Engineering and the Built Environment (EBE)

6 DST/NRF SARChI Chairs

Accredited journal units **111** (highest since 2010)

R144m Income raised by contracts

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

De Beer, C. Apparatus and method for determining the condition of an electricity-producing cell. PCT Patent Application PCT PCT/IB2015/054727.

Basler, M., Ginsberg, S.I., Gluckman, D.J., Mesarcik, P.J., Petousis, F.G., Vining, E. An early warning device for detecting and reporting dangerous conditions in a community. PCT Patent Application PCT PCT/IB2015/050608.

Brijlal, Y., John, L.R., Sivarasu, S. Hand Exoskeleton. National Phase Patent Application China 201380057411.8.

Brijlal, Y., John, L.R., Sivarasu, S. Hand Exoskeleton. National Phase Patent Application Europe 13824005.6.

Brijlal, Y., John, L.R., Sivarasu, S. Hand Exoskeleton. National Phase Patent Application South Africa 2015/02680.

Fenner, C.J., Harrison, S.T.L., Meissner, M.P., Olaofe, O.A. Method of Biotransformation of Linear Alkanes. PCT Patent Application PCT PCT/IB2015/054697.

Hussain, N., Tanaka, S. Fuel Cell MEA with Combined Metal Gas Diffusion Layer and Microporous Layer. PCT Patent Application PCT PCT/IB2015/052332.

Inggs, M.R., Mishra, A.K., Wilson-Langman, A. Symbiotic Radar and Communication System. National Phase Patent Application Britain 1514829.9.

Inggs, M.R., Mishra, A.K., Wilson-Langman, A. Symbiotic Radar and Communication System. National Phase Patent Application India 2962/KOLNP/2015.

Inggs, M.R., Mishra, A.K., Wilson-Langman, A. Symbiotic Radar and Communication System. National Phase Patent Application South Africa 2015/05936.

Inggs, M.R., Mishra, A.K., Wilson-Langman, A. Symbiotic Radar and Communication System. National Phase Patent Application United States 14/768,382.

Malan, A.G., Swan, S.G. A Pressure Vessel. Provisional Patent Application United Kingdom 1517711.6.

Mishra, A.K. Monitoring changes in an environment by means of communication devices. Provisional Patent Application Britain 1506665.7.

Tenim, S., Vicatos, G. Underactuated Prosthetic Hand. PCT Patent Application PCT PCT/IB2015/055078.

Granted Applications

Boonzaier, J.A., Hendricks, M.R., Vicatos, G. Transport Distraction Apparatus. National Phase Patent Application South Africa 2014/03775.

Claeys, M.C.M., Rößner, F., Sango, T.S., van Steen, E.W.J. A Process for the Production of Nitrogen or Phosphorous Containing Compounds from Synthesis Gas. National Phase Patent Application China 200980113744.1.

Lusilao-Zodi, G-A., Morrison, N. A System and Method for Estimating Round-Trip Time in Telecommunication Networks. National Phase Patent Application China 201180010384.X.

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

Professors	5
Associate Professors	6
Senior Lecturers	12
Lecturers	9
Technical Support Staff	8
Administrative Staff	9
Total	**49**

Emeritus Staff and Research Associates

Emeritus Professors	5
Emeritus Associate Professor	1
Research Associates	3
Total	**9**

Students and Postdoctoral Fellows

Postdoctoral Fellows	2
Doctoral	19
Masters	141
Honours	60
Undergraduates	364
Total	**586**

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 DUMINY
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 Proramme

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 Research Officer: 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; co-ordinate 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**

RESEARCH OUTPUT

Authored books

Gurney, K.J. 2015. The art of public space: Curating and re-imagining the ephemeral city. 183pp. Basingstoke Hampshire: Palgrave Macmillan. ISBN 9781137436894.

Edited books

Brown-Luthango, M., Battersby-Lennard, J.E., McGaffin, R., Sitas, F., Timm, S., Adlard, G., Haysom, G., Drivdal, L., Nama, N., Adams, E., Tapela, N. and Zweig, P. (eds) 2015. In State/Society Synergy in Philippi, Cape Town. 305pp. Rondebosch: African Centre for Cities. ISBN 9780620676304.

Gurney, K.J., Van Graan, M. and Stimie, M.S. (eds) 2015. In The South African handbook on arts and culture 2015/6. 387pp. 3rd edition. Cape Town: African Arts Institute. ISBN 9780992225308.

Pieterse, E.A., Edjabe, N. and Benson, K. (eds) 2015. In African Cities Reader -Land Property and Value. 216pp. 3rd edition. South Africa: Chimurenga. ISBN 9780987029584.

Skinner, C., Crush, J. and Chikanda, A. (eds) 2015. In Mean Streets: Migration, Xenophobia and informality in South Africa. 248pp. Canada: SAMP, ACC and IDRC. ISBN 9781920596118.

