, Space, Literature and Architecture*, pp. 270-289. Rotterdam: 010 Publishers Rotterdam. ISBN 9789064507977.
- Low, I. 2012. Signs from the Margins: design as instrument of empowerment in the 'new' South Africa. In G. Bruyns and A. Graafland (eds), *African Perspectives - [South] Africa. City, Society, Space, Literature and Architecture*, pp. 166-187. Rotterdam: 010 Publishers Rotterdam. ISBN 9789064507977.
- Muller, L. 2012. An ecological method and cultural landscapes. In H. Stoffberg, C. Hindes and L. Muller (eds), *South African Landscape Architecture*, pp. 95-154. South Africa: UNISA Press. ISBN 9781868886746.
- Muller, L. 2012. Celebration of the South African landscape. In H. Stoffberg, C. Hindes and L. Muller (eds), *South African Landscape Architecture*, pp. 155-275. South Africa: UNISA Press. ISBN 9781868886746.
- Muller, L. 2012. Establishing landscape architecture in South Africa. In H. Stoffberg, C. Hindes and L. Muller (eds), *South African Landscape Architecture*, pp. 17-37. South Africa: UNISA Press. ISBN 9781868886746.
- Muller, L. 2012. Excellence in design. In H. Stoffberg, C. Hindes and L. Muller (eds), *South African Landscape Architecture*, pp. 39-93. South Africa: UNISA Press. ISBN 9781868886746.
- Muller, L. 2012. Historic Schools as an intangible landscape: The role of oral histories in development. In H. Stoffberg, C. Hindes and L. Muller (eds), *South African Landscape Architecture: A Reader*, pp. 95-106. South Africa: UNISA Press. ISBN 9781868886623.
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- Pieterse, E.A. and Gurney, K. 2012. Cities, cultural policy and governance. In H. Anheier and Y.R. Isar (eds), *Cities, Cultural Policy and Governance*, pp. 194-203. 5th edition. UK: Sage Publications Ltd. ISBN 9781446201220.
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## Peer-reviewed published conference proceedings

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Ikokou, G. and Sithole, G. 2012. Multi-scale contextual classification of urban scenes from high resolution imagery. *Proceedings of GISSA Ukubuzana 2012. An African Dialogue: Geomatics for Infrastructure Development and Service Delivery*, 2 October, Kempton Park, Gauteng. South Africa: EE Publishers (Pty) Ltd. ISBN 9780620529136.

Letoao, N. and Smit, J.L. 2012. The use of GIS to evaluate the impact of the built environment on health in Cape Town: the case study of Philippi, "Brown's Farm". *Proceedings of GISSA Ukubuzana 2012. An African Dialogue: Geomatics for Infrastructure Development and Service Delivery*, 2 October, Kempton Park, Gauteng. South Africa: EE Publishers (Pty) Ltd. ISBN 9780620529136.

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Todeschini, F., Dewar, D. and Brander, A. 2012. Place, urban design and poverty: lessons from a comparison of Cape Town and Ahmedabad. *Proceedings of 1st International Conference on Architecture and Urban Design (1-ICAUD)*, 19-21 April 2012, Tirana. Albania: Epoka University Press. ISBN 9789928135018.

## Artistic works

Low, I. 2012. Digest of South African Architecture 2011.

## Master's degrees (by research)

Du Plessis, K. 2012. Promoting inclusionary regeneration processes and outcomes in Woodstock, Cape Town: local actors and agencies solutions to countering market-led gentrification in their neighbourhood. Master of City and Regional Planning. 179pp. Supervised by Winkler, T.

Bosworth, R. 2012. Ruimsig informal settlement: spatial dialectics and upgrade planning. Master of City and Regional Planning. 101pp. Supervised by Winkler, T.

# Department of Chemical Engineering

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

HEAD OF DEPARTMENT: PROFESSOR ALISON E LEWIS

## 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. The undergraduate programme is accredited by the Engineering Council of South Africa, whilst the undergraduate and postgraduate programmes both have national and international recognition for their high quality graduates.

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.

The research programme is focussed around five University-accredited research groupings in Bioprocessing, Catalysis, Crystallization & Precipitation, Engineering Education and Minerals Processing. The department also has strong research interests in Environmental Process Engineering and Process Modelling. The Chemical Engineering Department also hosts the DST-NRF Centre of Excellence in Catalysis, the DST Hydrogen Catalysis Centre of Competence, 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.

## Noteworthy research-related achievements in 2012

Dr Dyllon Randall, from the Crystallization and Precipitation Research Unit in the Department of Chemical Engineering, was one of three South African scientists to receive the renowned "Green Talents" sustainability prize in a competition organised by the German Federal Ministry of Education and Research in Berlin.

A first-of-its-kind convention dedicated to synthesis gas conversion - one of the key industrial technologies underpinning the South African economy - took place in Cape Town in April. The event was hosted by c\*change, the Department of Science and Technology and the National Research Foundation's Centre of Excellence in Catalysis at UCT, in association with Sasol, PetroSA and other sponsors.

Professor Alison Lewis was awarded the Department of Science and Technology's Distinguished Women Scientist Award in the 2012 South African Women in Science Awards.

Dr Adeniyi Isafiade received NRF Y2 rating.

Chemical Engineering had its highest-ever number of graduating students in 2012 – 99, 25 more than in 2011, and 43 more than in 2010.

## Departmental Statistics

Professors	9
Professor (contract)	1
Associate Professors	2
Senior Lecturers	5
Lecturer	1
Lecturers - Contract	1
Research Staff (permanent)	12
Research Staff (contract)	7
Technical & Scientific Staff (permanent & Long-term Contract)	24

Technical & Support Staff (contract)	15
Administrative and Clerical Staff (permanent)	20
Administrative and Clerical Staff (contract)	7
Total	104

## Honorary Staff

Honorary Professor	1
Honorary Adjunct Professors	2
Total	3

## Students

Doctoral	54
Master's	111
BSc(Eng)	508
Total	673

## Research Fields and Staff

### Permanent Academic Staff

#### MR PAUL BEPSWA

Centre for Minerals Research - Heuristic-based methods for precision accounting of material flows in mineral processing systems

#### DR MEGAN BECKER

Centre for Minerals Research, Process Mineralogy: using mineralogy to understand and predict the effect of mineralogy on minerals beneficiation (liberation, separation and disposal of valuable minerals from gangue).

