RESEARCH REPORT

2016/2017

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA

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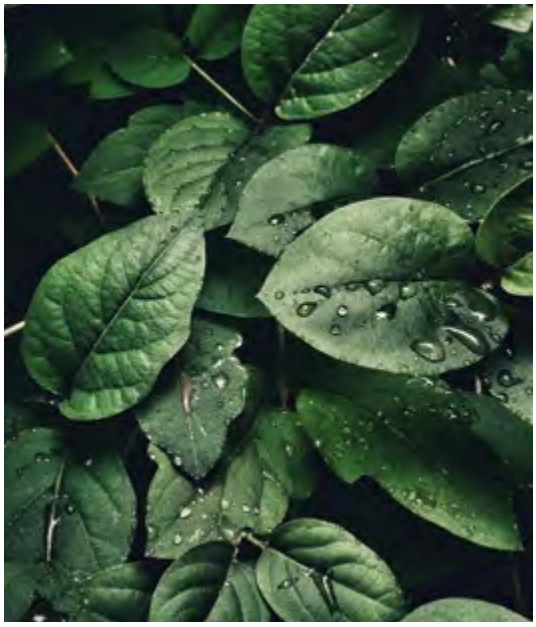

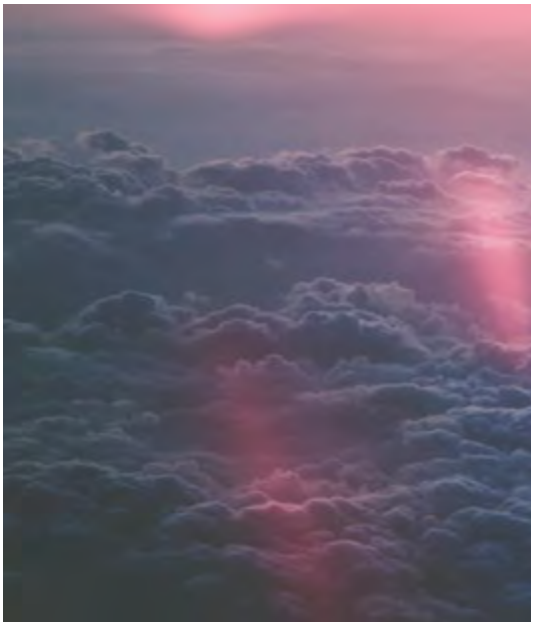

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Please visit www.ufs.ac.za/ufsresearch for publication data and an online version of the Report.

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RESEARCH REPORT 2016/2017

ENGAGEMENT INVESTMENT IMPACT

RESEARCH REPORT 2016/2017

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FOREWORD

RESEARCH LED AND REGIONALLY ENGAGED

Professor Francis Petersen became Vice-Chancellor of the University of the Free State in April 2017. During a candid interview he outlined his vision for research and how the University can make its mark. One comes away from such an interview with an impression of a person with an energy and a passion for research, who is ready to take on the challenge.

Your first year as the new Rector and Vice-Chancellor is almost over. What are your early impressions of research at the UFS?

There are distinct pockets of excellence and there is clearly a potential to expand; but the University is operating below its potential, mainly because everyone who should be, is not actively engaged in research. The challenge is for everyone at the University to see research as a critical core business, and to bring more academics on board. A first step will have to be to raise the number of staff with a PhD to well over fifty percent, so that we can work towards our vision of being a research led university.

The drivers of research are all present and the intentions are good, but they are not fully integrated to support the research vision of the University and to ensure sustainable capacity. We need to reflect on what we do, how we do it, and build on our successes.

What is your vision for research at the UFS?

The expressed aim is to be a research led university. This means that the way in which we approach our academic enterprise should be informed by research. For this we need to have a culture of research engagement – in all we do and at all levels, from undergraduate to postgraduate level and beyond.