Chapters in books

Battersby-Lennard, J.E. 2015. Food insecurity amongst urban households. In S. Fukuda-Parr, and V. Taylor (eds), Food Security in South Africa, pp. 97-119. Cape Town: UCT press. ISBN 9781775820727.

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

Inquiry Into Gender Research, pp103-127. United Kingdom: Cambridge Scholars Publishing. ISBN 9781443885140.

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Chikanda, A., Skinner, C. and Crush, J. 2015. Migrant entrepreneurship and informality in South African Cities. In J. Crush, A. Chikanda and C. Skinner (eds), Mean Streets: Migration, Xenophobia and informality in South Africa, pp. 1-24. Canada: SAMP, ACC and IDRC. ISBN 9781920596118.

Cirolia, L., Smit, W. and Duminy, J. 2015. Grappling with housing issues at the City Scale: mobilizing the right to the city in South Africa. In P. Herrle, A. Lay and J. Fokdal (eds), From local action to global networks: housing the urban, pp 159-174. England: Surrey: Ashgate. ISBN 9781472450517.

Dewar, D. 2015. A transformational path for Cape Town, South Africa. In F. Wagner, R. Mahayni, A. G. Pliller (eds), Transforming Distressed Global Communities, pp. 231-244. USA: Ashgate Publishing. ISBN 9781472410641.

Fraschini, M. 2015. Designing between scales. In A. Contin (ed), Questo Metropolitan Architecture, pp. 126-135. Italy: Maggioli Editore. ISBN 9788891609038.

Haysom, G. 2015. Philippi fresh produce market: Unrealised development? In M. Brown-Luthango (ed), State/Society Synergy in Philippi, Cape Town, pp. 153-173. Rondebosch: African Centre for Cities. ISBN 9780620676304.

Haysom, G. 2015. Urban scale food system governance: An alternative response to the dominant paradigm? In A. Allen, A. Lampis and M. Swilling (eds), Untamed Urbanisms, pp.76-88. New York: Routledge, Taylor and Francis Group, London and New York. ISBN 9781315746692.

Odendaal, N., Duminy, J. and Inkboom, D.K.B. 2015. The developmentalist origins and evolution of planning education in Sub-Saharan Africa, C. 1940 to 2010. In C.N. Silva (ed), Urban Planning in Sub-Saharan Africa, pp. 285-299. New York: Routledge. ISBN 9780415632300.

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Pieterse, E.A. and Provoost, M. 2015. The density syndicate. In M. Provoost (ed), Cape Town: Densification as a Cure for a Segregated City, pp. 5-159. Rotterdam: nai010. ISBN 9789462082274.

Sitas, F. 2015. Community Centres in Crisis: The story of the Tsoga Environmental Resource Centre. In Mercy Brown-Luthango (eds), State/Society Synergy in Philippi, Cape Town: 179-197. Rondebosch: African Centre for Cities. ISBN 9780620676304.

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Bassa, F., Petzer, B.J.M. and Winkler, T. 2015. At the coalface, Take 2: lessons from students' critical reflections. Planning Theory & Practice, 16(3): 423-426.

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Coetzee, S. and Smit, J.L. 2015. Development of an observatory for spatial planning in South Africa: a best practice review. South African Journal of Geomatics, 4(3): 326-338.

Colenbrander, D.R., Cartwright, A. and Taylor, A. 2015. Drawing a line in the sand: managing coastal risks in

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Sithole, G. and Majola, L. 2015. Framework for comparing segmentation algorithms. In T. Fuse and M. Nakagawa (eds), Proceedings of Joint Workshop with ISPRS WG IV/7 and WG V/4 Indoor-Outdoor Seamless Modelling, Mapping and Navigation, 21-22 May 2015, Tokyo. Germany: Copernicus GmbH (Copernicus Publications). ISSN 21949034.

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 Cystallization 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

Professors	11
Senior Lecturers/Senior Research Officers	15
Lecturers/Research Officers	8
Contract Lecturers	4
Technical and Scientific Staff	29
Administrative Support Staff	29
Total	**96**

Emeritus, Honorary and Adjunct Staff

Emeritus Professor	1
Honorary Professors	2
Adjunct Professors	5
Adjunct Associate Professor	1
Honorary Research Associates	4
Total	**13**

Students and Postdoctoral Fellows

Postdoctoral Fellows	17
Doctoral	68
Masters	118
BSc(Eng)	524
Total	**727**

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 BEPSWA
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 characterization

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; bioflotation; 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 respects 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 optimisatio

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 LÜCHTERS
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 pyromettalurgical 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
Process Modelling and Optimisation – 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 JOCHEN PETERSEN
Centre for Bioprocess Engineering Research – Hydrometallurgy, especially heap (bio) leaching of low-grade minerals, heap reactor characterization and modelling, bioleaching 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 – Flotation Chemistry

ADJUNCT PROFESSOR PAUL DEMPSY

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
Environmental and Process Systems Engineering – Decision support systems, sustainable energy systems, industrial ecology.

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.