#### MR WALTER BÖHRINGER

Centre for Catalysis Research - Acid catalysis.

#### 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

Centre for Research in Engineering Education – Student experience of learning in science and engineering, gold catalysis.

#### PROFESSOR MICHAEL CLAEYS

Centre for Catalysis Research – Director DST/NRF Centre of Excellence in Catalysis (c\*change), Fischer Tropsch synthesis, in-situ catalyst characterization, nano-materials.

#### DR KIRSTEN CORIN

Centre for Minerals Research - Mineral Processing, Flotation Chemistry: chemical interactions between reagents and minerals.

#### PROFESSOR DAVE DEGLON

Centre for Minerals Research and Anglo Chair - modelling of mechanical mineral flotation cells, computational fluid dynamics, hydrodynamics, gas dispersion, solids suspension.

#### HONORARY PROFESSOR MARK DRY

Centre for Catalysis Research - Fischer Tropsch (FT) catalytic processes, production of synthesis gas.

#### DR CARYN FENNER

Centre for Bioprocess Engineering Research - Production of fine chemicals and commodity bioproducts through combining research into process kinetics, product optimisation and induction. Production of affordable, modern biopharmaceuticals and chemicals; production of industrial enzymes with commercial applications; and the development and optimisation of bio-analytical procedures.

#### DR BELINDA MCFADZEAN

Centre for Minerals Research - Mineral processing: Flotation reagents such as collectors, frothers and depressants.

#### PROFESSOR 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.

#### PROFESSOR JEAN-PAUL FRANZIDIS

SA Research Chair in Minerals Beneficiation, Director: Minerals to Metals Signature Theme - Integrating and expanding capacity in minerals beneficiation research.

#### MR MARTIN HARRIS

Centre for Minerals Research – flotation, modelling, simulation

#### PROFESSOR SUE HARRISON

SA Research Chair in Bioprocess Engineering, Deputy Dean Research EBE, Director of the Centre for Bioprocess Engineering Research – Interaction of micro-organisms with the biochemical, thermal and hydrodynamic environment. Microbial community dynamics in planktonic and sessile environments. Biokinetics and metabolic modelling of the biomass and bioproduct components, applied to alkane biotechnology, human

health products, mineral bioleaching through heap and tank processes, AMD prevention and remediation, algal bioprocesses for bioenergy and fine chemicals. Bioprocesses for sustainable process engineering.

#### MR HILTON HEYDENRYCH

Senior Lecturer - 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.

#### MR NABEEL HUSSAIN

Centre for Catalysis Research - Design and development of catalytic components and devices for low temperature fuel cells

#### DR ADENIYI ISAFIADE

Environmental and Process Systems Engineering – Process design and optimization.

#### DR PIETER LEVECQUE

Centre for Catalysis Research - Electrocatalysts for fuel cells and high throughput catalyst preparation

#### PROFESSOR ALISON LEWIS

Director of the Crystallization & Precipitation Research Unit – Industrial precipitation and crystallization, product and particle analysis; process control for optimised product quality; crystallization process development; aqueous chemistry modelling of speciation, thermodynamic equilibria, hydrodynamic and population balance modelling of precipitation systems; water treatment through crystallization, eutectic freeze crystallization .

#### MR NIELS LÜCHTERS

Centre for Catalysis Research - high throughput experimentation, parallel preparation of heterogeneous catalysts, high throughput methodology for fuel processing research.

#### DR AUBREY MAINZA

Centre for Minerals Research – Comminution and classification, positron emission particle tracking, discrete element method, computational fluid dynamics.

#### MS RETHABILE MELAMU

Environmental & Process Systems Engineering Group - waste-to-energy, specifically using a framework of waste-to-energy projects on the ground.

#### PROFESSOR KLAUS MÖLLER

Process Modelling and Optimisation Group – multiphase

reactor modelling, separator modelling, integrated reaction – separation systems modelling, parameter estimation, modular process and flowsheet feasibility and optimisation. Centre for Catalysis Research – wax hydrocracking modelling, FT process modelling.

#### PROFESSOR CYRIL O'CONNOR

Director of the Centre for Minerals Research Flotation, reagent evaluation, cell design.

#### DR JOCHEN PETERSEN

Centre for Bioprocess Engineering Research – Hydrometallurgy, especially heap (bio) leaching of low grade minerals, heap reactor characterisation and modelling, bio-leaching processes.

#### DR DYLLON RANDALL

Crystallization and Precipitation Research Unit

#### DR RANDHIR RAWATLAL

Reactor Engineering with focus on modelling and simulation, mass transfer modelling in the activation of alkanes, multiphase flow, population balances and applications of segregation and compartment models in flow reactors for minerals bio-leaching and polymerization

#### DR MARCOS RODRIGUEZ PASCUAL

Crystallization and Precipitation Research Unit - Design and implementation of reactors for crystallization and precipitation processes applying thermo - fluid dynamics and non-intrusive optical techniques

#### MRS JEANNETTE SWEET

Centre for Minerals Research - Comminution and flotation

#### MRS RENE TOERIEN

Engineering Education - Chemical Engineering Schools Project: Resource material development for secondary school science teachers; science education research; schools liaison.

#### 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 JACOBUS VAN DER MERWE

Engineering Education

#### MR ANDRIES VAN DER WESTHUIZEN

Centre for Minerals Research Comminution as used on mineral processing operations for the liberation of valuables. Applied process optimisation through plant

campaigns, mass balancing, model fitting, and simulations.  
Fine grinding through stirred milling.

#### DR ROB VAN HILLE

Centre for Bioprocess Engineering Research – Mineral biotechnology, algal biotechnology, microbial ecology, carbon cycling, sulphide chemistry and bioremediation.

#### ASSOCIATE PROFESSOR HARRO VON BLOTTNITZ

Environmental and Process Systems Engineering – Industrial ecology especially Life Cycle Assessment, waste management and bioenergy, for sustainable development.

