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Knowledge on its own draws the mind into a circle of exploration.
It is when knowledge is shared and utilised that it becomes a journey of discovery.
This booklet maps out the research profiles of Chairholders in the South African Research Chairs Initiative.
The challenge of developing the requisite high-level research and innovation capacity that will make South Africa internationally competitive is national in scope. In this regard, South Africa must produce a greater number of highly skilled individuals to achieve the goal of an equitable growth path that develops sustainable livelihoods, education, health, and safe and secure communities. The South African Research Chairs Initiative (SARChI) is a strategic response by the South African government to address the challenge of developing high-level research skills for the National System of Innovation (NSI). The Initiative is designed to strengthen the academic leadership and the scientific research base of South Africa, in a way that supports the implementation of key national strategies such as the National Research and Development Strategy (2002), the Ten Year Innovation Plan (2008) and other strategies relevant for national development and for the creation of an internationally competitive knowledge economy.

SARChI was established by the Department of Science and Technology (DST) in 2005/06 and is implemented by the National Research Foundation (NRF). The main goal of this initiative is to strengthen and improve research leadership and research capacity in public universities for producing high-quality postgraduate students and advancing research.

The main objectives of SARChI are to:

- Expand the scientific research and innovation capacity of South Africa;
- Improve South Africa’s international research and innovation competitiveness while responding to social and economic challenges of the country;
- Attract and retain excellent researchers and scientists;
- Create research career pathways for highly skilled, high-quality young and mid-career researchers; and
- Strengthen and improve research and innovation capacity of universities for producing high-quality postgraduate students, research, and innovation outputs.

To date, 150 Research Chairs have been awarded across 20 public universities, through five successive rounds of calls for applications. Of the 150 Research Chairs, 143 have been filled and seven are in the process of being filled. Taking into account the relevance and significance of research areas of interest to key government strategies, the Research Chairs are established in various disciplines, which include Natural and Agricultural Sciences, Engineering and Applied Technology, Health Sciences, Humanities and Social Sciences.
In addition to SARChI, a partnership has been established between the DST, FirstRand Foundation, Anglo American Chairman’s Fund and Rand Merchant Bank Fund to co-invest in Mathematics Education and in Chairs.

SARChI has been successful in retaining leading South African researchers in the country as well as attracting leading international researchers to South African universities. It has also strengthened research collaboration between industry and universities and contributed to the training of the next generation of researchers for the NSI. Of the 143 filled Research Chairs, 44 are filled by incumbents who were either recruited from outside the country or from industry, thus making an addition to the research capacity within the Higher Education System. It is beyond a doubt that SARChI is a critical catalyst in accelerating capacity building and human resource development. In addressing the need for skilled human resources to drive the economy of South Africa, the NRF will continue to use this Initiative as one of the vehicles to deliver high-quality postgraduate students and postdoctoral fellows who are globally competitive. The NRF, will in addition, continue to secure more resources to grow SARChI. It remains for me to congratulate the current Research Chairholders and acknowledge the various individuals who have contributed and continue to contribute to assuring the success of this Initiative.

Dr Dorsamy Pillay
Deputy CEO (RISA-NRF)
**Professor PL Mafongoya**

**Research Chair:** Rural Agronomy and Development  
**Primary discipline:** Agricultural Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of KwaZulu-Natal  
**Chair commencement date:** January 2014  
**Website/blog:** saees.ukzn.ac.za

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**Biosketch**  
Professor Mafongoya holds a PhD in Forestry and Natural Resources Management (Agro-forestry), University of Florida (USA), an MSc in Applied Plant Sciences as well as an MSc Agricultural Development from Wye College, University of London (UK) and a BSc (Hons) Agriculture from the University of Zimbabwe.

He has over 28 years’ experience working with various international organisations and universities in the areas of agricultural research, development, education, and integrated natural resources management. He has published 85 refereed publications (62 journal articles and 23 book chapters) and is a fellow of the Zimbabwe Academy of Sciences.

**Current Research Interests**  

**Relevance of research**  
His research is important in devising and implementing innovative, science-based technologies for increasing incomes, food security and livelihoods through improving soil fertility and enhancing crop production in the impoverished soils of the low-input, subsistence farming systems, particularly in light of climate change.
Professor UL Opara

**Research Chair:** Postharvest Technology

**Primary discipline:** Agricultural Engineering

**Level of Chair:** Tier 1

**Institution:** Stellenbosch University

**Chair commencement date:** January 2009

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**Biosketch**

Professor Opara is a chartered agricultural engineer and heads a multidisciplinary team at the Postharvest Technology Research Laboratory which he has set up at Stellenbosch University. He completed his degrees in Agricultural Engineering at the University of Nigeria, Nsukka (MEng cum laude) and Massey University, New Zealand (PhD). He was a member of the management committee of the Centre for Postharvest and Refrigeration Research, foundation Programme Director for Engineering Technology in the Institute of Technology and Engineering at Massey University, and also served on the University Governing Council. He established a research and education programme in postharvest technology at Sultan Qaboos University in the Sultanate of Oman, where he was also Director of the Agriculture Experiment Station and Vice Dean for Postgraduate Studies and Research.

He is a highly sought-after keynote speaker on postharvest technology and innovation for agricultural development and food security, providing expert advice to leading international agricultural development organisations and global food chains, and has travelled extensively in Africa, Asia, Australasia and the Middle East. Professor Opara serves on the advisory and executive boards of several international scientific and non-governmental organisations, including the International Commission on Agricultural and Biosystems Engineering. He is a Visiting Professor of Agricultural and Bioresources Engineering at the University of Nigeria, Nsukka, and founding editor-in-chief of the *International Journal of Postharvest Technology and Innovation*.

**Current research interests**

His research combines engineering expertise with in-depth knowledge of agricultural production and post-production practices to develop novel postharvest technologies to maintain quality and safety, and reduce postharvest losses and food waste. Current research focuses on the development and application of (a) computational mathematical modelling to improve design and management of the cold chain, especially fruit packaging; (b) non-destructive tools to detect, measure, monitor and predict external and internal quality of fruit, including defects and disorders; and (c) scientific tools to quantify and reduce postharvest food losses and waste. Building local research capacity and expertise, including hands-on mentoring, is a central part of these research programmes.

**Relevance of research**

The global fresh food industry is highly competitive and requires the deployment of cost-effective and resource-efficient postharvest technologies to retain existing markets and to access new ones. In addition to meeting domestic demand, the South African horticultural industry is highly export-driven and our producers are particularly disadvantaged by long supply chains between the points of production and overseas markets, which predispose fresh produce to quality degradation and loss of value. It is therefore important that research is continuously undertaken to develop and adapt innovative cold chain technologies for better product handling to maintain quality and reduce losses and waste along the supply chain.

In collaboration with fruit industry grower organisations and the South African Postharvest Innovation Programme, the group is developing design blueprints for the “Packaging of the Future”, and with support from Citrogold SA Ltd and SA Perishable Products Export Control Board the group has developed guidelines for maturity indexing, storage and modified atmosphere packaging of pomegranates, which is a rapidly emerging high-value new fruit sector.
Professor FF Bauer

**Research Chair:** Integrated Wine Sciences  
**Primary discipline:** Biotechnology  
**Level of Chair:** Tier 1  
**Institution:** Stellenbosch University  
**Chair commencement date:** March 2013  
**Website:** www.sun.ac.za/wine_biotechnology

### Biosketch
Professor Bauer has focused most of his scientific career, which started with a PhD in Bordeaux (France) in 1992, on investigating the unicellular eukaryotic model system *Saccharomyces cerevisiae*. This yeast can indeed lay claim to being the scientifically best understood of all eukaryotic living systems, and has been at the forefront of many discoveries of scientific, medical and biotechnological importance. His past research has focused on applying molecular biology and functional genomics approaches to better understand fundamental aspects of cellular and molecular biology such as a cell's ability to sense the extracellular environment, the mechanisms of intracellular signal transduction and the genetic regulation of complex phenotypes. In the past decade, his research has turned more towards using the insights generated in such fundamental projects to better understand and control biotechnologically relevant phenotypes such as cell wall adhesion, wine aroma production and the role of carnitine in eukaryotic organisms.

### Current research interests
Professor Bauer's current research is part of an integrated approach to wine science that combines skills in molecular, cellular and systems biology with the traditional wine sciences of oenology and viticulture, as well as analytical chemistry, sensory science and multivariate data analysis. Beyond his continued focus on *Saccharomyces cerevisiae*, which now includes the investigation of transcription factor networks and the control of metabolic flux, his recent work has been directed towards a better understanding of wine: associated microbial biodiversity, the complex relationship between nutrients and aroma production, the interaction between different species of microorganisms, and the application of systems biology tools to multi-species cultures.

### Relevance of research
Professor Bauer's research attempts to balance fundamental interests in topics such as the molecular role of carnitine in eukaryotic cells or the impact of transcription factor networks on aroma production, with directly applicable, biotechnological approaches such as a better exploitation of natural biodiversity and of metabolic networks to produce desirable metabolites or to adjust cell wall-related properties. The fundamental projects aim at providing a basic understanding of relevant molecular and cellular processes, and are part of the global scientific drive to fully characterise and understand living systems. The biotechnological projects, on the other hand, all focus on wine-industry relevant targets such as improving the processing of wines and on helping the South African and global wine industries to produce wines of better quality.
Professor NC Bennett

**Research Chair:** Mammal Behavioural Ecology and Physiology  
**Primary discipline:** Biological Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Pretoria  
**Chair commencement date:** September 2007  
**Website:** www.up.ac.za/zoology

**Biosketch**
Professor Bennett completed his PhD in Zoology at the University of Cape Town and holds the Austin Roberts Chair of Mammalogy at the University of Pretoria. He was previously the president of the Zoological Society of southern Africa and holds the gold medal for outstanding research. He's a Fellow of the Zoological Society of London as well as the Royal Society of South Africa. The University of Pretoria awarded him the Chancellor’s Medal twice and on five occasions he has been recognised with an Exceptional Academic Achievement Award. Recently he was awarded the Havenga Prize from the Academy of Arts and Sciences.

He has an NRF A-rating for his research and has published 225 peer-reviewed scientific papers, 10 book chapters and co-authored one specialist book published by the University of Cambridge. The University of London awarded him a Visiting Professor status, he has an H-index of 31 and his work has been cited in literature numerous times. He is editor-in-chief of the *Journal of Zoology* (London) and the editor of *Biology Letters* and was previously the editor of *Proceedings of the Royal Society of London (Biological Sciences).*

**Current research interests**
His research uses small African mammals, and mole-rats in particular, as models to investigate a number of research avenues that are at the cutting edge of scientific scrutiny, namely:
- Mechanisms of reproductive suppression in social mammals;
- Extra-pair paternity and the prevalence of such a reproductive strategy in reported monogamous mating systems;
- Use of microphthalmic animals as models for investigating circadian rhythmicity;
- Early gene expression in the suprachiasmatic nucleus; and
- Use of molecular techniques to answer population level questions on the composition and structure of representative small mammal population.

**Relevance of research**
The research undertaken by Professor Bennett and his team has far-reaching implications. Much of it is at the cutting edge of scientific thinking in the zoological world and is important from a point of academic excellence, making inroads into several areas of research considered as hot topics in Biology. He is also training students in a number of scarce skills that are currently under-represented in South Africa. The research relevance can be seen by the quality of the scientific journals in which the group publishes. It is high quality and concentrates on topics of great importance in the field of Zoology specifically and Biology generally.
**Professor S Compton**

- **Research Chair:** Insects in Sustainable Agricultural Ecosystems
- **Primary discipline:** Biological Sciences
- **Level of Chair:** Tier 1
- **Institution:** Rhodes University
- **Chair commencement date:** August 2013

**Biosketch**

Professor Compton is a BSc (Zoology) and PhD (Genetics) graduate from Hull University (UK), who lectured at Rhodes University between 1995 and 2002, before joining the University of Leeds. He has field experience in several European, African and Asian countries.

**Current research interests**

Plant-animal interactions, especially in the tropics and sub-tropics, with particular interests in specialised pollination systems, insects associated with fruits, parasitoids and biological control.

**Relevance of research**

Insects include many important pest species, but are also valuable tools for pure and applied research.
Professor FD Dakora

Research Chair: Agrochemurgy and Plant Symbioses  
Primary discipline: Biological Sciences  
Level of Chair: Tier 1  
Institution: Tshwane University of Technology  
Chair commencement date: January 2007

Biosketch
Professor Dakora completed his PhD degree in Botany in 1989 at the University of Western Australia. He works on biological nitrogen fixation (BNF) with a focus on the plant, the interaction between microbe and host plant, as well as the microsymbiont itself. The approaches used in BNF studies include microscopy (light, scanning and electron microscopy); analysis of natural isotopes of N, C, and O (i.e. \( ^{15}\)N, \( ^{13}\)C and \( ^{18}\)O); measurement of mineral density in plant tissues using inductively coupled plasma-mass spectrometry; tissue mineral distribution using particle induced X-ray emission and backscattering spectroscopy (in collaboration with iTHEMBA Labs at Somerset West); assays of N and P metabolic enzymes in tissues and plant rhizosphere; field measurements of nitrogen fixation; and estimates of symbiotic N benefits in cropping systems.

He has an NRF B2-rating, has been widely published in many international scientific journals with over 85 peer-reviewed journal articles, 12 book chapters and nine peer-reviewed conference proceedings. He is also the editor of a book published by Springer entitled: Biological Nitrogen Fixation: Towards Poverty Alleviation through Sustainable Agriculture.

Current research interests
His research specifically relates to the following two Tshwane University of Technology Research and Innovation niche areas:

- Extraction processes, which investigate chemical extraction processes related to natural products; and
- Smallholder agriculture and organic farming, which aims to improve the livelihoods of South Africans.

Relevance of research
His research is directly relevant to agriculture. The quantification of biologically-fixed N can allow for the selection of legumes with high symbiotic performance for use as biofertilisers in cropping systems. Food crops can as a result be produced sustainably, without the use of expensive chemical fertilisers, which pollute the environment. Similarly, high protein legumes can be selected as forage or feed for livestock and wildlife. The programme on macronutrients and trace elements is pivotal to identifying food crops that are efficient at increasing micronutrient density in edible plant parts (i.e. biofortification) as opposed to the current conventional approach of supplementing foods (e.g. mealie-meal) with exogenous trace elements such as selenium, iron, and zinc. Additionally, data from studies of natural isotopes of N, C, O and H in plants have relevance to climate change, in that they can be used as predictors of the effect of climate change in natural ecosystems. The group is also currently assessing microsymbiont biodiversity in native and agricultural legumes. This has the potential to identify \( N_2 \)-fixing rhizobial bacteria that can be used as inoculants in agricultural setting.
**Professor HW Dirr**

- **Research Chair:** Protein Biochemistry and Structural Biology
- **Primary discipline:** Biological Sciences
- **Level of Chair:** Tier 1
- **Institution:** University of the Witwatersrand
- **Chair commencement date:** August 2007

**Biosketch**
Professor Dirr is the Director of the URC Protein Structure-Function Research Unit in the School of Molecular and Cell Biology at the University of the Witwatersrand (Wits). He completed his PhD in Biochemistry at Rand Afrikaans University (now known as the University of Johannesburg) in 1986 and from 1989-1990 he did a postdoctorate as an Alexander von Humboldt Fellow with Nobel laureate Professor Robert Huber. He was formerly a Professor and Head of the Department of Biochemistry at Wits until 1998. He has received a number of research grants, fellowships and awards, which include the Mellon Postgraduate Mentoring Award. He enjoys considerable international recognition for the high quality and impact of his research outputs, and acts as a reviewer for papers submitted to leading international scientific journals in the field of Biochemistry.

**Current research interests**
Genomes are powerful in that they carry the genetic information governing structures, functions and behaviour of cellular systems. On the other hand, proteomes (the protein complement of the cell) function as the three-dimensional expressions of the genome. Most cellular transactions are mediated and regulated by proteins through highly specific molecular recognition events, determined by their three-dimensional shapes. Proteins form the very basis of life and an understanding of their structure and function is therefore necessary to understand how life works, which forms the basis of the research focus of this Chair. A multidisciplinary approach that relies on the principles and methodologies of Biochemistry, Biophysics, Molecular and Structural Biology, and Bioinformatics is used. The availability of high-resolution structural information about biological systems provides insight into mechanisms, resulting in a more profound understanding of how biological function follows from structure. At Wits these three-dimensional structures are determined by X-ray crystallographic methods.

**Relevance of research**
Given the wide range of applications of proteins, an understanding of protein structure and function is not only of fundamental scientific interest, but also of tremendous value in the areas of biotechnology, health, commercial products, agriculture and the environment. A notable example is the application of protein research in the discovery and design of drugs.
Professor RA Dorrington

**Research Chair:** Marine Natural Products Research  
**Primary discipline:** Biological Sciences  
**Level of Chair:** Tier 2  
**Institution:** Rhodes University  
**Chair commencement date:** January 2014  
**Website/blog:** [http://www.rhodes.ac.za/biology/people/staff/dorrington/](http://www.rhodes.ac.za/biology/people/staff/dorrington/)

**Biosketch**
Rosemary Dorrington matriculated with distinction at St Cyprians School, Cape Town, after which she completed a BSc (Agric) majoring in Horticulture and Genetics at Stellenbosch University. She then moved to the University of Cape Town where she obtained her PhD in Microbiology in 1990. After three years as a Postdoctoral Fellow at the University of Tennessee, Memphis, USA, she was appointed as a lecturer in Microbiology at Rhodes University and promoted to full Professor in the Department of Biochemistry, Microbiology and Biotechnology in 2008. She served as Head of the Department from 2004-2009 and as Deputy Dean of the Faculty of Science from 2008-2011. During 2003-2004 Professor Dorrington was a Fulbright Visiting Scholar at the University of Alabama, Birmingham, USA. Professor Dorrington has led several large, multidisciplinary research programmes, including the South African Coelacanth Genome Sequencing Initiative and her research has been published in international peer-reviewed journals. Most notably she co-authored the recently published article on the coelacanth genome in *Nature*. Professor Dorrington has worked in Biotechnology commercialisation leading research programmes funded by national and international industry and serving as a member of the Board of Trustees of the LIFELab Biotechnology Regional Innovation Centre.

**Current Research Interests**
Professor Dorrington’s research forms part of a multidisciplinary programme to study the role of the microbiota (focusing on bacteria and viruses) in ecosystem functioning. The research programme is built around the application of metagenomics technologies to characterise microbial diversity and metabolic activity in aquatic and terrestrial ecosystems and their response to global change. In particular the interest is in studying specialised microbial symbionts associated with indigenous marine sponges and other invertebrates that produce bioactive compounds with pharmaceutical potential. The research aims to exploit the potential of these natural biosynthetic pathways as a platform for drug discovery.

**Relevance of research**
Globally, marine organisms are recognised as an important source of new bioactive compounds with potential pharmaceutical and other economically important applications. Over the past 30 years, marine organisms, and in particular invertebrates (sponges and ascidians), have been a rich source for the isolation and characterisation of novel marine natural products. A significant number of these compounds have potential applications either directly or as lead compounds in the pharmaceutical industry. South Africa is surrounded by diverse marine environments, rich in unique indigenous organisms with incredible potential to provide novel natural products. The aim of this research programme is to develop a multidisciplinary research platform in marine biodiscovery and fundamental studies on the functioning of our marine ecosystems.
Professor L Hoffman

Research Chair: Meat Science: Genomics to Nutrinomics
Primary discipline: Biological Sciences
Level of Chair: Tier 1
Institution: Stellenbosch University
Chair commencement date: January 2013

Biosketch
Professor Hoffman was born on a cattle and pig ranch in Zimbabwe. In 1984 he received a BSc in Animal Science at Stellenbosch University and in 1985 a BSc Hons *cum laude* and in 1987 a Master’s in Meat Science (*cum laude*) at the same university. In 1995 he received a PhD on “Factors influencing the meat quality of catfish”. During this period of working as a researcher in Aquaculture at the University of Limpopo, he published 38 peer-reviewed scientific papers. In 1997 he returned to Stellenbosch University as the resident Meat Scientist. Since 2000, he has published over 160 peer-reviewed meat-related papers and has attended and read papers at numerous international and national conferences. Fifty-five MSc students have completed their studies under his supervision. In 2004 his institution recognised his contribution to research by awarding him with the Stellenbosch University’s Prestige Research Award. Similarly, in April 2006 the South African Society for Animal Scientists recognised his contribution to furthering the animal science discipline by awarding him their Silver Medallion. In 2010 his research contribution in the discipline of exotic meats was recognised by the University of Western Australia (Perth) when they invited him to present a public lecture on this topic during the prestigious Hector and Andrew Stewart Memorial Lecture. In 2012 he was awarded a visiting professorship under the Cariparo programme of Padova University. He spent three months at this institution teaching PhD students. In 2013 his research on game meat and its contribution to international knowledge was recognised when the American Meat Science Association awarded him the AMSA International Lectureship Award. This award was established to honour an individual for “internationally recognised contributions to the field of Meat Science and Technology, active leadership and promotion of international activities that foster cooperation and open communication, and the dissemination of knowledge for the benefit of society through Meat Science and Technology”.

Current research interests
His major research focus is on the more exotic meat types produced from low-input agricultural systems such as ostriches and wild ungulates found in Africa. His research evaluates the various factors influencing the meat quality of animals “from stable to table”.

Relevance of research
His research is of a practical nature and is of value to the growing game and ostrich industries to ensure that a quality product fit for human consumption is produced (the relevance of his research to the South African consumer is clearly illustrated by his results on the mislabelling of species – donkey and water buffalo – which were published widely in the popular press).
Professor DS Jacobs

**Research Chair:** Evolutionary Biology and Biosystematics  
**Primary discipline:** Biological Sciences  
**Level of Chair:** Tier 2  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2008

**Biosketch**
Professor Jacobs completed a PhD in Zoology at the University of Hawaii, where he completed a thesis entitled “Character release in the endangered Hawaiian hoary bat, *Lasiurus cinereus semotus*”. He has worked at the University of Cape Town (UCT) since 1994, and his main research interests include all aspects of evolutionary biology. He has conducted research all around the world, including Australia, Costa Rica, Belize, Israel, Canada, Namibia, Botswana, Zambia and Zimbabwe. Many of his students have won prestigious awards (such as the Purcell Memorial Award for the best PhD thesis and SA Association for the Advancement of Science – S2A3 Bronze Medal for the best MSc thesis) and he has supervised more than 20 postgraduate degrees. His undergraduate course, designed and convened by him, has also won the Centre for Higher Education’s Award (UCT) for collaborative teaching. He has published more than 50 articles in high-impact journals.

**Current research interests**
He uses a range of molecular and field-based approaches to investigate the processes responsible for the rich diversity of life. This research thus entails several aspects of evolution, including organismal adaptation, biosystematics, comparative phylogeography and evolutionary development.

Field-based techniques are used to determine how animals have become adapted to the physical and biological elements of the environment incorporating studies on all aspects of phenotypic (i.e. morphological, behavioural and sensory) adaptation. He uses lab-based molecular techniques to understand the evolutionary relationships between animals, which is in turn used as a basis for his phylogeographic research.

Professor Jacobs collaborates with molecular biologists to understand the genetic basis of limb and sensory development in the hope of identifying the genetic basis of adaptations at the phenotypic level. It is hoped that genetic markers for specific phenotypic traits will be identified so that changes in the frequency of these genes can be used to illuminate how natural selection shapes the phenotype of animals. This research is supplemented by continued research into the natural history and ecology of animals, including studies on foraging ecology, community ecology and landscape ecology.

He is interested in the evolution of mammals and focuses on bats because they make up 25% of mammalian diversity and because there is a close correlation between the phenotype and habitat of bats. They are thus ideal for the study of adaptation and other evolutionary processes. One cannot understand mammalian biology without knowledge of how and why bats do what they do.

**Relevance of research**
This research provides a greater understanding of the origins of biodiversity and the evolutionary processes responsible for that diversity. It will also generate knowledge of mammalian biology (including that of humans) and the genetic basis of the mammalian phenotype, as well as contribute to our understanding of phenotypic anomalies in humans (such as dwarfism). Professor Jacobs regularly gives talks at secondary and tertiary education institutions on how evolutionary theory can be used to understand human biology and behaviour.
**Biosketch**
Professor Johnson works for the School of Life Sciences at the University of KwaZulu-Natal, Pietermaritzburg. In 1994, he completed his PhD on the pollination of plants in the Cape flora, obtained from the University of Cape Town. In 1999 he received the NRF President’s Award and currently holds an NRF A2-rating. He has published more than 230 peer-reviewed scientific papers, co-authored books on the natural history of Table Mountain and South African orchids, and has also written many popular science articles. He is currently on the editorial boards of two international journals, *Oecologia* and *Arthropod-Plant Interactions*, and in 2009 was guest editor for a special issue of the *South African Journal of Botany*.

**Current research interests**
He is a leading specialist in the field of plant pollination biology. His research is aimed at understanding the evolutionary diversification of plants, particularly in southern Africa, the conservation of plant-pollinator mutualisms, and the reproductive biology of invasive species. He developed a keen interest in the role of floral volatiles in mediating specialised plant-pollinator interactions, and established a state-of-the-art laboratory for the study of chemical cues used by plants to attract insect pollinators.

**Relevance of research**
The Research Chair strengthens the field of evolutionary biology, which is pivotal for understanding and conserving the rich biodiversity in southern Africa. The research is also important for ecology because many animals use flowers for food, and because pollination is essential for seed production by almost all plants. Pollination research is also important in the applied sciences of Forestry and Agriculture.
**Professor JM Kossmann**

- **Research Chair:** Genetic Tailoring of Biopolymers
- **Primary discipline:** Bio-engineering
- **Level of Chair:** Tier 1
- **Institution:** Stellenbosch University
- **Chair commencement date:** January 2007
- **Website:** academic.sun.ac.za/ipb/staff.html

**Biosketch**

Professor Kossmann is a former Head of Department at Risoe National Laboratory, a prestigious research organisation in Denmark. He is a co-inventor on more than 20 patent applications and co-author of more than 70 articles in journals, which had a high impact in the fields of carbohydrate partitioning in plants and in biopolymer engineering. He has managed to establish strong collaborative links with several leading international scientists in his field at the Max-Planck Institute of Molecular Plant Physiology (Germany); the Universities of Erlangen and Potsdam (Germany); the ETH Zurich (Switzerland); the Wageningen University and Research Centre (Netherlands); as well as relevant experts from academic institutions in Denmark that are members of the consortium Plant Biotech Denmark. From 2004 to present, he has been a member of the Biotechnology Committee of Winetech, the funding body of the South African wine industry. He has had collaborations with many different industries because his research is always at the interface between basic and applied Science.

**Current research interests**

His major research interests include plant metabolic engineering, the elucidation of biochemical pathways for biopolymer biosynthesis to enable their production in fermenters and crops, and the study of plant growth.

In the area of plant metabolic engineering he is trying to understand and positively influence carbohydrate partitioning to generate crops that either accumulate more starch or sucrose. In addition he is trying to modify plant biomass to make it more readily fermentable for biofuel production.

He has applied functional screens of DNA, genomic and metagenomic libraries from a range of species and diverse ecological niche areas, in the field of gene discovery for biopolymer production. This enables us to produce novel biopolymers with an array of potential applications.

A chemical genetic approach is being applied to further our understanding of plant growth to develop genetic markers for breeding more productive crops under low-input conditions. Using plant growth-promoting compounds we are trying to identify genes that respond to increased growth.

**Relevance of research**

In collaboration with the South African Sugar Association, the group has developed transgenic sugarcane lines that accumulate more sucrose. This technology was licensed to a global player in the agro-industry and will be commercialised if it performs under various environmental conditions. Many of our other projects are aiming at producing novel renewable resources for industrial application.
Biological Sciences

Professor MNB Momba

Research Chair: Water Quality and Wastewater Management
Primary discipline: Microbiology
Level of Chair: Tier 2
Institution: Tshwane University of Technology
Chair commencement date: April 2014

Biosketch
Professor Momba holds a BA degree in Education, BSc Honours and MSc degrees in Biology, and MSc and PhD degrees in Microbiology. Professor Momba conducts research activities on various aspects of water with drinking water purification and wastewater management, health-related water microbiology and bioremediation. After 27 years of specialising in the field of water research, she is a National Research Foundation (NRF) C2 Rated Scientist.

Professor Momba has over 160 publications. Her research achievements have led to an international award for Outstanding Community Support in 2004, a South African Women in Water Award and a Vice-Chancellor’s Senior Research Medal in 2005, a Woman Researcher of the Year in 2008 and 2011, Vice-Chancellor Female Senior Research of the year in 2012 and Institutional Innovator of year in 2012. These awards elevated her status in water research in South Africa and beyond.

Professor Momba is a member of no fewer than 13 national and international scientific committees, among others, Water Research Commission steering committees, the Water Institute of South Africa, the editorial board of Water SA, the International Water Association, the DNA Bar-coding of Life Committee, and reviewer of about seven refereed journals.

Current research interests
The Research Chair in Water Quality and Wastewater Management contributes to an integrated management approach of water and wastewater. Its research activities centre on:
- Municipal water and wastewater treatment (biological and chemical treatment or combination of both);
- Industrial wastewater treatment (bioremediation) and pollution preventive measures;
- Cost-effective strategies to secure adequate clean and safe drinking water to communities;
- Water hygiene and sanitation and water quality management;
- Water resources management and governance;
- Capacity building and technology transfer; and
- Social acceptance factors and strategies for the adoption of appropriate technologies.

Relevance of research
With just over 1 000 m$^3$ of freshwater available for each person per year for a population of around 49.99 million, South Africa is a severe water-scarce country. The country is currently facing formidable challenges in meeting the rising demand for clean water as available sources of freshwater are decreasing due to extensive industrialisation, increasing population density and a high level of urbanisation. There is a need for an integrated water resources perspective ensuring that social, economic, environmental and technical dimensions are taken into account in the management and development of water resources. The Chair in Water therefore focuses on a number of technologies to counteract pollution of water resources and to produce safe drinking water.
Professor M Ramsay

Research Chair: Bioinformatics of African Populations
Primary discipline: Human Genetics and Genomics
Level of Chair: Tier 1
Institution: University of the Witwatersrand
Chair commencement date: April 2014
Website/blog: www.wits.ac.za/research/sbimb

Biosketch
Professor Ramsay is Interim Director of the Sydney Brenner Institute for Molecular Bioscience (SBIMB) – one of the Wits 21st Century Research Institutes – and Professor in the Division of Human Genetics, National Health Laboratory Service and University of the Witwatersrand (Wits). Her interests in bioinformatics go back to 1997. She chaired the Wits Bioinformatics Steering Group (2005 to 2013) and is the current Acting Director. She was chair of the Southern African Society for Human Genetics from 2009 to 2013, and is joint-PI of the Southern African Human Genome Programme, a national initiative funded by the Department of Science and Technology. Professor Ramsay is PI and co-PI of two NIH-funded studies that aim to promote research into non-communicable diseases among African populations: a Human Heredity and Health in Africa (H3Africa) Collaborative Centre called AWI-Gen (Africa Wits-INDEPTH partnership to study genomic and environmental risk factors for cardiometabolic diseases in Africans), and the Fogarty-funded “Wits Non-Communicable Disease Research Leadership Training Programme”. Postgraduate student supervision and mentorship from honours to doctoral level and hosting of Postdoctoral fellows are an important part of her career. Professor Ramsay is joint editor and author of a textbook, Molecular Medicine for Clinicians. At Wits, she is joint champion of the cross-faculty Molecular Biosciences Research Thrust.

Current research interests
The research focus is to identify, analyse and explore patterns of genetic diversity among African populations to contribute to a better understanding of susceptibility to diseases in changing environments and lifestyles. This is achieved by mining genomic data to explore signatures of past influences that have shaped patterns of variation across sub-Saharan Africa and to study their impact on health and disease. Specific research interests include studies on genomic architecture in African populations, investigating the genetic and environmental contributions to rising levels of obesity, hypertension and diabetes, and genetic studies on HIV-related kidney disease and ophthalmological traits, including glaucoma.

Relevance of research
The dearth of genomic studies on African populations heightens their relevance in a global context. Complicating this research is the high genetic diversity and complex population structure among the people of the Continent. This, however, offers a unique opportunity to identify disease-causing or disease-associated variants. The field of health-related genomics is young, providing excellent opportunities to develop novel and innovative approaches to improve our understanding of the relationship between genetic variation and the influence of the environment on gene expression and behaviour. Opportunities to study African populations from a cross-disciplinary perspective herald a fascinating range of possibilities toward making an impact on the health of the peoples of sub-Saharan Africa.
### Professor C Shakleton

**Research Chair:** Interdisciplinary Science in Land and Natural Resource Use for Sustainable Livelihoods  
**Primary discipline:** Biological Sciences  
**Level of Chair:** Tier 1  
**Institution:** Rhodes University  
**Chair commencement date:** January 2013  
**Website:** [www.ru.ac.za/static/departments/environsci/](http://www.ru.ac.za/static/departments/environsci/)

### Biosketch

Professor Shakleton is Professor in Environmental Science at Rhodes University, where he has been based since mid-2000. He obtained his PhD through the University of the Witwatersrand (Wits) in 1997 on growth dynamics and models of savanna trees. He has previously held positions at CSIR, provincial government, the Rural Facility of Wits, and the Walter Sisulu University. Professor Shakleton has supervised or co-supervised 10 PhD and 38 Master's students. He has over 160 peer-reviewed journal papers to his name, six books and 31 book chapters and has acted as a referee for over 50 national and international journals. He is an associate editor of two journals: *Environmental Conservation* and *African Journal of Range and Forage Science*, and serves on the editorial board of *Environmental Planning and Management*.

### Current research interests

Professor Shakleton's broad research interests centre on the links between landscapes, biological resources and peoples' uses thereof. Trained as a plant ecologist he soon broadened his perspective to include social and resource valuation perspectives on how biological resources are used or abused, and how, in turn, resource supply enhances or constrains local livelihoods options and peoples' well-being. Professor Shakleton has extensive field research experience in interdisciplinary projects in rural areas of South Africa, and over the past few years has begun to apply these models and lessons to urban systems as well, which is underpinning his growing interest in urban forestry. He continues work on the ecology of individual plant species, typically those used by local people, including fuelwood, wild fruits, weaving fibres and vegetable species, and includes both indigenous and alien species.

### Relevance of research

Natural biological products underpin the sustainability of rural livelihoods in South and southern Africa as well as in other developing nations. Such use of natural biological products mitigates rural poverty levels for millions, and under the right circumstances and policy environments, can alleviate poverty for meaningful proportions of the rural and urban poor. Yet, these products are frequently invisible to developers and planners, and hence to national policies. This needs to be addressed if livelihoods are to be secured, poverty reduced and natural resources maintained. The focus of the Chair will be interdisciplinary research and human capacity development on the complex social, economic and ecological links among land, natural biological resources, and human well-being for sustainable livelihoods and poverty mitigation and alleviation. In essence it will grapple with the questions and methodological approaches around the policy, socio-economic and bio-physical contexts and situations and scales under which natural biological resources or land can contribute to or secure sustainable livelihoods, poverty reduction and greater equity, and to interrogate and expose the means of doing so in an ever-changing socio-economic environment. While the focus will be on rural areas this will not be exclusive, as natural resource use remains extensive among urban populations, especially the poor. The Chair speaks directly to a number of national priorities as articulated in the MTSF, National R&D strategy and the DST Ten-year Plan. Strategic priorities identified by the MTSF to which the Chair has relevance include rural development, land reform, food security, ecological sustainability, sustainable livelihoods and poverty reduction, which were also among several of the key issues and drivers under the South African Scenarios 2025 process. They are also well embedded in the international Millennium Development Goals (MDGs) with their associated targets and indicators. The National R&D strategy emphasises the importance of Science for poverty reduction, as well as to harness the “value” of biological resources.
Professor JL Snoep

**Research Chair:** Mechanistic modelling of health and epidemiology  
**Primary discipline:** Biological Sciences  
**Level of Chair:** Tier 1  
**Institution:** Stellenbosch University  
**Chair commencement date:** January 2013  
**Website:** www.uj.ac.za

**Biosketch**
Professor Snoep was trained in quantitative experimental biochemistry and microbiology and focused on linking enzyme kinetic mechanisms to physiological responses during his PhD. As a postdoctoral fellow he started working with mathematical modelling frameworks to integrate enzyme kinetics into reaction networks and quantifying the contribution of the individual characteristics to systems behaviour. Professor Snoep has 20 years’ experience of running an experimental lab with a strong mathematical analysis of the experimental results and in developing theoretical frameworks for biochemical reaction networks. For the last five years he has also been involved in data and model management of large systems biology networks and has expert knowledge of managing larger scientific projects. With the start of the SARChI project his research focus has shifted more to health-related topics where he used detailed mathematical models of biochemical processes to study whole-body disease states and aims to extend these models to the epidemiological level.