DR HENDRIK KOTZE
Centre for Catalysis Research, DST-NRF Centre of Excellence in Catalysis c*change – Magnetic and Raman analysis of working Fischer-Tropsch catalysts.

DR TOBIAS LOUW
Centre for Bioprocess Engineering Research – Multi-scale mathematical modelling of algae raceway ponds for optimal mass transfer and energy usage.

DR DOREEN NABAHO
Centre for Catalysis Research, DST-NRF Centre of Excellence in Catalysis c*change – Fischer-Tropsch synthesis

DR ROB POTT
Centre for Bioprocess Engineering Research – Conversion of waste organics into hydrogen, electricity and high value products by wild-type and genetically modified Rhodopseudomonas palustris.

DR RAHUL RAM
Minerals to Metals Signature Theme – hydrometallurgy, minerals characterisation, Understanding the effects of nano pore spaces on leaching of large ore particles.

DR VALENTINA RUSSO
Environmental and Process Systems Engineering – LCA for the quantification of environmental impact reductions provided by biogas installations incorporated in the meat production value chain.

DR BERNHARD SCHWANITZ
Centre for Catalysis Research, HYSA/Catalysis – Development of bimetallic precious metal catalysts for steam reforming of methane and Advanced MEA fabrication methods.

DR MARIETTE SMART
Centre for Bioprocess Engineering Research – Selection and characterisation of CO_2 sequestering algal strains for carbon mitigation of coal-derived flue gas and waste water remediation at power production plants.

DR MARGRETH TADIE
Centre for Minerals Research – Flotation Chemistry, Electrochemistry. Investigation of the effect of Eh on recovery of sulphide minerals.

Contact Details

Postal Address: Department of Chemical Engineering, University of Cape Town, Private Bag X3, Rondebosch, 7701
Telephone: +27 21 650 2518
Fax: +27 21 650 5501
Email: **che-enquiries@uct.ac.za**
Website: **http://www.chemeng.uct.ac.za/**

RESEARCH OUTPUT

Authored books

Lewis, A.E., Seckler, M.M., Kramer, H. and Van Rosmalen, G. 2015. Industrial Crystallization: Fundamentals and Applications. 319pp. United Kingdom: Cambridge University Press. ISBN 9781107052154.

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African countries. European Journal of Engineering Education, 41(3): 279-292.

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Claeys, M.C., Dry, M.E., Van Steen, E.W.J., Van Berge, P., Booyens, S., Crous, R., van Helden, P., Labuschagne, J., Moodley, D.J. and Saib, A.M. 2015. Impact of process conditions on the sintering behavior of an alumina-supported cobalt Fischer-Tropsch catalyst studied with an in situ magnetometer. ACS Catalysis, 5: 841-852.

Crimes, J., Fraser, D., Isafiade, A.J., Short, M. and Bonomi, A. 2015. Assessment of pre-treatment methods for bio-ethanol production from sugarcane bagasse. Chemical Engineering Transactions, 45: 1843-1848.

Dey, S., Pani, S., Singh, R. and Paul, G.M. 2015. Response of process parameters for processing of iron ore slime using column flotation. International Journal of Mineral Processing, 140: 58-65.

Du Preez, R., Clarke, K.G., Callanan, L. and Burton, S.G. 2015. Modelling of immobilised enzyme biocatalytic membrane reactor performance. Journal of Molecular Catalysis B-Enzymatic, 119: 48-53.

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Iglesias, G. M., De Vries, C., Claeys, M.C. and Schaub, G. 2015. Chemical energy storage in gaseous hydrocarbons via iron Fischer-Tropsch synthesis from H2/CO2 kinetics, selectivity and process considerations. Catalysis Today, 242: 184-192.

Inglesby, A., Griffiths, M., Harrison, S.T.L. and van Hille, R.P. 2015. Anaerobic digestion of Spirulina sp. and Scenedesmus sp.: a comparison and investigation of the impact of mechanical pre-treatment. Journal of Applied Phycology, 27: 1891-1900.

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Kantor, R.S., van Zyl, A., van Hille, R.P., Thomas, B.C., Harrison, S.T.L. and Banfield, J.F. 2015. Bioreactor microbial ecosystems for thiocyanate and cyanide degradation unravelled with genome-resolved metagenomics. Environmental Microbiology, 17(12): 4929-4941.

Little, L., Becker, M.E., Wiese, J.G. and Mainza, A.N. 2015. Auto-SEM particle shape characterisation: investigating fine grinding of UG2 ore. Minerals Engineering, 82: 92-100.

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McFadzean, B.J., Pani, S., Wiese, J.G. and O'Connor, C.T. 2015. The interactive effects of chemical and process parameters on the flotation performance of a UG2 ore. Minerals Engineering, 70: 92-98.

Mohamed, R., Cheng, X., Fabbri, E., Levecque, P., Kotz, R., Conrad, O. and Schmidt, T.J. 2015. Electrocatalysis of Perovskites: the influence of carbon on the oxygen

evolution activity. Journal of the Electrochemical Society, 162(6): F579-F586.