#### DR MARK WILLIAMSON

Development and characterisation of novel sensors for use in combustion processes, computational fluid dynamic modelling of combustion systems and optimisation of heat transfer in ovens, furnaces and driers.

#### MRS JENNIFER WIESE

Centre for Minerals Research - Flotation chemistry

### Honorary Staff

#### HONORARY PROFESSOR DEE BRADSHAW

Centre for Minerals Research – Process mineralogy, froth flotation including machine vision systems and chemical interactions.

#### HONORARY ADJUNCT PROFESSOR ALEXANDER STEWART LAMBERT

#### HONORARY ADJUNCT PROFESSOR DAVID WILLIAM WRIGHT

### Postdoctoral Fellows

#### DR ABOYADE AKINWALE

LCA of syngas from co-gasification

#### DR MAYELI ALVAREZ-SILVA

An investigation into the role of the froth phase in the flotation of UG2 ore using a laboratory column flotation cell

#### DR OLUWATOSIN AZEEZ

Synthesis of heat exchanger networks involving multiple utilities

#### DR THERESA FELTES

Preparation and characterization of nano-materials for Fischer-Tropsch synthesis

#### DR MELINDA GRIFFITHS

Large scale production of spirulina

#### DR ROBERT HENKEL

Two-dimensional gas chromatography GCxGC-TOF, Magnometer

#### DR RENE LARYEA-GOLDSMITH

Thermal conversion of biomass

#### DR PETER MALATJI

Development of bimetallic precious metal catalysts for steam reforming of methane

#### DR RAMOSHIBIDU MOGOROSI

Metal solutions indicators

#### DR RUSHANAH MOHAMED

Membrane electrode assembly development for PEM fuel cell application

#### DR QILING NAIDOO

Synthesis core-shell platinum group metal electrocatalysts by different approaches

#### DR SUZANA ANNA SAWI

Biological oxidation of alkanes for maximising use of this resource

#### DR ANGELA STOTT

Developing interactive quizzes for improving conceptual learning in science education.

### International Visitors

#### Centre for Catalysis Research

Professor Hans Niemantsverdriet - Eindhoven University of Technology, Netherlands

Professor Guenther G. Scherer - Paul Scherrer Institut, Switzerland

Professor Calvin H Bartholomew - Brigham Young University, USA

Dr Hanene Zazoua - Technical and Scientific Research Centre of Physico-Chemical Analysis, Algeria

Dr Lerari Djahida - Technical and Scientific Research Centre of Physico-Chemical Analysis, Algeria

Dr Sanjiv Malhotra (CEO) - Oorja Protonics, USA

Professor Thomas Schmidt - ETH Zurich and Paul Scherrer Institut, Switzerland

Professor Hubert Gasteiger - Technical University Munich, Germany

Professor Graham Hutchings - Cardiff University, United Kingdom

Dr Andrew York - Cambridge University, United Kingdom

Gessie Brisard - Sherbrooke University, Canada

Professor Hubert A. Gasteiger - Technische Universität, Germany

Dr Amira Abou-Hamdan - Chemspeed Technologies AG, Switzerland

Mr Bill Massengill - Micromeritics, USA

Dr Sebastian Storck - Germany

Cordelia Gloor - Paul Scherrer Institut, Switzerland

Dr Bachari Khaldoun - Research Centre in Analytical Chemistry and Physics, Algeria