**Current research interests**
Professor Snoep's main research interests within the SARChI project are:
- Whole-body modelling of glucose metabolism in malaria patients. We have constructed detailed kinetic models for glucose metabolism of *Plasmodium falciparum* and are extending the model to simulate glucose metabolism in the infected host;
- Modelling of pathogenesis and epidemiology of HIV/AIDS. We are setting up a database with mathematical models for HIV/AIDS;
- Metabolic side-effects of ART treatment in HIV-positive people; and
- Type II diabetes. We try to establish the key changes in signal transduction pathways while the disease develops.

**Relevance of research**
The SARChI project will enhance the predictive power in scenario modelling approaches for infectious disease epidemiology. By using more mechanistic models with a stronger biological content, the predictive power of these models will be greater than that of the currently used phenomenological models. The framework will ultimately integrate detailed biochemical knowledge of disease with the higher level of population dynamics, to predict the effect of specific interventions; at the whole-body level for individual health, and at the population level for public health. The research undertaken by the Chair will significantly strengthen the mandate of SACEMA by merging the biostatistics and population dynamics approaches with a strong programme at the biological level through experimental, software engineering, and mathematical modelling components.
Professor P Taylor

**Research Chair:** Biodiversity Value and Change in the Vhembe Biosphere Reserve  
**Primary discipline:** Biological Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Venda  
**Chair commencement date:** September 2013  
**Website/blog:** www.univen.ac.za

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**Biosketch**

Professor Taylor is an NRF B2-rated zoologist who holds a BSc Hons in Zoology from the University of Cape Town (1984) and a PhD from the University of KwaZulu-Natal (1991). He has authored more than 110 peer-reviewed journal articles, books and book chapters. While employed by the Durban Natural Science Museum as Curator of Mammals from 1989 to 2010 (including 11 months as Acting Director), he specialised in the systematics, ecology and conservation of small mammals, describing several new species to Science. He has received invitations and grants to pursue sabbatical research at the National Museum of Natural History in Paris (2000, 2001, and 2013) and the Smithsonian Museum of Natural History (2006).

Professor Taylor is the Immediate Past President of the Zoological Society of Southern Africa, a past Director on the Board of Directors of the International Federation of Mammalogists, and a Core Team Member of the Centre for Invasion Biology. Since 2010 he has been a Professor at the University of Venda, first in the School of Environmental Sciences, and, since September 2013, as the SARChI Chair on Biodiversity Value and Change in the Vhembe Biosphere Reserve.

**Current research interests**

Recent research interests developed at the University of Venda include community ecology, macroecology, agroecology, conservation and pest management of small mammals (bats, rodents and shrews) in both natural and agro-ecosystems, focussing on the Vhembe Biosphere Reserve of northern Limpopo Province. Ongoing studies include ecologically-based rodent management, ecosystem services (crop pest control) of bats in subtropical fruit orchards, mammalian ecological indicators in dry land rangelands and the use of ecological niche-models to predict climate change impacts on Afro-montane small mammals.

**Relevance of research**

Systematics forms the basis of all pure and applied biodiversity science, as explicitly recognised in SANBI’s Foundational Biodiversity Information Programme. Working on a strong foundation of good systematics, the role of small mammals as important ecological indicators (of climate change, land use change and habitat degradation) and ecosystem providers (for example, the insect pest control services of bats) in both natural and human-modified ecosystems is being increasingly recognised both globally as well as locally. Research under the University of Venda’s SARChI Biodiversity Chair will demonstrate the importance of biodiversity in a broader social and environmental context in a highly biodiverse but vulnerable environment centred on the Soutpansberg Mountains of the Vhembe Biosphere Reserve of northern Limpopo. The research will support and directly contribute to conservation planning at the scale of the Biosphere Reserve and Limpopo Province.
Associate Professor M Tuffin

Research Chair: Microbial Genomics
Primary discipline: Biological Sciences
Level of Chair: Tier 2
Institution: University of the Western Cape
Chair commencement date: January 2014
Website/blog: www.imbm.co.za

Biosketch
Associate Professor Tuffin trained as a molecular microbiologist, obtaining her Doctorate in 2003 at the University of Cape Town (UCT). After two postdoctoral tenures, she was appointed as the Deputy Director of IMBM, UWC in 2009 at Senior Lecturer level. She began establishing an independent research group in addition to managing, developing and leading the Institute, and also contributed to the undergraduate teaching of the Department of Biotechnology. She was promoted to Associate Professor in 2012, and in the same year took over leadership of the Institute as the Acting Director. Associate Professor Tuffin additionally oversees the management of the Next Generation Sequencing Facility. She has graduated over 20 MSc and PhD students in the last five years, and has published over 45 research papers, reviews and book chapters. She was elected Vice President of the South African Society of Microbiology, and is a committee representative of the Royal Society of South Africa (Western Cape Branch). Associate Professor Tuffin’s multidisciplinary research aims to develop biotechnologies from bacteria and their associated viruses and it encompasses metagenomics, applied microbiology, genomics, and marine and industrial biotechnology. The source of novel organisms and bioactivities are “extreme” environments and the “home-grown” biodiversity; South Africa’s ecosystems support astounding microbial diversity and endemism to be tapped into.

Current research interests
Micro-organisms are a significant resource for novel enzymes, biocatalysts and biologically active compounds. The traditional route of enzyme or product discovery is dependent on the cultivation of a micro-organism containing the activity of interest. However, only a minority of micro-organisms living in any given habitat is cultivable. This has stimulated the development of metagenomics and high throughput technologies. Metagenomics, the major research focus of this Research Chair, facilitates the direct access of all microbial genomes in any given environment, presenting infinite bioprospecting possibilities. Innovative and sophisticated approaches are being developed in this programme to overcome the current limitations associated with metagenomics, so as to accelerate the discovery of novel microbial-derived products.

Relevance of research
Microbial biotechnology, simply put, is a technology that uses micro-organisms to make innovative products that improve our lives. The research activities are focused on developing a service or a product for the healthcare, agriculture, renewable energies, dairy and chemical industries. Some of the examples include:
- Discovering and developing novel drugs from marine environments to treat a variety of diseases, including HIV, TB, malaria, cancer, central nervous diseases, inflammation and bacterial infections;
- Identifying sorghum-associated endophytes for crop improvement;
- Converting lignocellulosic biomass into different value-added products, including biofuels and fine chemicals;
- Identifying microbial bio-indicators to assess the effects of climate change and environmental impacts; and
- Developing phage-resistant organisms to improve fermentation-based industries (dairy and biofuels).
Professor B-E van Wyk

Research Chair: Indigenous Plant Use
Primary discipline: Biological Sciences
Level of Chair: Tier 1
Institution: University of Johannesburg
Chair commencement date: February 2013
Website: www.uj.ac.za

Biosketch
Professor van Wyk graduated at Stellenbosch University with a BSc in Forestry (1979); BSc Hons cum laude (1981); MSc cum laude (1983) and University of Cape Town (PhD 1989). He received several awards, including the SAAB Silver Medal from the South African Association of Botanists (2007), the University of Johannesburg (UJ) Vice-Chancellor’s Distinguished Award for Researcher of the Year 2008, the UJ Faculty of Science Research Award 2008 and 2011, the 2009 Havenga Prize for Biology and the 2011 medal (Science Faculty) from the South African Academy of Science and Arts. He has lectured in the Department of Botany and Plant Biotechnology, at the University of Johannesburg since 1985, became Professor in 1990 and supervised 18 MSc and 14 PhD students. Research-related activities include Convenor of the NRF Evaluation Assessment Committee for Plant Sciences (1997-1999); Chairman of NRF Indigenous Plant Use Forum (1996-) and organiser of 16 annual conferences; new crop and new product development with SA Druggists (now Aspen Pharmacare, 1993-1999) and the New Drug Development Platform (DTI, 2004-2006); and Member of the Presidential Task Team to develop a national framework policy for African Traditional Medicine in South Africa (2006-2008). He is author or co-author of 16 books, 15 book chapters, 285 research papers in ISI-accredited scientific journals, 95 new plant species and genera and some 300 contributions at national and international conferences.

Current research interests
• Taxonomic studies and revisions: Morphological, anatomical, chemotaxonomic and molecular systematic studies of African Apiaceae, Asphodelaceae, Fabaceae and selected genera from other families.
• Medicinal and toxic plants: Detailed studies of plants that are of commercial and/or forensic interest, including their morphology, anatomy, chemistry, biological activity and traditional uses.
• Ethnobotanical studies: Detailed survey work to document, analyse, and synthesise traditional knowledge on useful plants. Cape Herbal Medicine (of Khoi-San origin) is an urgent priority to ensure the preservation of a unique component of the cultural heritage of South Africa and humanity in general.

Relevance of research
This research field has become a high priority in view of the fragility of oral-traditional knowledge and the rapid loss of indigenous knowledge about plants and their uses. The botanical and cultural diversity of southern Africa provide important scientific opportunities, unique geographical advantages and represent a unique selling point for the country and its people, with important long-term potential to create jobs and enrich the cultural heritage. New knowledge in indigenous plant use has practical relevance in agriculture and rural development (new crops and food security), anthropology (origins of modern humans), ecotourism (increasing need for more sophisticated tourist guides), education (to contribute to the cultural transformation of South Africa), job creation and new product development (especially herbal medicines and functional foods). It also contributes to the development of multidisciplinary and multi-ethnic research capacity.
Biosketch

Professor Viljoen completed a BSc, BSc Hons (cum laude) and MSc (cum laude) in Botany at Stellenbosch University. In 1994 he commenced with a PhD at the University of Johannesburg on the chemotaxonomy of the genus Aloe, which was completed in 1999. In 1999 he was appointed lecturer in Pharmaceutical Chemistry in the Department of Pharmacy, University of the Witwatersrand. In 2002, he was promoted to senior lecturer at the University of the Witwatersrand and in 2005 to Associate Professor at the same institution. In July 2005 he was appointed as a research fellow in the Department of Pharmaceutical Sciences, Tshwane University of Technology, Pretoria.

He has authored/co-authored 165 peer-reviewed papers and supervised 50 postgraduate students working on the topic of phytochemical exploration and biological activity of indigenous medicinal and aromatic plants. Based on research contributions in the field of medicinal and aromatic plants he has been elected to the editorial board of the Journal of Essential Oil Research (Francis & Taylor). He is associate editor of the Journal of Ethnopharmacology (Elsevier) and reviewing-editor for the South African Journal of Botany (Elsevier). In 2013 Professor Viljoen received the SAAB Silver medal for his outstanding contribution to botanical research and in the same year he received the TWAS-ROSSA Award from The World Academy of Sciences for advancing the knowledge on the safe and effective use of herbal medicines.

Current research interest

Although South Africa boasts a tremendous biodiversity, complemented by indigenous knowledge on local plant use, the basic research required to lead to the optimised commercialisation of indigenous resources has remained a neglected research priority. This lack of research partly explains the void in South African-derived commercial products on international markets. Using metabolomics, a holistic, interdisciplinary field of research, medicinal plants will be methodically explored to unravel the complex interactions in biological systems. The success of any phytomedicine hinges on three crucial aspects: quality, safety and efficacy. The Research Chair in Phytomedicine will specifically focus on using state-of-the-art analytical techniques to develop elegant, yet practical methods for the quality assessment of medicinal plants and formulated products.

Relevance of research

Despite its existence and continued use over many centuries, and its popularity and extensive use during the last decade, herbal medicines have not been officially recognised in most countries. Consequently, education, training and research in this area have not been given due attention and support. The quantity and quality of the safety and efficacy data on phytomedicine are far from sufficient to meet the criteria needed to support its use worldwide. This is partly due to a lack of adequate or accepted research methodology for evaluating traditional and herbal medicines. It is envisaged that the Research Chair in Phytomedicine will use modern technology to explore “old wisdom” which will, in turn, add substantial value to help develop some of South Africa’s botanical assets into commercial products and may be instrumental in advancing the socio-economic value of our indigenous resources to the benefit of mankind.
Professor L Barbour

Research Chair: Nanostructural Functional Materials
Primary discipline: Chemistry
Level of Chair: Tier 1
Institution: Stellenbosch University
Chair commencement date: January 2007
Website: /academic.sun.ac.za/chemistry/

Biosketch
Professor Barbour developed an interest in the chemistry of the organic solid-state during his PhD and postdoctoral years. He has an NRF A-rating and heads a Structural Chemistry Laboratory at Stellenbosch University where he continues to explore the structure-function relationships of new materials.

He has a sustainable publishing record with highly prestigious journals and has published over 210 publications, including chapters in books and patents. He has been invited to speak at numerous conferences and maintains research collaborations with other scientists in the UK, USA, India and Australia. In 2007 he received the Rector’s award for outstanding research, in 2007-2008 the National Science and Technology Forum individual Award and in 2008 he became a Fellow of the Royal Society of South Africa.

Current research interests
- Supramolecular chemistry
- Crystal engineering
- Porous crystalline materials
- Solid-solid phase transitions
- Single-crystal and powder X-ray diffraction analysis
- Thermo analytical methods.

Relevance of research
His work is of a fundamental nature and is aimed at furthering general understanding, at the molecular level, of important issues that impact directly on new technologies for a sustainable future. This is relevant to the development of new materials for a cleaner environment.
Professor JR Bunt

**Research Chair:** Coal Research  
**Primary discipline:** Chemical Engineering and Chemical Sciences  
**Level of Chair:** Tier 2  
**Institution:** North-West University  
**Chair commencement date:** July 2013

**Biosketch**
Professor Bunt obtained his PhD in the field of fixed-bed coal gasification at the North-West University (NWU) in 2006. During the last 35 years Professor Bunt's research interests have ranged widely, from base metals, platinum group metal refining and mining chemicals, to ash mineralogy and, more recently, coal beneficiation and fixed-bed gasification. Professor Bunt was seconded by Sasol Technology Research and Development to NWU in 2009 to help develop capacity at the University in the field of coal science and technology under the Sasol-Hub-and-Spoke University collaboration drive. In 2011, Professor Bunt achieved the NRF rating status of Established Researcher, and was appointed as SARCHi Chairholder in 2013. He acts on a regular basis as reviewer for high-impact international scientific journals and has supervised numerous PhD and Master’s students in the area of coal science. Professor Bunt has been accredited with over 100 publications which have been published in reputable journals and presented at conferences all over the world. The main thrust of the coal research programme at NWU ranges from molecular modelling of coal structures (nano-scale), to reactivity/kinetic studies (micron-scale), and to lump coal pyrolysis and gasification studies (mm scale).

**Current research interests**
The SARCHi coal research portfolio addresses value addition across the entire coal value chain. It provides a focus on:
- Fine coal processing (drying fundamentals, stockpile drainage, dry coal beneficiation);
- Coal utilisation optimisation (coal breakage, briquetting, smokeless fuels, reactivity and kinetics, mineral transformational behaviour, tar, catalytic gasification); and
- Waste utilisation (CO₂ utilisation, ash utilisation, acid mine drainage eradication).

Numerous novel studies are included throughout the programme to explore new horizons for coal utilisation. The portfolio is technology-focussed with a good balance of fundamental and applied research. The portfolio aims to add value to existing industrial processes, but also provides scope to develop highly innovative new technologies with the use of catalytic processes that could also have application globally.

**Relevance of research**
The aim is to contribute to the economy and welfare of all people in South Africa in the field of providing energy, fuel and chemicals from coal by developing innovative alternative or improved processes using available coal reserves while maintaining a clean environment.

Advanced training (research and coursework) will be undertaken in selected fields of coal technology, which is relevant to the South African economy. This training of highly skilled manpower for the South African labour market will be done irrespective of gender, race or religion.

The international knowledge base of coal science and technology will be enhanced by publishing in highly rated international journals, presenting papers at conferences of international repute and collaborating with centres of expertise concerning common interests.

A further goal is to expand the present research group to the status of an international Centre of Expertise in order to provide, besides postgraduate training, selected consulting services to industry.
Professor PL Crouse

Research Chair: Fluoro-materials Science and Process Integration
Primary discipline: Chemical Sciences
Level of Chair: Tier 2
Institution: University of Pretoria
Chair commencement date: September 2007
Website: www.up.ac.za/chemeng

Biosketch
Professor Crouse did his undergraduate studies, Honours, and Master’s at the University of Cape Town, and obtained his PhD in Physical Chemistry at the University of Pretoria. He has 20 years of industrial experience after working across disciplines in the materials and nuclear industries. He spent seven years at the University of Manchester researching laser materials processing before taking up his current position.

Current research interests
- Fluoro-polymer synthesis, characterisation, and applications;
- Dry fluorination of inorganic materials, inclusive of bulk metal silicides, tantalum/nioibium oxides, and for surface modification;
- Modelling of fluorine cells;
- Advanced Metal Initiative (AMI) projects relating to fluoro-chemical processing, with the focus on the use of ammonium acid fluoride in minerals processing;
- Plasma and alternative high-temperature processes with the emphasis on fluorine-containing materials; and
- Materials modelling.

Relevance of research
The Chair is strongly supported by the national Fluoro-chemical Expansion Initiative (FEI). Both FEI and AMI are national research focus areas. Pelchem-Necsa is the nominated FEI champion and is the custodian of a substantial reserve of fluoro-chemical expertise. The Chair was created to serve the needs of both initiatives — to supply academic input into the programmes and to develop human capital for ensuring its success.
Professor B Klumperman

**Research Chair:** Advanced Macromolecular Architectures  
**Primary discipline:** Polymer Chemistry  
**Level of Chair:** Tier 1  
**Institution:** Stellenbosch University  
**Chair commencement date:** January 2006  
**Website:** www.klumperman-group.net

**Biosketch**
Professor Klumperman has nine years’ experience in industrial research and over 15 years in academic research. In the last five years he has published over 40 papers and most of his work is published in top journals in polymer Science (e.g. *Macromolecules*), and occasionally in higher ranked general chemistry journals (e.g. *Chem. Commun*). From 1995-1997 he served as a member of the Editorial Advisory Board of *Macromolecules*. Since 2009, he has been the editor for Elsevier’s *European Polymer Journal*. He has a recognised track record of developing new concepts in living radical polymerisation, for example in the explanation of the often observed induction period in RAFT-mediated polymerisation.

After taking up the Research Chair at Stellenbosch University, his work gradually shifted towards macromolecular materials for biomedical applications. There are several collaborations in place between Biochemistry, Microbiology, and Pharmacology. In 2007 he received an NRF A-rating, in 2008 he was elected a Fellow of the Royal Society of South Africa, and in 2009 he received the Rector’s Award for Excellent Research. In 2012 his A-rating was renewed by the NRF.

**Current research interest**
- In a number of projects, macromolecular building blocks are developed with specific functionalities; for example, alternating hetero-arm molecular brushes as scaffolds for inorganic nanostructures and amphiphilic block copolymers for drug delivery.
- Morphology control at nanometer length scale: Polymer morphology can be controlled during the polymer synthesis and self-assembly or in post-polymerisation processing. Both principles are used in the construction of materials with specific functionalities; such as antimicrobial fibres via electrospinning and self-assembly of foldamers in the presence of a chiral polymeric guest.
- Kinetics, mechanisms and explorative chemistry: Kinetic and mechanistic aspects of living radical polymerisation processes are investigated. This is mainly done via *in situ* measurement of relevant species. For the majority of cases 1H NMR spectroscopy is used to measure concentration profiles of those species. Also forming part of this research theme is the exploration of new polymerisation techniques and new polymer modification techniques. These include the synthesis of phenyl-triazole polymers that are being used in the group to study folding behaviour under the influence of solvent composition.

**Relevance of research**
Polymers are used in an increasing number of applications. Advanced macromolecular architectures are essential to meet the increasing demands of properties and functionalities for future polymer applications. Biomedical applications of polymers form an increasing part of the research within the group. The relevance of this research to the community outside the scientific world is expected to be substantial. Important applications are in the fields of drug delivery and regenerative medicine.
**Professor S Marx**

**Research Chair:** Biofuels and Other Clean Alternative Fuels  
**Primary discipline:** Chemical Sciences  
**Level of Chair:** Tier 2  
**Institution:** North-West University  
**Chair commencement date:** July 2007  
**Website:** www.nwu.ac.za

**Biosketch**
Professor Marx completed a BEng (Chemical Engineering) degree from Stellenbosch University in 1993, followed by an MEng degree (Chemical Engineering) on the use of catalytic carbon membranes for the catalytic conversion of benzene in 1995, and a PhD (Chemical Engineering) from PU in 2003 on the separation of TAME from methanol using pervaporation. This work is still being quoted in articles on organic-organic separation. She started her academic career in 1995 and currently holds the position of Associate Professor in Chemical Engineering at the North-West University. She is a registered Professional Chemical Engineer since 2002. She started a new research avenue in 1994 and is currently the holder of Associate Chair in Energy Research in Biofuels and Other Clean Alternative fuels. She teaches biotechnology, renewable energy technologies and reactor theory.

**Current research interests**
Main research interests are biofuels and biochemicals from biomass, specifically:
- Reduction in cost of biodiesel production using novel reaction techniques;
- Reduction in cost of lignocellulose conversion to ethanol using microwave and ultrasonic technologies;
- Production of affordable polymers from fermentation and biodiesel reaction wastes;
- Evaluation of third-generation feedstock for biofuels and biochemicals production; and
- Co-gasification of waste biomass for chemicals and fuels production.

**Relevance of research**
To date, 12 Master’s and one PhD student have graduated through the Associated Chair programme, all of whom have entered the energy field and have made considerable impact, especially through COEGA renewable energy projects. The success of students that were employed by COEGA led to COEGA awarding bursaries for students to study within the Associated Chair programme.

Since inception of the programme, the Associate Chair has delivered 21 international conference contributions and five publications in international peer-reviewed journals.

A community project for renewable energy awareness, which includes demonstration models that are donated to schools, has been initiated through the Associate Chair research programme and is aimed at teaching Grade 7 learners the mechanics and theory of renewable energy technologies. The project is run each year by the Master’s students in the programme.

Research into the use of third-generation biodiesel feedstock has led to the NWU investing in a biodiesel production plant that will provide biodiesel blends to both the on-campus transit system as well as the personnel of the NWU.
Professor T Nyokong

**Research Chair:** Medical Chemistry and Nanotechnology  
**Primary discipline:** Chemical Sciences  
**Level of Chair:** Tier 1  
**Institution:** Rhodes University  
**Chair commencement date:** July 2007

**Biosketch**
Professor Nyokong is a highly respected female researcher, both nationally and internationally. In 1987 she completed her PhD in Chemistry at the University of Western Ontario, Canada. She has received many awards for her research, including:

- 2004: The SABC2/Shoprite-Checkers Women of the Year Award in Science and Technology.
- 2005: The Order of Mapungubwe (Bronze).
- 2007: The NRF recognised her as one of the top three publishing scientists in South Africa.
- 2008: City Press/Rapport Prestige Award for Inspirational Women Achievers.
- 2009: NRF President’s Award as Champion for the transformation in research; the CEO Most Influential Women in Business and Government – Education and Teaching Sector Award; and the L’Oreal-UNESCO award for Women in Science as a laureate representing Africa and the Arab States.
- 2010: Honorary Doctorates from the Walter Sisulu University and the University of South Africa.
- 2011: Invited by Irina Bokova, Director-General of UNESCO, to be a member of the UNESCO High-level panel on Science, Technology and Innovation for sustainable Development. She was also awarded the Distinguished professorship at Rhodes University and the RSC (Royal Society in Chemistry)/PACN (Pan African Chemistry Network) Distinguished Women in Chemistry award.
- 2012: Included in the National Center for Research on Human Evolution located in Spain to be one of their “13 Names to change the world” and also awarded the South African Chemical Institute (SACI) Gold Medal.
- 2013: National Research Foundation A-rated researcher.

She has published 420 articles in refereed journals, one patent and eight chapters in books. She is the editor of the *African Journal of Pure and Applied Chemistry* and is on the editorial board of five other journals.

**Current research interests**
- Development of drugs for Photodynamic Therapy (PDT): A relatively new approach to cancer diagnosis and treatment, using a combination of oxygen, laser light and a photosensitiser.
- Development of biosensors: The development of electrochemical sensors based on catalysts.
- Development of enzyme-like catalysts (fine chemicals): Transformation of alkanes into more useful intermediates or products is still of great importance to industry. Transformations are done at ordinary temperatures to save energy and are of great interest to many industries, in particular the petroleum industry that produces thousands of tons of alkanes per annum.

**Relevance of research**
The research into PDT has relevance in cancer therapy, particularly those cancers that cannot be removed by surgery. Research into fine chemicals will lead to development of useful products from industrial waste; hence it is also environmentally important.
**Professor T Pradeep**

**Research Chair:** Nanotechnology for Water  
**Primary discipline:** Chemical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Johannesburg  
**Chair commencement date:** June 2014  
**Website:** [www.dstuns.iitm.ac.in/pradeep-research-group.php](http://www.dstuns.iitm.ac.in/pradeep-research-group.php)

**Biosketch**
Professor Pradeep is a professor of chemistry at the Indian Institute of Technology Madras, Chennai, India. He earned his PhD from the Indian Institute of Science and had postdoctoral training at UC, Berkeley and Purdue University, West Lafayette. His research interests are in molecular and nanoscale materials and associated instrumentation. He is an author of over 300 papers in journals, 55 patents or patent applications and five books.

Professor Pradeep is involved in developing affordable technologies for drinking water purification, some of which have been commercialised. He and his colleagues have incubated two companies. He is a recipient of some of the highest recognitions for scientists in India and is a Fellow of the Indian Academy of Sciences and Indian National Academy of Engineering. He is on the editorial boards of journals such as Nano Reviews, ACS Applied Materials & Interfaces, Particle, Surface Innovations, Chemistry-An Asian Journal and Nanoscale and is an associate editor of the new American Chemical Society journal, ACS Sustainable Chemistry & Engineering. His other interests include education, popularising science and developing advanced teaching aids. He has authored a few books in Malayalam and has received the Kerala Sahitya Academi Award for knowledge literature.

**Current research interests**
Molecular and nanoscale materials, clusters, drinking water purification, advanced mass spectrometry, instrumentation, ice chemistry, low-energy ion scattering, technology commercialisation.

**Relevance of research**
Our current research program is strongly related to the proposed activities of the Chair. It is important to expand the reach of the technologies developed currently to regions outside India where similar problems exist. Lessons learned from technology commercialization in India are relevant in South Africa. There is a need to set-up a school around nanotechnology for water in South Africa with sophisticated infrastructure as has been done in India to train the next generation.
Professor N Revaprasadu

Research Chair: Nanotechnology
Primary discipline: Chemical Sciences
Level of Chair: Tier 2
Institution: University of Zululand
Chair commencement date: January 2008

Biosketch
Professor Revaprasadu works in the Department of Chemistry at the University of Zululand (UZ) and completed his BSc (Hons) at the University of Natal (now known as the University of KwaZulu-Natal) in 1994. He was granted an NRF/Royal Society (UK) scholarship to complete his PhD in the area of nanomaterials synthesis at Imperial College, London, under the supervision of Professor Paul O’Brien. In 2000 he completed his PhD and returned to UZ where he started his research group with a focus on the synthesis of semiconductor nanoparticles using facile non-organometallic routes. He was awarded the SARChI Chair in Nanotechnology in 2007.

He has done extensive work on the synthesis of CdS, CdSe, CdTe, PbS PbSe and PbTe nanoparticles using a new route—a two-step hybrid high temperature solution based route—developed in his group. He has also developed a novel route to water-soluble selenium and tellurium based nanomaterials. This route has led to work on the toxicity and study of nanomaterials in biological systems. He is working very closely with African countries such as Cameroon, Ghana and Tanzania. He has published 90 articles in peer-reviewed journals and has presented his work at more than 40 international conferences. He has collaborative projects with the University of Manchester, University of Dar Es Salaam and University of Yaoundé.

Current research interests
- Synthesis of organically capped and water-soluble selenium and tellurium-based nanoparticles using a simple hybrid solution/high temperature route;
- Synthesis of materials for solar cell and sensor applications; and
- Synthesis of gold/semiconductor nanoparticles for drug delivery applications.

Relevance of research
The rapid depletion of our natural resources has increased the importance of research into the synthesis of functional materials for uses in areas such as renewable energy, sensors, biomedical applications, electronics and the like. The main focus in nanoscience has been the synthesis, manipulation and processing of nanomaterials. There is still room for work to be done to find new, simple, upscale and environmentally friendly routes to nanomaterials. The control of particle shape and assembly at the nanoscale is still not very well understood. The work done at UZ will address some of the fundamental issues of nanotechnology such as nanocrystal formation and shape control. The synthetic routes devised will allow the up-scaling of materials for solar cell applications. The water-soluble core shell nanoparticles will be used in drug delivery applications.
Professor TA Stenström

Research Chair: Development and optimisation of wastewater treatment technology for developing economies

Primary discipline: Water and Wastewater Technology

Level of Chair: Tier 1

Institution: Durban University of Technology

Chair commencement date: April 2013

Biosketch

Professor Stenström completed his PhD at the University of Gothenburg in 1989. During the last 35 years he worked at "the inter-phase" between health and environmental questions with a focus on Water and Sanitation and has gained international reputation in the areas of risk assessment and health-related environmental issues. This included assessments of the barrier functions of water and wastewater processes in large and small-scale treatment, questions related to emergency response and multidisciplinary applied research, where technology and health impact relates to the agricultural as well as social fields. Before taking up the position at the Durban University of Technology he spent his time as Chief Microbiologist at the Swedish Institute for Preventive Disease Control, as a Senior Research Fellow at the Bio-resource group of the Stockholm Environment Institute, and as a part-time professor at the University of Life Sciences, Faculty of Civil and Environmental Engineering, Norway. He acts as an advisor for WHO in Geneva, dealing with risk assessment and Sanitation Safety Planning.

As an applied researcher he has been heading and participating in research projects covering drinking water, wastewater and excreta, surface waters and integrated water and wastewater management both in industrialised countries and in developing economies. Most recently, the research is related to drinking water and sanitation management practices in the combined interventions between diarrheal disease and dengue vector control in Asia and Latin America. He has been, and is supervising, several PhDs both in Scandinavia and from countries representing developing economies, and has been evaluating PhD theses from Africa, Australia and Europe. He has an extensive publication record.

Current research interests

The focus of the research will cover the interlinked areas of technical application, environmental impact, health and security through:

- Improving the understanding of microbial action in full-scale biological wastewater treatment facilities with the intention of optimisation and trouble-shooting;
- Developing and adapting low-cost alternative wastewater treatment technology for rural and peri-urban application;
- Utilisation of lipid-producing microalgae for the tertiary treatment/polishing of final effluent from domestic wastewater;
- Catchment and technology -based integration of health, well-being and environment; and
- Assessment of wastewater treatment and reuse for crop and energy production.

Relevance of research

Protection of water resources and combating environmental degradation is a central challenge linked to water scarcity, water resource management and inadequate impact from treated effluents. This impact is further directly linked to human health issues and food security for society as a whole and especially for the poor and disadvantaged. A combined approach of treatment assessment, impact and tools to assess the situation is therefore necessary for South Africa.
Professor WH van Zyl

**Research Chair:** Biofuels and Other Clean Alternative Fuels  
**Primary discipline:** Microbiology/Chemical Engineering  
**Level of Chair:** Tier 1  
**Institution:** Stellenbosch University  
**Chair commencement date:** July 2007

**Biosketch**
Professor van Zyl is head of the Microbiology Department, Stellenbosch University and DST/NRF Senior Chair of Energy Research: Bio-fuels and other clean alternative fuels. After graduating [from where, with what degree?] in [which year?] he joined the CSIR as Research Officer at National Food Research Institute. Thereafter he left for Princeton University, USA, where he was a postgraduate student in the Department of Biology. In 1989 he returned to the CSIR to become Project Leader at its Division of Food Science and Technology. In 1992 he moved to Stellenbosch University as Associate Professor in the Department of Microbiology, becoming full professor in 1999.

He has twice received the Rector's Award for Excellent Teaching at Stellenbosch University and in 2004 he was awarded a Silver Medal from the South African Society for Microbiology (SASM) for exceptional achievement in any branch of Microbiology. In 2011 Professor van Zyl was a runner-up in the SANEA energy awards in the Category: Energy Awards.

He has published in 111 internationally refereed journals, authored three book chapters, with an “h” index of 29. He has been involved with 27 patents (23 international, four in South Africa) and presented 108 papers/posters at international symposia and 117 at national symposia.

Professor van Zyl has supervised 20 PhD students to graduation and 35 MSc students.

**Current research interests**
The laboratory of Professor van Zyl is well established in the microbiology and biochemistry of plant-degrading enzymes. He is a research leader in South Africa with significant international recognition in the recombinant production of these enzymes in Bakers’ yeast for biofuel production from total plant biomass. Professor van Zyl has established collaboration with researchers in Europe and the USA, particularly in the field of biomass conversion to bioethanol, and he holds several joint international patents in these fields.

In 2007 Professor van Zyl was awarded the prestigious Senior Chair of Energy Research (CoER) in Biofuels and other clean alternative fuels, currently funded by the Department of Science and Technology. In this capacity he is steering a large research programme towards the development of advanced second-generation technologies for the conversion of total plant biomass to biofuels.

**Relevance of research**
The CoER in Biofuels team focuses on human capital development with a strong scientific and engineering training, interacts with South African experts from industry, businesses and NGOs, and tries to stay abreast with the latest technologies and research through extensive international collaboration networks.
Professor P Watts

**Research Chair:** Microfluidic Bio-chemical Processing  
**Primary discipline:** Chemical Science  
**Level of Chair:** Tier 2  
**Institution:** Nelson Mandela Metropolitan University  
**Chair commencement date:** February 2013  
**Website:** innoventondcts.nmmu.ac.za/Home

**Biosketch**
Professor Watts graduated from the University of Bristol (UK) in 1995 with a first-class BSc in Chemistry. He continued his studies at Bristol, obtaining a PhD in bio-organic natural product chemistry in 1999. His PhD focussed on the synthesis of isotopically labelled compounds for use in determining biosynthetic pathways to polyketide-derived natural products. He subsequently worked at the University of Hull (UK) where he led the micro reactor and continuous flow technology group, being promoted to full professor in August 2011. He has published nearly 100 papers in the field and regularly gives lectures on the topic at worldwide conferences. He is on several editorial boards and is an associate editor of the *Journal of Flow Chemistry*.

**Current research interests**
Research interests include:
- Improving organic synthesis utilising new technology;
- Green chemistry;
- Process intensification;
- Electrochemical synthesis;
- Catalysis (and biocatalysis) in continuous flow reactors;
- Process analytical technology; and
- Nanomaterial synthesis.

**Relevance of research**
Within InnoVenton at NMMU Professor Watts will further develop the continuous flow methodology to investigate how small production platforms can enhance chemical manufacture within the South African economy. In addition, research will be undertaken to investigate the integration of synthesis and purification within continuous flow systems.
**Professor C Wolkersdorfer**

- **Research Chair:** Acid Mine Drainage Treatment
- **Primary discipline:** Hydrogeology and Hydrogeochemistry
- **Level of Chair:** Tier 1
- **Institution:** Tshwane University of Technology
- **Chair commencement date:** January 2014
- **Website/blog:** www.wolkersdorfer.info/minewater

**Biosketch**

Professor Wolkersdorfer is a mining hydrogeologist with 23 years’ experience in mine water geochemistry, hydrodynamics, geothermal applications and tracer tests. He held the world’s first Industrial Research Chair for Mine Water Remediation and Management at Cape Breton University, Nova Scotia, Canada. He also is Distinguished Professor for Mine Water Management at Lappeenranta University of Technology in Mikkeli, Finland. He has been teaching hydrogeology, mining hydrology, and tracer hydrology at Ludwig-Maximilians-Universität München und Bergakademie Freiberg, Germany and within the AEG master course of Tübingen University.

He received his PhD from Clausthal University, Germany and habilitated at Bergakademie Freiberg, Germany. He is the General Secretary of the International Mine Water Association and the Technical Editor of the journal *Mine Water and the Environment*.

He has published more than 100 papers, books and book chapters in various journals and proceedings about hydrogeology, archaeology and mining-related topics.

**Current research interests**

The Research Chair will contribute to solving mine water-related problems by conducting applied research on mine water management and treatment as well as on the prevention of mine water pollution. He will focus on passive treatment technologies in remote areas and active treatment where local water sources or people might be directly affected by the pollution. Key active technologies will be electrochemistry and the integration of various technologies into new water treatment methods. Another focus of research will be the understanding of the flooding process itself and stratification in flooded underground mines by means of tracer tests and optimised monitoring methods.

**Relevance of research**

South Africa is facing one of the world’s largest mine water problems and, if not addressed properly, the environment, heritage sites and local drinking water resources might be irreversibly affected. Though there are technologies available to purify the polluted mine water, many are expensive or not able to cope with the potential pollution expected on the Rand or other areas in South Africa. Most stakeholders are expecting the installation of active treatment technologies, yet, there might be *in situ* options that can also be used to tackle the issues. The research aims to understand the processes occurring, disseminate this knowledge to the public and key stakeholders and solve the most imminent cases in and around Gauteng.
Professor DR Bell

**Research Chair:** Earth Systems Science  
**Primary discipline:** Earth and Marine Sciences  
**Level of Chair:** Tier 1  
**Institution:** Nelson Mandela Metropolitan University  
**Chair commencement date:** August 2013

**Biosketch**
Professor Bell was born and raised in Cape Town, earning BSc (Zoology, Chemistry, Geology) and BSc Hons (Geology) degrees from the University of Cape Town (UCT), followed by a PhD in Geochemistry from the California Institute of Technology. He has held research positions at the Geophysical Laboratory of the Carnegie Institution of Washington, UCT, Massachusetts Institute of Technology, and Arizona State University.