Moyo, T., Petersen, J., Franzidis, J.-P. and Nicol, M. 2015. An electrochemical study of the dissolution of chalcopyrite in ammonia-ammonium sulphate solutions. Canadian Metallurgical Quarterly, 54(3): 268-277.

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Ngoma, I.E., Ojumu, T.V. and Harrison, S.T.L. 2015. Investigating the effect of acid stress on selected mesophilic micro-organisms implicated in bioleaching. Minerals Engineering, 75: 6-13.

Petersen, A.M., Melamu, R.B., Knoetze, J.H. and Gorgens, J.F. 2015. Comparison of second-generation processes for the conversion of sugarcane bagasse to liquid biofuels in terms of energy efficiency, pinch point analysis and life cycle analysis. Energy Conversion and Management, 91: 292-301.

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Sango, T., Fischer, N., Henkel, R., Roessner, F., Van Steen, E.W.J. and Claeys, M.C. 2015. Formation of nitrogen containing compounds from ammonia co-fed to the Fischer-Tropsch synthesis. Applied Catalysis A-General, 502: 150-156.

Short, M., Isafiade, A.J., Fraser, D. and Kravanja, Z. 2015. Heat exchanger network synthesis including detailed exchanger designs using mathematical programming and heuristics. Chemical Engineering Transactions, 45: 1849-1854.

Tadie, M., Corin, K.C., Wiese, J.G., Nicol, M. and O'Connor, C.T. 2015. An investigation into electrochemical interactions between platinum group minerals and xanthate: Voltammetric study. Minerals Engineering, 70: 148-155.

Tadie, M., Corin, K.C., Wiese, J.G., Nicol, M. and O'Connor, C.T. 2015. An investigation into the electrochemical interactions between platinum group minerals and sodium ethyl xanthate and sodium diethyl dithiophosphate collectors: mixed potential study. Minerals Engineering, 83: 44-52.

Tanaka, S. and Shudo, T. 2015. Experimental and numerical modeling study of the electrical resistance of gas diffusion layer-less polymer electrolyte membrane fuel cells. Journal of Power Sources, 278: 382-395.

van Hille, R.P., Dawson, E.J., Edward, C.J. and Harrison, S.T.L. 2015. Effect of thiocyanate on BIOX organisms: inhibition and adaptation. Minerals Engineering, 75: 110-115.

Van Steen, E.W.J. and Claeys, M.C. 2015. Promoting χ-Fe5C2(100)0.25 with copper a DFT study. Catalysis, Structure & Reactivity, 1: 11-18.

van Zyl, A., Huddy, R.J., Harrison, S.T.L. and van Hille, R.P. 2015. Evaluation of the ASTER TM process in the presence of suspended solids. Minerals Engineering, 76: 72-80.

Von Blottnitz, H., Case, J.M. and Fraser, D. 2015. Sustainable development at the core of undergraduate engineering curriculum reform: a new introductory course in chemical engineering. Journal of Cleaner Production, 106: 300-307.

Wiese, J.G., Becker, M.E., Yorath, G.A. and O'Connor, C.T. 2015. An investigation into the relationship between particle shape and entrainment. Minerals Engineering, 83: 211-216.

Peer-reviewed published conference proceedings

Broadhurst, J.L. and Harrison, S.T.L. 2015. A desulfurization flotation approach for the integrated management of sulphide wastes and acid rock drainage risks. In A. Brown, C. Bucknam, J. Burgess, M. Carballo and D. Castendyk (eds), Proceedings of 10th International Conference on Acid Rock Drainage & IMWA Annual Conference, 21-24 April 2015, Santiago. Chile: Gecamin. ISBN 9789569393280.

Moyo, T. and Petersen, J. 2015. Study of the dissolution of chalcopyrite in solutions of different ammonium salts. Proceedings of the SAIMM Copper Cobalt Africa Conference, 6-8 July 2015, Livingstone, Zambia. Johannesburg, South Africa: SAIMM. ISBN 9781920410711.

van Hille, R.P. and Harrison, S.T.L. 2015. Biomass retention and recycling to enhance sulphate reduction kinetics. In A. Brown, C. Bucknam, J. Burgess, M. Carballo, D. and Castendyk (eds), Proceedings of 10th International Conference on Acid Rock Drainage & IMWA Annual Conference, 21-24 April 2015, Santiago, Chile. Chile: Gecamin. ISBN 9789569393280.

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

Professors	6
Associate Professors	5
Senior Lecturers	4
Lecturers	1
Research Officers	2
Technical Support Staff	9
Administrative Support Staff	10
Total	**37**

Emeritus and Honorary Staff

Emeritus Associate Professors	5
Honorary Research Associates	5
Total	**10**

Students and Postdoctoral Fellows

Postdoctoral Fellows	3
Doctoral	29
Masters and Diplomas	210
Other – (Non degree/Diploma)	19
Undergraduate	457
Total	**718**

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; electro-mechanics; 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 Inés 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

Zingoni, A. 2015. Vibration Analysis and Structural Dynamics for Civil Engineers: Essentials and Group-Theoretic Formulations. 245pp. United States: CRC Press, Taylor & Francis Group. ISBN 9780415522564.