## Centre for Minerals Research

Mr Okay Altun - Hacettepe University, Turkey

Mr Denise Altun - Hacettepe University, Turkey

Mr Gauti Asbjörnsson - Chalmers University of Technology, Sweden

Professor Sun Chuanyao - BGRIMM, China

Mr Benoit Claremont - Magotteaux, Belgium

Mrs Ashleigh Collins - JKMR University of Queensland, Australia

Mr Benard de Haas - Magotteaux, Belgium

Dr Hakan Dundar - Hacettepe University, Turkey

Professor Magnus Evertsson - Chalmers University of Technology, Sweden

Professor He Fayu - BGRIMM, China

Dr Malko Hilden - JKMR University of Queensland, Australia

Dr Erik Hulthén - Chalmers University of Technology, Sweden

Mr Paul Kay - JKMR University of Queensland, Australia

Professor Han Long - BGRIMM, China

Mr Rodrigo M de Carvalho - Federal University of Rio de Janeiro, Brazil

Dr Narasimha Mangadoddy - Indian Institute of Technology, India

Professor Wei Mingan - BGRIMM, China

A/Professor Bertil Pålsson - Lulea Technical University, Sweden

Mr Johannes Quist - Chalmers University of Technology, Sweden

Dr Sepehr Sadrai - JKMR University of Queensland, Australia

Dr Ray Shaw - Australia

Mr Luo Sigang - BGRIMM, China

Professor Stephen Simukanga - University of Zambia, Zambia

Professor Marcelo Tavares - Federal University of Rio de Janeiro, Brazil

Dr Grant Valentine - JKMR University of Queensland, Australia

Mr Yan Wenfa - BGRIMM, China

Dr Weiguoxie - JKMR University of Queensland, Australia

## Centre for Bioprocess Engineering Research

Professor Jill Banfield - University of California, USA

Professor Chris Howe - Cambridge University, UK

Professor John Villadsen - Danish University of Technology, Denmark

Dr Chris Bryan - University of Exeter, UK

Dr Peter Neubauer - Technical University of Berlin, Germany

Dr Dave Dew - Billiton, UK

## Crystallization and Precipitation Research Unit

Professor Patrice Nortier - Grenoble INP, France

Mr Jim Wrubel - Newco, USA

Rudy Maliepaard - Mettler Toledo, Switzerland

Juan-Carlos Mani, Process Systems Enterprise Limited, UK

## Engineering Education

Professor Vidar Gynnild - Norwegian University of Science and Technology, Norway

Anna Danielson - Cambridge University, UK

## Minerals to Metals Initiative (MtM)

Professor Don McKee - Retired, University of Queensland, Australia

Professor MJ Nicol - Murdoch University, Australia

Professor JD Miller - University of Utah, USA

### Resignation

Dr Sanet Minnaar, Senior Lecturer 31<sup>st</sup> October 2012

### Retirement

Mr Bill Randall, Principal Scientific Officer 31<sup>st</sup> December 2012

### Appointments

Mr Hilton Heydenrych, Senior Lecturer 1<sup>st</sup> January 2012

Dr Mark Williamson, Senior Lecturer 1<sup>st</sup> January 2012

Mrs Zulfa Le Riche, Senior Scientific Officer 1<sup>st</sup> September 2012

## Contact Details

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## Research Output

### Chapters in books

Favish, J., Ross, D.A., Inggs, S.C., Kathard, H., Clarkson, C.P., Case, J.M., Collier-Reed, B.I. and Reid, S. 2012. Reflections on developing distinctive University of Cape Town graduate attributes. In M. Coetzee et al. (eds), *Developing Student Graduateness and Employability*, pp. 207-225. Randburg: Knowres Publishing. ISBN 9781869221898.

### Articles in Peer-reviewed Journals

Ahmadi, A., Ranjbar, M., Schaffie, M. and Petersen, J. 2012. Kinetic modeling of bioleaching of copper sulfide concentrates in conventional and electrochemically controlled systems. *Hydrometallurgy*, 127-128: 16-23.

Azeez, O., Isafiade, A.J. and Fraser, D. 2012. Supply and target based superstructure synthesis of heat and mass exchanger networks. *Chemical Engineering Research & Design*, 90: 266-287.

Brent, G.F., Allen, D.J., Eichler, B., Petrie, J.G., Mann, J.P. and Haynes, B. 2012. Mineral carbonation as the core of an industrial symbiosis for energy-intensive minerals conversion. *Journal of Industrial Ecology*, 16(1): 94-104.

Bryan, C., Davis-Belmar, C.S., Van Wyk, N., Fraser, M., Dew, D.W., Rautenbach, G.F. and Harrison, S.T.L. 2012. The effect of CO<sub>2</sub> availability on the growth, iron oxidation and CO<sub>2</sub> fixation rates of pure cultures of *Leptospirillum ferriphilum* and *Acidithiobacillus ferrooxidans*. *Biotechnology and Bioengineering*, 109(7): 1693-1703.

Chiume, R., Minnaar, S.H., Ngoma, I.E., Bryan, C. and Harrison, S.T.L. 2012. Microbial colonisation in heaps for mineral bioleaching and the influence of irrigation rate. *Minerals Engineering*, 30: 156-164.

Coetzee, W., Coetzer, R.L.J. and Rawatlal, R. 2012. Response surface strategies in constructing statistical bubble flow models for the development of a novel bubble column simulation approach. *Computers & Chemical Engineering*, 36(1): 22-34.

Coetzee, W., Coetzer, R.L.J. and Rawatlal, R. 2012. Semianalytical bubble-flow models for the development of a novel bubble-column simulator. *Industrial & Engineering Chemistry Research*, 51: 7398-7409.

Cole, K.E., Buffler, A., van der Meulen, N.P., Cilliers, J.J., Franzidis, J.-P., Govender, I., Liu, C. and van Heerden, M.R. 2012. Positron emission particle tracking measurements with 50 micron tracers. *Chemical Engineering Science*, 75: 235-242.

Corin, K.C., Bezuidenhout, J. and O'Connor, C.T. 2012. The role of dithiophosphate as a co-collector in the flotation of platinum group mineral ore. *Minerals Engineering*, 36-38: 100-104.

Dey, S. and Pani, S. 2012. Effective processing of low-volatile medium coking coal fines of Indian origin using different process variables of flotation. *International Journal of Coal Preparation and Utilization*, 32: 253-264.

Dey, S., Parolis, L.A.S. and Yorath, G.A. 2012. Quantification of sulphhydryl collector-mixture used in sulphide ore flotation. *Transactions of the Indian Institute of Metals*, 65(4): 387-392.

Durant, B., Farber, B.Y., Rule, C. and Mainza, A.N. 2012. Ceramic media selection for optimization of energy efficiency in IsaMills™. *Chemical Engineering & Technology*, 35(11): 1949-1953.

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## Department of Civil Engineering

HEAD OF DEPARTMENT: ASSOCIATE PROFESSOR NEIL ARMITAGE

### Departmental Profile

The Department of Civil Engineering currently has an establishment of 15 permanent full-time academic positions and 3 Research Officers, supported by a dedicated complement of 13 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 425 undergraduate students and 210 postgraduates – giving a total of 635 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

Professors	4
Associate Professors	7
Senior Lecturers	3
Lecturers	1
Research Officers	3
Technical Support Staff	6
Administrative Support Staff	7
TOTAL	31

### Emeritus and Honorary Staff

Emeritus Associate Professors	4
Honorary Research Associates	3
TOTAL	7

### Students

Doctoral	22
Master's	188
Undergraduate	425
TOTAL	635

## 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.

#### ASSOCIATE 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

Activity-based travel analysis; local movement network configuration and management; non-motorised transportation; policy analysis in the fields of urban passenger transport; land use-transport interaction.

#### 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.

#### MR MICHAEL CHAMPANIS

iCOMMS: Information for Community Oriented Municipal Services. Role of ICTs in water service delivery and management.

#### MS FARIIDAH CHEBET

Geotechnical engineering

#### PROFESSOR GEORGE EKAMA

Chemical and biological wastewater treatment; physical and biological process modelling.

#### DR DENIS KALUMBA

Geotechnical engineering: Ground Improvement, Waste Minimisation, Foundations/Soils Interaction, Electrokinetics, Geosynthetics, and Soil Remediation

#### PROFESSOR PILATE MOYO

Structural health monitoring and testing.

#### ASSOCIATE PROFESSOR ULRIKE RIVETT

iCOMMS: Information for Community Oriented Municipal Services. Role of ICTs in water service delivery and management.

#### MR 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

#### ASSOCIATE PROFESSOR KOBUS VAN ZYL

Hydraulics; urban water management; water demand analysis; distribution networks.

#### 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.

## Honorary Research Associates

### MS LISA KANE

Transportation engineering and planning.