**Current research interests**
- Geochemical approaches to understanding the processes by which planets form and evolve, with an emphasis on chemical and isotopic analysis of natural materials;
- The coupling between deep interior processes and surface environments on Earth and other planets, focusing on the roles of water and carbon;
- Continental lithosphere as an archive of long-term global change;
- Integration of geochemical approaches into transdisciplinary studies of environmental evolution and sustainability in southern Africa; and
- Complex systems-based approaches to Earth and space sciences and sustainability.

**Relevance of research**
The research is relevant to understanding patterns of global change, to local environmental sustainability, to minerals, energy, and water resources, and to human curiosity about life elsewhere in the galaxy.
Professor RJ Durrheim

**Research Chair:** Exploration, Earthquake and Mining Seismology  
**Primary discipline:** Seismology  
**Level of Chair:** Tier 2  
**Institution:** University of the Witwatersrand  
**Chair commencement date:** April 2007  
**Websites:** web.wits.ac.za/Academic/Science/GeoSciences/Home.htm  
www.africaarray.org

**Biosketch**

Professor Durrheim is a graduate of Stellenbosch University (BSc, 1977), University of the Witwatersrand (BSc Hons, 1978 and PhD, 1990), University of Pretoria (MSc, 1984) and University of South Africa (BA, 1984).

In 1979, he began his career as an exploration geophysicist with Gencor and in 1983 was appointed as a lecturer in the Geophysics Department at Wits. From 1989-1990 he spent a sabbatical year at the Geophysical Institute in Karlsruhe, Germany, and the USGS Office of Earthquakes, Volcanoes and Engineering in Menlo Park, California.

Durrheim joined the CSIR in 1993, where he conducted research in the fields of mine seismology and rockbursting, and managed the DeepMine and FutureMine Collaborative Research Programmes. During 2003 he was seconded to the Mining and Mineral Sciences Laboratories of Natural Resources Canada, Ottawa.

In 2007, Professor Durrheim was appointed as the Wits/CSIR South African Research Chair in Exploration, Earthquake and Mining Seismology. He continued with mine seismology research at the CSIR, where he is the PI of a five-year Japanese-funded project “Observational studies in South African mines to mitigate seismic risks”. He took up a research role at Wits, particularly the leadership of the AfricaArray programme, which seeks to do research and develop human and infrastructural capacity in Africa.

**Current research interests**

- Exploration of the Earth’s interior using natural or anthropogenic sources on scales ranging from the near-surface to the Earth’s mantle;
- Studies of earthquake source mechanisms and seismic hazard. Durrheim chairs the Global Earthquake Model (GEM) regional programme for sub-Sahara; and
- Studies aimed at reducing the risks associated with rockbursts in deep gold and platinum mines.

Data for many of the projects are supplied by the AfricaArray permanent network of 51 broadband seismometer stations deployed in 20 countries in sub-Saharan Africa.

**Relevance of research**

Professor Durrheim’s research team seeks to map the broad-scale geological structure of the African continent. This information helps geoscientists understand the structure and evolution of the Earth’s crust better, and assists governments and companies in their efforts to exploit minerals, oil, gas and groundwater without undue damage to the environment.

Studies of earthquakes, rockbursts, volcanoes and tsunamis produce information that assists engineers and government to develop strategies to mitigate the risk that geohazards pose to the welfare and development of Africa. The research activity not only produces knowledge, but develops human capacity and builds scientific infrastructure, such as the AfricaArray network of 50 geophysical observatories in sub-Sahara.
**Professor BC Hewitson**

**Research Chair:** Climate Change  
**Primary discipline:** Earth and Marine Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2008

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**Biosketch**

Professor Hewitson leads the Climate System Analysis Group (CSAG) at the University of Cape Town.

In 1990 he completed his MSc and in 1991 his PhD from Pennsylvania State University, USA, both focusing on regional climate change. He has been developing this research theme in South Africa for the past 20 years. Building on these personal interests and broad research activities around regional climate change, he has developed CSAG with a profile that ranges from climate modelling through to application in impacts and adaptation. CSAG is now the largest research group with this focus in Africa.

His research has led to leadership in research and capacity building roles in major international activities. These include coordinating lead author on regional climate projections for the Inter-governmental Panel on Climate Change, co-chair of the Working Group on Regional Climate for the World Climate Research Program, and numerous capacity building activities with emerging scientists and stakeholders across Africa.

**Current research interests**

- Climate modelling (both global and regional models) for a range of investigations including operational seasonal forecasting and multi-model climate change assessment;
- Regional climate change projections and climate downscaling, focusing on examining feedback mechanisms in the coupled climate system, and on developing regional scale tailored projections of climate change and related uncertainty;
- Historical climate change analysis exploring trends and variability, and the related process-based mechanisms;
- Capacity building in developing nations of emerging scientists on climate change; and
- Stakeholder communications and climate services in support of climate change adaptation.

**Relevance of research**

The core aim of the research is to increase the understanding of the regional implications of climate change and build the relevant science-society linkages. It also explicitly links across scientific disciplines and the social dimension of impacts and adaptation. This seeks to address the critical thresholds of vulnerability to climate on scales of relevance to society.
Professor AC Jarre

Research Chair: Marine Ecology and Fisheries
Primary discipline: Earth and Marine Sciences
Level of Chair: Tier 1
Institution: University of Cape Town
Chair commencement date: February 2008

Biosketch
Professor Jarre completed her PhD at the Alfred Wegener Institute, University of Bremen, Germany, and is a Marine Systems Ecologist specialising in marine social-ecological systems under global change, with an emphasis on exploited systems that are experiencing pronounced environmental signals. She has worked in well-known international institutes, as well as national and inter-governmental fisheries agencies and has experience in the development of ecosystem indicators for fisheries management, multivariate data analysis, nonlinear modelling, as well as interdisciplinary research.

Current research interests
- Improved knowledge of the functioning and dynamics of marine social-ecological systems under global change;
- Stronger capability for proactive and effective management of human impacts on marine ecosystems at national and regional levels and
- Active research into a multi-criteria decision support for fisheries management, including mediated systems modelling, development of indicators and management strategy evaluation.

Relevance of research
The marine environment around South Africa is unique, ranging from the upwelling Benguela ecosystem of the Atlantic Ocean to the Indian Ocean coral reef systems in the north-east of the country, and supports high biodiversity. These oceans also provide important goods and services to the people of South and southern Africa including contributions to food security, employment, economic returns and a range of human cultural practices. Benefits are obtained through different activities, such as fisheries, tourism, coastal and offshore mining, oil and gas extraction and others, all of which impact on the structure and functioning of the ecosystems, and are in turn impacted by these. These activities need to be managed responsibly to ensure that the health and productivity of the ecosystems are sustained for present and future human use. Research into understanding the complexity of the marine social-ecological systems under global change will improve the knowledge base for management, as well as develop tools to improve management advice. The research is carried out increasingly in a transdisciplinary setting across Natural and Social Sciences and involving non-academic stakeholders, an approach still in its infancy in South Africa.
Professor CD McQuaid

- **Research Chair:** Marine Ecosystems Research
- **Primary discipline:** Earth and Marine Sciences
- **Level of Chair:** Tier 1
- **Institution:** Rhodes University
- **Chair commencement date:** January 2008

**Biosketch**

Professor McQuaid completed his PhD in Zoology at the University of Cape Town in 1980. His research addresses three of the main environmental concerns relating to loss of biodiversity in a rapidly changing world: climate change, bio-invasions and over-exploitation leading to habitat destruction. He is a Distinguished Professor of Rhodes University with an NRF A2 rating. His track record unequivocally demonstrates the ability to attract and train world-class scientists, creating career paths for young scientists. He has won numerous awards, including the Rhodes Vice Chancellor's Senior Research Award, the Sir Kirby Laing Fellowship and the Oppenheimer Fellowship and is a Visiting Research Professor at the University of Hong Kong. He has published over 200 articles in peer-reviewed journals and has acted as a referee for over 30 national and international journals. His research is based on both deep-sea studies in the Southern Ocean, including Marion Island, and coastal ecosystems throughout southern Africa and in South America.

**Current research interests**

- The physiological and genetic basis for patterns of biodiversity and biogeography, including the spread of biological invasives; and
- How physical conditions drive fundamental differences in ecosystem functioning in both coastal benthic and offshore pelagic ecosystems.

The focus is on the distribution, genetic structure and habitat segregation across multiple scales of species, including interactions between invasive and indigenous species. The coastal work also focuses strongly on recruitment into marine populations, including the consequences for exploited species that are partially protected by marine reserves. The team is interested in how these communities are affected by upwelling and have approached this by comparing systems in South Africa and South America and most recently North Africa.

The deep-sea research uses the opportunities offered by the African Coelacanth Ecosystem Project to study communities along the Agulhas Current and how the distribution of larvae is affected. The Southern Ocean work has been extended to include both ends of the food chain, involving collaboration with many institutes within South Africa and abroad.

**Relevance of research**

Many marine ecosystems are profoundly influenced by their physical environment because they do not allow the accumulation of biomass that modifies conditions on land. The environment is changing at unprecedented rates and understanding how marine ecosystems are influenced by the physical environment is the key question of our time.
Professor R Perissinotto

**Research Chair**: Shallow Water Ecosystems  
**Primary discipline**: Earth and Marine Sciences  
**Level of Chair**: Tier 1  
**Institution**: Nelson Mandela Metropolitan University  
**Chair commencement date**: July 2013  
**Website**: research.ukzn.ac.za/Top-Published-Researchers-2011/ProfessorRenzoPerissinotto.aspx

**Biosketch**
Professor Perissinotto initiated his research career in the early 1980s, working on estuarine projects, first in his birth place, the Lagoon of Venice, and then in the Gullmar Fjord of Sweden and the Swartkops Estuary of South Africa. Eventually, PhD studies led him towards the Southern Ocean, where 10 years of investigations resulted in over 50 publications in the primary international literature. He returned to the estuarine field in 1996, and has since worked on numerous projects involving the ecosystem functioning of estuaries, with special emphasis on the temporarily open/closed systems of southern Africa. These have so far generated over 50 peer-reviewed publications, among which is a book on the *Temporarily Open/Closed Estuaries in South Africa* published by Nova Science (New York) and another titled *Ecology and Conservation of Estuarine Ecosystems: Lake St. Lucia as a Global Model*, published by Cambridge University Press.

**Current research interests**
Integrated ecosystem functioning of estuarine and coastal systems, with focus on:
- Invertebrate diversity;
- Zooplankton grazing and phytoplankton production;
- Food webs and benthic-pelagic coupling;
- Alien invasive species;
- Anthropogenic eutrophication; and
- Biological-physical-chemical interactions.

**Relevance of research**
Water is a scarce commodity in southern Africa, where many aquatic ecosystems are currently on a trajectory of rapid deterioration. The sustainable use of our water resources, and their rehabilitation where necessary, requires that adaptive management structures are continuously provided with scientific knowledge on the processes that govern aquatic ecosystems and their health.
Professor M Rouget

**Research Chair:** Land Use Planning and Management  
**Primary discipline:** Environmental Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of KwaZulu-Natal  
**Chair commencement date:** January 2013

**Biosketch**
Professor Rouget completed his PhD at the University of Cape Town in 2002. He has over 10 years’ experience of applied research in conservation planning, biological invasions and natural resources management. He has worked in academic and governmental institutions.

He has published more than 50 publications in international journals and serves on the editorial board of the journal *Diversity & Distributions*. In 2010, he received a B3 NRF rating and in 2011 he was elected as a founding member of the South African Young Academy of Science.

**Current research interests**
His research focuses on the use of interdisciplinary approaches to address current environmental issues. He is particularly active on:
- Integrated land use and conservation planning;
- Mapping and quantifying ecosystem services;
- Spatial analysis of ecological processes; and
- Applied transdisciplinary approaches.

**Relevance of research**
His research aims to improve environmental decision-making and is directly relevant to natural resource management. His research contributes to integrating biodiversity conservation into land use decision-making and generating multiple benefits from our ecosystems.
Professor J Sealy

**Research Chair:** Stable Isotopes in Archaeology and Palaeoenvironmental Studies

**Primary discipline:** Earth and Marine Sciences

**Level of Chair:** Tier 1

**Institution:** University of Cape Town

**Chair commencement date:** January 2013

**Biosketch**

Professor Sealy obtained her BSc (Hons), MSc and PhD (in 1989) degrees at the University of Cape Town (UCT). Her MSc and PhD theses were supervised by Nik van der Merwe, who at that time had recently published (with John Vogel of the CSIR) the first paper on stable carbon isotope measurements of biological materials. They measured archaeological human skeletons to ascertain when maize agriculture was adopted by Native Americans in eastern North America. Professor Sealy and her fellow student Julia Lee-Thorp (now Professor of Archaeological Science at Oxford University in the UK) helped to explore how the stable isotopes of carbon, nitrogen and other elements are distributed within ecosystems, and used isotope measurements of archaeological remains to reconstruct past diets and environments. These approaches are now widely used in archaeology and ecology and much of the pioneering work was done at UCT.

Professor Sealy’s work has been published in Nature and Science, as well as many other leading journals. According to Google Scholar, her papers have been cited approximately 2 500 times. She is a Fellow of the Royal Society of South Africa and UCT, and holds a B1 rating from the NRF.

**Current research interests**

Professor Sealy’s research focuses on applying stable isotopes to answer questions in archaeology and palaeoecology. She has worked extensively on hunter-gatherers living along the Cape coast during the past 10 000 years, and also on much older archaeology relating to the emergence of early modern humans (by which archaeologists mean “people like us”). Her research has challenged earlier ideas about how communities were organised, about how societies used the landscape and how this changed over time. This contributes to global efforts to better understand the range of possible hunter-gatherer lifestyles, bearing in mind that humans lived entirely as hunter-gatherers for 95% of our existence on Earth. At the recent end of the time-scale, she has also worked on the archaeology of the colonial era, developing now widely-used approaches to identifying migrants (e.g. slaves) on the basis of differences in bone chemistry in different parts of the skeleton.

Her work as the Chair will continue in two main directions, one to do with the development and behaviour of human societies (i.e. archaeology), the other to do with palaeoenvironments, emphasising the context/constraints within which humans evolved and lived. Specifically, she and her students will investigate diets and environments of early modern humans, environmental and dietary shifts and the development of more recent human societies in South Africa, isotope systematics (how stable isotopes are distributed across landscapes and through ecosystems and organisms) and method development in stable isotope studies.

**Relevance of research**

This Chair’s research falls directly within the area of two of South Africa’s Science Missions: Human Palaeontology (including Archaeology) and Environmental Sciences. It is based on the fact that stable isotopes provide natural tracers of biological and geological processes in the world around us, across scales ranging from earth and atmosphere science to intracellular metabolism. The research programme of this Chair, while based in Archaeology and Human Palaeontology, will link closely with other fields of research across the life and earth sciences and build collaborations with a wide range of colleagues and students, thus spreading the benefits of the SARChI chair widely.
Professor G Stevens

**Research Chair**: Experimental Petrology  
**Primary discipline**: Geology  
**Level of Chair**: Tier 1  
**Institution**: Stellenbosch University  
**Chair commencement date**: October 2007

**Biosketch**
Professor Stevens grew up in the town of Benoni on the East Rand, with the evidence of gold mining very much part of his daily landscape. This contributed to his interest in geology and particularly the processes that have shaped the unique geological heritage of South Africa. His PhD thesis at Manchester University centred around “Compositional Controls on Partial Melting in High Grade Metapelites”. Subsequent to graduating in 1995, Professor Stevens spent much of his academic career working towards an understanding of the processes by which rocks melt. The reason for this is that the partial melting of rocks drives the dynamism of Earth, yet remains a poorly understood process. This research focus area is very amenable to an experimental petrology approach, which involves the use of special autoclaves to directly stimulate the very high pressure and temperature conditions of rock and magma formation deep within Earth. His experimental petrology laboratory at Stellenbosch University is the only such facility in Africa and is being used to study the evolution of South Africa’s ancient and rich geology. He is a recipient of the Royal Society of South Africa’s Meiring Naude Medal, the Geological Society of South Africa Jubilee Medal and the NRF President’s Award and serves on the editorial boards of *Journal of Metamorphic Geology*, *Lithos* and *Terra Nova*. Professor Stevens is deeply honoured to be able to participate in the extraordinary effort to produce more South African PhD graduates which the SARChI programme represents.

**Current research interests**
- The mechanisms by which the Earth’s oldest continental crust was produced and evolved;  
- The controls on melting in Archaean subduction zones and the way in which these zones process water;  
- Paleo- to Meso-Archaean metamorphism and its significance for informing on geodynamic processes at this time in Earth’s history;  
- The origin of common granite magmas and the mechanisms behind secular changes in granite chemistry;  
- Constraining the degree of disequilibrium in the source areas for granite magmas and the way in which this shapes granite chemistry;  
- Constraining the melting behaviour of high temperature sulphide assemblages, particularly as relevant to the formation of South African ore deposits; and  
- Experimental investigation of the stability of diamond indicator minerals in Kimberlite magmas.

**Relevance of research**
South Africa has an exceptional geological heritage that is both rich in mineral wealth and in information on how the Earth has evolved. As much of this geological record involves rocks formed by the high temperature processes of magmatism and metamorphism, Professor Stevens’ experimental research is able to directly investigate the formation of this geological heritage. In the process, a unique and valuable set of skills is imparted to the MSc and PhD students who participate in the research programme. Some of these graduates enter the mining and minerals processing industry, directly stimulating national competitiveness. Others pursue academic careers and, in this way, contribute to national capacity building.
Professor F Viljoen

Research Chair: Geometallurgy  
Primary discipline: Geology  
Level of Chair: Tier 2  
Institution: University of Johannesburg  
Chair commencement date: June 2008  
Website: www.uj.ac.za

Biosketch
Professor Viljoen completed a PhD degree in Petrology at the University of the Witwatersrand in 1994. He has extensive experience in the use and application of analytical techniques such as electron microprobe analysis, infrared spectroscopy, laser ablation inductively coupled plasma mass spectrometry, thermal ionisation mass spectrometry, ion microprobe analysis, and electron microscope-based mineral liberation analysis. He has a proven track record of training students on the use and application of the instruments in Spectrua, the Central Analytical Facility of the University of Johannesburg. He has published 48 articles, of which three were published in the Journal Science, and is extensively published in DOE A-rated international journals.

Current research interests
His primary focus is to develop and apply geometallurgical methods to quantify the mineralogical and textural characteristics of orebodies, ores, concentrates and successor products in resource types relevant to the South African minerals industry. During each investigation the aim is primarily to generate a link between geology and extractive metallurgy as facilitated through the study of the mineralogy of the ore, and successor products.

His research also focuses on the characterisation of platinum-group element mineralisation within the Merensky Reef and the PlatReef of the Bushveld Complex. It is also focussed on aspects of gold, diamond, nickel, coal, and base metal mineralisation (Cu, Pb, Zn, Mn) from a mineralogical perspective, with a view to optimise treatment plants and metal recovery.

In addition, investigations are conducted into the application of automated mineralogy (through the 600F MLA) to non-traditional areas of application (e.g. the search for and characterisation of precious metal minerals in situ). Fundamental studies into the nature and crystallisation of natural diamonds are also ongoing, to get an enhanced understanding of the complexities in, and experimental requirements for, the laboratory-based production of synthetic diamonds that closely mimic natural diamonds.

Relevance of research
The Chair is unique to the African continent and is one of about five such research positions worldwide. This is in contrast to the rapid acceptance of geometallurgy by the minerals industry, resulting in a global shortage of professionals in the field. This Chair serves as an important skills training ground to the benefit of the mining and mineral beneficiation industries in southern Africa.
Professor R Wynberg

**Research Chair:** Environmental and Social Dimensions of the Bio-economy  
**Primary discipline:** Environmental Sciences  
**Level of Chair:** Tier 2  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2013  
**Websites:**  
www.eeu.org.za  
www.egs.uct.ac.za

**Biosketch**
Associate Professor Wynberg is an internationally acclaimed scholar on the bio-economy. She has consulted and published widely on this topic, including over 140 scientific papers, book chapters, technical reports and popular articles, and four co-edited books. She is also active in social movements in the region and a member of the Expert Committee for the UK government’s prestigious Darwin Initiative.

Her scholarship is characterised by an unusual breadth of experience as a researcher, policy advisor and activist, demonstrating her strong commitment to social justice and transformation in the sphere of biodiversity conservation and use. Because of the complexity of her research topic, and the importance of developing a holistic and integrated understanding, she has consciously developed a research strategy crossing many disciplines and engaging a body of literature and colleagues across the Humanities, Arts and Sciences. Her work has made significant contributions to innovation, knowledge extension and research advancement, bridging the gap between the theoretical dimensions of academia and the real world of environmental, social inequality and poverty challenges.

**Current research interests**
The Chair’s research programme focuses on four themes:
- **Access and benefit sharing (ABS), bio-discovery and the bio-economy,** aiming to strengthen conceptual underpinnings about ABS through enhanced understanding about implications for commercial sectors involved in the bio-economy, and their responses to environmental and equity considerations;
- **Use and trade of biodiversity by rural communities,** and links to livelihoods and poverty alleviation;
- **Governance approaches** that strengthen the rights of custodians of biodiversity and traditional knowledge holders and stimulate environmentally sustainable and socially just approaches in the bio-economy. A second stream of research investigates the so-called innovation chasm between research results, commercialisation and socio-economic outcomes; and
- **Deepen understanding about the environmental and social impacts of emerging technologies within the bio-economy,** such as genetic engineering, industrial biotechnology and biofuel production.

**Relevance of research**
There is a growing focus on the opportunities of the bio-economy throughout the industrialised and developing world. Yet despite the profound societal implications of these developments, our understanding of the environmental and social dimensions remains poorly developed. Immense changes in global economic systems, the rate of scientific change, and the information revolution make this all the more challenging. Environmental degradation and global climate change overlay these transformations and their multifaceted consequences on the bio-economy are only just beginning to be recognised.

The Chair provides an exciting opportunity to advance knowledge by catalysing the advancement of research and understanding across and within disciplines, building a critical mass of intellectual capacity, enabling human capital development, and informing policy and public debate. Its strong focus on engagement with communities, indigenous knowledge holders, and policy-makers, embeds a practice of engaged scholarship and social responsiveness, with the objective of developing a pioneering, highly collaborative and globally relevant knowledge hub with international stature.
Professor A Engelbrecht

Research Chair: Artificial Intelligence
Primary discipline: Information and Computer Sciences
Level of Chair: Tier 1
Institution: University of Pretoria
Chair commencement date: March 2007

Biosketch
Professor Engelbrecht received his Masters and PhD degrees in Computer Science from the Stellenbosch University, South Africa, in 1994 and 1999 respectively. He is a Professor in Computer Science at the University of Pretoria, and serves as Head of the Department. He also holds the position of South African Research Chair in Artificial Intelligence, and leads the Computational Intelligence Research Group at the University of Pretoria, consisting of 40 Masters and PhD students. His research interests include swarm intelligence, evolutionary computation, artificial neural networks, artificial immune systems, and the application of these Computational Intelligence paradigms to data mining, games, bioinformatics, finance, and difficult optimisation problems. He has published over 200 papers in these fields in journals and international conference proceedings, and is the author of the two books, Computational Intelligence: An Introduction and Fundamentals of Computational Swarm Intelligence. In addition to these, he is a co-editor of Foundations on Computational Intelligence and the upcoming book, Fitness Landscape Analysis. Professor Engelbrecht is a very active in the international community, annually serving as reviewer for over 30 journals and 10 conferences. He is an Associate Editor of the IEEE Transactions on Evolutionary Computation, Journal of Swarm Intelligence, and the IEEE Transactions on Computational Intelligence and AI in Games. Additionally, he serves on the editorial board of three other international journals, and is co-guest editor of special issues of the IEEE Transactions on Evolutionary Computation and the Journal of Swarm Intelligence. He served on the international programme committee and organising committee of a number of conferences, organised special sessions, presented tutorials, and took part in panel discussions. As member of the IEEE Computational Intelligence Society, he is a member of the Games technical committee. He was the founding chair of the South African chapter of the IEEE Computational Intelligence Society.

Current research interests

- Development and further design of the Open Source Library of Computational Intelligence (CI) algorithms (www.cilib.net).
- Development of CI solutions for challenging Bioinformatics problems, where the main focus is on the application of swarm-based algorithms to predict the secondary structure of RNA.
- Development of swarm robotics systems where control systems will be designed and implemented to control swarms robots.
- Development of co-evolutionary systems to be applied to the generation of strategies, for example these systems will be applied to write computer software that can learn strategies to play board games from zero knowledge.
- Development of new approaches to categorise, or cluster data that changes dynamically over time.
- Development of computational models to analyse vast amounts of structured and unstructured data, in order to identify trends (knowledge) hidden within such data.
- Study of social organisms to implement algorithmic models of the local interaction between the members of such organisms.
- Development of new optimisation algorithms to solve complex optimisation problems, such as multi-objective optimisation problems, dynamic optimisation problems, dynamic multi-objective optimisation problems, dynamically constrained optimisation problems, and finding and tracking multiple optima.
- The development of new training algorithms for neural networks in non-stationary environments.

Relevance of research
Research in Artificial Intelligence is relevant to all industries where solutions to complex optimisation problems are required, forecasting and prediction problems have to be solved, strategic decision-making processes are employed, large amounts of data need to be analysed to extract meaningful trends from data and there is a need to perform classification tasks.
Biosketch

Professor Naidoo completed his PhD at the University of Michigan and spent 1994-1995 as a Postdoctoral Fellow at Cornell University. He was appointed as a Chair of the University of Cape Town (UCT) to establish the Centre for High Performance Computing (CHPC). Following its successful establishment he served as Acting Research Director in 2006-2007 as the CHPC transformed into a National Research Service Laboratory. In 2009 he established the Scientific Computing Research Unit (SCRU) at UCT, and as Director he actively works with the CHPC, commercial hardware companies such as NVIDIA Corporation and international HPC Institutes to build the research discipline of Scientific Computing (SC) in South Africa. He has taken a leading role in South African SC development and was appointed chairman of the 2005 World Association of Theoretical and Computational Chemists 7th Congress. His laboratory has been active in SC training and has hosted an United Nations Industrial Development Workshop. Professor Naidoo’s principal scientific interests are the development and application of computational tools for the life sciences. His emphasis is glycoscience.

Current research interests

His group has made major technical advances in biophysical computational modelling with the development of a generalised Free Energy code called FEARCF. This was first published in 2002 in the leading Comp. Chem Journal where the potential of the method to produce O’Ferral-Jencks diagrams used in drug development in the field of enzymology was reported. In 2009 the method was generalised showing the potential value of the algorithm to urgent biophysics problems in glycobiology. The SCRU research facility has a wide range of computational capabilities in chemical glycobiology and glycoscience. In 2009 the NVIDIA Corporation awarded Professor Naidoo a NVIDIA Professor Partnership Grant to advance the group’s research programme that develops computational tools for the life sciences on acceleration platforms such as Graphical Processing Units (GPUs). He has developed frontier simulation software to investigate the detailed action of glycoenzymes. Currently he is developing the informatics tools to be used in gene to molecule analysis of microbial (bacterial) and neoplastic (cancer) diseases.

Relevance of research

His software development for glycoscience applications is internationally unique. His group recently attracted international attention with the simulation of a key reaction in the production of the biofuel, ethanol, from the woody biomass. His current focus is the design and development of computational tools to identify molecular biomarkers for specific cancers. This is then coupled with the group’s unique toolset that allows them to rationally design enzyme inhibitors that will inform the path laboratory scientists may take to develop new drugs. Their project on massive parallelisation of quantum code used by physical scientists will allow the community of materials and biophysicists to solve problems that were previously out of their reach. Professor Naidoo’s research unit is devoted to developing computational tools applied to glycoscience to enable clinical and laboratory scientists to understand the molecular causes of disease. This approach is at the frontier of chemical, biological and medical research. It is a rational approach based on a mechanistic understanding of chemical biology that prevents drug resistance and leads to effective diagnoses and cures for cancers.
Professor S Chakraborti

**Research Chair:** Statistics  
**Primary discipline:** Mathematical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Pretoria  
**Chair commencement date:** January 2011

**Biosketch**
Professor Chakraborti is Professor of Statistics and a Robert C and Rosa P Morrow Faculty Excellence Fellow. He is a Fellow of the American Statistical Association, an elected member of the International Statistical Institute and has been a Fulbright Senior Scholar to South Africa. Professor Chakraborti has authored and co-authored over 75 publications in a variety of journals such as *The Journal of the Royal Statistical Society, American Statistician, Technometrics, Journal of Quality Technology, Review of Economics and Statistics, Biometrical Journal, Applied Statistics, Journal of Experimental Education, Sankhya* and *Statistica Neerlandica*. He is the co-author of a well-known book *Nonparametric Statistical Inference* (fifth edition), with Jean D Gibbons. Professor Chakraborti has been the winner of the Burlington Northern Faculty Achievement Award at the University of Alabama for excellence in teaching. He has been cited for his contributions in mentoring and collaborative work with students and colleagues from around the world. He is currently serving as an Associate Editor of *Communications in Statistics*.

**Current research interests**
- Statistical Inference in general;  
- Statistical Process Control;  
- Nonparametric Statistical Inference;  
- Statistical Computing; and  
- Use of Technology in Teaching Statistics.

**Relevance of research**
The goal is to strengthen and energise several overlapping areas of research within the field of Statistics in the Department, which will strengthen many other interconnected areas of applications. The Chair will play a vital role in maintaining, developing and strengthening high-level statistics training and research programmes within the field of nonparametric statistics with applications to statistical quality control and other related areas. The deliverables include methodological developments and knowledge discovery in these and allied areas of research that overlap with these areas (such as Time Series Analysis, Multivariate Analysis, and the likes) that are traditional areas of strength within the Department. All of these activities fall under the research umbrella of the SARChI Chair and provide synergy.
Professor C Hui

**Research Chair:** Mathematical and Theoretical Physical Biosciences  
**Primary discipline:** Mathematical Sciences  
**Level of Chair:** Tier 1  
**Institution:** Stellenbosch University  
**Chair commencement date:** January 2014  
**Website:** math.sun.ac.za/hui

**Biosketch**

Professor Hui was born in Xi’an and received his BSc (1998) in Applied Mathematics from Xi’an Jiaotong University, his MSc (2001) in Applied Mathematics and PhD (2004) in Mathematical Ecology from Lanzhou University. Hui was a researcher at the DST-NRF Centre of Excellence for Invasion Biology (C∙I∙B) from 2008 to 2013, and has remained a core team member of the centre. He was appointed Adjunct Professor in 2011 in the Research School of Arid Environment & Climate Change at Lanzhou University, after serving as Visiting Professor from 2006 to 2009. In January 2014, Professor Hui was promoted to full Professor in the Department of Mathematical Sciences at Stellenbosch University for this SARChI Chair appointment, also co-hosted by the African Institute for Mathematical Sciences (AIMS) in Cape Town.

Professor Hui is a P-rated scientist in Applied Mathematics, Ecology and Environmental Science, and received the 2011 Elsevier Young Scientist Award in 2011. He is a supervisor at the Southern African Young Scientists Summer Programme (SA-YSSP) and a recognised expert by the Mathematics of Planet Earth (mpe2013.org).

Professor Hui has published more than 100 papers and is on the editorial board of several journals: *Biological Invasions, Frontiers in Ecology and Evolution, The Scientific World Journal, The Open Zoology Journal,* and *Applied Mathematics and Computational Sciences.*

**Current research interests**

Professor Hui is working on the interface between mathematics and biology. His interests lie in proposing models and theories for explaining emerging patterns in whole-organism biology, namely ecology. His recent research focus includes developing novel methods in mathematics, statistics and theoretical physics to unlock the mechanisms behind realistic biological patterns, especially on how patterns related to the heterogeneity of species distributions, the hierarchy of biological networks and the size of adaptive traits, change with measurement, characteristic and organisational scales. These research areas all serve to clarify the interactions among patterns, scales and dynamics in the ever-evolving ecological system.

**Relevance of research**

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Professor J Lubuma

Research Chair: Mathematical Models and Methods in Bioengineering and Biosciences
Primary discipline: Mathematical Sciences
Level of Chair: Tier 1
Institution: University of Pretoria
Chair commencement date: August 2013
Website/blog: www.up.ac.za/lubuma and www.up.ac.za/SARChI_M3B2

Biosketch
Professor Lubuma received his PhD from the Université Catholique de Louvain in Belgium in 1985 and was a postdoctoral fellow at the International Centre for Theoretical Physics in Italy (1990-1991). He has worked at and visited many prestigious universities and research institutions. From May 2004 till July 2013, he was Head of the Department of Mathematics and Applied Mathematics at the University of Pretoria (UP). After joining UP in 2000, Professor Lubuma initiated and still leads a very successful research group within the focus area Partial Differential Equations, their Numerical Analysis and Mathematical Modelling. He has published widely in prestigious journals and has participated in several major conferences either as keynote speaker, session chairperson or organiser of symposiums.

Professor Lubuma has made significant contributions to the theory of the nonstandard finite difference schemes as well as to the design and implementation of innovative numerical schemes that replicate the dynamics of a wide range of differential models that arise in applications. Professor Lubuma has contributed to make science work in Africa. He has trained several postgraduate students and is involved in various regional centres of excellence. He renders a vital service to the scientific community through his extensive involvement as an associate editor and referee for several journals.

Recent awards and recognitions include:
- NRF B2-rated researcher;
- South African Mathematical Society Award for Research Distinction 2011;
- Sign of Honour by the Bulgarian Academy of Sciences;
- Fellow of the African Academy of Sciences;
- Fellow of the Academy of Science of South Africa;
- Fellow of Die Suid- Afrikaanse Akademie vir Wetenskap en Kuns;
- Subject of biographical record in the Marquis Who’s Who in the World 29th Edition 2012; and
- University of Pretoria Exceptional Achiever (Academic) Award three consecutive times.

Current research interests
Identification of adequate scientific, engineering and medical responses to problems such as epidemiological diseases and ecology of species that pose massive threat to the society.
Professor SD Maharaj

**Research Chair:** Gravitating Systems  
**Primary discipline:** Mathematical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of KwaZulu-Natal  
**Chair commencement date:** January 2007

**Biosketch**

Professor Maharaj completed his PhD at the University of Witwatersrand. He is a Senior Professor in the School of Mathematics at the University of KwaZulu-Natal, and in 2009 was named a Lifetime Fellow. In 2005 he was appointed Director of the Astrophysics and Cosmology Research Unit. He is a Fellow of the Royal Society of South Africa. He was a recipient of the Vice-Chancellor’s Research Award as well as the South African Mathematical Society Medal for the International Year of Mathematics. He has previously held the positions of treasurer and secretary in the South Africa Gravity Society, South African Mathematical Society, and served on the National Committee for the International Mathematical Union. Presently he is a member of the Council, and Treasurer of the Academy of Science of South Africa, and is a board member of the NRF. He is involved in the organisation of numerous conferences in South Africa and abroad. He has published many papers in international journals, supervised several MSc and PhD students, and made several conference presentations.

**Current research interests**

The principal research interests are related to applications in cosmology and relativistic astrophysics in the context of general relativity, which is the standard theory of gravity. This involves the analysis of the nonlinear Einstein field equations for neutral matter and the coupled Einstein-Maxwell system of partial differential equations for charged matter. In cosmology, the focus of study is inhomogeneous cosmological models, and the relationship between symmetries and the spacetime geometry. In astrophysics, the main thrust is the modelling of superdense stars and radiating stars in strong gravitational fields. The role of the barotropic equation of state, relating the energy density to the pressure, is a major focus.

**Relevance of research**

Models of gravitating systems are crucial to describe phenomena that arise in astrophysical and cosmological scenarios. The principal applications include inhomogeneous cosmological models and processes in the early universe, gravitational collapse and the formation of black holes, and the formation of spacetime singularities in relativistic systems. Transport processes involved in the evolution of relativistic stars, the thermodynamics of matter under intensely strong gravitational fields, superdense relativistic stars with high core densities, and radiating relativistic stars are studies of current interest in astrophysics. The group’s models provide a theoretical basis for physical features observed in astronomical objects. It is attempting to build a deeper understanding, in general relativity, of the underlying physics for such structures.
Professor BD Reddy

- **Research Chair:** Computational Mechanics
- **Primary discipline:** Mathematical Sciences
- **Level of Chair:** Tier 1
- **Institution:** University of Cape Town
- **Chair commencement date:** January 2007

**Biosketch**
Professor Reddy completed his PhD at Cambridge University in 1977. He was appointed to the South Africa Research Chair position in view of the strategic significance of computational mechanics and the role of the Centre for Research in Computational and Applied Mechanics (CERECAM), which he heads, in promoting research and postgraduate training in the area. He will continue in his role as director of CERECAM and will seek to align research activities in computational mechanics with national priorities such as the Centre for High Performance Computing as well as with priorities in industry. He was bestowed with the National Order of Mapungubwe (Bronze), by the former President of the Republic of South Africa, Thabo Mbeki, for his outstanding contributions to, and achievements in, the fields of Mathematics and Science.