Articles in peer-reviewed journals

Alexander, M.G. and Thomas, M. 2015. Service life prediction and performance testing current developments and practical applications. Cement and Concrete Research, 78: 155-164.

Aza-Gnandji, C. and Kalumba, D. 2014. Experimental and numerical analyses of the behaviour of rammed stone columns installed in a South African soft soil. 360 Degrees: The Ashridge Journal, 3(6): 477-497.

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Beushausen, H. and Burmeister, N. 2015. The use of surface coatings to increase the service life of reinforced concrete structures for durability class XC. Materials and Structures, 48: 1243-1252.

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Cooke, S. and Behrens, R. 2015. Articulated density – a study of its potential effects on the financial sustainability of South African BRT corridors. Civil Engineering, 2015(8): 38-42.

Couvelis, F. and Van Zyl, J. 2015. Apparent losses due to domestic water meter under-registration in South Africa. Water SA, 41(5): 698-704.

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Ekama, G.A. 2015. Recent developments in biological nutrient removal. Water SA, 41(4): 515-524.

Fisher-Jeffes, L., Gertse, G. and Armitage, N.P. 2015. Mitigating the impact of swimming pools on domestic water demand. Water SA, 41(2): 238-246.

Hitge, G. and Vanderschuren, M.J.W.A. 2015. Comparison of travel time between private car and public transport in Cape Town. Journal of the South African Institution of Civil Engineering, 57(3): 35-43.

Höhlig, B., Schmidt, D., Mechtcherine, V., Hempel, S., Schrofl, C., Trommler, U. and Roland, U. 2015. Effects of dielectric heating of fresh concrete on its microstructure and strength in the hardened state. Construction and Building Materials, 81: 24-34.

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Kobel, D. and Del Mistro, R.F. 2015. Valuing the non-user benefits of improving water and sanitation in informal settlements: a study of Cape Town. Urban Water Journal, 12(3): 248-261.

Lizarralde, I., Fernandez-Arevalo, T., Brouckaert, C., Vanrolleghem, P.A., Ikumi, D.S., Ekama, G.A., Ayesa, E. and Grau, P. 2015. A new general methodology for incorporating physico-chemical transformations into multi-phase wastewater treatment process models. Water Research, 74: 239-256.

Otieno, M. and Alexander, M.G. 2015. Chloride conductivity testing of concrete – past and recent developments. Journal of the South African Institution of Civil Engineering, 57(4): 55-64.

Pan, S., Armitage, N.P. and Van Ryneveld, M. 2015. Sustainable and equitable sanitation in informal settlements of Cape Town: a common vision? Water SA, 41(2): 222-231.

Qian, J., Lu, H., Jiang, F., Ekama, G.A. and Chen, G.H. 2015. Beneficial co-treatment of simple wet flue gas desulphurization wastes with freshwater sewage through development of mixed denitrification-SANI process. Chemical Engineering Journal, 262: 109-118.

Roy, P., Zuidgeest, M., Martinez, J.A., Miscione, G. and van Maarseveen, M. 2015. Phone call elasticity of city travel in Ahmedabad. Travel Behaviour and Society, 2: 15-25.

Salazar Ferro, P. and Behrens, R. 2015. From direct to trunk-and-feeder public transport services in the Urban South: territorial implications. Journal of Transport and Land Use, 8(1): 123-136.

Salazar Ferro, P., Muoz, J.C. and Behrens, R. 2015. Trunk and feeder services regulation: Lessons from South American case studies. Case Studies on Transport Policy, 3(2): 264-270.

Salvoldi, B., Beushausen, H. and Alexander, M.G. 2015. Oxygen permeability of concrete and its relation to

carbonation. Construction and Building Materials, 85: 30-37.

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Skatulla, S., Sansour, C. and Hjiaj, M. 2015. On computational shells with scale effects. Computer Methods in Applied Mechanics and Engineering, 283: 46-73.

Sobhee-Beetul, L. and Kalumba, D. 2015. Stone column reinforcement of a soft South African clay: a laboratory investigation. Geotechnical Engineering Journal of SEAGS & AGSSEA, 46(4): 81-85.

Teunissen, T., Sarmiento, O.L., Zuidgeest, M. and Brussel, M. 2015. Mapping equality in access: the case of Bogots sustainable transportation initiatives. International Journal of Sustainable Transportation, 9: 457-467.

Vanderschuren, M.J.W.A. and McKune, D. 2015. Emergency care facility access in rural areas within the golden hour?: Western Cape case study. International Journal of Health Geographics, 14: 5(8pp).

Vanderschuren, M.J.W.A. and Phayane, S. 2015. Non-motorised transport facility guidelines – accommodating people? Civil Engineering, 2015(October): 68-72.