### PROFESSOR MANU SANTHANAM

Concrete materials and technology; concrete diagnosis, service life design

### MR VERNON COLLIS

Integrated structural design; sustainability solutions; concrete repair and rehabilitation

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## Research output

### Chapters in books

Vanderschuren, M.J.W.A. 2012. Non-motorised transport in Africa. In R. Williams (ed.), *The Sustainable Transport & Mobility Handbook - Volume 3 - The Essential Guide*: pp. 3-73. South Africa: alive2green. ISBN 9780620450652.

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Githachuri, K., Alexander, M.G. and Moyo, P. 2012. Durability performance of a range of marine concretes and the applicability of the South African service life prediction model. *Materials and Structures*, 45(1-2): 185-198.

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Malumbela, G., Moyo, P. and Alexander, M.G. 2012. Longitudinal strains and stiffness of RC beams under load as measures of corrosion levels. *Engineering Structures*, 35: 215-227.

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- Muchaka, P. and Behrens, R. 2012. Evaluation of a 'walking bus' demonstration project in Cape Town: qualitative findings, implications and recommendations. Proceedings of 31st Southern African Transport Conference (SATC 2012), 9-12 July 2012, Pretoria, South Africa. Pretoria, South Africa: Document Transformation Technologies cc. ISBN 9781920017538.
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## Department of Construction Economics and Management

HEAD OF DEPARTMENT: PROFESSOR KEITH CATTEL

### 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, procurement, entrepreneurship, and teaching and learning.

Strong research links exist with academic institutions in the United Kingdom, Australia, United States of America, Central and East Africa, and India, as well as with institutions within South Africa.

During 2012, papers were presented at key international conferences in Durban, Port Elizabeth, Cape Town, Abuja, Edinburgh, Sydney, Elmina, and Montreal. 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.

Nationally, the Department continues its engagement with local and international organisations. These include:

- The Association of South African Quantity Surveyors on the Standard System and Chapter Committees,
- The South African Council for the Quantity Surveying Profession as Council Members and on the Education Standards and Research Sub-Committee,
- The Royal Institution of Chartered Surveyors on the World Regional Board, the Education Standards Board and on the EMEA Region Education Standards Board,
- The South African Facilities Management Association,
- The South African Property Owners Association, and,
- The Construction Industry Development Board.

Research endeavours by individual staff have been good in terms of higher degree graduates, attracting research funding, and producing research outputs. The staff received research funding from a variety of sources in 2012, namely: the University Research Committee, the National Research Foundation (NRF), and the Construction Industry Development Board. In addition, the department boasts a "B2" NRF-rated researcher.

## Departmental Statistics

### Permanent and Long-term Contract Staff

Professors	2
Associate Professors	2
Senior Lecturers	9
Lecturer	1
Administrative and Clerical Staff	5
Departmental Assistant	1
TOTAL	20

### Students

Doctoral	6
Master's	91
Postgraduate Diploma	23
Honours	61
Undergraduate	425
TOTAL	606

## Research Fields and Staff

### Permanent Staff

#### PROFESSOR K.S. 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 P.A. BOWEN

Value management; project procurement; project briefing as an interpersonal communication process; the sustainability assessment of buildings; the impact of HIV/AIDS on the South African construction industry; corruption in the construction industry; and stress management for built environment professionals.

#### ASSOCIATE PROFESSOR K.A. MICHELL

Facilities management as a social and community enterprise in low-income areas of cities; urban facilities management; work space planning and management in buildings; learning spaces.

#### 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.

#### MRS E. EDWARDES

Senior Lecturer: Education in construction studies; enhancement of skills required for construction studies.

#### MRS K. EVANS

Senior Lecturer: Work with the African Centre for Cities Research Laboratory; innovative financing of medium to low-income housing from the perspective of end-users; working capital, bridging finance and wholesale finance.

#### 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 – 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; green buildings; service learning and application in construction education; social responsibility and construction education.

#### MR J. MARKS

Senior Lecturer: Entrepreneurial thinking; skills migration, learning spaces; experiential learning; integrated learning.

#### MR M. MASSYN

Senior Lecturer: Skills and competencies of SME's within the construction industry; procurement systems using in housing delivery with particular emphasis on the PHP delivery system.

#### 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 process; property valuation theory and practice; epistemology and methodology in property market research.

#### DR A. WINDAPO

Senior Lecturer: Contractor performance and development studies; housing procurement and development studies; risk and quality management processes on construction projects and health, safety and environmental issues.

**DR E. HURST**

Academic Development Lecturer: Academic literacies; student-centred learning and assessment; identity and agency; the sociolinguistic study of the links between language, style and identity.

**Contact Details**

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**Research output****Chapters in books**

Michell, K.A. 2012. FM as a social enterprise. In K. Alexander and I. Price (eds), *Managing Organizational Ecologies - Space, Management and Organization*, pp.167-177. New York. NY: Routledge (Taylor & Francis Group). ISBN 9780415896993.

**Articles in Peer-reviewed Journals**

Bowen, P.A., Edwards, P. and Cattell, K.S. 2012. Corruption in the South African construction industry: a thematic of verbatim comments from survey participants. *Construction Management and Economics*, October 30: 885-901.

English, P.J. and Le Jeune, K. 2012. Do professional women and tradeswomen in the South African construction industry share common employment barriers despite progressive government legislation? *Journal of Professional Issues in Engineering Education and Practice*, 138(2): 145-152.

English, P.J. and Bowen, P.A. 2012. Overcoming potential risks to females employed in the South African construction industry. *The International Journal of Construction Management*, 12(1): 37-49.

Mooya, M.M. and Cloete, C.E. 2012. Governance structures for real estate transactions: markets, networks and hierarchies in Windhoek's urban low-income settlements. *Acta Structilia*, 19(2): 46-73.

Vilasini, N., Neitzert, T., Rotimi, J. and Windapo, A.O. 2012. A framework for subcontractor integration in alliance contracts. *International Journal of Construction Supply Chain Management*, 2(1): 54.