**Current research interests**
Current research interests and activities span a range of topics in theoretical and computational mechanics. These include inelastic material behaviour, cardiovascular biomechanics, flows of viscoelastic fluids, and various problems associated with the analysis and development of new finite element methods.

**Relevance of research**
Research in computational mechanics straddles theoretical and applied issues. It is intended that activities in the research Chair will reflect this breadth by publishing results in international journals, presenting at local and international conferences, and giving priority to problems in industry to which direct contributions can be made.
Professor JR Botha

Research Chair: Nanophotonics
Primary discipline: Physical Sciences
Level of Chair: Tier 2
Institution: Nelson Mandela Metropolitan University
Chair commencement date: January 2008

Biosketch
Professor Botha completed his PhD in Physics at the Nelson Mandela Metropolitan University (formally known as the University of Port Elizabeth) where he holds a Professorship. He is a Von Humboldt Fellow, with extensive experience in the epitaxial growth of semi-conducting layers and heterostructures, including quantum structures, and has expertise in various electrical and optical techniques suitable for characterising nanostructures. He has published almost 100 papers in peer-reviewed international journals.

Current research interests
Professor Botha has numerous challenging projects, including:
- InAsSb and related nanostructures for application in mid-infrared detectors. This work includes the development of InAs/GaInSb strained layer superlattices and InAsSb quantum dots by MOCVD;
- The development of ZnO and MgZnO by MOCVD for ultraviolet detectors. This project focuses on issues such as p-type doping in ZnO (one of the outstanding issues preventing this exciting material from yielding high-quality photo diodes), and the prevention of phase separation in MgZnO, in order to produce high-quality ZnO/MgZnO quantum structures;
- Chemical bath deposition of ZnO nanorods on silicon substrate for white light emitters. This work addresses the challenges of controlling the orientation and dispersion of nano seed crystals on silicon substrate, to act as templates for the formation of ZnO nanorods. It is also aimed at controlling the shape and size of the ZnO nanorods; and
- MOCVD growth and characterisation of antimony based quantum dot structures for photovoltaic and mid-infrared sensor applications.

Relevance of research
Apart from the very interesting fundamental phenomena manifesting themselves on the nano and quantum scales, and the challenges associated with manipulating and manufacturing semiconductor structures on these scales, this work is aimed at serving a local niche industry involving the manufacture of infrared sensors. The group also aims to develop improved procedures to manufacture new materials and structures for light-emitting and light-detecting devices operating both in the ultraviolet and in the infrared ranges. Overall, we strive to be at the forefront of international development and offer high-quality training, as evidenced by several collaborations with overseas groups, which provide ample opportunity for students to travel abroad.
Professor M Böttcher

- **Research Chair**: Astrophysics and Space Physics
- **Primary discipline**: Physical Sciences
- **Level of Chair**: Tier 1
- **Institution**: North-West University
- **Chair commencement date**: January 2013
- **Website**: www.phy.ohiou.edu/~mboett/

**Biosketch**

Professor Böttcher received his PhD (Physics) at the Max-Planck-Institute for Radio Astronomy and University of Bonn, whereafter he furthered his postdoctoral studies at Rice University, Houston, Texas between 1997-2002.

From 1999-2002 Professor Böttcher was the NASA/SAO Chandra Postdoctoral Fellow at Rice University, Houston, Texas before spending the next decade at Ohio University, Athens, Ohio, Department of Physics and Astronomy, where he was appointed full Professor.

**Current research interests**

- High-Energy Astrophysics;
- Astroparticle Physics;
- Gamma-Ray Astronomy; and
- Astrophysical Relativistic Jet Sources (active galactic nuclei, gamma-ray bursts, Galactic black holes).

**Relevance of research**

Understanding relativistic particle acceleration to the highest energies achieved in the Universe, probing the most violent astrophysical environments, leading to an understanding of fundamental physics in extreme regimes not approachable by man-made experiments on Earth.
Professor C Carignan

**Research Chair:** Extragalactic Multi-Wavelength Astronomy  
**Primary discipline:** Physical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** July 2011

**Biosketch**
Professor Carignan holds a PhD in Astronomy from the Australian National University. He is Adjunct Professor at the Université de Ouagadougou, Emeritus professor at the Université de Montréal and appointed in 2011 was Professor at the University of Cape Town. He has sat on various boards and committees of Astronomy in Canada. Currently, he is a member of the SALT Task Team, the chair of the NRF SALT-MeerKAT collaborations committee, member of the NRF rating committee, member of the steering committee of the Office of Astronomy for Development (OAD) and leader of a team developing a 4k x 8k Frame Transfer EMCCD with e2v.

**Current research interests**
Professor Carignan’s main contribution to research in Astrophysics is the study of the mass distribution in late-type spiral and dwarf galaxies carried out in the last 25 years. This work has clearly demonstrated that the contribution of dark matter to the total mass of dwarf galaxies (~90%) is much more important than in massive spirals (~50%). Moreover, contrary to the situation in spirals where dark matter contributes mainly in the outer parts, dark matter in dwarfs contributes at all radii. Most of this work was done using radio HI kinematical data.

The resolution reached by N-body simulations of the cosmic evolution of dark halos allows one to predict the inner part of halo density profiles. In principle, these profiles could be directly compared with the ones deduced from modelling the rotation curves. Unfortunately, the sensitivity of the rotation curves to the exact density profile of the halos is quite low, and one must use the highest sensitivity and the highest resolution possible to arrive at useful comparisons. Combining the high spatial resolution of Fabry-Perot (FP) Ha data to the high sensitivity but low spatial resolution of HI data, it is possible to show that the simulations are predicting halo density profiles much more centrally concentrated than what is observed.

In order to obtain high-quality Ha kinematical data, a camera was specially developed (FaNTonM) to work in photon counting mode with essentially zero read-out noise. Using this instrument, surveys were carried out for barred spiral galaxies, galaxies of the SINGS sample and a sample of spirals in the Virgo Cluster. Those observations were obtained at the Observatoire du mont Mégantic (1,6m) and the Observatoire de Haute-Provence (1,93m) for the objects requesting a large field and on the 4m-class CFHT and ESO (La Silla, Chile) for more distant objects. A similar FP instrument, GHaFaS, was built for the WHT 4,3m telescope.

Professor Carignan led a team that did the first Neutral Hydrogen (HI) line observation with the MeerKAT precursor KAT-7.

**Relevance of research**
Recently a CCD camera with zero read-out noise was developed based on an EMCCD chip. The first controller giving satisfactory results for this type of chip was just breveted and the first one produced and sold to NASA. This also gave rise to a spin-off company called Nüvü Cameras that will commercialise the new controller.
Professor S Colafrancesco

**Research Chair:** Radio Astronomy  
**Primary discipline:** Physical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Witwatersrand  
**Chair commencement date:** August 2011

**Biosketch**
Professor Colafrancesco graduated in Physics *summa cum laude* at Rome University La Sapienza (Italy) and obtained his PhD in Astronomy from Padua University (Italy) in 1990. He has been a leading astrophysicist in the Italian National Institute for Astrophysics (1991-2011) where he was involved in many international leading projects and research activities. He was also the Director of the Education Division (2000-2005) at the Rome Astronomical Observatory, the Scientific coordinator of the Italian Space Agency (ASI) Science-Data-Center, and the Project Scientist/Manager of various space projects. From 1994-1999 he was a Member of the Italian Astronomy Research Council and since 1990 has been a referee of the Italian Minister for University and Research. He is currently involved in, and provides theoretical and data analysis support to, various ground-based and space-borne astronomical projects operating from radio to gamma-ray frequencies. During his career he has published widely and in leading astrophysical journals with a publication record of more than 350 scientific publications, 180 of which in peer-reviewed journals and he has received more than 70 invited reviews.

**Current research interests**
His research strategy aims at using the most powerful radio telescopes (SKA, MeerKAT) to unveil the structure and evolution of the Universe and its structures. His research interests include the search for Dark Matter, the evolution of galaxy clusters, the nature of the most powerful cosmic accelerators (blazars, radiogalaxies), the evolution of galaxy outflows, the origin of cosmic rays and magnetic fields in cosmic structures, and new directions in light propagation. He proposes to exploit the radio-gamma correlation in cosmic sources to develop a multi-wavelength platform of radio (MeerKAT, SKA) and gamma-ray experiments (HESS, CTA) in the South African framework.

**Relevance of research**
The relevance of his scientific research is largely recognised in cosmology, particle-astrophysics, radio and mm astronomy, plasma astrophysics, high-energy astrophysics, with a high degree of research innovation and originality. He has been pioneering the multi-wavelength approach to the indirect detection of Dark Matter, and the high-energy particle acceleration mechanisms in galaxy clusters advocating the use of multi-wavelength observations of these structures to better understand the contribution from high-energy particles. He is widely considered a leading scientist in the study of the SZ effect in cosmic structures, where he opened new directions of investigation. His publications have obtained more than 6 000 citations on international journals, with a h-index of 45.
**Professor R Davé**

**Research Chair:** Cosmology with multiwavelength data: exploiting SALT and Meerkat  
**Primary discipline:** Physical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of the Western Cape  
**Chair commencement date:** January 2013  
**Website:** ursa.as.arizona.edu/~rad

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**Biosketch**

Professor Davé obtained his Artium Baccalaureus (Bachelor of Arts) in Physics from the University of California, Berkeley, his MS (Master of Science) in Physics from California Institute of Technology, and his PhD in Astronomy and Astrophysics from the University of California, Santa Cruz in 1998. After that, he was awarded a Lyman J. Spitzer Postdoctoral Fellowship at Princeton, and in 2000 received a Hubble Fellowship, which he took to the University of Arizona. In 2003, he was hired as an Assistant Professor at Arizona, and obtained tenure in 2009. He took up the SARChI Chair at UWC in January 2013. Currently, Professor Davé has over 100 publications, 7,000 citations, and in addition to leading a high-profile research group, he is involved in numerous major international observational and theoretical projects using Hubble, MeerKAT, and other telescopes.

**Current research interests**

Professor Davé seeks to answer the basic question, “Why does the Universe look the way it does?” This largely involves understanding the physics by which the wide diversity of galaxies today emerges from the tiny primordial fluctuations arising in the early Universe. To study this, Professor Davé utilises sophisticated hydrodynamic simulations run on high-performance supercomputers. Much of his current effort involves examining the cycle of mass, energy, and heavy elements that connects galaxies to their surrounding intergalactic gas, the so-called baryon cycle, that is the emerging view for how galaxies evolve from their birth phase during reionisation, their growth phase during “cosmic noon”, and their emergence into the familiar Hubble sequence today.

**Relevance of research**

Professor Davé aims to help South Africa obtain a leadership role in the international astronomical community by optimally leveraging world-class facilities being developed here, such as SALT, MeerKAT and eventually SKA. This will provide greater opportunities and prominence for South Africans and all Africans within the international scientific community, and build a tradition of excellence in scientific exploration.
Professor T Jarrett

**Research Chair:** Astrophysics and Space Physics  
**Primary discipline:** Physics  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2007  
**Website:** [www.ast.uct.ac.za/~jarrett/](http://www.ast.uct.ac.za/~jarrett/)

**Biosketch**
Professor Jarrett's scientific career has focused on the formation and evolution of galaxies, both in the local universe and at earlier epochs, peering through the optical-infrared window to study the physical processes that govern the galaxies. His expertise with infrared astronomy spans the entire window: from the near-infrared (1 to 3 microns) that is used to study the stellar mass of galaxies, into the mid-infrared (4 to 50 microns) that is sensitive to star formation and interstellar medium processes, and through the far-infrared (50 to 500 microns) which traces the coldest and most massive gas and dust content of galaxies. He has used ground-based telescopes to observe in the near-infrared, airborne observatories to conduct mid-infrared spectroscopy, and space-based telescopes to observe in the mid- and far-infrared continuum and line emission.

His research efforts have focused on key elements of extragalactic science: the internal (detailed) mysteries of galaxies, how they form and how they evolve, and their distribution (large scale structure) in space. He has made major contributions to these fields, as well as to the greater astronomical community, through his work as a NASA/JPL mission scientist at the California Institute of Technology. He has played a major role, and continues to do so, in three great missions: Two Micron All Sky Survey (2MASS), Spitzer Space Telescope and the Widefield Infrared Space Explorer (WISE).

His research has also exploited the unique capabilities of the radio window to study continuum (3, 6 and 20cm) and 21cm hydrogen line emission. Equally important, he has engaged in two-way feedback with the Science community through publications, talks, workshops, committees, conferences and education public outreach efforts.

**Current research interests**
The highest priority is to produce the WISE Galaxy Catalog, composed of large galaxies and resolved galaxies (numbering in the millions). This will be the major focus of his research in the next five years. Related to this effort, there are a number of projects that will use multi-wavelength Radio-Infrared-Optical:

- **SKA Pathfinders:** He is a team member of the ASKAPWALLABY (PI B Koribalski), ASKAPEMU (PI R Norris) and APERTIFZOA projects, which will commence in late-2014. His focus will be to cross-match the WISE catalogues with the radio HI and continuum sources. With his colleagues at UCT (Kraan-Korteweg) and the Netherlands (G Jozsa) they will bear down on sources in the Zone of Avoidance, where all traditional surveys (including 2MASS and WISE) have a difficult time with source confusion, but the HI surveys should pierce with ease.

- **Multi-wavelength Galaxy Evolution – WISE, GAMA and HI Galaxies:** Explore the interconnection between the gas reservoir, as traced by HI observations, and the tracers of past-to-present galaxy evolution through WISE, GAMA (optical spectroscopic) and other (e.g. spectral Halpha) observations, Professor Jarrett’s postdoctoral Ed Elson (UCT), colleague Baerbel Koribalksi (ATNF), and Michelle Cluver (AAO) will be employing data from the GAMA/AAT, ATCA, Parkes and KAT7 telescopes in combination with optical-infrared measurements of nearby galaxies as selected in the Local Volume HI Survey (LVHIS) survey, and from compact galaxy groups.

**Relevance of research**
Observational cosmology; galaxy evolution; databases and large products.
Professor V Jejjala

**Research Chair:** Theoretical Particle Cosmology  
**Primary discipline:** Theoretical Physics  
**Level of Chair:** Tier 2  
**Institution:** University of the Witwatersrand  
**Chair commencement date:** October 2011  
**Website:** www.wits.ac.za/staff/vjejjala

**Biosketch**
Born in India, Professor Jejjala moved to the United States when he was five years old. Around this time, Carl Sagan convinced him that his research focus should be the Big Bang rather than dinosaurs. True to this change in vocation, he graduated from the University of Maryland at College Park in 1996 with three Bachelor of Science degrees (in Physics, Mathematics, and Astronomy). Subsequently, he completed a PhD in Physics at the University of Illinois at Urbana–Champaign, where he worked on problems in string theory under the supervision of Robert G Leigh. Following his postgraduate education, he conducted postdoctoral research at Virginia Tech (2002-2004), Durham University (2004-2007), the Institut des Hautes Études Scientifiques (2007-2009), and Queen Mary University of London (2009-2011). He assumed a SARCHI Chair at the University of the Witwatersrand in October 2011. Today, just as he had intended at the age of five, he spends his days and nights pondering the Universe.

The questions that appeal to him most are also the most primitive and the most profound. “How is the Universe constructed at its most basic level?” “Why is Nature as it is and not some other way?” These questions reach to the heart of our understanding of space, time, and matter.

**Current research interests**
String theory is the leading candidate for the unification of the fundamental forces. This synthesis comes at a cost: the theory predicts 10 dimensions of space and time. In our everyday life, we only experience four dimensions. He focuses on bringing string theory into contact with space time physics in our Universe.

Having learnt that there is a dictionary that translates problems in gravity to problems in quantum field theory, he investigates the physics of black holes. Because black holes are singular space times, this is a stepping stone to understanding cosmological singularities such as the Big Bang.

**Relevance of research**
Under the bluest skies, the question “Why is the world as we see it?” must have been asked by our forebears on the African savannah at the very beginning of civilisation. It is human compulsion to inquire about where things come from, how things work, and the way the world around us pieces in to an immense Universe. We are the stuff from the Big Bang contemplating the origin and evolution of the cosmos. In this generation, not far from where the questions were initially posed by the earliest humans, the group proposes novel solutions to ancient enigmas. We are tantalising close to fitting aspects of the real world on extremely large and extremely small scales into a coherent, unified whole.
**Professor RS de Mello Koch**

**Research Chair:** String Theory and Fundamental Physics  
**Primary discipline:** Theoretical Physics  
**Level of Chair:** Tier 1  
**Institution:** University of the Witwatersrand  
**Chair commencement date:** August 2006

**Biosketch**  
Professor De Mello Koch completed his PhD in Theoretical Physics at the University of the Witwatersrand in 1997, and is a Professor in the School of Physics. He has received a number of awards, which include the South African Institute of Physics (SAIP) Silver Jubilee Medal in 2001 and an NRF President's Award during the same year. He is a Fellow of the Institute for Advanced Studies, Stellenbosch, SA and a Fellow of the Institute for Advanced Studies, Durham, UK.

**Current research interests**  
It has been clear for about three decades that the strong interactions are described by a quantum field theory with local gauge symmetry. Evidence for this comes from lattice simulations of the theory as well as from a study of the high energy limit of the theory, reliably captured by perturbation theory. However, we still do not have an analytic understanding of the low energy dynamics of gauge theories. Despite more than three decades of intense study, the problem remains unsolved.

An unrelated problem is that of quantum gravity, the framework that consistently unifies quantum field theory and general relativity. A theory of quantum gravity is needed to address problems that include the dynamics of black hole evaporation and of the Big Bang itself. At this time, we do not even have a consistent, complete conceptual framework for quantum gravity. A promising, unfinished attempt to build such a theory is string theory.

Maldacena's ground-breaking work gave convincing arguments that gauge theory and quantum gravity are equivalent physical theories. For any question that can be asked in gauge theory, there is a corresponding question in quantum gravity and vice versa. Evidence for this conjecture, now called the gauge/string theory duality, is substantial.

The focus of this research is on the gauge theory side of the gauge/string theory correspondence. A novel approach to multi-matrix systems is being developed. In a nutshell, the new approach employs Schur-Weyl duality and the representation theory of symmetric groups to organise the infinite-dimensional space of states of the theory in a surprisingly simple way. This emergence of simplicity from a complex system with a vast number of degrees of freedom, is central in this approach towards understanding the gauge or string duality.

**Relevance of research**  
Applications of this research are in Mathematics (new results in representation theory, as well as in geometry and number theory related to Matrix models), as well as to Physics, including integrable models, membrane dynamics and QCD.
Professor R Maartens

**Research Chair:** Astronomy and Astrophysics  
**Primary discipline:** Physical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of the Western Cape  
**Chair commencement date:** January 2011  
**Website:** www.uwcastro.org

**Biosketch**
Professor Maartens did his PhD in Cosmology with George Ellis at the University of Cape Town. He currently holds a Square Kilometre Array Research Chair at the University of the Western Cape, and is also a Professor of Cosmology at the Institute of Cosmology and Gravitation (ICG), University of Portsmouth, UK. He was Director of the ICG from its inception in 2002 until 2010, during which time the ICG became one of the top cosmology research groups in the UK. He has published over 150 papers in refereed journals, and is co-author of a Cambridge monograph, *Relativistic Cosmology* (2012).

Professor Maartens held a Senior Research Fellowship from the UK Particle Physics and Astrophysics Research Council, 2002-2005, and was a member of the UK Particle Astrophysics Advisory Board, 2005-2007, and the Advisory Council of the Sloan Digital Sky Survey, 2005-2010. He is currently Chair of the Cosmology Team in the international SKA Science Working Group, and is a chief editor of the journal *General Relativity and Gravitation*.

**Current research interests**
Professor Maartens is interested in developing and analysing theoretical models of the Universe and in testing them against observations. He works on some of the “big” questions in cosmology, including: “What are the origin, nature and evolution of the fluctuations in the early Universe that act as seeds for the formation of galaxies in the late Universe?” “What is the cause of the accelerating expansion of the Universe? Is it a ‘dark energy’ field that is pushing galaxies away from each other faster and faster – or a correction to Einstein's theory of gravity?” Cosmological observations of the background radiation and of galaxies and hydrogen gas are delivering massive sets of data at ever higher precision, allowing us to test the various models that try to answer these questions. The SKA radio telescope array, most of which will be located in South Africa, will be the biggest ever astronomy instrument. Data from the SKA will be one of the most important means for testing our theories of dark energy and gravity.

**Relevance of research**
Cosmology aims to explain the history and the evolution of the Universe and its contents. This contributes to our understanding of some of the key problems in fundamental physics. In addition, cosmology contributes to the general advance of knowledge and culture, giving us a better understanding of the position of humanity in the cosmos.

South Africa has made major investments in the SALT optical telescope at Sutherland and the MeerKAT array of radio telescopes near Carnarvon, and in the training of engineers and scientists to build and operate these instruments, and to exploit the data that they provide. Since the successful bid by South Africa to host the major part of the SKA, there will be a tremendous growth in the next decades in the size of the radio array near Carnarvon. Professor Maartens’ research uses the data from these telescopes, and other telescopes elsewhere in the world, to answer key questions in cosmology. Early-career scientists in his research team are trained in the skills necessary to build models, compute their predictions, analyse data and test those models against observations. These skills are also applicable in other areas of mathematical modelling.
Professor F Petruccione

**Research Chair:** Quantum Information Processing and Communication  
**Primary discipline:** Physical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of KwaZulu-Natal  
**Chair commencement date:** September 2007  
**Website:** quantum.ukzn.ac.za

**Biosketch**
Professor Petruccione completed his PhD in 1988 and his Habilitation in 1994. In 2004 he was appointed Professor of Theoretical Physics at the University of KwaZulu-Natal (UKZN), in 2005 he was awarded an Innovation Fund grant to set up a Centre for Quantum Technology, and in 2007 he was granted a South African Research Chair for Quantum Information Processing and Communication. He is Chairman of QZN Technology, a spin-off company of UKZN, and is one of the Deputy Directors of the National Institute for Theoretical Physics.

He has published more than 100 papers in refereed journals. He is the co-author of a monograph on *The Theory of Open Quantum Systems*, an editorial board member of *Open Systems and Information Dynamics*, as well as an editor of several proceedings’ volumes and special editions of scientific journals.

**Current research interests**
Professor Petruccione has been working on the theory of open quantum systems, which is at the basis of many recent quantum technological applications. The miniaturisation of technological devices necessitates manipulation of objects at the nanoscale level at which coherent quantum mechanical processes start to dominate the physical properties. The unavoidable interaction of these systems with their environment gives rise to dissipative mechanisms and a strong loss of quantum coherence, such as decoherence. Since perfect isolation of quantum systems is not possible, it is of central importance to incorporate the methods and tools of the theory of quantum systems in the exploration of quantum technologies.

He is working on the following projects:
- Theoretical foundations of open quantum systems;
- Stochastic simulation methods for open quantum systems;
- Simulation methods for quantum technological devices;
- Quantum Key Distribution in optical fibres;
- QuantumCity: a real life quantum communication network in the eThekwini Municipality;
- Cold atoms and quantum computing; and
- Quantum Biology.

**Relevance of research**
Quantum Information Processing and Communication (QIPC) is an emerging research area, which has the potential to revolutionise several areas of Science and Technology. QIPC is based on the physical laws of quantum mechanics and this new paradigm allows for applications that were unthinkable within classical physics. Quantum computing promises immense computing power, Quantum Key Distribution guarantees completely secure communication, Quantum Biology might give us a better understanding of photosynthesis.
Professor H Schwoerer

Research Chair: Photonics, Ultrafast and Ultra-intense Laser Science
Primary discipline: Physical Sciences
Level of Chair: Tier 1
Institution: Stellenbosch University
Chair commencement date: January 2007

Biosketch
Professor Schwoerer completed his PhD in Femtosecond Holography at the Federal Institute of Technology, Switzerland, and has more than 15 years of research experience both in femtosecond spectroscopy and high-intensity laser research. After completing his PhD, he started research at the University of Warzburg, Germany, and in time resolved molecular spectroscopy with special emphasis on coherent control schemes. In 1999 he was the head of the high-intensity laser laboratory at the University of Jena, where he developed the JETI 10 TeraWatt Laser, which was one of the most intense laser systems in the world at that time. He was responsible for the laser operation and ran a user facility for international JETI users. In 2005, he became Associate Professor Extraordinary at Stellenbosch University and he also received the Arnold-Sommerfeld-Preis at the Bavarian Academy of Science, for his research in the field of high-intensity lasers.

Current research interests
His main research interest is the investigation of structural dynamics of matter on an atomic time scale and on an atomic spatial scale. He is interested in the initial elementary processes of organic molecules, as well as complexes and crystals thereof, upon depositing energy to them. Elementary processes can be changes in the configuration of the molecular structure, or intra- or intermolecular transfer of charge (electron or proton) or energy. These processes form the first and decisive step of many chemically and biologically relevant reactions, for example photosynthesis or vision, but also of more technical applications such as light harvesting, coherent control of molecular reactions or more general molecular electronics.

He keeps in contact with the world-wide high-intensity laser community, and still pursues the idea of a South African ultra-high intensity laser system, done in close cooperation with colleagues from nuclear, accelerator and theoretical physics in this country.

Relevance of research
Investigation of the structural dynamics of matter in real time contributes to the understanding of elementary and initial processes of complex molecular reactions. This very typical fundamental science task is relevant because it will help us to understand the particular reaction and its generalisations; it will provide the means to optimise related molecular electronics applications; and it is the best education to the next generation of truly innovative researchers.
**Professor P Selyshchev**

**Research Chair:** Complex Systems  
**Primary discipline:** Physical Sciences  
**Level of Chair:** Tier 2  
**Institution:** University of Pretoria  
**Chair commencement date:** January 2011

**Biosketch**

Professor Selyshchev completed his PhD in Theoretical Physics at the Kiev Institute for Nuclear Research and at the Taras Shevchenko Kyiv University. The title of his thesis was “The nonlinear couplings and external fluctuations in self-organisation of radiation defect structures”. He joined the Physics Department of the University as an engineer in 1981 and became Professor in 2002. He has developed and taught many courses, including Self-organisation of non-equilibrium systems; Materials for nuclear reactors; Theory of solids under irradiation; Synergism of phenomena in materials under irradiation; Simulation of radiation damage; and New problems in Physics. He has published about 250 scientific papers and several monographs. Professor Selyshchev was also involved as a theoretician in the development of post-Chernobyl strategies.

**Current research interests**

Professor Selyshchev specialises in Theoretical Physics, specifically complex non-linear systems and their evolution. He focuses on kinetic non-linear processes in materials under irradiation and has developed a theoretical approach to the self-organisation phenomena in irradiated materials. Research foci are temporal and spatial self-organisation of defect density under irradiation, dimensional changes in irradiated materials as dissipative structures and different kinds of interactions as mechanisms of dissipative structure formation. The point of these researches is using nonlinear feedbacks between elements of microstructure and selecting suitable irradiation conditions for renovation of structural characteristics by means of irradiation. The goal is to explore and to select optimal conditions to minimise radiation damage and the negative influence of irradiation.

**Relevance of research**

The effects of radiation on properties of materials are of significant interest in scientific and technological contexts ranging from astrophysics and nuclear reactor technology to semiconductor device manufacture and space system engineering. This interest stems partly from the fact that the natural world is pervaded with radiation and in part from the practical applications that have been found for radiation effects in Science and Technology.
Professor O Smirnov

Research Chair: Radio Astronomy Techniques and Technologies
Primary discipline: Physical Sciences
Level of Chair: Tier 1
Institution: Rhodes University
Chair commencement date: October 2012

Biosketch
Professor Smirnov graduated from Moscow State University with a degree in theoretical Mathematics, then went on to do a PhD in optical astronomy techniques at the Russian Academy of Sciences. After his PhD, he spent 12 years as a postdoctorate, researcher and software developer at the Netherlands Institute for Radio Astronomy (ASTRON), before taking up the Chair at Rhodes University. During his time at ASTRON, he was active in the development of novel radio interferometric techniques and calibration methods, and became the primary developer of the MeqTrees system for simulation and calibration of radio interferometers, as well as ionospheric modelling and flagging tools. He was also involved in the LOFAR telescope, and with the last days of the AIPS++ project (which was later revived and reinvented as the CASA system).

Current research interests
Radio astronomy techniques; novel algorithms for radio interferometer calibration and imaging; aspects of radio telescope design; radio interferometric simulations; automatic data reduction pipelines; Big Data; and use of HPC in the fields above.

Relevance of research
Roughly 70% of the Square Kilometre Array has been awarded to South Africa. Successful use of this instrument will require the development of many new radio interferometric techniques, and a body of local researchers skilled in these techniques.
Professor H Swart

Research Chair: Solid State Luminescent and Advanced Materials  
Primary discipline: Physical Sciences  
Level of Chair: Tier 1  
Institution: University of the Free State  
Chair commencement date: March 2013  
Website: natagri.ufs.ac.za/templates/staff.aspx?DCode=113&pid=8KxS0gjHfLU%3d

Biosketch
Professor Swart is a B2 NRF-rated researcher and currently a Senior Professor in the Department of Physics at the University of the Free State. Over the past 17 years he has led research in the area of the degradation of phosphors for field emission displays and developing materials for nano solid state lighting. He has been key in developing processes to synthesise and deposit thin films of various types of semiconductor nano particles which will enhance the colour, luminescent intensity and lifetime of these displays. He has more than 200 publications in international peer-reviewed journals, 34 peer-reviewed conference proceedings, three book chapters and books with more than 1 100 cited author references, more than 340 national and international conference contributions (authored and co-authored). He has an ISI H-index of 17. He is a reviewer for around 25 international and national professional journals in his field (or in related fields), as well as member of the editorial board of the high-impact factor journal Critical Reviews in Solid State and Materials Sciences. He received the South African National Science and Technology Forum (NSTF) award for research capacity development of students in the niche area of nanophysics in 2009. His commitment to the next generation of scientists is also reflected in the awards he received from the Faculty of Natural and Agricultural Sciences at the University of the Free State for excellence, mentorship and for academic entrepreneurship. He received honorary membership from the Golden Key association. He currently supervises about 20 PhD and MSc students and has delivered 38 PhD and MSc students in the past. He has established a National Nano Surface Characterisation Facility (NNSCF) containing state-of-the-art surface characterisation equipment. The interdisciplinary results obtained with these systems were recently selected to be on the cover of FEMS Yeast research for 2013.

Current research interests
The main focus of his research group will be to improve luminescent materials for applications in Flat panel Displays and Solar Cells; the development of OLED materials as well as materials for power-saving solid state lighting devices.

Relevance of research
The fabrication of phosphors will provide affordable lighting for people in rural areas, assisting with national infrastructure development, but may also be used in high-technology plasma and field emission television screens. Specifically, the development of nanophosphors which may be excited with rays from the sun during the day and then brought into the house at night, giving light to read and study, is one example of how this research may assist in reducing vulnerability and contribute to poverty alleviation.
Professor S Triambak

Research Chair: Nuclear Science
Primary discipline: Physical Sciences
Level of Chair: Tier 2
Institution: University of the Western Cape
Chair commencement date: September 2013

Biosketch
Professor Triambak currently holds a position at the Department of Physics and Astrophysics at University of Delhi, India. He is actively involved in the fields of nuclear astrophysics, fundamental symmetries and nuclear structure. Prior to his appointment in Delhi, he held postdoctoral research fellowships at the University of Guelph, Canada (2007-2008) and at TRIUMF, Canada's National Laboratory for Nuclear and Particle Physics (2008-2011). He is an active member of several international collaborations at nuclear physics facilities in Europe, North America and India. He obtained his PhD in 2007 from the University of Notre Dame, USA. He was also a graduate research assistant at the Center for Experimental Nuclear Physics and Astrophysics at the University of Washington in Seattle, USA, from 2003-2007. His PhD dissertation work was on isospin symmetry violations in nuclei.

Current research interests
Professor Triambak’s current research lies at the interface of Particle Physics, Nuclear Physics and Astrophysics. His work involves low-energy experiments that use the atomic nucleus as a laboratory to obtain a better understanding of nuclear interactions and the creation of matter in extreme stellar environments. A lot of his work also focuses on using atomic nuclei as experimental probes to test the fundamental symmetries of nature that are assumed by our present knowledge of Particle Physics phenomenology.

Relevance of research
The standard model of Particle Physics, which describes nature at the smallest scales, has currently been reinforced by the recent discovery of a Higgs-like boson, the so-called “holy grail” of Particle Physics. Professor Triambak’s approach of using precise Nuclear Physics measurements to test the standard model offers a method that is complementary to high-energy collider experiments (such as at the Large Hadron Collider in CERN) to search for signals that can be ‘smoking guns’ for hitherto unknown physics beyond the standard model. Such experimental work will additionally provide insight into understanding an elusive particle, the neutrino, whose properties seem ambiguous at present. His involvement in experimental nuclear astrophysics is relevant in the context of understanding nuclear reactions in stars, which created most of the elements in the periodic table and can thus be deemed responsible for the diversity of phenomena that we observe.
Professor D Davidson

Research Chair: Electromagnetic Systems and EMI Mitigation for Square Kilometre Array  
Primary discipline: Engineering Sciences  
Level of Chair: Tier 1  
Institution: Stellenbosch University  
Chair commencement date: January 2011

Biosketch
Professor Davidson holds a PhD from the Stellenbosch University obtained in 1991 (on parallel processing for Computational Electromagnetics), where he has been a Professor since 1996.

He has authored or co-authored over 50 journal papers and more than 130 conference papers, as well as a book now in its 2nd edition. He is a Fellow of the IEEE and a member of ACES and the SAIEE. He currently serves on the IEEE Antennas and Propagation Society administrative committee. He edits the bi-monthly EM Programmer's Notebook column in the IEEE Antennas and Propagation Magazine. He received the NRF's President's Award in October 1995 and presently has a B2 rating. In 2005, he received the Rector’s Award for Excellent Research from Stellenbosch University. He was local chair of the very successful joint international conferences ICEAA-IEEE APWC-EEIS held in Cape Town in September 2012.

Current research interests
Professor Davidson works in the field of applied electromagnetics. For most of his career, his work has focussed on Computational Electromagnetics (CEM) – the numerical solution of Maxwell's equations – and supporting technologies, in particular high-performance computing. He has worked closely on further developments of FEKO, a leading EM simulation program, and has collaborated extensively with local industry on this. Since his appointment to the SKA chair in 2011, the scope of his work has expanded significantly to address radio astronomy. This includes extensions of CEM techniques to specific problems in antenna design for SKA, as well as consideration of signal processing for radio telescopes, and antenna calibration issues. He is also principal investigator of the joint SU-UCT research programme, “MeerKAT High Performance Computing (HPC) for Radio Astronomy”, continuing an earlier flagship project of the national facility, the Centre for High Performance Computing.

Relevance of research
With the success of the SKA site bid announcement in May 2012, South Africa will be hosting the lion's share of the SKA. This highly international project relies on a number of technologies, including applied electromagnetics, his speciality. The ability to accurately predict and efficiently model antenna performance is crucial at both the design stage, as well as during operation; in the latter case, modern calibration methods increasingly require accurate models of the antenna beams.

Overall, the theory of electromagnetics underlies much of electronic engineering, in particular radio frequency and microwave engineering. This, in turn, underpins crucial technologies in major industries, including telecommunications, wireless, radar, remote sensing and many defence applications. As such, his work is relevant in both radio astronomy, as well as in much wider fields of electronic engineering, as evidenced by his elevation to Fellow of the IEEE in 2012, with the citation “for contributions to computational electromagnetics”.

Professor KD Djouani

**Research Chair:** Enabled Environments for Assisted Living  
**Primary discipline:** Engineering Sciences  
**Level of Chair:** Tier 2  
**Institution:** Tshwane University of Technology  
**Chair commencement date:** January 2014

**Biosketch**  
Professor Djouani is a full Professor, scientist and technical group supervisor of pattern recognition, soft computing, networking systems and Robotics at University Paris Est-Creteil (UPEC) seconded to Tshwane University of Technology. Since June 2012, he has been the Deputy Director in charge of research at the IUT-CV (University Institute of Technology) at UPEC. In January 2011, he was appointed as full professor at French South African Institute of Technology (F’SATI) at Tshwane University of Technology, after having been seconded, from July 2008 to December 2010, by the French Ministry of Higher Education to the same institution.