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Vannecke, T.P.W., Lampens, D.R.A., Ekama, G.A. and Volcke, E. 2015. Evaluation of the 5 and 8 pH point titration methods for monitoring anaerobic digesters treating solid waste. Environmental Technology, 36(7): 861-869.

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Zingoni, A., Enoma, N. and Govender, N. 2015. Equatorial bending of an elliptic toroidal shell. Thin-Walled Structures, 96: 286-294.

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Baufeldt, J. and Vanderschuren, M.J.W.A. 2015. Investigation and gap analysis of selected cycling upgrades in Cape Town and the new NMT facility guidelines. In W.J. vd M. Steyn (ed), Proceedings of the 34th Southern African Transport Conference (SATC 2015), 6-9 July 2015, Pretoria. Pretoria: SATC. ISBN 9781920017637.

Behrens, R., Adjei, E., Covary, N., Jobanputra, R., Wasswa, B. and Zuidgeest, M. 2015. A travel behaviour change framework for the City of Cape Town. In W.J. vd M. Steyn (ed), Proceedings of the 34th Southern African Transport Conference (SATC 2015), 6-9 July 2015, Pretoria. Pretoria: SATC. ISBN 9781920017637.

Beushausen, H., Alexander, M.G., Wieland, M. and Linsel, S. 2015. Prescriptive versus performance-based design approaches for concrete durability. Proceedings of 27th Biennial National Conference of the Concrete Institute of Australia (Concrete 2015), 30 August – 2 September 2015, Melbourne, Australia. Australia: Concrete Institute of Australia. ISBN 9781943847709.

Bickford, G. and Behrens, R. 2015. What does transit oriented development mean in a South African context? A multiple stakeholder perspective from Johannesburg. In W.J. vd M. Steyn (ed), Proceedings of the 34th Southern African Transport Conference (SATC 2015), 6-9 July 2015, Pretoria. Pretoria: SATC. ISBN 9781920017637.

Busatta, F. and Moyo, P. 2015. Structural health monitoring of the Olifants River viaduct. Proceedings of International Heavy Haul Association Conference (IHHA 2015), 21-24 June 2015, Perth, Australia. Australia: International Heavy Haul Association. ISBN 9780646940069.

Busatta, F. and Moyo, P. 2015. Vibration monitoring of a large scale heavy haul railway viaduct. In G. Feltrin (ed), Proceedings of 6th International Conference on Experimental Vibration Analysis for Civil Engineering Structures (EVACES '15), 19-21 October 2015, Dubendorf, Switzerland. France: EDP Sciences. ISSN: 2261236X.

Chebet, F. and Kalumba, D. 2015. Large direct shear testing of sand reinforced with polyethylene (plastic) shopping bag waste material. In A. Gens (ed), Proceedings of XVI European Conference on Soil Mechanics and Geotechnical Engineering, Geotechnical Engineering for Infrastructure and Development, 13-17 September 2015, Edinburgh, Scotland. Scotland: ICE. ISBN 9780727760678.

Cooke, S. and Behrens, R. 2015. Articulated density: a study of its potential effects on the financial sustainability of South African BRT corridors. In W.J. vd M. Steyn (ed), Proceedings of the 34th Southern African Transport Conference (SATC 2015), 6-9 July 2015, Pretoria. Pretoria: SATC. ISBN 9781920017637.

Jjuuko, S., Matiop, P.B. and Kalumba, D. 2015. Evaluation of index and strength characteristics of clay soil stabilized with lime as subgrade material in Jonglei, South Sudan. In M. Bouassida, M. Khemakhem and S.E. Haffoudhi (eds), Proceedings of 16th African Regional Conference on Soil Mechanics and Geotechnical Engineering (Innovative Geotechnics for Africa), 27-30 April 2015, Tunisia. Tunisia: Tunisian Association of Soil Mechanics. ISBN 9789938129366.

Jjuuko, S., Kalumba, D., Mutaasa, H.K. and Lukanda, J. 2015. Prediction of compaction density of lateritic soil base pavement layers from dynamic cone penetration values in Uganda. In M. Bouassida, M. Khemakhem and S.E. Haffoudhi (eds), Proceedings of 16th African Regional Conference on Soil Mechanics and Geotechnical Engineering (Innovative Geotechnics for Africa), 27-30 April 2015, Tunisia. Tunisia: Tunisian Association of Soil Mechanics. ISBN 9789938129366.

Jjuuko, S. and Kalumba, D. 2015. Shear-bond strength of thin spray-on liners as a surface support mechanism in underground rock support a review. Proceedings of 13th International Congress of Rock Mechanics (ISRM Congress 2015), 10-13 May 2015, Montreal, Canada. Canada: Canadian Institute of Mining, Metallurgy and Petroleum. ISBN 978926872254.