Being research led also means taking stock of our context. We should be regionally relevant, focusing on the needs and strengths of our region and those things where we have a competitive advantage. So, for me, the overarching vision

is to be a research led, regionally engaged university that produces scholars and research outputs that are globally competitive. This should be the starting point of everything we do.

How do you enable such a vision?

In order to become a research led, regionally engaged, globally competitive institution, we have to keep growing the culture of research and ensure we have the right structures to support our researchers. I believe that the drivers are two-fold. Firstly, our appointments, promotion and performance management processes must be geared to expecting all academic staff to be involved in research. Secondly, we will implement a differentiated research strategy, based on a clustering approach to develop identified areas in which we can become world class, globally competitive and create a momentum where our research output can move much faster and raise our visibility.

To enable such a vision, we have to ensure that our research support is fully optimised and fully integrated, so that there is seamless support for the research endeavour.

We must support our researchers in terms of funding, and equip them with the right skills to source funding. We have to make seed funding available, and connect individuals to potential research funding. Our strategy for research funding, which includes research infrastructure, should not only be for the clusters but also for individuals to attain their research goals. We need to work with industry partners and donors and we must build North-South and South-South partnerships to access funding.

How should the UFS respond to the challenge posed by declining government funding for research?

The pressure on the fiscus in terms of subsidised free education will inevitably impact on other departmental expenditure, including the proposed increase in spend on research and development. Any future model will have to involve a partnership between government, universities, donors, industry and science councils. We need an ecosystem where these groups work cohesively together to address needs for economic growth; that is, human capital with high level skills, uptake of technology by industry, pushing new boundaries of new technologies, and ways of working. We need crucial discussions at high levels on research funding. We cannot continue to look to government for more funding. We will have to craft donor funding in such a way that it also speaks to our research needs.

When your Vice-Chancellorship is reviewed in five years' time, what, for you, would success look like?

There are the obvious quantitative measures, such as an increase in the percentage of staff with doctoral qualifications, an increase in postgraduate and postdoctoral numbers, more partnerships making an impact, particularly in terms of actual value of industry and donor funding to research, increased quantity and quality of publication output, and increased allocation of funding for infrastructure.

Attaining these should impact on the national ranking of the University; so I would hope to have seen a substantive movement upward in terms of where the UFS is compared to the top five South African universities. I would also like to have seen a positive improvement in the perception of people in terms of research, where they embrace it as a vital part of the University's business.

To achieve this there are challenges, but we have a foundation on which to build, and we can achieve it.

INTRODUCTION

As I reflect on the past two years of the scope of this research report (and even the past five years), one of the highlights has been the change in the academic discourse on all three campuses. Academic success is now understood to imply excellence in teaching and especially in research, with the expectations of sustained and outstanding quality research outputs, as well as scientific and scholarly engagement at an international level. In our focus on research and research outputs as a way of building the national and international reputation of the University, we were able to increase the research output units of the UFS over the past five years by 54%. Not only has the number of publication outputs increased, but UFS researchers are now also publishing 75% of their research in international journals. The permanent academic staff at the UFS are significantly more research productive as we have increased the number of research output units per academic staff member from 1.27 five years ago to 1.83 in 2016.

Much of our effort during the past two years was focused on building the research reputation of the University and its academic staff. We placed the emphasis on NRF ratings as a measure of the quality, impact and sustained research outputs of individuals through a peer-review process. These interventions have had a significant impact on the number of rated researchers, as well as the categories of ratings. NRF ratings increased by 40% over the past five years, and for the first time in more than 20 years, the UFS has A-rated scientists and scholars (three in total) among its staff complement. Only four years ago the UFS had no P-rated researchers (outstanding researchers under the age of 35 who may

become A-rated in the future) and very few Y-rated researchers (young academics under the age of 40 with the potential of becoming established researchers), and we now proudly employ one P-rated researcher and 31 Y-rated scientists and scholars. The increase in the number of rated young staff members attests to the impact of our investment in the research career development of these academics, through initiatives such as the Prestige Scholars' Programme (PSP), the Researcher Development Programme, the Mid-career Programme and the Mentorship Programme.