He heads the SCTIC team of the LISSI Lab, University Paris Est, and until July 2008 he was also national and European projects manager at the LISSI Lab. His current research work focuses on developing novel and highly efficient algorithms for reasoning systems with uncertainty, as well as optimisation and networked control systems.

He has authored/co-authored over 200 articles in archival journals, and conference proceedings as well as one patent, one IP, 18 chapters in edited books and two books.

**Current research interests**  
Research activities focus on developing mechatronic and networked technologies to help the elderly and persons with disabilities. By implication there will also be a focus on nonlinear modelling and control of mechatronic systems with the human in the loop while considering different sources of uncertainties that exist in such systems.

Main research themes targeted by the Chair in the Enabled Environment for Assisted Living include:  
- Modelling and control of non-linear networked systems with uncertainties;  
- Modelling and design of Mobile and Wearable Robotics to enable mobility and autonomy of persons with disabilities and the elderly; and  
- Development of Pattern recognition and behavioural analysis for human intention detection to predict the human interaction in the control loop. To handle different levels of uncertainties in the system, a higher order fuzzy logic strategy will be developed.

**Relevance of research**  
The developed research concerns assistive living technologies. The newly developed systems adapt their behaviour to the needs of the user and to specific situations. For instance, a mobility assistive system, as the exoskeleton under development at TUT, adapts to the disability situation (from rehabilitation to paraplegic mobility). In other cases, blind persons need more intelligent navigation systems with a virtual safety envelope concept in which the mechanical system is connected to the enabled environment using sensory information to ensure safe navigation at any time. In addition, the next-generation wheelchair needs to be adapted to persons with disabilities in which the control interfaces are dependent on the disability situation, and must be capable of detecting the user’s intention in real time to ensure safe and easy navigation. These are a few of the potential expectations that could lead to innovative products in this emerging field of assisted living.
Professor R Falcon

**Research Chair:** Clean Coal Technology  
**Primary discipline:** Chemical Engineering  
**Level of Chair:** Tier 1  
**Institution:** University of the Witwatersrand  
**Chair commencement date:** April 2007

**Biosketch**
Professor Falcon has been in coal research for over 40 years and now supervises postgraduate research at the University of the Witwatersrand (Wits), Johannesburg. She graduated with a PhD from Wits followed by advanced training in coal science and technology at the Berbau Forschung in Germany and the National Coal Board in the UK. She established a coal research group in Wits in the late 1970s, followed by a consulting company working with industry for the next 20 years. After a brief spell as Programme Manager at the CSIR (Enertek) and three years in the Eskom Research Facility in Rosherville, she joined Wits in the early 2000s.

Professor Falcon has specialised in research in a variety of coal-related fields within industry, specifically understanding coal qualities on process technologies and vice versa. She has received a number of national and international awards, has written over 80 publications, contributed to a number of books and produced more than 2 000 technical reports on industrial research and development. She attended meetings in the UN-ECE Coal Working Groups in Geneva as the South African technical representative for several years, is a recently retired Chairman of the Steering Committee for the Centre for Carbon Capture and Storage of South Africa, and is currently Director of the Fossil Fuel Foundation of SA.

**Current research interests**
Current research interests involve:
- Advanced understanding of the nature, transformation and performance of coal and its derivatives (coal, coke, char, minerals, trace elements, ash) in a variety of processes using petrography and other advanced techniques;
- Designing or adapting coal-fired plant (pf, FBC) to meet the reducing coal qualities (specifically combustion for power generation);
- Investigating the implementation of new CCT processes (UCG);
- Developing advanced biomass forms for co-firing with coal;
- Developing improved or alternative coal-based carbon reductants for the metallurgical industry; and
- Examining the cost-effectiveness and environmental impact of the new technologies.

**Relevance of research**
South Africa is the one country in the world most dependent on coal for its energy, liquid fuels and metallurgical reductants. It is also faced with significantly reducing coal qualities as well as an onslaught of environmental legislations with respect to reducing the use of coal to meet impending CO₂ and related-GHG reductions. Given the high costs for CO₂ capture and the as-yet limited locations for the storage of CO₂ once captured, the only approach left to South Africa, while renewable energy options gain traction, is to ensure the more efficient use of its coal resources to reduce its emissions. This includes urgent improvement in current technologies or the development of new clean-coal technologies.
Professor N Fitz-Coy

Research Chair: Innovative Small Satellite Technology and Applications for Africa
Primary discipline: Engineering Sciences
Level of Chair: Tier 2
Institution: Cape Peninsula University of Technology
Chair commencement date: April 2014
Website: www.mineralstometals.uct.ac.za

Biosketch
Professor Fitz-Coy’s research efforts address the dynamics and controls of multi-degree-of-freedom (M-DOF) systems with emphasis on space applications. Current research interests include attitude control of small satellites, design and analysis of multi-satellite systems, and space debris mitigation and remediation strategies. His research team has developed the world’s smallest control moment gyroscopes that were flown on SwampSat. He and his team designed and built DebiSat (a representative satellite for debris characterisation) and performed a hypervelocity impact test to emulate an on-orbit collision. Another research interest of his is M-DOF vibration testing. He has authored over 100 technical articles and has been the recipient of the Henry Pusey Best Paper Award, Abe Zarem Educator Award, and the IEST Maurice Simpson Technical Editors Award.

Professor Fitz-Coy has twice received the Bisplinghoff Award for his teaching and service to undergraduate education, and the AIAA Abe M. Zarem Educator Award for graduate student mentorship. He is an Associate Fellow of AIAA and chairs its Small Satellite Technical Committee (SmSTC) Advocacy Sub-committee. He is a Senior Member of the American Astronautical Society (AAS), the American Society for Engineering Education (ASEE), and the International Federation of Automatic Control (IFAC).

Current research interests
Professor Fitz-Coy’s research portfolio addresses the development of technologies required for High Performance Pico-Nano-Micro satellites for addressing the socio-economic needs of Africa. Specifically, his research in guidance, navigation, and control (GNC) systems is an enabler for many of the space missions identified specifically for the Africa Continent. Additionally, his efforts in developing technologies that enable end-to-end verification and validation of satellite hardware and software for mission assurance will ensure that the developed satellite systems perform as desired. Finally, his efforts in space debris mitigation and remediation will ensure that Africa is a good steward of the space environment.

Relevance of research
Innovative and cost-effective space-based solutions that address the socio-economic challenges of Africa, and the world in general, require a significant investment in human capital development. The multidisciplinary and interdisciplinary nature of the proposed effort will culminate in the establishment of Clusters of Excellence in Space Science, Engineering and Technology throughout Africa, which will serve as hubs for awareness, education, research and innovation by leveraging collaboration with international networks of expertise in these fields.
Professor JP Franzidis

**Research Chair:** Minerals Beneficiation  
**Primary discipline:** Engineering Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2008  
**Website:** www.mineralstometals.uct.ac.za

**Biosketch**
Professor Franzidis obtained his PhD from the Open University in the UK. He joined the Department of Chemical Engineering at UCT in 1983. His research career has been in various aspects of mineral (including coal) beneficiation, especially flotation. In 1996 he moved to the University of Queensland, Australia, to lead the world’s largest collaborative mineral processing research project, the AMIRA P9 project, which received numerous awards both for research and research methodology. His flotation research led to the development of a steady-state flotation circuit simulator, JKSimFloat, which has been applied to over 150 flotation operations world-wide. From 2003 to 2007 he was Chief Investigator of two large Australian Research Council Linkage grants, aimed at predicting and improving flotation performance. In 2007, he returned to UCT to direct the newly formed Minerals to Metals Signature Theme.

**Current research interests**
He conducts research at the systemic (holistic) level into:
- “Techno-environmental issues” in minerals beneficiation, such as mitigating acid rock drainage (ARD), sequestration of carbon dioxide through mineral carbonation of mining wastes, and recovering value from wastes (specially by flotation);
- Improving safety in mineral beneficiation operations; and
- Educating and developing for the sustainable management of mineral resources.

Research at the fundamental level to develop expertise in and employ the knowledge of mineralogy, rheology, electrochemistry, computational modelling, and particle tracking using radio-active labelling, will lead to the improvement of mineral beneficiation unit operations.

**Relevance of research**
The aim is to carry out research that will facilitate the sustainable development of the minerals resources of South Africa. Key challenges facing the minerals industry, such as improving process performance, minimising power and water consumption and waste production, and promoting cleaner and safer processing options and technologies, are being addressed, as well as the development of human capital to take the industry into a new paradigm.
Professor STL Harrison

Research Chair: Bioprocess Engineering  
Primary discipline: Engineering Sciences  
Level of Chair: Tier 1  
Institution: University of Cape Town  
Chair commencement date: January 2008  
Websites: www.ceber.uct.ac.za  
www.chemeng.uct.ac.za/staff/academic/harrison

Biosketch
Professor Harrison completed her PhD in Chemical Engineering at Cambridge University and has been on the academic staff of UCT since 1991, serving as lecturer, researcher, member of UCT Council, Head of Department and Deputy Dean, and researcher for periods of her employment in the Department of Chemical Engineering at UCT. She has been a visiting scientist at MIT, USA, and a visiting professor at Cambridge University, UK. In 2007 she received the SA's Distinguished Woman Scientist award. She is currently the director of the Centre for Bioprocess Engineering Unit at UCT. She is a fellow of the South African Academy of Engineers, WISA and SAIMM and a member of the Academy of South Africa (ASSAF). To date, she has supervised 71 postgraduate students to graduation (14 PhD and 57 MSc degrees) and co-authored 113 referred papers in journals and books.

Current research interests
Professor Harrison's research in bioprocess engineering spans bacterial, fungal, archael and algal bioprocesses with application in biohydrometallurgy, prevention and treatment of acid rock drainage (ARD), maximising resource productivity, bioenergy products, biocommodities from wastes, fine chemicals, nutraceuticals and expression of niche peptides, proteins and anti-microbials. Through these she focuses on microbial dynamics, biokinetics, biological stress responses and process integration. She has a strong interest in quantifying environmental burden associated with processes with the view to minimising it.

Key themes of her research are:
- Enhancing the understanding of the interaction of micro-organisms with the biochemical, osmotic, thermal, physical, and hydrodynamic environment, especially in terms of stress response and microbial dynamics;
- Enhancing understanding of the structure/function relationship within mixed microbial communities, enabling their manipulation for robustness and performance;
- Maximising microbial productivity through combining reactor design, fluid contacting and metabolic flux analysis with emphasis on product induction, metabolic activity and process inhibition. Here the interaction between the fluid environment and biological phase is of key importance as demonstrated in both heap bioleaching of mineral sulphides as well as large scale algal culture;
- Integrating the bio-production phase and downstream processing phases in process development; and
- Minimising the environmental burden associated with commodity bioprocesses by maximising resource productivity and enhancing energy-efficient contacting systems for gas/liquid mass transfer.

Relevance of research
The research programme centres on the establishment of generic knowledge at the molecular and metabolic, unit operation and the sustainable process levels for benefit across specific bioprocesses. This fundamental basis is particularly facilitated through the SARChI Chair in Bioprocess Engineering and provides a platform to apply the knowledge generated into South Africa-specific processes. These contribute across water treatment and remediation, renewable energy, human health products including nutraceutical and anti-microbials, commodity bioproducts including polymers, fine chemical products including enzymes and pigments, minerals beneficiation, resource productivity and renewable resources.
Professor Iwuoha’s research interests relate to the designing of “smart” nanomaterials (polymeric, dendritic, graphenated and carbon nanotubes composite systems) for application in the construction of sensors, reactors and energy-generating systems. There are research activities in the electrochemical beneficiation of platinum group metals (PGMs) by developing new-generation nanoscale phases and quantum dots for the purpose of harnessing their clean energy production (in lithium ion battery cathodes, supercapacitors and photovoltaic cells), sensor fabrication, luminescence, light-emitting diodes and thermo-chromic properties. Intelligent amperometric and impedimetric transducers are used in the development of novel technological platforms for ultrasensitive enzyme-nanobiosensors, immunoassays and genosensors (DNA and aptamer sensors). Several research activities focus on sensors for medical diagnostics (of disease markers and therapeutic monitoring of the metabolism of anti-retroviral and anti-tuberculosis drugs); food safety determination; and the determination and mapping of environmental pollutants harmful to human health and vital eco-systems.

Relevance of research
The electrochemical energy research deals with the beneficiation of PGMs; the instabilities of lithium ion cathode, organic light-emitting diodes (OLED), organic photovoltaic cells (OPV) and supercapacitors; as well as reducing the cost of solar cells to ensure access to electricity for rural communities. The sensors research aims to produce easy-to-use tools for point of care clinical applications; and to acquire data necessary for setting quality standards for priority pollutants in food, drinking water and environment, as well as for monitoring compliance to set standards.
Professor T Majozi

- **Research Chair:** Sustainable Process Engineering
- **Primary discipline:** Chemical Engineering
- **Level of Chair:** Tier 1
- **Institution:** University of the Witwatersrand
- **Chair commencement date:** January 2007

**Biosketch**

Professor Majozi is a full Professor in the School of Chemical and Metallurgical Engineering, where he also holds a SARChI Chair in Sustainable Process Engineering. His main research interest is batch chemical process integration, where he has made significant scientific contributions that have earned him international recognition. Some of these contributions have been adopted by industry. He was an Associate Professor in computer science at the University of Pannonia in Hungary from 2005 to 2009. Majozi completed his PhD in Process Integration at the University of Manchester Institute of Science and Technology in the United Kingdom. He is a member of various international scientific committees for leading Process Systems Engineering symposia and conferences and a member of the editorial board of *Chemical Engineering Transactions Journal*. He is also a member of Academy of Sciences of South Africa and a Fellow for the Academy of Engineering of SA. He has received numerous awards for his research, including the Burianec Memorial Award (Italy); P-rating (NRF); University of Pretoria Leading Minds Centenary Award; S2A3 British Association Medal (Silver); the South African Institution of Chemical Engineers Bill Neal-May Gold Medal, and the NSTF-BHP Billiton Category B Award. Recently, he won the AU-TWAS Young Scientist Award. Majozi is author and co-author of more than 150 scientific publications, including a book in Batch Chemical Process Integration published by Springer in January 2010. Majozi is an NRF B1-rated researcher.

**Current research interests**

Professor Majozi's current research interests involve process integration of batch chemical processes as well as debottlenecking of utilities in continuous processes. Current research on batch processes focuses on design, synthesis and optimisation of multipurpose batch plants. The synthesis problem pertains to mainly capturing the essence of time that is paramount in discrete-task processes, as traditionally encountered in batch facilities. On the other hand, work on continuous processes is aimed at developing systematic techniques for optimum design of systems that are characterised by simultaneous heat and mass transfer. Typical examples include cooling water systems and steam system networks. We are also extending this approach to optimising an integrated gasification combined cycle (IGCC).

**Relevance of research**

Batch chemical processes constitute more than 50% of the SA industrial sector and are usually encountered in the manufacture of low-volume, high-value added products. Typical examples are pharmaceuticals, agrochemicals as well as food and beverage industries. Due to significant lack of technical know-how, efficiencies in batch operations tend to be extremely low, thereby resulting in adverse environmental impact. Recent developments in our research have clearly demonstrated that there exists a significant knowledge gap in the optimal and sustainable design of these operations. Most of this work has been conducted in collaboration with multinational companies based in SA. Our work on IGCC is aimed at optimum design of power generation systems with thermal efficiencies above 50%, instead of 35% that is currently the norm in SA. Given the reliance of SA on coal, improvement in efficiencies is concomitant with significant reduction in CO₂ emissions. A further goal is to expand the present research group to the status of an international Centre of Expertise in order to provide, besides postgraduate training, selected consulting services to industry.
Professor AG Malan

**Research Chair:** Industrial Computational Fluid Dynamics  
**Primary discipline:** Engineering Sciences  
**Level of Chair:** Tier 2  
**Institution:** University of Cape Town  
**Chair commencement date:** April 2014

**Biosketch**
Professor Malan achieved his Master’s in Mechanical Engineering (*cum laude*) in 1996. He spent several years in industry to discover that a need existed for multi-physics computational fluid dynamics (CFD) technology. He then pursued PhD research at the University of Wales, Swansea. His research was awarded “Best PhD Thesis for year 2002” from the Association of Computational Mechanics in Engineering as well as the “Young Researcher Fellowship for Exemplary Research in Computational Mechanics” at the Second MIT Conference on Computational Fluid and Solid Mechanics held in Boston in 2003.

After returning to South Africa, Professor Malan established a world-class CFD technology base. He has published more than 90 conference and journal papers for which he has received international recognition. This includes invitations as keynote speaker at several international conferences as well as an “Outstanding Paper Award” from Literati Network Awards for Excellence. Professor Malan serves on the editorial board of *Journal for Numerical Methods in Heat & Fluid Flow*, and acted as Vice-president of the South African Association for Theoretical and Applied Mechanics. He is co-founder of the African Conference on Computational Mechanics (AfriComp), which is an IACM-accredited international conference. Professor Malan is also CEO of the spin-out company Elemental Numerics (Pty) Ltd.

**Current research interests**
Professor Malan’s main focus is on the development of a new multi-physics CFD technology. This has resulted in the Elemental™ software, which employs novel programming and numerical techniques specifically designed for large-scale parallel computing. Current research areas include free-surface modelling with phase change for the aerospace and space industries; aeroelastic simulations for small as well as large aircraft; biomedical modelling; adjoint optimisation and reduced-order-modelling (ROM) technologies. The research component of the work typically involves developing improved discretisation techniques and advanced parallel solvers.

**Relevance of research**
Professor Malan’s work has resulted in the new multi-physics CFD technology Elemental™. The new software has undergone extensive evaluation by respected international companies such as Airbus, and found to have exceptional capabilities. Airbus, the internationally leading large passenger aircraft manufacturer, “have found the Elemental code to be scientifically innovative while outperforming competing codes by a significant margin, particularly in terms of accuracy”. It has also found application in numerous other industries. These range from biomedical and space, to energy generation and mining. Various South African companies have derived direct benefit. Examples include industrial fan optimisation and novel hydrogen-powered unmanned aerial vehicles (UAV) design.
Professor D Ramjugernath

Research Chair: Fluorine Process Engineering and Separation Technology
Primary discipline: Chemical Engineering
Level of Chair: Tier 1
Institution: University of KwaZulu-Natal
Chair commencement date: September 2007

Biosketch
Professor Ramjugernath completed a PhD in Chemical Engineering at the University of Natal (now the University of KwaZulu-Natal). He is a Professor of Chemical Engineering and Director of the Thermodynamics Research Unit in the School of Engineering at the University of KwaZulu-Natal. He has published over 110 peer-reviewed journal papers and 190 peer-reviewed conference papers, and four chapters in books. He has successfully graduated over 70 Master’s and PhD students. Professor Ramjugernath has been recognised for his research achievements with numerous awards, which include a National Research Foundation (NRF) President’s Award in 2005, National Science and Technology (NSTF) Awards in 2005 and 2010, and the UKZN Vice-Chancellor Research Award in 2010.

Current research interests
- Fundamentals of fluorine process engineering and separation technology relating to the generation of experimental data and the development of novel experimental equipment and methods, as well as the theoretical aspects of separation and reaction technology.
- Refrigerants: The refrigerants market is a multi-billion dollar industry and with stricter environmental legislations and the banning of numerous current refrigerants (CFC-based) that are depleting the ozone layer, research is being undertaken into new refrigerant molecules and blends, which are environmentally more acceptable.
- Synthesis of novel fluorine compounds, with a focus on developing reaction mechanisms for the synthesis of fluorinated derivatives for pharmaceutical applications.
- Selective fluorination of molecules.
- Development of models and correlations for thermophysical and thermodynamic properties of chemical compounds.
- Molecular simulation studies of phase equilibria.

Relevance of research
South Africa has a strategy to beneficiate chemicals and elements that we are fortunate to have in our country, as part of its chemical sector development plan. Fluorspar is one such ore and is the starting material for all fluoro-chemical products. The research being undertaken by the Chair is leading the way in developing processes, technology and products to achieve the goals of the fluoro-chemical expansion initiative. A large component of the research is related to chemical thermodynamics and separation therefore there is also a goal to develop world-class expertise in separation technology.
Professor B Rand

Research Chair: Carbon Technology and Materials
Primary discipline: Engineering Sciences
Level of Chair: Tier 1
Institution: University of Pretoria
Chair commencement date: January 2006

Biosketch
Professor Rand is a renowned international expert in carbon materials science. His work is widely recognised and he has had many invitations to present keynote lectures. He also has over 200 publications. He has participated in international collaborative programmes, such as with the National Physical Laboratory in Delhi, Central South University and Wuhan Technological University in China, the University of Alicante in Spain, Tokyo Institute of Technology and with groups in the USA. He is a participant in the international co-ordination project on irradiation creep in nuclear graphite under the auspices of the IAEA.

At the University of Leeds, UK, he was a Professor of Ceramics until 2006, with roles such as Head of Department and Director of Research for the Faculty of Engineering. He is an independent member of GTAC (Graphite Technical Advisory Group for Nuclear Plant), which reports to the Nuclear Installation Inspectorate in the UK.

Current research interests
Professor Rand’s research interests are in carbon and graphite materials, including graphitic refractory materials. Current projects (in collaboration with group members) are:
- Viscoelastic properties of liquid crystalline precursors of carbon;
- Advanced processing of carbon and graphite;
- The irradiation creep of nuclear graphite;
- Characterisation of graphite microstructures;
- Oxidation of graphite;
- Fabrication-structure-property relationships for graphitic composites relevant to the nuclear industry;
- Development and control of microstructure in the coking process;
- Injection moulding of carbon components; and
- Pitch precursor characterisation and thermal processing.

Relevance of research
The research into graphitic materials is of key industrial significance. These materials are used extensively in the metallurgical industry and as key structural components in some forms of nuclear reactors. Key to South Africa is the development of the Pebble Bed Modular Reactor, which also contains large amounts of various kinds of carbon and graphite materials. Carbon is also a major nanostructured material and new areas of carbon nanotubes and graphene are exciting researchers worldwide.
Professor P Rousseau

**Research Chair:** Nuclear Engineering  
**Primary discipline:** Engineering Sciences  
**Level of Chair:** Tier 1  
**Institution:** North-West University  
**Chair commencement date:** January 2006

**Biosketch**

Professor Rousseau completed his PhD at the University of Pretoria and is a graduate of the OPM executive education programme at Harvard Business School. He is a registered professional engineer and Professor in Mechanical and Nuclear Engineering at North-West University (NWU). At NWU he was formerly the Director of the School of Mechanical and Materials Engineering, as well as Director of Energy Systems Research, and received the student council award for best lecturer in the Faculty of Engineering. His postgraduate students have won awards for the best Master’s degree in Science and Engineering at NWU, and for one of the top three papers presented at the European Nuclear Education Network PhD event in 2009.

He continues to be involved as a consultant in industry and was also the technical lead for the design of the High Pressure Test Unit (HPTU) and High Temperature Test Unit (HTTU) of the Heat Transfer Test Facility (HTTF) that formed part of PBMR’s thermal-fluid phenomena test plan.

He has published more than 80 papers in international technical journals and conference proceedings, he serves on the editorial board of the international journal *Nuclear Engineering and Design* and is a board member of the Nuclear Industry Association of South Africa (NIASA). He currently holds a C1 rating as an established researcher from the NRF and he also serves on the NRF’s Engineering Specialist Committee for evaluation and rating.

**Current research interests**

The primary research focus is thermal-fluid systems modelling applied to the nuclear power industry.

Thermal-fluid systems modelling research includes the development of generic systems modelling methodologies and tools as well as the development of simulation models for specific applications such as steam generators and natural convection-driven reactor cavity cooling systems.

**Relevance of research**

Thermal-fluid systems modelling is an important tool in the analysis, design, optimisation, licensing and operation of reactors and power plants as well as in the development of plant simulators.

Its applicability is not limited to a specific type of reactor or technology and therefore provides a valuable training platform to prepare candidates for joining the local or international nuclear industry.

Modelling is also an important cross-cutting topic in each of the proposed next-generation IV nuclear reactor systems.
Professor PE Ngoepe

**Research Chair:** Computational Modelling of Materials  
**Primary discipline:** Technologies and Applied Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Limpopo  
**Chair commencement date:** January 2007

**Biosketch**
Professor Ngoepe completed a PhD in Physics at the University of the Witwatersrand. He is a CSIR Fellow and has contributed to science policy development in this country in the form of Science and Technology strategies such as: nanotechnology, advanced manufacturing, hydrogen economy, energy research, battery research, mining and minerals research. He was awarded the NSTF award, NRF President’s Award, and the National Order of Mapungubwe (Silver). He has served on editorial boards and advisory committees of international conferences and was an organiser of some, including computational modelling summer schools. He has over 70 publications and presented a number of papers at local and international conferences. He has supervised over 30 MSc and PhD students.

**Current research interests**
His research interest is in computational modelling of materials – ranging from electronic to nano scales as well as covering energy storage, minerals, alloys, polymers with local and international collaborations. The goal is high-performance computing. One of the major motivations of the research programme is to run large-scale simulations. They have had major breakthroughs in the derivation of the first robust empirical interatomic potentials for pyrite and hence for mineral sulphides as a whole. They are continuing with studies of stabilities of pyrite-marcasite polymorphs including those of precious metals from heats of formation and phonons. Oxidation and hydration of metal sulphide surfaces are being investigated. Significant effort has been invested in derivation of potentials for pentlandite structure (Co9S8), which was assisted by results of ab initio calculations and experiments. Research on energy storage devices has continued, including the large-scale simulations on lithium intercalated metal oxides that are run at the Centre for High Performance Computing, Cape Town. Studies have also continued on precious metal superalloys particularly used in high-temperature jet engines.

**Relevance of research**
In the mineral processing industry, optimisation of precious metal extraction from sulphide minerals is strongly mediated by surface properties. Computer modelling provides a fundamental atomistic understanding of such processes. Value addition to minerals is linked to development of alloys applicable to auto catalysts, turbine engines, light aircraft frames and shape memory alloys. Computer modelling predicts phase stabilities and phase diagrams essential for alloy design. Depletion of fossil fuel reserves and environmental concerns has accelerated exploration for alternative energy sources.
**Associate Professor A Christoffels**

**Research Chair:** Bioinformatics and Public Health Genomics  
**Primary discipline:** Bioinformatics  
**Level of Chair:** Tier 1  
**Institution:** University of Western Cape  
**Chair commencement date:** January 2008  
**Website:** www.sanbi.ac.za

**Biosketch**

Professor Christoffels completed his PhD in Bioinformatics at the University of the Western Cape in 2001. From 2001-2004 he embarked on a postdoctoral fellowship in Singapore Nobel Laureate Sydney Brenner's lab where he worked on the genome evolution of fish genomes and algorithms to detect gene duplication events. He started a research group in 2004 at Temasek Life Sciences in Singapore and held an assistant professorship from 2004-2007 at Nanyang Technological University. During this time, he worked on genome annotation techniques applied to polyploidy genomes that don't have a completely assembled genome. In 2007, he joined the South African National Bioinformatics Institute as an Associate Professor and in 2009 became the Director of SANBI. In 2009 he was awarded the Research Chair in Bioinformatics.

**Current research interests**

His research comprises the use of comparative genomics tools and in-house technologies to investigate host-pathogen interactions with a view to develop intervention methods.

The host-pathogen interactions are restricted to:

- **Tuberculosis:** The availability of new sequencing technologies such as Illumina allows them to rapidly sample genomes at reduced costs and time. In collaboration with the Tygerberg Medical School TB Centre of Excellence, they are exploiting the use of short-reads to investigate TB virulence and developing methods to detect strain variation. They are applying machine learning techniques to predicting interactions between human and mycobacteria.

- **Trypanosomiasis:** As part of an international collaborative project funded by the World Health Organisation, they are investigating host-pathogen interaction at the level of transcriptome profiling of the vector (tsetse fly); developing a system for gene predictions within the newly sequenced tsetse genome; and understanding the intracellular membrane trafficking within the trypanosome in response to host immune response.

This range of projects overlaps and it is his goal to develop a computational framework to support next-generation sequencing data and its accompanying data analysis techniques. In this regard, he has assisted the agricultural research community in transferring these computational skills to their research domain.

**Relevance of research**

The application of next-generation sequencing techniques is at the forefront of computational biology on the international front. Developing ways to manage and analyse this data has a wide range of applications. In particular, they have opted to apply these techniques to two diseases, tuberculosis and trypanosomiasis, which have a health impact at a national and regional level respectively. More recently, their small RNA (miRNA) prediction tool has opened opportunities to consider ways of controlling disease-borne insect vectors that plague South Africa and Africa.
Professor JD Eyles

**Research Chair:** Health Policy and Systems  
**Primary discipline:** Health sciences  
**Level of Chair:** Tier 1  
**Institution:** University of the Witwatersrand  
**Chair commencement date:** January 2014

**Biosketch**
Professor Eyles has an international reputation in the field of health systems and policy research. He has published widely in this area with over 170 publications, and has supervised 30 PhD students. Some of his papers have become standards for citation, especially in qualitative methods, healthcare resource allocation and public involvement in healthcare decision-making.

His particular areas of expertise include population health status and need; access and equity in healthcare; healthcare financing; human resources; governance and stakeholder participation; and developing decision support tools to enable the transfer of research to practice.

He has presented at many international gatherings, and has served on Canadian and international agencies by providing seminars or advice on committees such as the US-Canada International Joint Commission, the Woodrow Wilson Center, and Industry, Health and Environment Canada. He has also served on provincial advisory boards as well as university-based committees, at one stage chairing the University Budget Committee.

He served as a Research Chair at McMaster University in Canada from 1994-2000 after which he became Director of the McMaster Institute of Environment and Health (MIEH) until 2004. He has worked extensively internationally, developing research and practice partnerships across disciplines and sectors.

**Current research interests**
Professor Eyles’ current research interests concern health systems and the development of effective health policy. Working within the context of WHO’s initiatives on health system strengthening and universal health coverage, he is examining access and equity issues in healthcare, specifically with respect to delivery mechanisms and the contextual and institutional factors that shape not only the governance of the health system but also the allocation of resources. His research emphasises the national, provincial, district and facility levels for specific types of care.

**Relevance of research**
Professor Eyles’ research will focus on universal access to quality care for all South Africans. This is necessary to strengthen the public health system’s ability to use resources effectively and efficiently, while increasing the production of skilled health workers. This work will make a vital contribution to the major reform being carried out by the South African Government, and to the goals of working towards a more equitable and socially just health system.

As a result of his international research, Professor Eyles will bring many working collaborations to CHP and Wits, strengthening our connections with other universities working in the field.
Professor D McIntyre

Research Chair: Health and Wealth in South Africa  
Primary discipline: Health Sciences  
Level of Chair: Tier 1  
Institution: University of Cape Town  
Chair commencement date: January 2008

Biosketch
Professor McIntyre is a Professor at the University of Cape Town and was the founding Director of the Health Economics Unit. She has provided extensive and high-level policy inputs within South Africa and other African countries, particularly in relation to health care financing issues. Her research contributes to identifying ways of improving the health status of South Africans, both through equitable economic development and through health system improvements. She has also been centrally involved in developing health economics capacity within the African region.

Current research interests
- Monitoring and evaluating the implementation of health system policy changes aimed at universal coverage in South Africa;
- Contributing to further development of the conceptualisation and measurement of universal coverage in collaboration at country and global levels with international partners;
- Contributing to the development of appropriate goals for the health sector as part of the post-2015 sustainable development agenda;
- Contributing to global debates about the most appropriate way to provide financial protection and access to needed health care to those outside the formal sector;
- Critically evaluating alternative provider payments to promote the provision of high-quality health services and other strategies for active purchasing of health services; and
- Analysing the social-determinants of health status in the South African context.

Relevance of research
The current agenda of research is of relevance from three main perspectives. Firstly, this research is directly feeding into critical debates about reform of the South African health system, particularly in relation to the debates about introducing a national health insurance. Secondly, it will identify critical pathways from social and economic conditions of households to health status. It will, thus, identify key policy levers outside the health sector that can also contribute to health status improvements. Finally, it is contributing at a high level to global efforts to promote universal health systems and health status improvements in low- and middle-income countries.
Associate Professor S Sampson

- **Research Chair**: Mycobactomics
- **Primary discipline**: Health Sciences
- **Level of Chair**: Tier 2
- **Institution**: Stellenbosch University
- **Chair commencement date**: July 2013
- **Website/blog**: www.linkedin.com/pub/samantha-sampson/4/563/47b

**Biosketch**

Associate Professor Sampson is a tuberculosis (TB) researcher with expertise in mycobacterial genetics, microbiology, immunology and animal models of TB, and has published her work in high-ranking international journals including *PNAS, Infection* and *Immunity and Vaccine*. With a strong international collaborative network, her work is frequently cross-disciplinary: she has published with clinicians, epidemiologists, engineers, animal and public health experts, molecular biologists, and immunologists.

Associate Professor Sampson obtained her PhD from Stellenbosch University, with a focus on genetic and phenotypic characterisation of *Mycobacterium tuberculosis*. She subsequently gained over 10 years of international research experience in top-ranking institutions. While at Harvard University School of Public Health, she worked on the development of novel TB vaccine candidates, as well as their safety and efficacy testing in a range of infection models.

In 2006, she was awarded a Wellcome Trust Research Career Development Fellowship, and moved to Imperial College London. Here, she initiated research aimed at dissecting the TB host-pathogen interface, and also contributed to the development of reporter technology for *in vivo* imaging of mycobacterial infection. Upon being awarded the SARChI Chair in Mycobactomics, she returned to South Africa to establish her own research group focused on TB host-pathogen interactions within the DST/NRF Centre of Excellence in Biomedical Tuberculosis Research.

**Current research interests**

Our overall research goal is to gain a better understanding of how the pathogen *Mycobacterium tuberculosis* interacts with its host to cause disease. To achieve this, we use molecular mycobacteriology and *in vitro* infection models together with data-rich methodologies, such as whole genome sequencing, transcriptomics, proteomics and lipidomics. These methods are underpinned by computational approaches. Specific research areas include advancing our understanding of:

- TB host-pathogen interactions, with a particular focus on persistent mycobacteria;
- Biology of drug-resistant strains of *M. tuberculosis*; and
- TB/HIV interactions at the molecular level.

**Relevance of research**

The TB epidemic represents an ongoing national and international public health threat. Our ability to develop novel and effective interventions will be greatly advanced by a better understanding of how the pathogen interacts with its host, a key goal of this work. In addition to addressing a national health priority area, this research programme will contribute to capacity development and innovation in Science, Engineering and Technology, in line with national strategic priorities.
Professor AE Schutte

**Research Chair:** Early Detection and Prevention of Cardiovascular Disease in Africa  
**Primary discipline:** Health Sciences  
**Level of Chair:** Tier 2  
**Institution:** North-West University  
**Chair commencement date:** July 2013  
**Website/blog:** www.linkedin.com/pub/alta-ae-schutte/12/b28/277

**Biosketch**
Professor Schutte is a Professor of Physiology at the Hypertension in Africa Research Team (HART), Faculty of Health Sciences of the North-West University. Her research focus is on identifying early markers for the development of hypertension, and ultimately the prevention of cardiovascular disease in the black South African population.

She has published over 100 papers on the topic of hypertension, and has been acknowledged for her work as the winner of the Distinguished Young Women Scientist in the Life Sciences award, presented by the South African Department of Science and Technology; and the British Association Medal from the Southern Africa Association for the Advancement of Science (S2A3). In 2012 she was the recipient of the Meiring Naude Medal from the Royal Society of South Africa, and the 2012 AU-TWAS (African Union & The World Academy of Sciences) Award.

She serves on the editorial boards of established cardiovascular journals, such as *Current Hypertension Reports* and *Current Obesity Reports*, serves on the editorial advisory panel of *Clinical Science*, and is an Associate Editor of *BMC Cardiovascular Disorders*. She is a member of the Executive Council of the International Society of Hypertension (ISH) and Board Member of the Southern African Hypertension Society (SAHS).

**Current research interests**
Professor Schutte is the Principle Investigator of a new prospective study that includes young black and white South Africans, namely the African-PREDICT study (African Prospective study on the Early Detection and Identification of Cardiovascular disease and hypertension), thereby building on previous findings that indicate the rapid escalation in the incidence of cardiovascular disease in South Africans. HART and a multidisciplinary team spanning Nutrition, Biochemistry, Genomics, Proteomics, Metabolomics, Biostatistics, Psychology, and Biokinetics, plan to follow these young and healthy individuals for the next 5-20 years in an attempt to identify predictors for early cardiovascular changes by utilising conventional as well as cutting edge techniques.

**Relevance of research**
A recent systematic global analysis in 5,4 million participants showed that global blood pressure has decreased since 1980. However, region-specific inspection of this data shows that in individuals from Africa, blood pressure has actually increased.

The paucity of longitudinal studies on the development of hypertension in black South Africans has hampered investigations to identify which traditional or new biomarkers, health behaviours and conventional risk factors are the strongest predictors for developing hypertension over time.