Khumalo, N. and Vanderschuren, M.J.W.A. 2015. A methodology to assess the road accident risk as a result of direct sunlight exposure: A case study in Cape Town. In W.J. vd M. Steyn (ed), Proceedings of the 34th Southern African Transport Conference (SATC 2015), 6-9 July 2015, Pretoria. Pretoria: SATC. ISBN 9781920017637.

Kiptoo, D., Kalumba, D., Okonta, F.N., Zannoni, E., Aschrafi, J. and Moormann, C. 2015. Geogrid and geotextile reinforced base on a soft subgrade soil. In C.F. Leung, T. Ku and S.C. Chian (eds), Proceedings of the International Conference on Soft Ground Engineering (ICSGE2015) – Advances in Soft Ground Engineering, 3-4 December 2015, Singapore. Singapore: Research Publishing. ISBN 9789810975203.

McCormick, D., Orero, R., Behrens, R. and Ommeh, M. 2015. Cooperatives as a means of paratransit reform: case studies of inter-city matatu savings and credit cooperatives in Kenya. In W.J. vd M. Steyn (ed), Proceedings of the 34th Southern African Transport Conference (SATC 2015), 6-9 July 2015, Pretoria. Pretoria: SATC. ISBN 9781920017637.

Reddy, J. and Behrens, R. 2015. Public transport capacity provision and its sensitivity to demand estimation. In W.J. vd M. Steyn (ed), Proceedings of the 34th Southern African Transport Conference (SATC 2015), 6-9 July 2015, Pretoria. Pretoria: SATC. ISBN 9781920017637.

Ssozi, E.N., Reddy, B.D. and Van Zyl, J.E. 2015. The behavior of leaks in plastic pipes displaying viscoelastic deformation. In K. Karvazy and V. L. Webster (eds), Proceedings of World Environmental and Water Resources Congress 2015, 17-21 May 2015, Austin, Texas. USA: American Society of Civil Engineers (ASCE). ISBN 9780784479162.

Vanderschuren, M.J.W.A., Baufeldt, J. and Phayane, S. 2015. Mobility barriers for older persons and people with universal design needs in South Africa. In R. Macario (ed), Proceedings from the 14th International Conference on Mobility and Transport for Elderly and Disabled Persons, 28 – 31 July, Lisbon, Portugal. Portugal: Tecnico Lisboa. ISBN 9789892062624.

Vanderschuren, M.J.W.A., Phayane, S., Taute, A. and Ramotswane, M. 2015. Non-motorised transport facility guidelines: what is new and why? In W.J. vd M. Steyn (ed), Proceedings of the 34th Southern African Transport Conference (SATC 2015), 6-9 July 2015, Pretoria. Pretoria: SATC. ISBN 9781920017637.

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

Professors	2
Associate Professors	3
Senior Lecturers	8
Lecturer	3
Administrative and Clerical Staff	5
Departmental Assistant	1
Total	**22**

Students

Doctoral	9
Masters	115
Postgraduate Diploma	34
Honours	52
Undergraduate	306
Total	**516**

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: **Mareldia.Fagodien@uct.ac.za**
Website: **http://www.cons.uct.ac.za**

RESEARCH OUTPUT

Edited books

Brown-Luthango, M., Battersby-Lennard, J.E., McGaffin, R., Sitas, F., Timm, S., Adlard, G., Haysom, G., Drivdal, L., Nama, N., Adams, E., Tapela, N. and Zweig, P. (eds) 2015. State/Society Synergy in Philippi, Cape Town. 305pp. Rondebosch: African Centre for Cities. ISBN 9780620676304.

Chapters in books

McGaffin, R. 2015. State intervention into the Philippi area: through the Wetton-Lansdowne corridor programme. In M. Brown-Luthango (ed), State/Society Synergy in Philippi, Cape Town, pp. 127-145. Rondebosch: African Centre for Cities. ISBN 9780620676304.

Articles in peer-reviewed journals

Bowen, P.A., Edwards, P. and Cattell, K.S. 2015. Corruption in the South African construction industry: experiences of clients and construction professionals. International Journal of Project Organisation and Management, 7(1): 72-97.

Bowen, P.A., Govender, R.A., Edwards, P. and Cattell, K.S. 2015. An integrated model of HIV/AIDS testing behaviour in the construction industry. Construction Management and Economics, 32(11): 1106-1129.

Bowen, P.A., Govender, R.A., Edwards, P. and Cattell, K.S. 2015. HIV testing of construction workers in the Western Cape, South Africa. Aids Care, 27(9): 1150-1155.

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Bowen, P.A., Govender, R.A., Edwards, P., Cattell, K.S. and Street, A. 2015. Factors determining South African construction workers' prejudice towards and discrimination against HIV+ persons. Journal of Construction Engineering and Management-Asce, 141(7): 04015014(18pp).

Jay, C.I. and Bowen, P.A. 2015. Value management and innovation: a historical perspective and review of the evidence. Journal of Engineering, Design and Technology, 13(1): 123-143.

Leung, M., Bowen, P.A., Liang, Q. and Famakin, I. 2015. Development of a job-stress model for construction professionals in South Africa and Hong Kong. Journal of Construction Engineering and Management-Asce, 141: 04014077(9pp).