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**Peer-reviewed published conference proceedings**

Bowen, P.A., Edwards, P. and Cattell, K.S. 2012. Corruption in the South African construction industry: a mixed methods study. In S. Smith (ed.), *Proceedings of the Twenty-Eight Annual Conference of the Association of Researchers in Construction Management (ARCOM 2012)*, 3-5 September 2012, Edinburgh. Reading, UK: ARCOM. ISBN 9780955239069.

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Docherty, M.J., Gabaraane, T. and Mabusela, N.O. 2012. The township caterer's project: experiences from the student chapter of Engineers without Borders. In N. Beute (ed.), *Proceedings of the 20th Conference on the Domestic Use of Energy 2012 (DUE 2012)*, 3-4 April 2012, Cape Town. Cape Town, South Africa: CPUT. 9780981431178.

Ellmann, A.-M. and Allen, S. 2012. Contextualising the evaluation of the sustainability of low cost housing. In K. Michell, P. Bowen and K. Cattell (eds), *Proceedings of the Joint CIB W070, W092 & TG72 International Conference on Facilities Management, Procurement Systems and Public Private Partnership - Delivering Value to the Community*, 23-25 January 2012, Cape Town, SA. Cape Town: Department of Construction Economics and Management, University of Cape Town. ISBN 9780620507592.

Olatunji, A., Windapo, A.O. and Nureni, F. 2012. Examining the effect of quality management practices used on construction project performance. In S. Laryea, S.A. Agyepong, R. Leiringer and W. Hughes (eds), *Proceedings of the West Africa Built Environment Research (WABER) Conference 2012*, 24-26 July 2012, Abuja, Nigeria. Reading, UK: West African Built Environment Research (WABER) Conference. ISBN 9780956606013.

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Verster (eds), Proceedings of 8th ICEC World Congress "Quest for Quality: Professionalism in Practice" (ICEC 2012), 23-27 June 2012, Durban, SA. Durban: ASAQS. ISBN 9780868868080.

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Samarasinghe, D.A.S., Tookey, J.E., Rotimi, J., Windapo, A.O. and Thiruchelvam, S. 2012. Examining construction materials purchasing practices. In I. Kamardeen, S. Newton, B. Lim and M. Loosemore (eds), Proceedings of 37th AUBEA (Australasian Universities Building Educators Association) International Conference, 4-6 July 2012, Sydney, Australia. Australia: The University of New South Wales, Australia. ISBN 9780646581279.

Tucker, G., Windapo, A.O. and Cattell, K.S. 2012. Marketing strategy and small and medium-sized construction companies: establishing their strength of affiliation. In F. Emuze (ed.), Proceedings of Second NMMU Construction Management Conference, 25-27 November 2012, Port Elizabeth, SA. Port Elizabeth: Department of Construction Management, NMMU. ISBN 9781920508166.

Van Zyl, A., Worsley, L., Allen, S. and Massyn, M.W. 2012. The impact of a formal requirements specification process/methodology on the quality and success of complex engineering projects. In R.G. Pearl and J.J.P. Verster (eds), Proceedings of 8th ICEC World Congress "Quest for Quality: Professionalism in Practice" (ICEC 2012), 23-27 June 2012, Durban, SA. Durban: ASAQS. ISBN 9780868868080.

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Symposium of W055, W065, W089, W118, TG76, TG78, TG81 and TG84 (Management of Construction: Research to Practice), 26-29 June 2012, Montreal, Canada. Canada, Montreal: CIB conference. ISBN 9782981335517.

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Windapo, A.O., Cattell, K.S. and Oyewobi, L. 2012. Business diversification and performance: evidence from south african construction firms. In F. Emuze (ed.), Proceedings of Second NMMU Construction Management Conference, 25-27 November 2012, Port Elizabeth, SA. Port Elizabeth: Department of Construction Management, NMMU. ISBN 9781920508166.

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Yokwana, N.R.A., Ndhokubwayo, R. and Windapo, A.O. 2012. Qualitative analysis of indicators of successful women mentorship in the South African construction industry. In G. Nani, R.K. Nkum, E. Awere, E. Kissi and E. Bamfo-Agyei (eds), Proceedings of the 1st Applied Research Conference

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Ghana: Applied Research Conference in Africa (ARCA) Conference. ISBN 9789988170516.

## Department of Electrical Engineering

HEAD OF DEPARTMENT: EMERITUS PROFESSOR  
B.J. DOWNING

### Departmental Profile

The Department of Electrical Engineering has 24 permanent academic staff, 131 MSc students and 53 PhD students. The research activities and projects are largely industrially based. The main funding sources are Eskom, Sasol, Telkom, Siemens, De Beers, Mintek, Water Research Commission, Anglo Platinum, Department of Trade and Industry, South African National Defence Force, SunSpace, IQS and the NRF.

The Department has seen a growth in the number of undergraduate students over the past 10 years, which is expected to result in higher postgraduate numbers. There are seven large research groups in the Department, which attract 80% of the postgraduate students. These are:

1. Broadband, Wireless, Communication, and Networks
2. Electrical Machines and Power Electronics
3. Image Processing and Vision Systems
4. Control and Instrumentation
5. Power Engineering
6. Remote Sensing and Radar
7. Robotics and Mechatronics

### Departmental Statistics

#### Permanent and Long-term Contract Staff

Professors	6
Associate Professors	6
Senior Lecturers	9
Lecturers	6
Research Staff	3
Technical Support Staff	6
Administrative and Clerical Staff	6
Departmental Assistants	1
Total	43

### Students

Doctoral	53
Master's	131
Undergraduates	710
Total	894

### Research Fields and Staff

#### Permanent Staff

##### PROFESSOR M. BRAAE

Multivariable control; mineral extraction control applications; computer-based education

##### PROFESSOR A. BAGHAI-WADJI

Electronics and Computational Engineering

##### PROFESSOR C.T. GAUNT

Electricity delivery networks

##### PROFESSOR M.R. INGGS

Radar remote sensing; synthetic aperture radar; software defined radio; parallel computing