The wide-ranging knowledge to be gained from the African-PREDICT study should contribute to our understanding of disease development, and would equip scientists to instigate intervention and prevention programmes to be significantly more successful than at present.
Professor W van Damme

Research Chair: Health systems, complexity and social change  
Primary discipline: Health Sciences  
Level of Chair: Tier 1  
Institution: University of the Western Cape  
Chair commencement date: January 2013

Biosketch
Professor Van Damme, MD, MPH, completed his PhD in Medical Sciences at the Free University Brussels in 1998 on the topic of refugee health (Guinea). He has lived for 10 years overseas, mainly in Peru, Sudan, Guinea and Cambodia, working with Doctors without Borders (MSF). In each of these countries he worked in primary health care and health systems development, and dealt with humanitarian emergencies. He has been working as a researcher and teacher for 15 years at the Institute of Tropical Medicine (ITM), Antwerp, Belgium.

As a SARChI Research Chair he splits his time between South Africa and Belgium. He is working at the School of Public Health of the University of Western Cape, focusing on comparative health systems research and on organising the PhD programme in public health. He also continues as a Professor in Public Health and Health Policy at ITM. Several ITM colleagues contribute to developing an institutional collaboration between UWC and ITM, in particular Bruno Marchal and Luc Van Leemput.

Professor Van Damme is a member of the Technical Evaluation Reference Group of the Global Fund to fight AIDS, TB and malaria. He also has been a member of various WHO expert committees.

He has extensive teaching and coaching experience at Master's and Doctoral level. He coordinates Emerging Voices for Global Health (ev4gh), an innovative programme to train young researchers to get their voice heard on the international scene.

He has published some 100 papers in peer-reviewed journals, including The Lancet, Health Policy and Planning, Social Science and Medicine, AIDS, Tropical Medicine and International Health, BMJ, Plos Medicine, Plos One, and many others.

Current research interests
Professor Van Damme's main research interests have been related to global health, including health policy and health systems strengthening in fast-changing societies:

- Pro-poor health financing and health policy in Southeast Asia, with a special focus on Health Equity Funds in Cambodia;
- International health policies, mainly new funding mechanisms, such as the Global Fund to Fight AIDS, TB and malaria and its impact on national health systems in donor-dependent countries, such as Ethiopia, Mozambique and Malawi;
- Delivery models for AIDS care, especially their human resources configurations, in countries with high HIV prevalence (mainly in southern Africa); and
- He is now focusing on developing the field of Comparative Health Systems and Policy Research, using a Complex Adaptive Systems approach, with Chronic Lifelong Conditions (CLLCs) as the primary theme

Relevance of research
His research intends to contribute to improving access to health care and universal health coverage, a key societal goal in South Africa and worldwide.
Biosketch

Professor Birkholtz completed her PhD on biochemical aspects of malaria jointly in South Africa, the USA and Germany. She is currently an associate professor in the Department of Biochemistry at the University of Pretoria. Professor Birkholtz serves on the board for the South African Society of Biochemistry and Molecular Biology and the editorial panel for the Biochemical Journal (Disease Environment).

Her research has been presented at more than 50 local and international conferences with numerous cited publications and a co-authored specialised book. Professor Birkholtz has received various international scientific and teaching awards, including German Academic Exchange Service (DAAD) and Andrew W Mellon Foundation fellowships, as well as Trends in Parasitology and International Union of Biochemistry and Molecular Biology (IUBMB) Best Research Presentation awards. The University of Pretoria recognised her as Exceptional Young Researcher in 2010 and 2013.

Current research interests

Professor Birkholtz’s research interest is focused on the physiology, biochemistry and pharmacology of malaria parasites. She investigates biochemical distinctions between the malaria parasite and the human host, which are exploitable for the design of novel antimalarial chemotherapeuticals and transmission blocking drugs:

- Biochemical characterisation of novel drug compounds targeting the cell cycle development of malaria parasites in their pathogenic, asexual forms;
- Identifying novel drugs and drug targets that interfere with asexual and sexual development of malaria parasites;
- Understanding the biochemical processes involved in sexual differentiation of gametocyte forms of the parasite from pathogenic, asexual parasites; and
- Determining the effects of transmission-blocking strategies on field-isolated parasite populations and correlating this with human health effects.

Relevance of research

The Chair was created to harness expertise in malaria control in South Africa to enable sustained malaria control particularly in the African context. The research programme undertaken by Professor Birkholtz’s team is internationally competitive and trend-setting and will contribute to the global Malaria Eradication Agenda. Additionally, the work is nationally pioneering and influential in the commitment of South Africa to attempt to eliminate malaria from its borders by 2018. The research area of Professor Birkholtz contributes uniquely to the interplay between malaria control and elimination by focussing on both the pathogenic and transmission forms of the parasite to ensure sustainability in malaria control and elimination. Due to the innovative nature of the work, students in the programme are trained in scarce skills related to malaria parasite biology in Africa.
Professor JM Blackburn

**Research Chair:** Applied Proteomics and Chemical Biology  
**Primary discipline:** Biotechnology  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2008  
**Website:** www.medicalbiochemistry.uct.ac.za

**Biosketch**
Professor Blackburn completed his DPhil degree in Chemistry at the University of Oxford, under the supervision of Professor Sir Jack Baldwin, FRS, and carried out postdoctoral research at the Medical Research Council (UK) with Professor Sir Alan Fersht, FRS. He has previously held a Royal Society University Research Fellowship at the Department of Biochemistry, Cambridge University and he was an EPSRC Visiting Research Fellow at the University of Manchester and a Fellow of Fitzwilliam College, Cambridge. He was founder and Research Director of the Centre for Proteomic and Genomic Research in Cape Town, the academic founder and Chief Scientific Officer of a UK biotechnology company, Sense Proteomic Ltd, and the Chief Scientist of Procognia Ltd (UK).

He serves on a number of national and international committees, including the National Health Research Committee, the Biotechnology committee of the International Union of Pure and Applied Chemistry, and the Nominations and Election Committee of the Human Proteome Organisation. He is on the editorial advisory boards of the *Journal of Proteome Research, Journal of Proteome Science* and *Computational Biology, Expert Review of Proteomics.*

**Current research interests**
- Academic expertise and current research ranges from the synthesis of novel enzyme substrates and inhibitors, through enzymology, protein biochemistry and molecular biology, to the creation of novel proteins.
- Understanding the effects of polymorphic variation and mutation on protein function and on protein-drug interactions.
- Understanding the selectivity of protein-drug interactions.
- Mass spectrometry-based diagnostic or prognostic biomarker discovery.
- Mass spectrometry-based mechanistic studies on human infectious and non-communicable diseases.
- Protein array-based biomarker discovery and validation.
- Development of improved diagnostic tests for tuberculosis.

**Relevance of research**
His research is generally aimed at using advanced mass spectrometry methods to provide a new level of understanding concerning the underlying mechanisms of disease and of drug response, including the effects of mutations thereon. His group is also actively involved in biomarker discovery and validation research in the infectious and non-communicable diseases. His basic sciences research programmes are strongly aligned with the international goals of personalised medicine and are thus directly relevant to the Biotechnology Strategy of South Africa.
**Professor F Brombacher**

**Research Chair:** Immunology of Infectious Diseases in Africa  
**Primary discipline:** Medical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2008

**Biosketch**
Professor Brombacher completed his PhD at the Max-Planck Institute for Immunobiology, Germany. He is a Fellow of the University of Cape Town and a member of the Institute of Infectious Disease and Molecular Medicine (IIDMM) at the Health Science Faculty Division of Immunology, as well as Director of the Medical Research Council (MRC) Unit on Immunobiology of Infectious Diseases. He is the coordinator for Immunology and Infectious Diseases, as well as group leader of the International Centre for Genetic Engineering and Biotechnology (ICGEB).

He has received awards such as the International Senior Welcome Trust Fellow, Oppenheimer Award and an A1 ‘world leader’-rating by the NRF. In 2009, he had more than 120 international peer-reviewed publications with several papers in top journals like *Nature* and *Science*, and a personal H-factor, exceeding 40, resulting from more than 6 000 citations.

**Current research interests**
The group investigates host protective mechanisms in diseases relevant to the African continent. This comprises experimental murine models for human Tuberculosis, African Trypanosomiasis, Leishmaniasis and Schistosomiasis. Allergic Asthma, Colitis and Fibrosis are non-infectious disease models under investigation. Major topics include cytokine network and regulation, lymphocytes differentiation and function, dendritic cell and macrophage activation, and the role of non-immunological cells in health/disease regulated by Interleukin-4 or -13. The research strategy is based on knowledge gained from a loss of function approach in knockout and knockdown animal models. This includes the generation and characterisation of novel conditional gene deficient mouse strains using the Cre/loxP and TetOperon system for spacial and temporal deficiency. Together with transcriptomic approaches the significance of genes, factors and cells for host protection are uncovered, supporting the long-term goal for the development of safe and cost-effective drug and vaccination strategies. Special focus within the SARChI programme is on:

- A platform for autovaccination for experimental animal models, gene therapy and vaccination; and
- Gene mining of pathogenetic factors.

**Relevance of research**
Research on immunology of diseases forms the basis for the development of rational strategies for drug therapy and vaccination as a medium-term goal. This will significantly contribute to human health and subsequent reduction of poverty in order to achieve quality of life and sustainability for the South African and world population as a long-term goal. Subsequently, Professor Brombach is involved in immunological research of human diseases with the main focus on infectious diseases.
Professor K Chibale

**Research Chair:** Drug Discovery  
**Primary discipline:** Medicinal Chemistry  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2008  
**Website:**  
www.kellychibale-researchgroup-uct.com  
www.h3-duct.ac.za

**Biosketch**
Professor Chibale obtained his PhD in Synthetic Organic Chemistry from the University of Cambridge with Stuart Warren (1989-1992). This was followed by postdoctoral stints at the University of Liverpool in the UK as a British Ramsay Research Fellow with Nick Greeves (1992-94) and at the Scripps Research Institute in the USA as a Wellcome Trust International Prize Research Fellow with KC Nicolaou (1994-96). He was a Sandler Sabbatical Fellow at the University of California, San Francisco, USA (2002), a US Fulbright Senior Research Scholar at the University of Pennsylvania School of Medicine, USA (2008) and a Visiting Professor at Pfizer in the UK (2008).

**Current research interests**
Discovery of potential drugs that fight malaria, tuberculosis, helminth (parasitic worm) as well as cardiovascular and fibrosis diseases.

**Relevance of research**
It is vital for South African scientists to enhance the drug discovery capability of the country to address its health needs in particular, but also those of the rest of the African continent. Thus research into the discovery of potential medicines against the major diseases in South Africa and Africa is critical along with the training of a new generation of South African and African scientists with key modern pharmaceutical industry skills required to discover modern medicines. The research being undertaken also has the potential to lead to seeding a pharmaceutical industry that will create employment while seeking to address the challenges of various diseases.
Professor M Coetzee

**Research Chair:** Medical Entomology and Vector Control  
**Primary discipline:** Medical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of the Witwatersrand  
**Chair commencement date:** January 2008  
**Website:** [web.wits.ac.za/academic/health/pathology/MERU](http://web.wits.ac.za/academic/health/pathology/MERU)

**Biosketch**

Professor Coetzee has an MSc and PhD from Wits University. From 1995-2007 she headed the SAIMR/NHLS Department of Medical Entomology/Vector Control Reference Unit. She is currently employed by Wits University as Research Professor in the School of Pathology, supported by a NRF SARChI grant. She was Director of the Malaria Entomology Research Unit from 2009-2012 and is currently co-director of the newly established Wits Research Institute for Malaria.

Recent international awards/honours include:
- Aedes (Coetzeeomyia), named after her by researchers at the Smithsonian Institution, Washington DC, 2010;
- John Belkin Memorial Award, American Mosquito Control Association, USA, 2012;
- The African Union Nkwame Nkrumah Regional Award for Women Scientists, Ethiopia, 2011;
- First runner-up in the 2011 DST/NRF Women in Science Awards;
- Winner of the 2010 NSTF award for research in the last 5-10 years; and

Professor Coetzee sits on the WHO Technical Expert Group for the Global Malaria Programme, co-chairs the Insecticide Resistance sub-committee, WHO/RBM Vector Control Working Group, and is the WHO representative on the DDT expert committee, Stockholm Convention on the banning of persistent organic pollutants. She sits on panels to review grant applications for the Wellcome Trust, the EU-FP7 and local funding agencies.

**Current research interests**

The research focus is three-fold:
- To study insecticide resistance in the major African malaria mosquitoes. This is one of the major threats to malaria control on the African continent and is the priority research area of the group;
- To develop novel means of mosquito control, for example, through the use of entomopathogenic fungi, new chemicals for larviciding; and
- To study vector-parasite interactions. Interesting insights have arisen from laboratory infections of mosquitoes with rodent parasites that opens other avenues of research into this critical field.

**Relevance of research**

Malaria is still the major killer of pregnant women and children under five years old in Africa with over 500,000 dying annually. In the light of the huge efforts that are now being made to control malaria in Africa, a clear understanding of the above issues is needed to guide malaria control programmes in their choice of interventions and, where appropriate, choice of insecticides.
Professor SA Madhi

**Research Chair:** Vaccine Preventable Diseases

**Primary discipline:** Medical Sciences

**Level of Chair:** Tier 1

**Institution:** University of the Witwatersrand

**Chair commencement date:** January 2008

**Biosketch**

Professor Madhi is a registered Paediatric Infectious Diseases specialist and completed his PhD at the University of the Witwatersrand. He currently holds the posts of Executive Director of the National Institute for Communicable Diseases, Professor of Vaccinology at the University of the Witwatersrand and co-director of the Medical Research Council’s Respiratory and Meningeal Pathogens Research Unit. He is a NRF A-rated scientist since 2011 and was admitted to the Academy of Science of South Africa in 2012. He is recipient to national and international awards related to his research in the field of vaccine-preventable-diseases. He also holds the position of President of the World Society for Paediatric Infectious Diseases (2010-2014).

He has published over 160 peer-reviewed publications in leading scientific journals including *Nature Medicine, The New England Journal of Medicine, The Lancet* and *Science*. His contribution to research on pneumococcal conjugate vaccine and rotavirus vaccine were pivotal to informing World Health Organisation (WHO) recommendations for the inclusion of these vaccines into universal childhood immunisation programmes. He is also an internationally recognised clinical scientist in the field of vaccination of HIV-infected individuals. He has served on multiple advisory boards, including for WHO and BMGF. He is frequently invited to address international scientific meetings in the field of vaccine preventable diseases.

**Current research interests**

The overall objective of the research is to improve the health of vulnerable groups in industrialising countries, including children, pregnant women and HIV-infected individuals, through the prevention of infectious diseases by vaccination. The research includes epidemiology, immunology and clinical evaluation of vaccines.

The current focuses of activities include evaluation of the public-health impact of the introduction of rotavirus and pneumococcal conjugate vaccine on under-five morbidity and mortality in South Africa. There is also an increasing focus on understanding the immunology of vaccine-preventable diseases, including influenza virus, respiratory syncytial virus and Group B streptococcus in pregnant women. This agenda aims at targeting pregnant women for future vaccination strategies with the objective of protecting their newborns during early infancy by virtue of passive immunity derived from the mother.

**Relevance of research**

The research over the past 10 years contributed to WHO recommendations for the adoption of rotavirus and pneumococcal conjugate vaccine into universal immunisation programmes. The studies also lead to South Africa being the first African country to have introduced both these vaccines into the national immunisation programme, which collectively is expected to reduce under-five mortality by up to 10% and all-cause hospitalisation by 20-25% in South Africa. The current focus of vaccination of pregnant women could contribute to reducing death during the first month of life, which constitutes up to 40% of all under-five childhood mortality in South Africa and the burden of which has remained unchanged over the past decade.
Associate Professor EM Meintjes

Research Chair: Brain Imaging
Primary discipline: Medical Imaging
Level of Chair: Tier 2
Institution: University of Cape Town
Chair commencement date: January 2007
Website: www.miru.uct.ac.za/

Biosketch
Professor Meintjes is an Associate Professor based in the MRC/UCT Medical Imaging Research Unit in the Department of Human Biology at the University of Cape Town. She has extensive experience in the field of brain imaging via functional magnetic resonance imaging (fMRI), and plays a key role in both applied and basic MRI research. This includes pulse sequence development, image processing, signal processing, and application of advanced MRI techniques to the study of foetal alcohol syndrome, HIV-related pathology, and cardiac MRI. Much of her research relates to real-time motion correction in MRI and optimisation of MRI for paediatric applications.

Current research interests
- Development of MRI technology for real-time motion correction, specifically with the aim to image young children without sedation.
- Study of the neural correlates of Foetal Alcohol Syndrome in 8-10-year-old children, using fMRI, diffusion tensor imaging (DTI), magnetic resonance spectroscopy (MRS), and structural MRI (sMRI).
- Study to investigate the effects of different ARV treatment strategies on brain development in six-year-old children.
- Neuroimaging studies to investigate the effects of prenatal alcohol and TIK exposure on new-born infants.
- Develop a method to measure ARV neurotoxicity non-invasively using MRI.
- Implement a control system to correct for the effects of respiratory motion in real-time during cardiac MRI imaging.
- Establish a small animal imaging capability.
- Evaluate the accuracy of medical imaging systems.
- Use of cine DENSE imaging to study cardiac function in heart diseases that are specifically relevant to South Africa and other developing countries.

Relevance of research
MRI provides exquisite soft tissue contrast and provides a unique tool to non-invasively study structure and function. Since there is no radiation involved, it is especially suited to studies involving children. It allows one to study, among others, structure, function, chemical integrity, white matter abnormalities, diffusion, flow, strain, and elasticity. This flexibility also makes MRI extremely complex and it is often necessary to optimise and develop imaging techniques specifically for our populations and pathologies. Through this work we are able to better diagnose and improve our understanding of diseases that are specifically relevant to South Africa.
Associate Professor T Ndung’u

**Research Chair:** Systems Biology of HIV/AIDS  
**Primary discipline:** Medical Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of KwaZulu-Natal  
**Chair commencement date:** September 2007

**Biosketch**
Professor Ndung’u is an Investigator and Max Planck Institute for Infection Biology Research Group Leader at the KwaZulu-Natal Natal Research Institute for Tuberculosis and HIV (K-RITH). He is Professor and Victor Daitz Chair in HIV/TB Research and Director of the HIV Pathogenesis Programme (HPP) at the Doris Duke Medical Research Institute, Nelson R. Mandela School of Medicine, and University of KwaZulu-Natal. He is one of the recipients of the inaugural Howard Hughes Medical Institute International Early Career Scientist award. From 2008-2011, he co-chaired the Young and Early Career Investigators Committee (YECIC) of the Global HIV Vaccine Enterprise and played a key role in the formulation of the Enterprise’s 2010 Scientific Strategic Plan. He is a member of the scientific advisory board of the Southern African Consortium for Research Excellence (SACORE), a research consortium of five southern African universities and their counterparts from the United Kingdom.

Professor Ndung’u graduated with a degree in Veterinary Medicine from the University of Nairobi, Kenya, and obtained a PhD in Biological Sciences in Public Health from Harvard University. He then undertook postdoctoral studies in Virology at Harvard Medical School. He is a past recipient of the Edgar Haber Award (Harvard University), the Vice-Chancellor’s Research Award (University of KwaZulu-Natal) and in 2012 was a finalist for the National Science and Technology Forum/BHP Billiton Awards for outstanding contribution to Science, Engineering, Technology and Innovation (SETI) in the category of a research capacity development.

**Current research interests**
Professor Ndung’u’s research interests are host-virus interactions, antiviral immune responses and biomedical interventions applicable to resource-limited settings. Professor Ndung’u has published in the fields of virology, immunology and biomedical research policy.

His primary research interests are in HIV-1 pathogenesis and vaccine development. He is also interested in the development and application of other biomedical interventions that can be applied in resource-poor settings. His research is aimed at an integrated (systems biology) approach to understanding immune responses to HIV-1 and subsequent viral adaptation to understand the most effective strategies that can be applied in vaccination. His laboratory also studies the interaction of HIV-1 with host cell proteins, replication cofactors and antiviral factors, and antiretroviral drug resistance.

**Relevance of research**
The ultimate goal of this research is to develop an effective HIV-1 vaccine. His research aims at understanding the immune and genetic correlates of viral protection and control in natural untreated infection. It is hoped that the knowledge gained from this research will aid in the development or design of effective vaccines or therapeutic interventions. The group is also exploring how to maximise the effectiveness of currently available antiretroviral drugs.
Professor V Pillay

Research Chair: Pharmaceutical Biomaterials and Polymer-Engineered Drug Delivery Technologies
Primary discipline: Medical Sciences
Level of Chair: Tier 1
Institution: University of the Witwatersrand
Chair commencement date: January 2008
Website: www.wits.ac.za/waddp

Biosketch
Professor Pillay is a Fulbright Scholar, a Personal Professor of Pharmaceutics, Head of Pharmaceutics and Director of Pharmaceutics and Pharmaceutics Research at the University of the Witwatersrand’s (Wits) Department of Pharmacy and Pharmacology. He is also the Executive Director of the Wits Advanced Drug Delivery Platform. He is a member of several prestigious academic associations in the US, Africa and South Africa, and has also served as an Associate Professor of Pharmaceutics at the College of Pharmacy and Pharmaceutical Sciences, Florida A&M University, USA.

He completed his PhD at the Temple University School of Pharmacy, USA. He is a B2-rated scientist with the NRF for his work in Drug Delivery and Rate-Modulating Polymeric Complexes and has been awarded a US patent with several other local and international patent applications currently granted or under review. His research has been published widely and he currently serves on the reviewer and editorial advisory boards of numerous international scientific journals and books.

Current research interests
The advanced drug delivery technologies currently engineered in his laboratories focus on unique solutions that will contribute to enhancing the bioavailability and/or efficacy of various categories of drugs and other bioactives. He has for many years been involved in the elucidation of the physicochemical and physicomechanical transitions occurring in polymeric networks as a result of chemical crosslinking reactions. His most recent focus is in the area of Neuro-Nanopharmaceutics.

Research projects include:

- Biodegradable implantable drug delivery devices;
- Transmucosal wafer technology;
- Advanced tablet technology;
- SpheriXite™ technology platform;
- Superiorly efficacious technologies for treating communicable diseases;
- Nanomerix targeting technology; and
- Application of food technology in advanced drug delivery.

Relevance of research
Numerous challenges are currently faced by the pharmaceutical industry as patents on originator products continue to expire, and companies struggle to produce innovative breakthroughs to offset the impact of generics. Pipeline innovations such as those developed in Professor Pillay’s laboratories hold the key to success in overcoming these challenges as numerous pharmaceutical companies are looking to the biotechnology and academic sectors to renew their product lines. Furthermore, the South African government is focusing on providing affordable healthcare at all levels and is looking at a number of drastic issues to reduce price levels in the private and public sectors.
Professor S Seedat

Research Chair: Post-traumatic Stress Disorder  
Primary discipline: Medical Sciences  
Level of Chair: Tier 1  
Institution: Stellenbosch University  
Chair commencement date: January 2008

Biosketch

Having featured among the top 10 matriculants in Kwazulu-Natal in 1984, Professor Seedat has come a long way. She is a co-director at the Medical Research Council Unit on Anxiety and Stress Disorders at the Department of Psychiatry, Stellenbosch University. Among her many accolades and qualifications, Professor Seedat completed a PhD at Stellenbosch University and was selected for an anxiety and stress programme research fellowship at the University of California, USA.

She was the recipient of the Alexander von Humboldt Research award in 2012.

She is currently involved in various research areas that include the treatment and prevention of post-traumatic stress disorder (PTSD) in women and children.

Current research interests

- Development of a high-excellence, collaborative and multifaceted research and training programme in PTSD that brings together basic and clinical neuroscience in this focus area with the overarching goal to further understand the aetiology and pathophysiology of this disorder.
- Building expertise in gene-brain-environment interaction studies by linking the measurement of genetic vulnerability to brain function (using functional magnetic resonance imaging – MRI) and brain structure (structural MRI), neurochemical changes, symptom dimensions and subtypes, neurocognition, and early life stress or trauma in individuals at risk for PTSD. Projects span a wide range including adolescent trauma, HIV, and foetal alcohol spectrum disorders, among others.

Relevance of research

Anxiety disorders such as PTSD are among the most prevalent, costly and disabling of these neuropsychiatric disorders, accounting for one-third of total associated costs. It can be argued that, in a country where violence is endemic and rates of PTSD are high, focusing larger-scale scientific efforts on understanding the psychobiological underpinnings of this anxiety disorder is both critical and relevant. Moreover, advances in basic neuroscience, clinical science, and community approaches have propelled the trauma field forward, making PTSD one of the most rewarding arenas of current psychiatric research. While at an international level considerable research effort has been directed towards the aetiology, phenomenology, clinical and neurobiological characteristics, and treatment of PTSD and related comorbid disorders (such as depression, critical gaps in knowledge still remain.
Professor C Tiemessen

**Research Chair:** HIV Vaccine Translational Research  
**Primary discipline:** Medical Virology  
**Level of Chair:** Tier 1  
**Institution:** University of the Witwatersrand  
**Chair commencement date:** April 2013

**Biosketch**
Professor Tiemessen studied at the University of the Witwatersrand, graduated with a BSc in 1984 (Majors: Microbiology and Zoology) and BSc (Honours) in Microbiology in 1985. She was then employed at the National Institute for Virology (now the National Institute for Communicable Diseases (NICD)) on a one-year grant from the Medical Research Council and was permanently employed in 1986. While working she completed her PhD in Virology and graduated at the University of the Witwatersrand in 1993. She began studying HIV in 1993 and currently heads the Cell Biology Research Laboratory within the Centre for HIV and STIs at the NICD, NHLS, and holds a joint appointment with the University of the Witwatersrand in the Division of Virology, School of Pathology.

In 2005 Professor Tiemessen was awarded a prestigious Wellcome Trust International Senior Research Fellowship for five years. She has collaborations with international and many local investigators, and has published widely in scientific journals. She has served on the editorial boards of three international journals and serves as a reviewer of manuscripts for a large number of international journals and for grants submitted to local and international funders. She currently serves on the Poliomyelitis Research Foundation (PRF) Scientific Advisory Panel and on the NRF rating panel for Health Sciences.

**Current research interests**
Our maternal-infant HIV-1 transmission (MTIT) studies have highlighted the value of using a more integrated approach of combining genetic and immunological phenotype studies. Broadly our research questions are the following:
- What constitutes protection from HIV-1 acquisition, and from disease progression in HIV-1 infected individuals with good (long term non-progressors: LTNP) and exceptional control (elite controllers: ECs)?
- What are the mechanisms that underlie protective immune processes identified through models of MTIT, adult transmission studies and study of LTNP/ECs?
- How can these pathways be manipulated for improving human health through vaccine or therapeutic approaches?

**Relevance of research**
There is considerable variation in the degree to which different individuals are susceptible to HIV-1 infection, and among those who become infected in their ability to control their course of infection. African populations have the greatest genetic diversity and population-based differences exist in phenotypic outcomes. Having identified potential targets for protection from HIV-1 acquisition and attenuation of disease progression, our approach is one that continues to source new targets, and seeks solutions to combating HIV-1 infection/disease progression through understanding and ultimately manipulating relevant pathways of protection in diverse population groups.

Overall, this knowledge is crucial to the development of HIV vaccines that provide protection from infection and from disease progression, and for the development of novel anti-HIV treatments.
**Professor G Walzl**

**Research Chair:** Biomarkers for Tuberculosis  
**Primary discipline:** Medical Sciences  
**Level of Chair:** Tier 1  
**Institution:** Stellenbosch University  
**Chair commencement date:** January 2011  
**Website/blog:** www.sun.ac.za/molbiogen/index.php/en/immunology-home

**Biosketch**

Professor Walzl is clinician scientist and head of the Stellenbosch University Immunology Research Group (SUN-IRG), where his research interests focus on biomarkers for tuberculosis. His group works on the immunology of *Mycobacterium tuberculosis* (MTB) infection and, in particular, diagnostic markers, markers of TB treatment response and markers of protective immunity against MTB. His group is part of several international consortia that conduct recruitment of large cohorts of participants with well-characterised MTB infection and disease phenotypes followed by advanced “omics” discovery experiments to address major translational issues in TB. Their research spans the divide between clinical and basic sciences in a high-TB-prevalence area.

**Current research interests**

The research group focuses on immunological markers for different infection phases of TB. Discovery of biomarkers of natural and vaccine-induced protection will focus on household contacts of TB cases and on vaccine studies. Diagnostic marker discovery for active and latent MTB infection will employ multiplex cytokine arrays to differentiate between latent and active TB. Eventually, field-friendly tests like lateral flow or microfluidic devices will be developed. Another focus area is the discovery of markers for TB treatment response for the early detection of poor treatment outcomes. Bioinformatic integration of the different analytical platforms is needed to maximise the benefit of the discoveries.

**Relevance of research**

TB biomarker discovery represents a high-priority research area as it addresses one of the major health challenges facing South Africa. The translational approach, which spans from basic molecular biology to clinical application and programmatic implementation, lends itself to capacity building across diverse fields. The SA National Research Strategy emphasises the need for innovation and an increase in human capital and transformation in the SA science base. Biomarker will significantly support the development of new tools to combat TB.
Professor AL Williamson

**Research Chair:** Vaccinology  
**Primary discipline:** Medical Virology  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2008

**Biosketch**
Professor Williamson is a virologist on the joint staff of the University of Cape Town (UCT) and the National Health Laboratory Service (NHLS). As a Full Member of the Institute of Infectious Disease and Molecular Medicine (IIDMM) her research activities are housed in this institute. She is internationally recognised for both HIV vaccine and Human Papillomavirus (HPV) expertise. She has headed the South African AIDS Vaccine Initiative-funded vaccine development team since 2000, which was responsible for the development of two vaccines tested in two Phase 1 clinical trials in the USA and South Africa. She is head of the World Health Organisation HPV Labnet lab for the Africa Region and joint head of the Molecular Epidemiology Laboratory (UCT/NICD/NHLS). She has published more than 145 papers in peer-reviewed journals and is actively engaged in training postgraduate students.

**Current research interests**
- **HIV vaccine development:** The aim is to make prophylactic HIV/AIDS vaccines that will induce broad, polyfunctional CD4+ and CD8+ cell responses, neutralising antibodies as well as a wide spectrum of long-lived memory T cells. One of the projects is to construct DNA, MVA and BCG vaccines expressing HIV-1 subtype C “mosaic” immunogens (Fischer et al., 2007 Nat. Med. 13) and to compare them with the SAAVI vaccines. In collaboration with Ed Rybicki, the team is also developing HIV Envelope vaccines to induce neutralising antibodies.
- **Avipoxvirus project:** Although many vaccine vectors have been tested in clinical trials and animal models there is no one ideal vaccine vector. Therefore, there is a need for the discovery of novel vectors and the development of improved vectors. South African avipoxvirus isolates will be characterised and after basic characterisation, viruses will be selected to test the hypothesis that there are novel African avipoxviruses that could be developed as vaccine vectors and that modifications to these vectors could substantially improve the immunogenicity of the vaccines.
- **Genital microbiome project:** The sexually transmitted HPVs and HIV are the cause of significant public health problems in South Africa. This project will investigate the composition of the complex genital tract microbiota and interaction with HIV and HPV.
- **HPV projects:** HPV vaccination has not been introduced into the public sector in South Africa. Molecular epidemiology is being done to provide supporting data for HPV vaccine introduction. Novel technologies are currently being used to identify novel HPVs in clinical specimens.

**Relevance of research**
Vaccines are the most cost-effective way of controlling disease. The HIV vaccine research project investigates various vaccine vectors with the long-term goal of moving vaccines through the vaccine development pipeline from basic research to clinical trials. Cervical cancer is caused by HPV and this research is aimed at providing data to support HPV vaccine introduction in South Africa. There is also a need for data to introduce a cervical cancer screening policy, particularly in high-HIV-prevalence communities.
Professor N Goduka

Research Chair: Indigenous Knowledge Systems (IKS)
Primary discipline: Human Development and IKS
Level of Chair: Tier 1
Institution: Walter Sisulu University
Chair commencement date: February 2010

Biosketch
Professor Goduka completed a PhD in Human Ecology with a major in Human Development and Multicultural Education at Michigan State University, US, in 1987. From 1988 to January 2010 she was a Professor in the Department of Human Environmental Studies at Central Michigan University, Michigan in the United States.

In 2010, she joined Walter Sisulu University (WSU) as the SARChI Research Chair in IKS. Below are some of her accomplishments and work in progress since she has been working at WSU as an IKS Researcher. She is spearheading and chairing the following:

- Establishment of the Interfaculty Committee for the Bachelor of Indigenous Knowledge Systems (B.IKS) Programme at WSU. This programme is targeted to be offered in January of 2015;
- Formulation of the Institutional IKS Policy at WSU;
- Establishment of Eziko/Indigenous Writers’ Institute. The goal of the Institute is to produce an IK Anthology and IK teaching and learning material for the upcoming B. IKS Degree; and
- Establishment of the Demonstration Gardens for Indigenous Leafy Vegetables (ILVs) at WSU. These will be used as sites for research, experiments and analysis of samples for nutritional and medicinal contents.

Current research interests
Her research interests include Moral Regeneration among children and youth in schools, as well as the impact of ILVs for food security and poverty alleviation/eradication in selected rural communities in the Eastern Cape Province, South Africa.

Her research approach includes mixed methods (quantitative and qualitative, as well as community-based Participatory Action Research (PAR). These both lend themselves to indigenous research designs. She has also developed Eziko Sipheka Sisophula Theoretical Framework. The goal of this research is to create spaces within the academy to deconstruct western-based knowledge systems that are marginalising indigenous-based knowledge systems.

Relevance of research
Within the academy, theories have historically been constructed in ways that have maintained and privileged the centrality, legitimacy and superiority of western thinking. These theories are, however, being challenged by a range of indigenous scholars/researchers and students who are engaged in efforts to establish decolonising spaces within university settings. They are generating decolonising frameworks and research methodologies for rethinking the nature and structure of education for all learners (Smith, 1999). They are also establishing intellectual spaces to create analytical, conceptual and theoretical frameworks for the development and integration of IK within the curricula for sustainable development (Goduka, 2005; Battiste, 2002; Cajete, 2000). These emerging frameworks animate fundamental IK theories and methods as means to raise its intellectual, cultural and social value, and its status as a system of scientific knowledge; without mystifying western-based knowledge systems or mythicising indigenous-based knowledge systems.
Professor CA Hamilton

Research Chair: Archive and Public Culture
Primary discipline: Humanities
Level of Chair: Tier 1
Institution: University of Cape Town
Chair commencement date: July 2008
Websites:
www.apc.uct.ac.za
www.arc.uct.ac.za
www.archivalplatform.org

Biosketch
Professor Hamilton completed her PhD at the Johns Hopkins University in 1993. She is the former Director of South Africa’s first graduate school for the Humanities, at the University of the Witwatersrand and of the Constitution of Public Intellectual Life Research Project, also at Wits. An authority on the pre-colonial history of southern Africa, Professor Hamilton is also recognised internationally for her work in interrogating the concept of archive that holds sway in modern epistemology and in elucidating its political effects. She is a co-editor of the Cambridge History of South Africa (2010) and of Refiguring the Archive (2002); editor of The Mfecane Aftermath (1995); and author of Terrific Majesty: The Powers of Shaka Zulu and the Limits of Invention (1998).

Current research interests
- Critical enquiry into the production, shaping and reshaping over time of archives and other forms and practices that are approached for archival-like information, including but not confined to, a concern with the public life of the archive.
- The public life of ideas.
- Politics, power and identities in southern Africa, c.1750-1830.

Relevance of research
The research seeks to enable on-going recuperation of pasts, which were denied by colonialism and apartheid. The matter of restorative justice in South Africa has focused on recent history, with the cut-offs for the Truth and Reconciliation Commission being set at 1960 and land restitution at 1913. The research is concerned with a process of redress in relation to a much deeper past. It does this by calling into being an expanded archive for that deeper period, by accounting for its historical disavowal, and undertaking intensive research into the making and interpretation of existing archives. This project of expanding the archive and reconstructing its many histories and public lives is a Herculean task that sows seedbeds in anticipation of ongoing detailed scholarly labour by future generations.
Professor CS Henshilwood

Research Chair: The Origins of Modern Human Behaviour
Primary discipline: Humanities
Level of Chair: Tier 1
Institution: University of the Witwatersrand
Chair commencement date: January 2008
Website: tracsymbols.eu

Biosketch
Professor Henshilwood completed his PhD in Archaeology at the University of Cambridge in 1995. He directs the Blombos Cave Project in South Africa, a major archaeological research initiative that is contributing significantly to the international debate on the origins of what is considered modern human behaviour. The excavations at this site have uncovered marine shell beads, engraved ochres and bone tools that date some 75 000 years ago. He is also now excavating two new Middle Stone Age sites situated in the De Hoop Nature Reserve, South Africa, that are older than 60 000 years. In 2005, the French Prime Minister awarded him the Chevalier dans l’Ordre des Palmes Académiques, for distinguished contributions to French education and culture.