Massyn, M.W., McGaffin, R., Viruly, F.M. and Hopkins, N. 2015. The challenge of developing higher density, affordable housing in the inner city of Cape Town. International Journal of Housing Markets and Analysis, 8(3): 412-428.

McGaffin, R., Cirolia, L. and Massyn, M.W. 2015. Overcoming the challenge of vertical consolidation in South Africa's low-income settlements: a case study of Du Noon. Urban Forum, 26: 59-75.

Mooya, M.M. 2015. The education and professional practice of valuers in South Africa: a critical review. Property Management, 33(3): 245-274.

Nurick, S., Le Jeune, K., Dawber, E.P., Flowers, R.J. and Wilkinson, J.G. 2015. Incorporating Green Building. The Journal of Sustainable Real Estate, 7(1): 21-40.

Oyewobi, L., Windapo, A.O. and Rotimi, J. 2015. An empirical analysis of construction organisations' competitive strategies and performance. Built Environment Project and Asset Management, 5(4): 417-431.

Oyewobi, L., Windapo, A.O. and Rotimi, J. 2015. Measuring strategic performance in construction companies: a proposed integrated model. Journal of Facilities Management, 13(2): 109-132.

Rabe, C., McGaffin, R.P. and Crankshaw, O. 2015. A diagnostic approach to intra-metropolitan spatial targeting: evidence from Cape Town, South Africa. Development Southern Africa, 32(6): 726-744.

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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 main funding sources include Eskom, Telkom, De Beers, Sasol, Mintek, Water Research Commission, Anglo Platinum, Department of Trade and Industry, Dept of Science and Technology, South African National Defence Force, SunSpace, and the National Research Fund.

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

Professors	5
Associate Professors	8
Senior Lecturers	7
Lecturers	7
Senior Scholars	2
Technical Support Staff	7
Administrative Support Staff	6
Total	**42**

Emeritus and Honorary Staff

Emeritus Professors	6
Honorary Appointments	2
Total	**8**

Students and Postdoctoral Fellows

Postdoctoral Fellows	3
Undergraduate	713
Honours	4
Masters	213
Doctoral	82
Occasional	9
Total	**1024**

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 Rofessors

ASSOCIATE PROFESSOR PAUL BARENDSE
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 BRAAE
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

PROFESSOR TREVOR GAUNT
Electricity Delivery Networks

ASSOCIATE PROFESSOR JOHN GREENE
Computational Intelligence

ASSOCIATE PROFESSOR MICHEL MALENGRET
Power Electronics; Remote Area Power Supplies and Rural Electrification

PROFESSOR ALEX PETROAINU
Power System Analysis; Operation and Control

PROFESSOR MANFRED REINECK
Antennas

Senior Scholars

MR NECO VENTURA
Broadband Networks & Applications, Internet of Things

DR RON HERMAN
The Modelling and Assessment of Uncertainty in Power Systems

Honorary Members

MR IRSHAD KHAN
High Frequency Power Electronics, Induction Heating

PROFESSOR PIETER CILLIERS
Geomagnetic and Electric Fields, Ionospheric Modelling, Space Weather Impacts on Technology

Postdoctoral Fellows

DR SHIRLEY COETZEE
Synthetic Aperture Radar (SAR)

DR SEESHAM SRINU
Development of Optimal Spectrum Sensing Algorithm and its FPGA Implementation for Cognitive Radio Networks

DR CRAIG TONG
Radar and High Performance Computing

Contact Details

Postal Address: Department of Electrical Engineering, University of Cape Town, Private Bag X3, Rondebosch, 7701
Telephone: +27 21 650 2811
Email: **eleceng@uct.ac.za**
Website: **www.ee.uct.ac.za**

RESEARCH OUTPUT

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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

Professors	6
Associate Professors	6
Senior Lecturers	11
Lecturers	2
Part-time Lecturers	1
Academic Development Lecturer	1
Teaching Assistants	9
Technical Support Staff	9
Administrative and Clerical Staff	4
Workshop Apprentices (Temporary)	2
Total	**51**

Emeritus, Honorary and Adjunct staff

Emeritus Professors	3
Adjunct Professors	2
Honorary Professors	1
Honorary Research Associates	1
Total	**7**

Students and Postdoctoral Fellows

Postdoctoral Fellows	3
Doctoral	41
Masters	151
PG Diploma	2
Honours	10
Undergraduates	585
Occasional – Non degree PG	1
Total	**793**

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 REDELINGHUYS
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 FLOWEDAY
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 BOULLE
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

Contact Details

Postal Address: Department of Mechanical Engineering, University of Cape Town, Private Bag X3, Rondebosch, 7701
Telephone: +27 21 650 3231
Fax: +27 21 650 3240
Email: **MEC-mechanicalengineering@uct.ac.za**
Website: **http://www.mecheng.uct.ac.za/**

RESEARCH OUTPUT

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