##### PROFESSOR J. TAPSON

Instrumentation and measurements; ultrasonics; microactuators; probe microscopy

##### PROFESSOR P. PILLAY

Electrical machines and drives

##### ASSOCIATE PROFESSOR S.P. CHOWDHURY

Renewable Energy, Distributed Generation and Grid Integration, Microgrids and Smartgrids, Energy Efficiency and Demand Side Management, Fuel Cells and Energy Storage, Electrical Drives, Power System Operation, Control and Stability

##### ASSOCIATE PROFESSOR M.E. DLODLO

3G mobile and future communication systems

##### ASSOCIATE PROFESSOR K. FOLLY

Power system stability, control, grid integration of Renewable Energy, Intelligent grid, applied Computational Intelligence and HVDC Transmissions Systems

##### ASSOCIATE PROFESSOR M.A. KHAN

Electrical machines and drives

##### ASSOCIATE PROFESSOR A.J. WILKINSON

Signals and image processing; radar; SAR interferometry; tomography, Bayesian interference; inverse problems; RF power amplifiers

**ADJUNCT ASSOCIATE PROFESSOR M. MALENGRET**

Power electronics; remote area power supplies and rural electrification

**DR P.S. BARENDSE**

Senior Lecturer; Electrical machines and drives

**DR S. CHOWDHURY**

Senior Lecturer, Power & Energy

**DR O.E. FALOWO**

Senior Lecturer, Communications

**MR S.I. GINSBERG**

Senior Lecturer, Digital systems

**DR M. HANIF**

Senior Lecturer, Power Electronics

**DR A. MISHRA**

Senior Lecturer; Radar Signal Processing and Machine Learning

**DR A. MURGU**

Senior Lecturer, Telecommunications, Networks, IP and Network Reliability

**DR F.C. NICOLLS**

Senior Lecturer; Image processing, signal processing and computer vision

**MR I. KHAN**

Adjunct Senior Lecturer, High frequency power electronics, induction heating

**MRS K.E AWODELE**

Lecturer, Power System Reliability

**MR A. PATEL**

Lecturer, BioRobotics and Control

**MS R. SMIT**

Lecturer, Engineering Education

**MR M.S. TSOEU**

Lecturer, Control and Instrumentation

**MS R.A. VERRINDER**

Lecturer, Robotics: navigation, localisation and mapping; control and instrumentation

**MR S. WINBERG**

Lecturer, High Performance Computing & Software Defined Radio

**Research Staff****DR R. HERMAN**

Senior Research Officer, Statistical Techniques in Power Systems

**DR A VAN DER BYL**

Research Officer, Reconfigurable computing for signal processing applied to SDR

**MR M.J.E. VENTURA**

Senior Research Officer, Broadband communications & applications; digital systems

**Honorary/Emeritus Professors****EMERITUS PROFESSOR B.J. DOWNING**

Microwave Systems and Circuits

**EMERITUS PROFESSOR G. DE JAGER**

Image processing; machine vision and image compression

**EMERITUS PROFESSOR A. PETROIANU**

Power system analysis; operation and control

**EMERITUS PROFESSOR K.M. REINECK**

Antennas

**EMERITUS ASSOCIATE PROFESSOR J.R. GREENE**

Computational Intelligence

**Contact Details**

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E-mail: ElecEng@uct.ac.za  
Web: <http://www.ee.uct.ac.za>

**Research output****Chapters in books**

Folly, K.A. and Sheetekela, S. 2012. Optimal design of power system controller using breeder genetic algorithm. In S. Gao (eds), *Bio-Inspired Computational Algorithms and Their Applications*, pp. 303-316. Croatia: Intech. ISBN 9789535102144.

**Articles in Peer-reviewed Journals**

Adeyeye, M., Ventura, N.M. and Foschini, L. 2012. Converged multimedia services in emerging Web 2.0 session mobility scenarios. *Wireless Networks*, 18: 185-197.

- Alatawneh, N. and Pillay, P. 2012. Test specimen shape considerations for the measurement of rotational core losses. *IEEE Transactions on Energy Conversion*, 27(1): 151-159.
- Bagula, A.B., Zennaro, M., Inggs, G., Scott, S. and Gascon, D. 2012. Ubiquitous sensor networking for development (USN4D): an application to pollution monitoring. *Sensors*, 12(1): 391-414.
- Basak, P., Chowdhury, S., Halder, S. and Chowdhury, S.P. 2012. A literature review on integration of distributed energy resources in the perspective of control, protection and stability of microgrid. *Renewable & Sustainable Energy Reviews*, 16: 5545-5556.
- Basu, A.K., Bhattacharya, A., Chowdhury, S. and Chowdhury, S.P. 2012. Planned scheduling for economic power sharing in a chp-based micro-grid. *IEEE Transactions on Power Systems*, 27(1): 30-38.
- Curry, N. and Pillay, P. 2012. Biogas prediction and design of a food waste to energy system for the urban environment. *Renewable Energy*, 41: 200-209.
- Dekker, J., Nthontho, M., Chowdhury, S. and Chowdhury, S.P. 2012. Economic analysis of PV/diesel hybrid power systems in different climatic zones of South Africa. *International Journal of Electrical Power & Energy Systems*, 40(1): 104-112.
- Dekker, J., Nthontho, M., Chowdhury, S. and Chowdhury, S.P. 2012. Investigating the effects of solar modelling using different solar irradiation data sets and sources within South Africa. *Solar Energy*, 86: 2354-2365.
- Dzobo, O., Gaunt, C.T. and Herman, R. 2012. Investigating the use of probability distribution functions in reliability-worth analysis of electric power systems. *International Journal of Electrical Power & Energy Systems*, 37: 110-116.
- Dzobo, O., Gaunt, C.T. and Herman, R. 2012. Reliability worth assessment of electricity consumers: a South African case study. *Journal of Energy in Southern Africa*, 23(3): 31-39.
- English, P.J. and Le Jeune, K. 2012. Do professional women and tradeswomen in the South African construction industry share common employment barriers despite progressive government legislation? *Journal of Professional Issues in Engineering Education and Practice*, 138(2): 145-152.
- English, P.J. and Bowen, P.A. 2012. Overcoming potential risks to females employed in the South African construction industry. *The International Journal of Construction Management*, 12(1): 37-49.
- Falowo, O.E. and Chan, H.A. 2012. Dynamic RAT selection for multiple calls in heterogeneous wireless networks using group decision-making technique. *Computer Networks*, 56(4): 1390-1401.
- Falowo, O.E. and Chan, H.A. 2012. Multiple-RAT selection for reducing call blocking/dropping probability in cooperative heterogeneous wireless networks. *EURASIP Journal on Wireless Communications and Networking*, 221: (1-12).
- Hendricks, M.S., Karpul, D., Nicolls, F. and Lambert, M.I. 2012. Velocity and acceleration before contact in the tackle during rugby union matches. *Journal of Sports Sciences*, 30(12): 1215-1224.
- Ibrahim, M. and Pillay, P. 2012. Advanced testing and modeling of magnetic materials including a new method of core loss separation for electrical machines. *IEEE Transactions on Industry Applications*, 48(5): 1507-1515.
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Cecchini, C. 2012. General predictive control: an investigation of perceived limitations. MSc(Eng). 98pp. Supervised by Braae, M. and Tsoeu, M.S.