He has published widely in scientific journals, given public lectures in various countries, presented a number of television and radio programmes, and regularly writes articles for popular publications. His book, Homo symbolicus – The dawn of language, imagination and spirituality was published by John Benjamins in 2010.

Current research interests
The study of the human past has been negatively impacted in the last decades by the fragmentation of research and isolation of disciplines. Increasingly, sub-disciplines focus only on limited time periods and geographical areas, without adopting multidisciplinary approaches. While they have refined our knowledge of the human trajectory, they have not been able to provide an integrated view of human prehistory, or allowed for an understanding of the key mechanisms underlying behavioural innovations. With a multidisciplinary philosophy, the SARChI Chair-led research will overcome these deficiencies by integrating a variety of experts in human evolution with a focus on H. sapiens in southern Africa.

Relevance of research
This project is the first attempt to combine new archaeological results, original multi-proxy palaeoenvironmental data, and state-of-the-art climatic simulations for two different hemispheres, and integrate them into dedicated biocomputational architecture. The goal is to understand how the key behavioural features that make us humans appeared among early H. sapiens. This project is innovative and ambitious with respect to its target time period (MIS 6-3), its interdisciplinary character, its methodology, and the questions it addresses.
Professor R Kaschula

Research Chair: Intellectualisation of African Languages, Multilingualism and Education
Primary discipline: Humanities
Level of Chair: Tier 1
Institution: Rhodes University
Chair commencement date: January 2013

Biosketch
Professor Kaschula is Professor in the School of Languages at Rhodes University. He holds the African languages SARChI Chair and together with Dr Pam Maseko, heads up the DHET Catalytic Project on Concept Formation. He has taught at the Universities of Cape Town, Stellenbosch, Western Cape, Walter Sisulu, Rhodes and at Goucher College in the USA.

He holds a PhD in African literature. He has been the recipient of the Young African Leaders Award, the Nulton International Scholarship for Study in the USA, and the Ernst Oppenheimer Scholarship for study at SOAS, University of London. He is also the author of a number of short stories, novels, and academic works in English and isiXhosa. His novels include *The Tsitsa River and Beyond*. His academic works include *The Bones of the Ancestors are Shaking: Xhosa Oral Poetry in Context; Communicating across Cultures in South Africa: Toward a Critical Language Awareness; and Sign Language: A South African and Global Perspective*. He has published in excess of 50 academic articles in leading journals both within South Africa and abroad, for example in the *Journal of African Cultural Studies* (SOAS) as well as *Research in African Literatures* (Ohio).

He has been awarded the Nadine Gordimer/COSAW prize for short story writing and the Nasou-Via Afrika literature prize. He was short-listed for the Maskew-Miller Longman Short-Story Award. In 2008 his novel *Emthonjeni*, published in English as *Take me to the River*, was placed on the International Board of Books for Young People’s Honour list (Copenhagen). In 2008/9, his short story, *Valley of Voices* was included in the Caine African Writer’s Prize collection, *Jambula Tree*. In 2011, a short story entitled *Six Teaspoons of Sweetness* was published in *African Pens 2011*, as part of the international PEN-Studzinski literary award.

He has been nominated to the editorial boards of a number of journals, including the *Journal of African Cultural Studies*. He sits on a number of organisational boards such as the Executive Board of the African Languages Association of Southern Africa (ALASA).

Current research interests
Professor Kaschula’s current research interests include the following:
- Intellectualisation of African languages and concept development;
- Applied Language Studies;
- Oral and Literary Studies;
- African Languages and Education; and
- Creative Writing in isiXhosa and English.

Relevance of research
The relevance of this research is directly linked to the necessity for increased status and corpus language planning in relation to African languages. It also speaks to the need for allowing cognition and understanding of conceptual material to be undertaken in a language that one understands best before transferring back to English. The relevance of the research takes into account the necessity for the increased visibility of particularly African languages as espoused by the Constitution of the country.
Biosketch
Professor Mesthrie completed his PhD in Linguistics at the University of Cape Town in 1985. He was Head of the Linguistics Section of the Department of English Language and Literature (1998-2009), President of the Linguistics Society of Southern Africa (2001-2009), and co-editor of the CUP journal English Today (2007-2012). He was a member of the English National Language Body, constituted by PANSALB and parliament. He is series editor for CUP’s Key Topics in Sociolinguistics and executive life member of the Linguistics Society of Southern Africa. Among his publications are Language in South Africa (CUP, 2002) and World Englishes (with Rakesh Bhatt, CUP 2008).

Current research interests
His research area is Linguistics generally, and more specifically, Sociolinguistics, with special emphasis on Migration, Language and Social Change, examining sociolinguistic practices “from below” in relation to:

- Multilingualism and language contact;
- Sociolinguistic variation and change;
- Sociophonetics of English in post-apartheid society; and
- Sociolinguistic theory.

Relevance of research
Professor Mesthrie was awarded the South African Research Chair in view of the significance of sociolinguistics in understanding heritage, culture and social change in a multilingual society, one in which migration has been a salient feature in its past history and present composition. Sociolinguistics offers tools to examine interactions between different languages (and thus of their speakers) and to examine at a very sensitive level the degree of social change occurring in society. While language can be used as a tool of domination, it can also be used to bring people together and to afford them new opportunities. The research project affords detailed new ways of understanding our South Africanness and especially that of the younger generation. It also covers linguistic adaptations made by new African and Asian migrants as they attempt to assimilate to South African society.
Associate Professor N Nieftagodien

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Biosketch
Professor Nieftagodien completed his undergraduate degree at the University of Cape Town and postgraduate degree at the University of the Witwatersrand. He is currently the Head of the History Workshop and NRF Chair in Local Histories, Present Realities at the University of the Witwatersrand. He previously co-ordinated Development Studies and serves on the committees/boards of the Global Labour University (GLU), The Society, Work and Development Institute (SWOP) and the Centre of the Built Environment (CUBES). He has lectured in the Department of History on the Middle East, African Cities and Urban History. He is the co-author, with Phil Bonner, of books on the history of Alexandra, Kathorus and Ekurhuleni, and recently published a book on the history of Orlando West as well as co-edited a book on the history of the ANC. In addition, he has published articles and book chapters on aspects of popular insurgent struggles, public history and local history. Professor Nieftagodien served on the board of the South African Democracy Education Trust and is currently a member of the South African History Archives.

Current research interests
His principal area of research is on the history of the Vaal Triangle, focusing on the evolution of the early location (mainly Evaton) and the production of various urban spaces and the contestations generated in these processes. This has included analyses of land occupations, struggles over different imaginings of local governance (especially in the 1930s and 1940s), which affected the relationship between local movements and a relatively weak local state, as well as the creation of new industrial spaces and the consequences thereof for the production of social and political spaces. Research in and with local communities provide continuous opportunities critically to reflect on public history.

Relevance of research
The history of this region is largely unknown. More significantly, the production of different kinds of spaces and how these constituted urban forms remains under-researched. The role of ordinary citizens, black and white, and the contestations between those in power and people wanting to make claims to new urban spaces provides interesting and novel insights into the history of urban areas.
Professor L Ntsebeza

Research Chair: Land Reform and Democracy in South Africa: State and Civil Society Dynamics
Primary discipline: Sociology
Level of Chair: Tier 1
Institution: University of Cape Town
Chair commencement date: January 2008
Website: www.landreform.uct.ac.za
www.africanstudies.uct.ac.za

Biosketch
Professor Ntsebeza completed a PhD in Sociology and is lecturing Sociology at the University of Cape Town (UCT). He has conducted published research on land and agrarian questions in South Africa around themes such as land rights, democratisation, land and agrarian movements, rural local government and traditional authorities. Apart from numerous peer-reviewed articles and book chapters, he authored the book *Democracy Compromised: Chiefs and the Politics of Land in South Africa* and has co-edited three other books, all four titles peer-reviewed. Professor Ntsebeza is part of a consortium involving academics from the Universities of Cape Town, Rhodes and Dar es Salaam, as well as the African Institute for Agrarian Studies in Zimbabwe that established a Summer School on Land and Agrarian issues in Africa. The first school was established in Zimbabwe in January 2009. His main current research interests are on farm workers and dwellers with specific focus on recent developments in the Western Cape and the intellectual and political history of the renowned African scholar, the late Archie Mafeje.

Current research interests
- Farm workers and farm dwellers in South Africa, with specific reference to the 2012/3 farm worker strikes in the Western Cape.
- The role of land in the struggle against poverty in South Africa.
- The intellectual and political history of Archie Mafeje.
- Land and democracy issues.
- Lands rights for rural women.
- African studies at UCT.

Relevance of research
The above themes address issues around land questions, democracy, gender, equity and agency with specific reference to the rural areas of South Africa. These matters are currently being debated throughout the globe. The recent economic and financial crisis and the resultant loss of jobs are putting land questions, land use, food security and democracy high on the agenda. Further, the farm workers’ strikes that took place in the Western Cape in 2012/3 have brought to the fore the question of the agency of the poor and downtrodden, as well as their willingness to make their voices heard. Research undertaken in the Land Reform and Democracy Research Chair undoubtedly makes a significant contribution to these debates.
Professor AL Tayob

Research Chair: Islam, African Publics and Religious Values
Primary discipline: Humanities
Level of Chair: Tier 1
Institution: University of Cape Town
Chair commencement date: January 2008
Websites: blogs.uct.ac.za/blog/tayoblog

Biosketch
Professor Tayob is Professor of Islamic Studies at the University of Cape Town. He is currently also the Head of Department. Professor Tayob obtained his doctoral degree in 1989 from Temple University in the United States. He has worked and published on Islam in South Africa, Africa and modern Islam in general. His most recent books are Religion in Modern Islamic Discourse (Hurst/Columbia University Press, 2009) and Muslim schools and education in South Africa and Europe (Waxmann Verlag, 2011).

He is a recognised scholar in the study of modern Islam in general, and Islam in Africa in particular. Professor Tayob is invited regularly to conferences, presenting keynote talks, visiting professorship, and to take up research fellowships. His recent books on Education (2011), Modern Islam (2009) and a collaborative translation of an early historical text (2011), add to his earlier books on Islam in South Africa. In addition, he has to his name numerous articles and book chapters on the study of religion, Islam in Africa and modern Islamic thought.

Current research interests
- Religion Education in South Africa: He is turning his attention to how religion is taught in public life. Building on the work on Islam in public life, this project will examine the role of Religion Studies as part of Life Orientation (LO) and as a free-standing subject in South African schools. The project will examine the role and value of religion education in South African schools, that has replaced the former Biblical Studies curriculum.
- Modern Islam: He continues to do cutting edge work on how to approach the study of Islam in the modern world. His main preoccupation is how to link the present and the past, what categories we use to interpret the present. He is offering alternative categories drawn from the history of Islam.
- Biographies of religious engagement: The third area of research is a focus on the personal dimension of religious revival. Taking a biographical approach, he asked what motivates people to join religious revival groups? How do they choose and stay within a group? These questions are posed to Muslim activists in South Africa, Egypt and Nigeria, and to Muslims and Christians in East Africa.

Relevance of research
The global revival of religion in public spheres cannot be denied or ignored. It impacts on all forms and levels of individual and social life. A study of religious discourse is crucial for understanding modern religions, their sources of inspiration and their underlying structure. They cast a long shadow on public life in general.
Professor RCD Franzen

Research Chair: Tax Policy and Governance  
Primary discipline: Law  
Level of Chair: Tier 1  
Institution: University of Pretoria  
Chair commencement date: March 2013  
Website: www.ati.up.ac.za

Biosketch
Professor Franzsen has been the Director of the African Tax Institute (ATI) in the Faculty of Economic and Management Sciences, University of Pretoria, since July 2007. Previously he was Professor in the Department of Mercantile Law at the University of South Africa. In 1990 he obtained a doctorate in Law from Stellenbosch University with a thesis on South Africa’s real estate transfer tax. He is a co-founder of the Southern African Tax Institute (SATI), predecessor of the ATI which was established in 2002 to undertake capacity development in the areas of tax policy and tax administration in the public sector in Africa. He is a member of the Advisory Board of the International Property Tax Institute (IPTI) and has authored or co-authored numerous conference papers, journal articles and a number of specialist books especially on land and property taxes. He has acted as tax policy advisor to countries in the Caribbean, People’s Republic of China, Croatia, Egypt, Indonesia, Liberia, Rwanda, South Africa, Tanzania and Uganda on especially property tax issues. He has also acted as an instructor on property taxation for the International Monetary Fund (IMF) and the Lincoln Institute of Land Policy.

Current research interests
- Property and land tax policy, laws and administration.
- Real estate transfer taxes.
- Urban and rural local government institutions and finances.

Relevance of research
To broaden their revenue bases and/or to ensure more accountable local governance, more than 50 countries have recently reformed or are currently (2013) reforming their property tax systems, including countries such as Greece and Ireland.
Professor C Himonga

Research Chair: Customary Law, Indigenous Values, and Human Rights
Primary discipline: Law
Level of Chair: Tier 2
Institution: University of Cape Town
Chair commencement date: January 2008

Biosketch
Professor Himonga is a Professor of Law at the University of Cape Town (UCT) and an NRF-rated researcher. She holds an LLB (University of Zambia), an LLM (at King’s College, London) and a PhD (London School of Economics and Political Science). She has collaborated in three major international and regional academic research projects in Europe and Africa, and is a former member of the South African Law Reform Commission Project Committee on Customary Law. She has served on a number of Boards of Trustees, including the International Association of Law Schools Board from 2005-2010.

Current research interests
Her current research interest is African customary law with a focus on:
- The actual workings of African Customary Law as a normative system and a part of the national legal system, especially in the areas of marriage, succession and inheritance, traditional leadership, land tenure, children, and dispute resolution;
- The conceptualisation of customary law as living and official customary law; and
- Interfaces/intersections between customary law and common law and between customary law and human rights.

Relevance of research
Customary law plays an important role in the regulation of people’s lives in South Africa and in Africa. This is partly evident from the increasing recognition of customary law by African national constitutions. However, little is known of this system of law, in terms of its current form, working and relationship to other components of the legal system. Its application and future in African legal systems will, therefore, depend on the scientific research conducted on it.
Professor N Steytler

**Research Chair:** Multilevel Government, Law and Development  
**Primary discipline:** Law  
**Level of Chair:** Tier 1  
**Institution:** University of the Western Cape  
**Chair commencement date:** January 2013  
**Website:** Mlgi.org.za

**Biosketch**
Professor Steytler is the holder of the South African Research Chair in Multilevel Government, Law and Policy, located in the Community Law Centre, at the University of the Western Cape, having been the director of the Centre for a number of years. He has widely published in the areas of constitutional law, federalism and local government. He is a member of Municipal Demarcation Board and has served as consultant to international organisations, government departments at national, provincial and local level. He is the president of the International Association of Centres for Federal Studies and in November 2012 he was awarded an honorary doctorate by the University of Fribourg, Switzerland.

**Current research interests**
The Chair’s main research interests are:
- The current reform agenda for provincial and local government in South Africa, in particular the role that metropolitan government will play in the future;
- The development of a specific African model of devolution over the last 20 years, dealing with a set of shared circumstances and responding in similar ways;
- The possible impact that the BRICS economic initiative may have on multilevel governance (and vice versa) in the participating states; and
- A south-north engagement on federalism and devolution.

**Relevance of research**
The four areas listed above have clear relevance to peace, stability and development in South Africa, Africa and the global south:
- The development of the system of multilevel government is playing an important role, either retarding or advancing stability and development in South Africa. In terms of the National Development Plan the system is here to stay and the question is how could it function better;
- Likewise, devolution has been used in post-conflict countries to ensure political accommodation, development and limiting the abuse of centralised power. A proper understanding of the dynamics of the system is thus vital for the effective pursuit of the important goals of devolution;
- While the focus of the BRICS economic initiative has been on international and national actions, in multilevel governmental systems the entire system must be aligned to achieve the desired outcome; and
- The debate on federalism and devolution has been dominated by the research institutions in the West, writing from a perspective of developed countries. There is a need to develop a more robust knowledge base in the South that may be more relevant to challenges of governance in the South.
Professor H Strydom

Research Chair: International Law  
Primary discipline: Law  
Level of Chair: Tier 1  
Institution: University of Johannesburg  
Chair commencement date: May 2013

Biosketch

Professor Strydom was appointed Senior Lecturer in Public International Law, University of the Free State in 1983, Associate Professor in 1991 and full Professor in 1995. In 2002 he was appointed Professor in public law at the then-Rand Afrikaans University (which became the University of Johannesburg in 2005) and was awarded the NRF Research Chair in International Law in 2013.

Professor Strydom is the President of the South African Branch of the International Law Association (ILA) and a member of the ILA’s climate change committee. He serves on the editorial board of the South African Yearbook of International Law and is a founding member of the African Yearbook of International Humanitarian Law.

Current research interests
- Public International Law.
- International Environmental Law.
- International Human Rights Law.
- International Peace and Security.
- African Union.

Relevance of research
On-going engagement with contemporary issues in public international law and contributions in international fora; collaboration with international and national peers on a wide range of topics; supervision of Master’s and Doctoral studies.
Professor AJ van der Walt

**Research Chair:** Property Law  
**Primary discipline:** Law  
**Level of Chair:** Tier 1  
**Institution:** Stellenbosch University  
**Chair commencement date:** January 2008  
**Website:** sarcpl.sun.ac.za

**Biosketch**  
Professor Van der Walt specialises in Comparative Constitutional Property Law, modern private Property Law and Property Theory. He is an internationally respected researcher who has received numerous awards. Among the prizes and honours bestowed on him are the Alexander von Humboldt-Stiftung Fellowship (four times since 1990), a Visiting Fellowship Commoner at Trinity College, Cambridge (twice since 2004), Fellowship of the Royal Academy of South Africa and membership of the Academy of Sciences of South Africa. In 2002, 2007 and 2012 the NRF awarded him an A1-rating.

**Current research interests**  
His research focuses on the development of post-apartheid property law.
- Development of a new paradigm within which property law can play a meaningful role combating poverty, reversing the social and economic hierarchies established under apartheid and building the basis upon which economic growth and development can be pursued in conjunction with human dignity, equality and justice.
- Exploring the implications of the new paradigm in the areas of private Property Law, Constitutional Property Law and Property Theory.
- Development of:
  - new knowledge,
  - a new basic academic text, and
  - a new generation of scholars in the general field of Property Law, particularly in an effort to help position Property Law within (and to help promote) the political, social and economic transformation that is taking place in South Africa.

**Relevance of research**  
The relevance of the research is located in two main areas, namely working out the implications of the political, social, economic and constitutional transformation in post-1994 South African society for Property Law; and training a new generation of Property Law scholars who can carry this work further in legal practice, government service and academe.
Professor P Vrancken

**Research Chair:** Law of the Sea and Development in Africa  
**Primary discipline:** Law  
**Level of Chair:** Tier 2  
**Institution:** Nelson Mandela Metropolitan University  
**Chair commencement date:** January 2008  
**Website:** law.nmmu.ac.za

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**Biosketch**
Professor Vrancken was awarded the LLD degree by UCT in 1993. He was the Head of the Department of Public Law at the NMMU until June 2013. He has supervised or co-supervised several LLM and LLD students. He is the author or co-author of more than 50 articles in accredited South African and foreign journals. Professor Vrancken is the editor and co-author of *Tourism and the Law in South Africa* (2002), the co-editor and co-author of *Introduction to Human Rights Law* (2009) and the author of *South Africa and the Law of the Sea* published in 2011 by Martinus Nijhoff Publishers in Boston and Leiden. Professor Vrancken is currently directly involved in the efforts of the African maritime administrations led by the South African Maritime Safety Authority to build the higher education structures necessary for Africa to meet its human capacity and research needs in coastal and ocean studies.

**Current research interests**
Professor Vrancken’s research interests include the legal developments affecting the African coasts and maritime environment, the incorporation of the international law of the sea into the domestic legal system of African states and the legal aspects of coastal and marine tourism. During the present funding cycle (2013-2017), Professor Vrancken will focus on the legal regime of ports in the SADC region.

**Relevance of research**
Research on the legal frameworks of port assets and activities in the SADC states will substantially advance the knowledge required to ensure that SADC states have in place, implement, monitor compliance with and enforce legal regimes which promote the rule of law at sea, avoid distorting competition between ports and are best suited to the states’ present developmental needs, while being in a position in the years ahead to keep up with, and proactively influence relevant developments at global level.
Professor J Adesina

Biosketch
Professor Jimi Adesina is the newly appointed South African Research (SARChI) Chair in Social Policy at the University of South Africa. Professor Adesina is also the Professorial Research Associate at the Nordic Africa Institute (Uppsala University, Sweden). Previously, he served as Professor of Sociology at Rhodes University, and most recently, Professor of Sociology and Head of the Department of Anthropology and Sociology at the University of the Western Cape. He taught at the University of Ibadan and has held visiting appointments at the University of Ulster (Northern Ireland), University of the Witwatersrand, the UN Research Institute for Social Development (Geneva), the UN Economic Commission for Africa (Addis Ababa), the University of Oxford, and the Nordic Africa Institute, Sweden.


Between 2002 and 2008, Professor Adesina served as a member of the Executive Committee of the Council for the Development of Social Science Research in Africa (CODESRIA), and Chair of its Programme Sub-Committee. A past President of the South African Sociological Association, Professor Adesina is the founding Secretary-General of the African Sociological Association. He was elected to the Academy of Science of South Africa (ASSAf) in 2005. He serves on the editorial board of several journals, including the African Sociological Review (CODESRIA), South African Review of Sociology, Current Sociology (International Sociological Association), and Contemporary Sociology (American Sociological Association). He is a Corresponding Editor of the Review of African Political Economy.

Current research interests
The research focus of the SARChI Chair is on “Rethinking Social Policy: in search of inclusive development”. The research programme involves three interlocking thematic fields:

- Rethinking the conceptual foundations of social policy and social policy architectures, framed by the idea of “transformative social policy”;
- Rethinking poverty from a relational perspective and a comparative understanding of the role of encompassing social policy regimes in addressing structural poverty and inequality; and
- Understanding “social policy from below”, with a focus on “non-formal” mutual networks, their operations, and normative underpinnings.

Relevance of research
The programme under the SARChI Chair speaks to:

- The challenge of inequality, structural poverty, and the imperative of inclusive development. It unpacks not only the issues of policy design but the ideational/normative underpinnings of policy choices, as well; and
- Knowledge production grounded in a distinctly (South) African context, and as the basis for advancing the frontiers of global knowledge in the field of social policy.
Professor J Adler

Research Chair: Mathematics Education
Primary discipline: Social Sciences
Institution: University of the Witwatersrand
Chair commencement date: January 2010

Biosketch
Professor Adler completed a PhD at the University of the Witwatersrand (Wits). She holds the FRF Mathematics Education Chair at Wits, and directs the Quantum Research Project on Mathematics Teacher Education. She holds the Chair for Mathematics Education at King's College, London. She has worked in Mathematics Education since the 1970s as a teacher, curriculum developer and lecturer. As a Mathematics educationist and academic at Wits she has led the conceptualisation, development and implementation of a range of degree programmes, including a PhD programme in Mathematics Education.

She is the recipient of the Academy of Sciences of South Africa (ASSAf) 2012 Gold Medal award, for Science in the Service of Society, and a fellow of the society. In 2003, she received the Wits Vice-Chancellor Research Award as well as the Vice-Chancellor's Team Award for Academic Citizenship. She has published extensively – four books, 32 peer-reviewed journal articles, 16 book chapters – and delivered 16 keynote and plenary addresses at international conferences.

Current research interests
She has three inter-related research interests:
● Teaching Mathematics in multilingual classrooms;
● Professional development of Mathematics teachers; and
● Mathematical work of teaching. The research in multilingual classrooms began in 1991, and evolved into a interdisciplinary project that tracked the learning of Mathematics, Science and English language teachers enrolled in an in-service professional development programme. In 2002 she began work on the QUANTUM project, focused on describing the mathematical work of teaching. Her current FRF Mathematics Education Chair work is a five-year research and development project focused on the quality of teaching and learning of Mathematics in 10 secondary schools in Gauteng.

The research on teaching Mathematics in multilingual classrooms began in 1991, and was the subject of her PhD dissertation. Between 1996 and 1999, she directed a larger, long-term, interdisciplinary and collaborative project that tracked the learning of Mathematics, Science and English language teachers enrolled in a formalised in-service professional development programme. She tracked 26 teachers over three years in order to describe and explain their “take up” from various aspects of the language practices like code-switching. These two projects, situated as they are in a transforming educational sector in South Africa, coupled with growing practical knowledge across diverse contexts has led to an understanding that the mathematical work of teaching remains under-described, thwarting attempts to improve teaching through strategic teacher education programmes. Her current work is geared to enabling this description, so as to inform and improve the quality of Mathematics teacher education.

Relevance of research
Her research is grounded in problems practice, specifically the quality of instruction in Mathematics in secondary schools, and the development of models of professional development in Mathematics that support such work.
**Professor P Alexander**

**Research Chair:** Social Change  
**Primary discipline:** Social Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Johannesburg  
**Chair commencement date:** January 2010  
**Website:** [www.uj.ac.za/EN/Faculties/humanities/researchcentres/sacsc/Pages/home.aspx](http://www.uj.ac.za/EN/Faculties/humanities/researchcentres/sacsc/Pages/home.aspx)

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**Biosketch**

Professor Alexander completed a PhD at London University and is a Professor of Sociology at the University of Johannesburg. He authored or co-authored the following books: *Racism, Resistance and Revolution* (1987); *Workers, War and the Origins of Apartheid* (2000); *Racializing Class, Classifying Race* (2000); *Globalisation and new Identities: a View From the Middle* (2006); *Marikana: A view from the Mountain and a Case to Answer* (2012); and *Class in Soweto* (2013). He has published 23 articles and seven chapters in various books. He is the Africa Editor of *Global Networks* and holds fellowships at Oxford University and Jawaharalal Nehru University, Delhi.

**Current research interests**

- Comparative Labour History.
- Class structure and class identity.
- Social and political protests in South Africa.

**Relevance of research**

His research contributes to an understanding of processes of social changes in South Africa by placing these in a global context.
Professor S Bracking

Research Chair: Applied Poverty Reduction Assessment
Primary discipline: Social Sciences
Level of Chair: Tier 1
Institution: University of Kwa-Zulu Natal
Chair commencement date: January 2010
Website: www.thestudyofvalue.org
www.theafricareport.com/columns

Biosketch
Professor Bracking graduated from York and Leeds Universities in the UK. She moved to the University of Manchester where she was a member of the Chronic Poverty Research Centre (2001-2006) and Global Poverty Research Group (2001-2007) and was promoted to Professor in International Development in the School of Environment and Development in 2012. Professor Bracking is a political economist and political scientist and studies issues of poverty, economic justice and development in southern Africa and beyond. Her most recent work focused on the developmental co-benefits of climate finance designated for climate change adaptation projects, moving from a 20-year career of research in development finance generically.

From 2009-2012, Professor Bracking was Principle Investigator on a number of research grants: on reform of European development finance institutions funded by the Ministry of Foreign Affairs in Norway (2010); on development and environmental impact assessment funded by Norwegian Church Aid (2011); on HIV (CoBaSys), funded by the European Union and ACP (2008-2013); and on value and valuation at the Leverhulme Centre for the Study of Value (LCSV) (2012- ). Professor Bracking is editor of Corruption and Development (Palgrave, 2007) author of Money and Power (Pluto, 2009), and is currently completing a book on The Financialisation of Power in Africa (Routledge, forthcoming).

Current research interests
Professor Bracking has recently finished work on re-theorising private sector corruption in the extractive industries and infrastructure sector in South Africa, funded by the Michelsen Institute. She has ongoing research in the LCSV which critically explores the social articulation of valuation and worth in the development, environment and conservation domains. Under the NRF/DST SARChI Chair in Applied Poverty Reduction Assessment a programme of research has begun to reduce the scale and scope of poverty in South Africa by assessing policy interventions and implementation, and by exploring the political economy of ill-being and the fiscal basis of economic justice.

Relevance of research
The relevance of the research is found in the continued need to reduce poverty, at the micro and macro scale and in all its dimensions in South Africa and beyond. Professor Bracking herself has been invited to comment on poverty reduction and economic justice in a number of forums, including as an expert witness to the UK Parliamentary Committee on International Development (December 2010) because of her research work on the CDC Group, the UK’s development finance institution. She has also worked with ZIMCODD on debt write-off (2008); Counter Balance on reform of the European Investment Bank (2009); and Advocates for International Development (A4ID) (2006 – ).
Professor B Cousins

Research Chair: Poverty, Land and Agrarian Studies
Primary discipline: Social Sciences
Level of Chair: Tier 1
Institution: University of Western Cape
Chair commencement date: January 2010
Website: www.plaas.org.za

Biosketch
Professor Cousins completed a DPhil in Applied Social Science at the University of Zimbabwe in 1997, and a BA in Sociology and Geography at the University of South Africa in 1982. He was in exile for 19 years and worked in agricultural training and extension in Swaziland (1976-1983) and Zimbabwe (1983-1986), and carried out research on communal grazing, livestock production and rural class formation in Zimbabwe (1986-1991). From 1991-1995 he lectured Anthropology at the University of the Western Cape and held a Chair in Development Management from 1998-2009. He founded and directed the Programme for Land and Agrarian Studies (PLAAS) at the university’s School of Government from 1995-2009. PLAAS, now the Institute for Poverty, Land and Agrarian Studies, employs 25 staff members, is the leading research centre of its kind in southern Africa, and enjoys an international reputation for high-quality applied research. Between 1999 and 2009 Professor Cousins led and co-managed five regional or trans-continental research and networking programmes on land, livelihoods, and natural resource management. He has published widely in both academic and non-academic formats, and his publications include 30 peer-reviewed journal articles, 28 book chapters and six edited or co-edited books.

Current research interests
Professor Cousins’ research over the past decade has focused on the key themes of production, property and power, and their interconnections in the context of land and agrarian reform in southern Africa. This research is strategic and use-oriented, in this instance by policy-makers and civil society groups concerned to reduce poverty and inequality through redistributing assets, securing rights and democratising decision-making in rural areas.

His current research focuses mainly on the politics and economics of land and agrarian reform, in particular on the role of small-scale agricultural producers within such reforms; on the legal recognition or formalisation of customary land rights; and on the changing nature of rural social organisation and systems of livelihood.

Relevance of research
Government programmes such as land and agrarian reform occur within complex, variable and dynamic social, economic and political contexts. The realities of these contexts deeply influence the outcomes of state interventions, yet policy makers often poorly understand them. Rigorous, empirically-grounded social science research that explores the complexities of rural poverty, agrarian change and emerging property regimes can shed light on the outcomes of state policies and programmes and inform their reformulation.
Professor M Graven

Research Chair: Numeracy Education
Primary discipline: Social Sciences
Institution: Rhodes University
Chair commencement date: January 2011

Biosketch
Professor Graven holds a PhD from the University of the Witwatersrand obtained in 2002. She began as the South African Numeracy Chair at Rhodes University in January 2011. Prior to this position she was an Associate Professor in Mathematics Education at the University of the Witwatersrand and following that the Director of Mathematics at St Andrews College for 2009-2010. Her decision to move from the university world back into schools temporarily reflects her passion for Mathematics teaching and her need to be an “insider” in the profession of Mathematics teaching in order to strengthen her work as a Mathematics teacher educator and researcher. Her scholarly work is widely respected both nationally and internationally as attested to by the many citations of her publications from across the globe and the numerous keynote lectures she has been invited to give at various conferences. She has also authored a top-selling Mathematics textbook and has contributed to policy documents and the work of the Independent Examinations Board. She was the founding editor of the Learning and Teaching Mathematics journal of AMESA and serves as a reviewer and on the editorial board for several local and international journals. Professor Graven began her career as a Mathematics teacher at St Barnabas College in 1991.

Current research interests
The focus of the research within this Chair is to research innovative, sustainable and practical solutions to the challenges of numeracy education in primary schools.

Researchers in the Chair-led team investigate:
- The role of language in effective numeracy teaching and learning;
- Key factors in effective numeracy teaching;
- Key factors in effective numeracy learning;
- The nature of learning within after-school Mathematics clubs; and
- The nature of learning within an in-service community of practice of primary numeracy teachers.

Relevance of research
South Africa faces a Mathematics crisis (Fleisch, 2008). The third International Mathematics and Science Study Repeat Survey (TIMMS-R) confirmed this and indicated that South African Mathematics learners’ performance was significantly poorer than the vast majority of other participating countries in tests that measured basic mathematical skills (Howie, 2001). Addressing this crisis requires a creative search for sustainable ways forward. Within the South African Numeracy Chair Project intervention programmes are being rolled which focus on: numeracy teacher development; learner after-school clubs, and finally creating a general Mathematics buzz of passion and innovation in the broader Grahamstown area. Researching the nature of the effectiveness of this three-pronged approach is central to all research conducted by members of the South African Numeracy Chair Research Team.
Professor P Harrison

**Research Chair:** Development Planning and Modelling  
**Primary discipline:** Social Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Witwatersrand  
**Chair commencement date:** March 2010

**Biosketch**
Professor Harrison completed a PhD in Development Planning at the University of Natal in 1998. From 2006-2009 he served as Executive Director: Development Planning and Urban Management at the City of Johannesburg Metropolitan Municipality. In March 2010 he took up the NRF Chair at the University of the Witwatersrand. He has served as a member of various national and international professional organisations, including the South African Council of Town and Regional Planners as the Chairperson of the Council’s Education Advisory Committee from 2001-2003; as well as on the editorial panel of Planning Practice and Research (United Kingdom) from 2003-2008. He has jointly written two books on urban planning in South Africa, produced seven monographs on niche travel in South Africa, contributed chapters to seven books and written more than 22 peer-reviewed articles on Philosophies, Theories and Methodologies of Planning, Development Economics, Municipal and Regional Planning. He is currently a Member of South Africa’s National Planning Commission in the Presidency, and participated actively in the preparation of South Africa’s first National Development Plan. He also serves on a panel of experts advising government on urban policy.

**Current research interests**
His areas of specialisation are in urban planning and management, spatial planning, and spatial analysis.

The current focus of his research programme is the investigation and analysis of the shifting spatial order within large city-regions, and especially within greater Johannesburg. The research brings together the practice and theories of urban planning with methodologies and insights from other disciplines, and with the technologies of spatial analysis and modelling.

The research shows how the institutional orders of government, the private economy, and of society interact to shape the physical landscape. It is informed by the ideas of the new institutionalism, and emphasises the role and influence on space of formal legal and institutional arrangements, and of informal influences and practices.

The research programme will have four strongly related components:
- The mapping, simulation and modelling of spatial change;
- The role of government, and especially of urban planning, in shaping urban space;
- The spatial outcomes of decision-making in the private sector; and
- Culture, community, and spatial transformation.

**Relevance of research**
The proposed research responds to the challenges of rapid urbanisation in the global south, and especially to the development of large and complex city-regions that pose considerable dilemmas for planning and urban management. The primary objective of the research is to support, develop and promote forms of development planning that will contribute to making cities in poor and middle-income countries more liveable, sustainable, efficient and equitable. The research is directly informing government policy in South Africa through Professor Harrison’s membership of the National Planning Commission and other government bodies.
Professor CAO Hoppers

**Research Chair:** Development Education  
**Primary discipline:** Social Sciences  
**Level of Chair:** Tier 2  
**Institution:** University of South Africa  
**Chair commencement date:** January 2008

**Biosketch**
Professor Hoppers was a technical adviser on Indigenous Knowledge Systems to the Parliamentary Portfolio Committee on Arts, Culture, Science and Technology (South Africa) and led the task team to draft the national policy on Indigenous Knowledge Systems. She was a Distinguished Professional at the Human Sciences Research Council; an Associate Professor at the University of Pretoria; a Visiting Professor at Stockholm University (Sweden); Scientific coordinator and Campus Director for the Council for the Development of Social Science in Africa (CODESRIA) Annual Social Science Campus (2006); and a recipient of an Honorary Doctorate in Philosophy from Orebro University (Sweden) and an Honorary Doctorate in Education from Nelson Mandela Metropolitan University in South Africa. She was formerly a member of the International Faculty of the United Nations International Leadership Academy (Amman-Jordan); and is a member of the Academy of Science of South Africa and the Academy of Science Special Panel on the Future of Humanities. She serves as Co-Director and member of the Board of the PASCAL International Observatory (initiated by the Organization of Economic Cooperation and Development Countries (OECD)). She is a Fellow of the African Academy of Sciences (AAS).

Professor Hoppers is a scholar and policy specialist on international development, education, North-South questions, disarmament, peace, and human security. She is a UNESCO expert in basic education, lifelong learning, and on Science and Society; an expert in disarmament at the UN Department of Disarmament Affairs; an expert to the World Economic Forum on benefit sharing and value addition protocols; and the World Intellectual Property Organisation on traditional knowledge and community intellectual property rights. She is Goodwill Ambassador for Makerere University in Kampala, Uganda; and Ambassador for Non-Violence at the Durban Universities’ International Centre for Non-Violence.