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P. Omar, S. 2012. Target tracking using multisensor data fusion for an unmanned aerial vehicle sense and avoid system. MSc(Eng). 88pp. Supervised by Winberg, S.

Oyedokun, T. 2012. Sea clutter simulation. MSc (Eng). 90pp. Supervised by Inngs, M.

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Raw, B. 2012. The design and development of a pulsed radar block for the Rhino platform. MSc (Eng). 89pp. Supervised by Inngs, M. and Winberg, S.

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Ubisse, A. 2012. Comparison of Digsilent, Matlab PST and PSAT for steady state and stability studies on HVAC-HVDC systems. MSc(Eng). 105pp. Supervised by Folly, K. and Awodele, K.

Van den Eynde, N.V.E. 2012. Modelling of a stand-alone photovoltaic system with dedicated hybrid battery energy storage system. MSc(Eng). 99pp. Supervised by Chowdhury, S.P. and Chowdhury, S.

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## Patents

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## Department of Mechanical Engineering

(Including the Blast Impact and Survivability Research Unit (BISRU), the Centre for Materials Engineering (CME), the Centre for Research in Computational and Applied Mechanics (CERECAM), the Energy Research Centre (ERC), and the SASOL Advanced Fuels Laboratory (SAFL)).

HEAD OF DEPARTMENT: PROFESSOR CHRISTIAAN REDELINGHUYS

## Department Profile

The Department of Mechanical Engineering includes 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), the Energy Research Centre (ERC) and the SASOL Advanced Fuels Laboratory (SAFL). The research interests of BISRU cover all engineering aspects of blast and impact scenarios, including the impact/blast process, structural response and material characterisation of structural components, as well as human bio-mechanical response under impact conditions. Research in CME is directed at an understanding of the relationships between the production processes and structure, properties and performance of engineering materials. CERECAM focuses on mathematical modelling of complex material behaviour, simulation of processes of deformation and failure of engineering components and artefacts, development of stable and accurate computational solution techniques and computational fluid dynamics. The ERC researches energy efficiency, energy modelling, climate change issues and sustainable energy. The SAFL



is arguably the most sophisticated engines laboratory undertaking fuels research in the country. A number of smaller research groupings focus on areas such as advanced manufacturing, aeronautics, orthopaedics, composite materials engineering, computational fluid dynamics, engineering education, engineering management, fracture and fatigue, non-destructive testing and robotics.

## Departmental Statistics

### Permanent and long-term contract staff (excluding research officers)

Professors	5
Adjunct Professors	2
Emeritus Professor	1
Honorary Professor	1
Associate Professors	6
Senior Lecturers	8
Lecturers	2
Part-time Lecturer	2
Academic Development Lecturer	1
Teaching Assistants	8
Technical Support Staff	11
Administrative and Clerical Staff	3
Workshop Apprentices	3
Total	55

## Students

Postdoctoral	2
PG Diploma	5
Doctoral	25
Occasional – Non degree UG	34
Occasional – Non degree PG	1
Master's	127
Honours	17
Undergraduate	627
Total	838

## Research Fields and Staff

### PROFESSOR KEVIN BENNETT

Director, Energy Research Centre; Energy research.

### MS TRACY BOOYSEN

Chief Scientific Officer; Electro Mechanical engineering, robotics and agents.

### 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.

### 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 WIM FULS

Senior Lecturer; Centre of specialisation in energy efficiency; power plant process flow modelling

### DR REUBEN GOVENDER

Senior Lecturer; BISRU; high strain rate material characterisation; composite materials; blast and impact loading of structures and materials.

### EMERITUS 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.

### MR ERNESTO ISMAIL

Lecturer; BISRU, CERECAM; meshless methods, non-linear elasticity.

### ADJUNCT PROFESSOR LOUIS JESTIN

Power Generation systems design and operation

### 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

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**PROFESSOR GERALD NURICK**

Director, BISRU; structural impact; crashworthiness; high strain rates; impact biomechanics.

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Head of Department; autonomously guided parafoils, airliners in formation flight.

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Lecturer, SASOL Advanced Fuel Lab, engines and fuels research.

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

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Mrs M Senatla

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Senior Research Scientist, iThemba Laboratory for Accelerator Based Sciences, Centre for Materials Engineering; solid-state phase transformation, thin films and coatings, materials characterization by nuclear microprobe, X-ray, neutron and synchrotron diffraction techniques.

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Chief Research Officer, ERC; climate change

**MR AJAY TRIKAM**

Research Officer, ERC; energy efficiency; greenhouse gases; mitigation modeling.

**PROFESSOR HARALD WINKLER**

ERC; climate change (economics, mitigation & policy) and environmental economics.

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**Research output****Chapters in books**

Favish, J., Ross, D.A., Inggs, S.C., Kathard, H., Clarkson, C.P., Case, J.M., Collier-Reed, B.I. and Reid, S. 2012. Reflections on developing distinctive University of Cape Town graduate attributes. In M. Coetzee et al. (eds), *Developing Student Graduatness and Employability*, pp. 207-225. Randburg: Knowres Publishing. 9781869221898.

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## Patents

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