**Current research interests**
Her research focuses on the following research topics:
- The conditions for integrating indigenous knowledge into mainstream;
- Peace and human development;
- Science, culture and society; and
- Universities and society in Africa with a focus on rethinking community engagement.

Established as an observatory on human development, this SARChI Chair asks two questions:
- What kind of transformative actions must be brought to bear to enable both restorative action and sustainable human development to occur in Africa and elsewhere?; and
- How can key areas of disciplinary knowledge production (such as Science, Economics, Education and Law) be reconstituted in order to bring about a just and human-centred development on the continent?

**Relevance of research**
The SARChI Chair aims at developing methodologies for transformative action at systems level, while generating a new paradigm of cutting-edge intellectual work that will influence thinking both within South Africa and internationally.
Professor C Julie

**Research Chair:** Mathematics Education  
**Primary discipline:** Social Sciences  
**Institution:** University of Western Cape  
**Chair commencement date:** July 2011

**Biosketch**
Professor Julie completed a PhD in Mathematics and Computer-based Education at the University of Illinois at Urbana-Champaign. He is a Professor of Mathematics Education at the University of the Western Cape (UWC). He has also held a similar position at the University of Agder in Norway and as Visiting Professor at the University of Bergen. He has been involved in Mathematics Education since the early 1970s as a teacher, developer of resources for school Mathematics, conceptualiser and director of support programmes in Mathematics for learners and teachers. At UWC, he has led the conceptualisation, development and implementation of degree programmes in Mathematics for Teachers and Mathematics. He also led the Graduate Studies in Science, Mathematics and Technology Education programme – a multi-national project to develop research capacity in sub-Saharan countries through doctoral studies.

Professor Julie was instrumental in establishing the Association of Mathematics Education in South Africa and he is a member of the Agder Society of Letters and Science in Norway. He has published widely in peer-reviewed journals, book chapters and two books. He has delivered keynote and plenary addresses at international conferences.

**Current research interests**
He has five primary interrelated research interests:
- The development of high-quality teaching of school Mathematics;
- Teaching and learning of the applications of Mathematics and Mathematical Modelling;
- Affective and personal organisational dimensions of learning Mathematics;
- Elementary Mathematics from an advanced point of view and advanced Mathematics from an elementary point of view; and
- Systematic reviews of issues in Mathematics teaching and learning.

A secondary interest is in the evolution of Mathematics Education as a discipline.

**Relevance of research**
The understanding and enhancement of high-quality instruction of school Mathematics will contribute towards quantitative and qualitative improvement of achievement in school Mathematics. The research foci hold promise for the development of research-driven classroom-embedded models for such quality teaching and studying Mathematics at school level.
Professor LB Landau

- **Research Chair:** Human Mobility and Urban Diversity
- **Primary discipline:** Social Sciences
- **Level of Chair:** Tier 1
- **Institution:** University of the Witwatersrand
- **Chair commencement date:** January 2014
- **Website/blog:** www.migration.org.za

**Biosketch**

Professor Landau was formerly the founding director of the African Centre for Migration & Society at Wits University which now hosts the Research Chair in Human Mobility and the Politics of Difference. He holds an MSc in Development Studies (LSE) and a PhD in Political Science (Berkeley). Widely published in the academic and popular press, he is author of *The Humanitarian Hangover: Displacement, Aid, and Transformation in Western Tanzania* (Wits Press), co-editor of *Contemporary Migration to South Africa* (World Bank), and editor of *Exorcising the Demons Within: Xenophobia, Violence and Statecraft in Contemporary South Africa* (UN University Press). He has served as the Chair of the Consortium for Refugees and Migrants in South Africa (CoRMSA), is a member of the South African Immigration Advisory Board and of the editorial boards of *International Migration Review, Migration Studies, and the Journal of Refugee Studies*.

**Current research interests**

This Chair will develop comparative perspectives on how mobility and the resulting social, cultural and economic diversity are reshaping the politics of rapidly transforming communities. Through examinations starting in South Africa and extending across Africa and elsewhere, it will identify and explain emerging forms of political subjectivity, political authority, and governance regimes in spaces characterised by continued mobility. In its initial phase the concentration will be on the continent's emerging urban estuaries: gateway zones characterised by transience, translocalism and social heterogeneity. As sites often loosely structured by state policy or dominant cultural norms, these estuaries are giving rise to novel modes of political community, institutional configurations, and practical ethics.

**Relevance of research**

As migration changes the nature of African communities and their position within a globalised world, this Chair will further Africa-based research that speaks to policy challenges while informing global academic discourse. It promises to generate new insights into the changing nature of African society while questioning what heightening diversity, mobility and fluidity means for the nature of community, political authority, and urban development. The implications of this work will be far-reaching, speaking directly to concerns of social cohesion, urban planning, and public participation.
Professor C Landsberg

Research Chair: African Diplomacy and Foreign Policy
Primary discipline: Social Sciences
Level of Chair: Tier 1
Institution: University of Johannesburg
Chair commencement date: January 2013
Website/blog: Chrislandsberg.com

Biosketch
Professor Landsberg is a Senior Associate in the School of Leadership at the University of Johannesburg (UJ). He is a former Chair of Politics at UJ. He was previously Director of the Centre for Policy Studies (CPS), and a former co-founder and co-director of the Centre for Africa’s International Relations (CAIR) at Wits. Professor Landsberg holds BA and BA Hons degrees (UJ); MA (Rhodes); and MPhil and D Phil degrees (Oxford). He was a Hamburg Fellow at Stanford University.

Current research interests
Professor Landsberg specialises in South African Foreign Policy and Africa’s diplomacy and international relations, with specific reference to the continent’s inter-state evolving system, and its relations with external powers and global institutions. He pursues a four-pronged approach to continental affairs: the continent’s evolving Development, Governance, Peace and Security, and Co-operation architectures. He has published widely on these topics, and is currently researching his tenth book.

Relevance of research
Notwithstanding the fact that issues of African renewal and Pan-Africanism are high on the agenda, challenges pertinent to these phenomena enjoy scant attention among scholars and researchers. The SARChI Chair: African Diplomacy seeks to make a modest contribution, both by the quality and accessibility of its work, and by engaging continental institutions and government actors. The Chair engages students, academics and scholars alike, as well as decision-makers, to ensure its work has relevance and impact. It believes in the “Mode-20” genre of research as it is committed to closing the gap between theory and practice.
**Professor CJ Macleod**

**Research Chair:** Critical Studies in Sexualities and Reproduction: Human Social Dynamics  
**Primary discipline:** Social Sciences  
**Level of Chair:** Tier 2  
**Institution:** Rhodes University  
**Chair commencement date:** 2014  
**Website/blog:** [www.ru.ac.za/criticalstudies/about/](http://www.ru.ac.za/criticalstudies/about/)

**Biosketch**
Professor Macleod is a Professor of Psychology at Rhodes University and editor-in-chief of the international, award-winning journal, *Feminism & Psychology*. She has written extensively in national and international journals on pregnancy, teenage pregnancy, abortion, sexuality, sex education, feminist psychology and post-colonialism. She is author of the book *Adolescence, pregnancy and abortion: constructing a threat of degeneration* (published by Routledge), which was awarded the Distinguished Publication Award by the American Association for Women in Psychology (2012) as well as the Rhodes University Vice-Chancellor’s book award (2012). She is author of the Department of Health (2010) document, *Strategy framework. Sexual and reproductive health amongst adolescents: comprehensive preventive and promotion strategies*. She was a member of the panel of experts for the World Health Organisation’s Geneva meeting on Adolescent pregnancy within the context of the Making Pregnancy Safer programme. She is a member of the Executive Committee of the International Society of Critical Health Psychology and of the Academy of Science of South Africa. She is on the editorial board of *Gender & Society*. She received Vice-Chancellor awards for her research from the Universities of Zululand and Fort Hare, and research funding from the Johan Jacobs Foundation, the NRF, SANPAD, and the Mellon Foundation.

**Current research interests**
- Discourses concerning sexualities (such as sexual orientation, ‘adolescent’ sexuality) and reproduction/pregnancy deployed in public and private spaces.
- The governmental technologies of representation and intervention that achieve or undermine particular gendering, racialising and class-based effects, and lead to the continuation/discontinuation of sexual and reproductive health inequities.
- How particular discourses regarding sexualities and reproduction are perpetuated or resisted in the everyday lives of men, women and their families.
- The interstice between carers (health service providers and teachers) and the recipients of sexual and reproductive health or education services and how these interactions promote or hinder sexual and reproductive health/citizenship.

**Relevance of research**
Despite the introduction of enabling legislation, and the implementation of a range of interventions, South Africa is faced with multiple challenges surrounding sexuality and reproduction. These include: sexual coercion and violence; transactional sex; HIV infection; rape; hate crimes against sexual minorities; unwanted pregnancies; and a high maternal mortality rate. Barriers to sexual and reproductive health include structural factors and a range of social dynamics. These challenges and barriers are simultaneously rooted in, and serve to perpetuate, a range of social inequities centred on race, class, ability, sexual orientation, age and gender. The goal of the Research Chair is to crucially assess the social and human dynamics underpinning our slow progress towards full sexual and reproductive citizenship for all.
Professor GA Minkley

**Research Chair**: Social Change  
**Primary discipline**: Social Sciences  
**Level of Chair**: Tier 1  
**Institution**: University of Fort Hare  
**Chair commencement date**: September 2009

**Biosketch**
Professor Minkley completed a PhD at the University of Cape Town. He worked in the Department of History at the University of the Western Cape until 2003, and following that at the University of Fort Hare as a Senior Researcher and a Professor of History. Until 2009 he was the Director of Post Graduate Studies at the Govan Mbeki Research and Development Centre at the University of Fort Hare. His extensive publication record includes four books (including in print), three edited journal collections, as well as more than 30 articles.

**Current research interests**
His research interests are in South African History and the Dynamics of Social Change, Public and Visual History, Public Memory and Public Space. In relation to the research areas of Social Change this entails attempting to explore the ways that “the social” itself no longer conjures a common set of assumptions about society, culture, representation, or the methods by which we write and produce history. Rather it is a category and construct that needs to be explored, engaged and researched. This project seeks to engage these categories and constructs of the Social and Social Change, drawing on innovative archives and methodologies of the performative around people’s everyday lives and constitutions of community, and trace and explore its multiple and often contradictory and ambiguous meanings and trajectories in the Eastern Cape, South Africa, and more widely.  

The primary focus of the research is concerned with processes of subject formation, with subjectivities and with the subjection of agency and thus on the understanding and analysis of changing social (and power) relations at the local level, the way these relationships are constituted and transformed and how this affects individual and collective forms of identification, recognition and association.

These concerns are located within a number of inter-related projects and themes, entail close collaborative work with local and international partners and include focus areas on “Social Acts” on “Seeing the Sound of Social Change”, on “Rethinking the Rural”, on the “Politics of the Humanities and Social Change”, on “Developing the Common, Community and Engagement” and on “Love and Revolution”.

**Relevance of research**
This research is directly related to concerns with social change in the pre- and post-1994 period and has relevance not only to concerns with understanding local and global transitions in social life related to those of knowledge economies, but also to significant changes and new ways of being in the world. As such, the relevance of the project relates to exploring new ways in which both the impersonal processes that construct the subject and the shared experiences of subjects in constituting and re-assembling the social world are re-examined and pasts and presents re-articulated and re-assembled.
**Professor W Olivier**

- **Research Chair:** Mathematics Education
- **Primary discipline:** Social Sciences
- **Institution:** Nelson Mandela Metropolitan University
- **Chair commencement date:** 1 January 2010
- **Website:** mbeki-maths-dev.nmmu.ac.za/Home geopolgebra-nmmu.co.za

**Biosketch**

Professor Olivier studied at the University of Port Elizabeth (now called Nelson Mandela Metropolitan University) and completed his PhD studies in 1991. He became a full Professor in 2003 and headed the Mathematics and Applied Mathematics department at this institution (2002-2010). Professor Olivier was a C-rated researcher from 1992-2002 and also an active member of a national Algebra research team that was funded by the NRF during this period. Apart from his interest in Algebra research, Professor Olivier always had a keen interest in the teaching and learning of Mathematics.

He founded the Govan Mbeki Mathematics Development Programme in 2002 and, since 2006, has led the research into and development of innovative technology-based teaching and learning resource materials for Further Education and Training (FET) educators and learners. In 2008 the Govan Mbeki Mathematics Development Unit was formally constituted as an engagement entity of the NMMU with Professor Olivier as the Head. Since 2009, structured curriculum-aligned Mathematics skills development programmes for in-service educators and school learners have been developed and implemented with success in various districts of the Eastern Cape Province.

**Current research interests**

Current research interests are linked to the use of modern technologies in the teaching and learning of Mathematics at the FET level. The research thrusts within this framework include:

- Innovative design and integrated use of modern video technologies to create rich techno-blended teaching and learning environments;
- The role that modern Tablet PC technology could play as an instructional device to enhance the learning experience(s) of Mathematics students;
- The use of rich techno-blended teaching and learning models to deliver structured Mathematics skills development programmes for educators and learners;
- The use of dynamic geometry (DG) and computer algebra systems (CAS) to create multiple representation platforms for teaching problem-solving in Mathematics classrooms;
- The potential benefits of utilising GeoGebra software and Maths applets as complementary resources to enhance the quality of the teaching and learning of Mathematics; and
- The use of cellphones and mobile learning systems to deliver effective support for the teaching and learning of Mathematics at secondary schools.

**Relevance of research**

The research thrusts mentioned above are all linked to the development, implementation and refinement of innovative and modern techno-blended teaching and learning models that aim to address the Mathematics crisis in secondary schools. Projects linked to Chair Research Programme are implemented in previously disadvantaged secondary schools and focus on:

- Mathematical skills development of in-service FET Mathematics teachers;
- Incubation of Mathematics learners with potential for smooth access to SET-related study programme at HE institutions; and
- Technology-assisted Mathematics learner and peer support.
Biosketch

Professor Pieterse completed a PhD at the London School of Economics, an MA in Development Studies at the Institute of Social Studies, The Netherlands, and a BA Hons from the University of the Western Cape. He directs the African Centre for Cities at the University of Cape Town. His research is wide-ranging, covering themes such as African urbanism, cultural planning, regional development, governance and macro development issues. He is a founder member of Isandla Institute, which serves on the Boards of Magnet Theatre, the Sustainability Institute and the Cape Town Partnership. He regularly provides advisory services to international development agencies, such as UN-Habitat, African Development Bank, DBSA, OECD territorial division, UNEP. He was asked to serve on an international Advisory Committee for Cooper-Hewitt, National Design Museum, curating an international exhibition, Critical Mass: Design and Urbanisation. He has published many books over the years.

Current research interests

- Theorisations of African urbanism based on engagement between urbanists and artists interested in the phenomenology of African cities.
- Implications of the sustainable cities literature in the context of Cape Town metropolitan region and urban regulatory issues.
- Governance, planning and institutional theory in relation to African municipalities in a context of intensifying urbanisation.
- Urban inclusion theory and policy with reference to the global south.
- Intersections between culture and planning, with particular reference to Cape Town and Johannesburg.
- Visual representations of African urban conditions in the documentary format.

Relevance of research

This research is helping raise awareness among South African and African policy decision-makers about the importance of urbanisation processes and offering concrete policy alternatives for both understanding trends and responding to them. It is generating a series of high-level theoretical and conceptual frameworks that can be used in diverse urban disciplines (such as Sociology, Human Geography, Planning, Architecture, Anthropology, Law) to think about the systemic dimensions of urban development and potential responses. His research together with the African Centre for Cities, is providing a platform for scholars, students, policy practitioners from government and civil society to come together to create new applied knowledge about how to address concrete urban development challenges. This has direct policy relevance but is also informing new ideas about the methodological dimensions of quality urban research.
Professor J Pillay

**Research Chair:** Education and Care in Childhood  
**Primary discipline:** Social Sciences  
**Level of Chair:** Tier 2  
**Institution:** University of Johannesburg  
**Chair commencement date:** April 2013  
**Website:** www.uj.ac.za

Biosketch
Professor Pillay completed a DEd (Educational Psychology) at Rand Afrikaans University and is currently a Professor at the University of Johannesburg in the Department of Educational Psychology. He is registered with the Health Professional Council of South Africa (HPCSA) as an educational and counselling psychologist. He has published 24 articles, four conference proceedings, four chapters in books and co-edited the book *Community Psychology: Analysis, Context and Action*. He has supervised more than 20 Master’s and 11 Doctoral students. He chaired two major funded research projects focusing on the psycho-educational experiences of learners from child-headed households (SANPAD funded) and the ecology of practice of school counsellors and Life Orientation teachers (NRF funded). He is the guest editor of special theme issues of two ISI Journals: *School Psychology International* and *Education as Change*. Recently he was appointed Associate Editor of *School Psychology International*. Professor Pillay has presented numerous papers at national and international conferences and co-chaired the Educational Psychology Division of the International Congress of Psychology 2012.

Current research interests
Professor Pillay’s current research is to assess factors of vulnerability (risks, pathology) and factors of protection (resiliency, assets, strengths) that are prevalent in the education and care of orphans and vulnerable children (OVC) as embedded in their families/caregivers, schools and communities. The ultimate goal is to utilise the findings of the targeted assessments to design focused interventions that can be implemented to reduce the factors of vulnerability and enhance protective factors in OVC through culturally appropriate, evidence-based, authentic interventions with their families/caregivers, schools and communities. To this end, the research has the following objectives:

- Investigate the effects of paternal, maternal and double parental absence on children in their early years of education and care, and to explore how such absence contributes to children’s levels of vulnerability;
- Measure trauma, grief, depression, stress, anxiety and levels of vulnerability in OVC;
- Understand the role that schools and stakeholders play in contributing to the vulnerabilities of OVC as well as the support that they can provide;
- Determine the role that communities play in contributing to the vulnerabilities of OVC, as well as the support they can provide; and
- Investigate protective (resilience/strengths/assets) factors within OVC.

Relevance of research
Research on support interventions from an early age can result in policy briefs that could lead to the holistic development of OVC that would inevitably be an asset to the South African society. The young are the future leaders and academics in society so an investment in their education and care in childhood is an investment in the future economic, political and social stability of our country.
Professor DR Posel

Research Chair: Economic Development
Primary discipline: Social Sciences
Level of Chair: Tier 1
Institution: University of KwaZulu-Natal
Chair commencement date: January 2008
Website: sds.ukzn.ac.za

Biosketch
Professor Posel completed a PhD in Economics at the University of Massachusetts, USA, in 1999. She is recognised as one of the key economic analysts of household survey data in South Africa. She was integrally involved in the National Income Dynamics Study (NIDS), and is currently a steering committee member of the national research project on Employment, Income Distribution and Inclusive Growth. Her work is recognised both nationally and internationally and she has published widely. She has received numerous awards for her research and regularly reviews papers and proposals for national and international journals and institutions.

Current research interests
Her research focuses on the following five areas:

- The economics of marriage: This research explores marriage markets in South Africa, and considers how the nature of contemporary bride wealth practices may affect marriage outcomes.
- Changes in household composition and economic well-being: This research investigates how households have changed in post-apartheid South Africa and it explores the relationship between household composition and economic well-being.
- Households and migration: This research project investigates changes in migration patterns in the post-apartheid period, looking particularly at changes in remittance transfers and at the nature of “temporary” labour migration.
- Households and the labour market: This project explores the nature of, and the returns to, labour force participation in South Africa. Specific focus areas include the measurement of unemployment and the returns to language capital among the employed.
- The economics of child-care and the labour market: This project investigates how women’s responsibility for childcare influences the nature of their labour market engagement.

Relevance of research
These research projects on the economics of marriage, migration, households and the labour market form an integral part of evaluating the experiences of economic development among individual South Africans; and of explaining gender, race and inter-generational differences in access to resources. This in turn informs the formulation and assessment of economic and social policy that seeks to reduce poverty and increase economic well-being in the country.
Professor M Schäfer

Research Chair: Mathematics Education
Primary discipline: Social Sciences
Institution: Rhodes University
Chair commencement date: January 2010
Website: www.ru.ac.za/mathsedchair/

Biosketch
Professor Schäfer completed a PhD at Curtin University, Australia, in 2003. He is a full Professor and a former Head of the Department of Education at Rhodes University, and is a very successful supervisor of postgraduate and postdoctoral students. He was the President of the Southern African Association for Research in Mathematics, Science and Technology Education. He regularly presents keynote addresses at a variety of national and international forums and conferences and is actively involved in growing research activities in Mathematics Education in the SADC region, notably in Namibia and Malawi. He currently holds the FRF Mathematics Education Chair at Rhodes University.

He has authored and co-authored in excess of 50 peer-reviewed articles and conference papers both nationally and internationally, published work in books and presented at numerous national and international forums. He was formerly the editor of Pythagoras and has served as a reviewer for various journals such as The African Journal of Research in Mathematics, Science and Technology Education, African Education Review, and The South African Journal of Education.

Current research interests
His research interests are in Teacher Development and Practice, Teacher Identity, Language in Concept Literacy in Mathematics and Science, Cognition in Mathematics Education, Spatial Conceptualisation and Visual Technology in Mathematics Education.

The main focus of his research is coordinating a novel research agenda that is characterised by an intertwined process of research and Mathematics Education development in the Grahamstown education district. His other research focus is in how to harness opportunities in mobile technology for the learning and teaching of Mathematics. He is also compiling a directory of all published research in Mathematics Education in South Africa and has also initiated a research group that is looking at how enactivism can contribute to enhance a better understanding of mathematical cognition and teacher development in South Africa.

Relevance of research
This Chair in Mathematics Education is framed by a generative research agenda that is interwoven with a development programme involving 12 secondary schools from previously disadvantaged areas in Grahamstown. There are regular teacher contact sessions at Rhodes, school visits and catch-up sessions for pupils (Grade 10).
Professor ME Steyn

Research Chair: Critical Diversity Studies
Primary discipline: Social Sciences
Level of Chair: Tier 1
Institution: University of the Witwatersrand
Chair commencement date: February 2014
Website/blog: www.wits.ac.za/wicds

Biosketch
Professor Steyn was one of the early theorists in the field of Critical Whiteness Studies. Her book *Whiteness just isn’t what it used to be: White identity in a changing South Africa* (SUNY Press, 2001) won the Outstanding Scholarship award in International and Intercultural Communication from the National Communication Association, USA, in 2002.

Professor Steyn's work on Whiteness progressed into a more comprehensive interest in the symbolic and material value of hegemonic positionalities – such as whiteness, heterosexuality, masculinity, able-bodiedness, middle-classness – how these systems of oppression intersect, interlock, co-construct and constitute each other, and how they are reproduced, resisted and reframed. This is encapsulated in the conceptual framework she developed, Critical Diversity Literacy.


Current research interests
This research programme focuses on the “root causes” of how difference is constructed in different contexts of intersecting, asymmetrical power relations to create unequal life opportunities, and on how these dynamics can be interrupted. This objective will be met through examining:

- How discourses of diversity, transformation and related concepts are shaping organisational spaces and in turn are being shaped within these spaces;
- How individual and group subjectivities are being structured;
- What possibilities for social change are being opened up and which closed down; and
- The broader implications of the social imaginaries influencing transformation in South Africa.

Relevance of research
South Africa carries the burden of historical inequalities and discrimination along lines of “otherness” such as race, class, gender, HIV-AIDS status, sexuality, disability, culture, nationality and ethnic affiliation. Democracy brought about a rights-based dispensation that has enabled many dimensions of diversity to claim recognition within the society and its organisational sites. Yet, the limitations of legislation in creating an inclusive society have also become clear. This research does not focus on legislative compliance and/or demographics but rather seeks an understanding of how the entire social imaginary needs to shift. The programme will:

- Theorise contextually grounded understandings of diversity issues;
- Research how these dynamics are “at work” empirically in specific locations; and
- Develop knowledge and materials that address South African needs.
Professor H Venkatakrishnan

Research Chair: Numeracy Education  
Primary discipline: Primary Mathematics  
Institution: University of the Witwatersrand  
Chair commencement date: January 2011  
Website: tinyurl.com/numeracychair  
       tinyurl.com/WitsPrimaryMaths  
       www.wits.ac.za/staff/hamsa.venkatakrishnan.htm

Biosketch
Professor Venkatakrishnan is a graduate of University College London (BSc Hons Mathematics, 1989), and Kings College London (PGCE, 1990; MA (Distinction) Mathematics Education, 1999; PhD Mathematics Education, 2004). Her doctoral study focused on early secondary level in two schools and was awarded the British Educational Research Association's award in 2005 for most significant doctoral contribution to the field of education in the previous year.

She worked in London comprehensive schools as a high school Mathematics teacher for eight years, before moving into doctoral study and postgraduate Mathematics teacher education at the Institute of Education, London.

In 2005, she moved from London to Johannesburg and began work at Wits in 2006 as a postdoctoral research fellow in the area of Mathematical Literacy. She acted as Head of Division of Mathematics Education between 2009-10, and Chair of the Education Research Committee between 2010-12.

She was awarded the SA Numeracy Chair in 2010, with a five-year remit (2011-15) to investigate sustainable models to improve primary Mathematics teaching and learning in 10 partner primary schools.

Professor Venkatakrishnan has served on several national research and research capacity building bodies. She continues to serve as an International Editorial Board member for the Research in Mathematics Education journal, and contributes to international task teams focused on primary Mathematics.

Current research interests
Professor Venkatakrishnan’s current research interests are focused on developing, trialling and analysing interventions focused on supporting development in primary Mathematics teaching and learning. Research activity is focused on building models and conceptual frameworks that allow for analysis of these developments – with a particular focus on understanding coherence and connections in primary Mathematics teaching and teachers’ Mathematical Discourse in Instruction (MDI). Specific attention is paid within MDI to teachers’ tasks and examples, explanations and representations.

Research work focused on describing learning gains, teacher development, and assessment issues related to primary Mathematics is also under way.

Relevance of research
Work within the Chair project is focused on improving the teaching and learning of numbers in connected and progressive ways. Research findings are feeding into teacher development models and content. Feedback from the 2011 cohort of teachers who went through a pilot in-service primary Mathematics content knowledge for teaching course is positive, with gains seen at the level of knowledge, with follow-up focus on classroom practices under way. Investigation into the possibilities for participants taking up primary Mathematics leadership roles is being explored.

Broader advocacy work for primary Mathematics teaching is also building communities and networks of primary Mathematics teachers, with writing in professional and public access print media reaching large numbers of teachers and schools.
**Professor MJ Walker**

**Research Chair:** Higher Education and Human Development  
**Primary discipline:** Social Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of the Free State  
**Chair commencement date:** July 2013  
**Website/blog:** checar.ufs.ac.za

**Biosketch**

Professor Walker is a graduate of the Universities of KwaZulu-Natal and Cape Town. She joined the University of the Free State (UFS) in 2012 as Senior Research Professor. She is also Director of Research Training and senior researcher in the EU-funded Marie Curie *EDUWEL* project (2010-2014). Before joining the UFS, she was Professor of Higher Education at the University of Nottingham (UK) where she was Director of Postgraduate Students and a Director of Research in the Faculty of Social Sciences. She retains her link to Nottingham as an Honorary Professor. Professor Walker is a fellow of the Human Development and Capability Association and a fellow of ASSAf.

She has delivered numerous international keynotes and seminars, written more than 100 book chapters and refereed journal articles, and authored or edited 11 books, including two highly regarded volumes on doctoral education. In 2013 she published two books on higher education with Routledge. She currently holds editorial board memberships on the *Journal of Human Development and Capabilities*, *Journal of Professional Development*, *Power and Education*, and CRISTAL, and referees for international journals and book publishers. She supervises nine PhD students and four Master’s students and mentors a number of postdoctoral fellows. In 2013, she established the Centre for Higher Education and Capabilities Research (CHEcaR).

**Current research interests**

Professor Walker’s research interests focus on how universities can contribute to the making of the post-2015 world, and how universities can advance inclusive and human development at the macro, meso and micro levels in higher education settings. More specifically, she researches the formation of human capabilities in relation to student opportunities, achievements and post-university lives and careers, especially in relation to gender, race and social class. She also focuses on public-good professional education, and on curriculum and pedagogy as a space for equality in capabilities. Finally, she is exploring human development university indicators in research, teaching and community engagement.

**Relevance of research**

This research is relevant to global debates about universities and development. At both a theoretical and empirical level it contributes innovatively to our understanding of what would be needed to transform universities to advance human capabilities and interrupt inequalities. The research therefore interrogates the role of higher education in order to advance human development and justice in education and society, especially in relation to severe inequalities and poverty. Significantly, it asks what kind of societies we want, what is important in a democratic society, and thus, what kind of higher education is valuable, relevant and desirable. The research focus proposes that questions and strategies of economic growth and human capital cannot be sustainably addressed in the absence of these questions.
Professor H Bhorat

- **Research Chair:** Econometric Modelling
- **Primary discipline:** Economic Sciences
- **Level of Chair:** Tier 1
- **Institution:** University of Cape Town
- **Chair commencement date:** January 2010

**Biosketch**

Professor Bhorat is professor of Economics, University of Cape Town, South Africa. He is also the Director of the Development Policy Research Unit (DPRU). He has his PhD in Economics through Stellenbosch University. His research interests cover the areas of labour economics, poverty and income distribution. He is the current recipient of a highly prestigious national Research Chair under the theme of Economic Growth, Poverty and Inequality: Exploring the Interactions for South Africa. He has co-authored two books on labour market and poverty issues in South Africa, and has published over 150 academic journal articles, chapters in books and working papers. He has undertaken extensive work for numerous South African government departments, most notably the Department of Labour, the Presidency and the National Treasury. He has served on a number of government research advisory panels and consults regularly with international organisations such as the ILO, World Bank and the UNDP. Professor Bhorat was the Minister of Labour’s appointee on the Employment Conditions Commission (ECC) – the country’s minimum wage-setting body. He is currently a member of the Statistics Council of South Africa. Professor Bhorat served as an economic advisor to Thabo Mbeki and Kgalema Motlanthe, formally serving on the Presidential Economic Advisory Panel. He is currently an advisor to the Minister of Finance.

**Current research interests**

- Since 1994, has economic growth managed to simultaneously reduce income poverty and inequality across all covariates?
- What are the drivers of this differential impact on poverty relative to income inequality from the growth process?
- Through a standard income source decomposition of the Gini coefficient, across a range of relevant covariates, can we identify what types of income are shaping income inequality and in turn how this has changed over time?
- What is the current and future role of social grants in alleviating or ameliorating the inequality consequences of economic growth?
- Is the pattern of employment growth and its sectoral, as well as skills profile, optimal in terms of maximising the reduction in poverty from economic growth?
- What is the impact of economic policy regulation on employment, economic growth and poverty reduction?
- Are there experiences from emerging market (and low-income countries) growth experiences, which offer common growth policy lessons?

**Relevance of research**

It is evident in almost all domestic economic policy discussions that government is grappling with the issue of both the level and nature of economic growth. There is a high level of awareness around the notion that economic growth is necessary, but insufficient conditions for reductions in household poverty and inequality. In the aftermath of a global recession, and with the economy having shed close to 900 000 jobs, we do need innovative and fresh policy interventions. The kind of evidence brought to bear in the above research programme looking at the relevance of diverse issues such as schooling, crime, social grants, minimum wages on growth, poverty and inequality – alludes to the programme’s relevance to policymakers.
**Professor M Leibbrandt**

**Research Chair:** Poverty and Inequality Research  
**Primary discipline:** Economic Sciences  
**Level of Chair:** Tier 1  
**Institution:** University of Cape Town  
**Chair commencement date:** January 2008

**Biosketch**

Professor Leibbrandt completed a PhD at the University of Notre Dame in 1993. He serves in leadership roles in a number of research projects in South Africa and Africa. He is the principal investigator on the National Income Dynamics Study funded by the Office of the President and is the Director of the Southern African Labour and Development Research Unit (SALDRU). SALDRU has for the last 30 years been conducting large social surveys to generate the data needed to inform such analysis of poverty and inequality. An ambitious programme of new data gathering, with a particular emphasis on longitudinal data, underpins the work of Professor Leibbrandt and his team. For a three-year period within the first five years of this Chair, Professor Leibbrandt served as the President of the Economics Society of Southern Africa. Currently he is the project director of a national research project funded by the Treasury to fill in crucial research gaps in our understanding of employment, income distribution and inclusive growth.

**Current research interests**

To understand the processes of social mobility within contemporary South Africa with a particular focus on unfolding poverty and inequality dynamics. This includes an investigation of who is escaping from poverty and why? More generally, the focus is on who is getting ahead, who is falling behind and which policies can assist to place individuals and households in positive trajectories.

**Relevance of research**

There is widespread recognition of the importance of ensuring that South Africa's growth processes embrace the poor and those in the bottom half of the income distribution. In addition, South Africa needs a large and vibrant middle class in order to broaden inclusion. This Chair facilitates a sustained programme of research to measure and analyse South Africa's unfolding poverty and inequality dynamics.
Biosketch
Professor Muchie holds a PhD in Science, Technology, and Innovation for Development (STI4D) from the University of Sussex. He is currently a DST/NRF Research Professor of Innovation Studies at the Institute of Economics Research on Innovation (IERI) at Tshwane University of Technology. He is also a NRF-rated Research Professor. He is concurrently the Professor at Development and International Relations (DIR) at Aalborg University. He is also senior Research Associate at the SLPTMD Programme at Oxford University. He is non-executive Director of the Real African Publishing House responsible for The Research on African Technology, Science and Innovation. He has held various positions, among which include the Director of the Research Programme on Civil Society and African Integration at the then University of KwaZulu-Natal; Honorary Professor at Jiaxing University in China; Assistant Professor in Amsterdam University; Visiting Professor in Carlton College, USA; Principal Lecturer at Middlesex University; Professor at Aalborg University and Lecturer at Cambridge University. He is also a fellow of ASSAF, The South African Science Academy.

Professor Muchie has widely published in the areas of:
- International political economy and the emergence of new world orders;
- Broad based development studies;
- The foundation of an African system of technological innovation; and
- Comparative regional research on Technology and Development. Since 1985, he has produced over 200 publications, including books, chapters in books, and articles in internationally accredited journals and entries in institutional publications.

Current research interests
His research interests include:
- Development economics of innovation;
- Innovation systems and African structural transformation and development;
- Research, knowledge and higher education; and
- Innovation systems and African integration.

Relevance of research
African economies need to learn to employ Science, Technology and Innovation to promote African development. The research by the Chair and a team of doctoral and postdoctoral researchers will create both basic and applied knowledge for policy learning, high-quality training and intellectual independence. The group started the African Journal of Science, Technology, Innovation and Development to create an outlet for emergent researchers to publish in Africa. It created an African GLOBELICS doctoral academy to create high-quality trained personnel to feed into higher education to transform, for example, the South African university system. The integration research is relevant to find novel ways of linking the African economies, knowledge, and higher education. The Chair, together with the combined research work of post-docs, hopes to create a strong South African research, knowledge and higher education area. It also hopes to link South Africa’s relatively strong research area with the greater African research area.
Professor S van der Berg

**Research Chair:** Economics of Social Policy  
**Primary discipline:** Economic Sciences  
**Level of Chair:** Tier 1  
**Institution:** Stellenbosch University  
**Chair commencement date:** January 2008

**Biosketch**
Professor Van der Berg is Professor of Economics at Stellenbosch University. He joined this department in 1981 after a brief period in journalism and then in economic research in the public sector. As the Research Chair in the Economics of Social Policy, he works with a team of young researchers making their way into research on Economics and Social Policy issues, particularly issues of poverty and inequality, and the Economics of Education. This research programme within the Department of Economics has become known as ReSEP (Research on Socio-Economic Policy).

**Current research interests**
Professor Van der Berg’s research interests have always been in issues of poverty, inequality and social mobility and how these are influenced by policy. His research therefore covers poverty, inequality and the labour market, as well as the Economics of Social Policy (including Education, Health and Welfare). Within the broader research focus on Social Policy and its interaction with poverty, inequality and development, his research emphasis has shifted from social spending and its targeting towards specific social policy issues and social delivery. This especially applies to quantitative applications in education. His research and that of his group includes the use of education production functions to identify the factors influencing such output, once the effect of socio-economic status and home background has been considered. Another area of research is the effect of education quality in the labour market. Conventional earnings functions simply investigate the impact of the quantity of education, but differences in educational quality are crucial for understanding what drives labour market outcomes in South Africa.

**Relevance of research**
Professor van der Berg interacts a lot with policymakers and has had a significant impact on policy. For example, his research on social security culminated in the appointment of the Lund committee and the subsequent introduction of Child Support Grants. His research on poverty trends was quoted in the State of the Nation Address, while his diagnosis of problems in school education featured prominently in the recent Roadmap for Education and its policy plan. The chapter in the National Development Plan on education draws largely on the ReSEP research. He consults for National Treasury, national and provincial departments, Umalusi (the education certification body), the World Bank, UNICEF and UNDP.
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Knowledge on its own draws the mind into a circle of exploration.

It is when knowledge is shared and utilised that it becomes a journey of discovery.

This booklet maps out the research profiles of Chairholders in the South African Research Chairs Initiative.
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