During recent years we also focused our efforts on increasing the number of post-doctoral fellows and postgraduate students. The strategy to improve the number of post-doctoral fellows was developed to increase innovative research ideas, research capacity and supervision capacity, and to build a pipeline of possible academic employees. The number of postdoctoral fellows has doubled to the current 163 fellows. In order to increase the number of postgraduate students enrolled at the UFS, we developed a Council-approved strategy to provide tuition bursaries for all master's and doctoral students. This strategy has proven to be highly successful as the number of postgraduate students has been steadily increasing. We have also implemented a strategy to provide bursaries to Honours students. This is a one-year investment in students who represent a pipeline into master's and doctoral studies, and the degree has the highest throughput rate of all degrees offered at the University.

The UFS is currently ranked ninth among the South African universities, but has the potential to leap into the top six universities in the country. If we can maintain the momentum we have built over the past five years, we will improve the national ranking of the UFS based on its research outputs. In order to achieve this, we have to develop the qualifications and research skills of our current academic staff, but also wisely appoint new academics. In conjunction with this, we have to address the current demographics of our researchers. Specifically, we hope to address the low representation of black academics and women among our cohort of associate professors and professors, as well as our rated researchers. Furthermore, we must focus our attention on building excellent academic departments. In the coming years we will implement a strategy for differentiated support of research. We have already established research focus areas at the UFS that need to be further developed into centres of excellence. Lastly, we must develop strategies to obtain international funding, in addition to developing the human capacity in this research support area.

I want to thank every academic staff member, as well as every support staff member who made a contribution to the increase in our research outputs, stature and reputation. I congratulate every NRF rated researcher for their hard work and commitment. I am looking forward to seeing what the UFS researchers on all three campuses will achieve during the coming two-year period.

Professor Corli Witthuhn
VICE-RECTOR: RESEARCH

RESEARCH REPORT 2016/2017

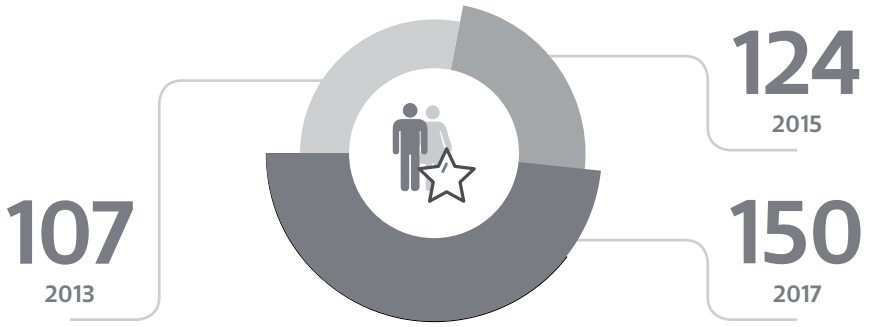
OVERVIEW
OF UFS RESEARCH

The period 2016/2017 was a successful one for the UFS research community. The staff and students of the University have responded with enthusiasm and commitment to the challenges and opportunities presented to them. There has been a growth in overall funding received, research output, awards and recognition - as testified by the growth in NRF ratings.

This report continues to provide an assessment of the University's performance employing those metrics which are generally recognised as reasonable indicators of research performance. It is important that these should not be read in isolation, but in conjunction with the rest of the report, to gain a fuller picture of the breadth, scope and impact of UFS research, bearing in mind that a report such as this can only provide a limited snapshot of the broad range of research being undertaken by our researchers.

RESEARCH STAFF

INCREASE IN NRF RATED RESEARCHERS



INCREASE IN Y-RATED RESEARCHERS

NEXT GENERATION RESEARCHERS

100% RESEARCH MASTER'S GRADUATES 2017

140

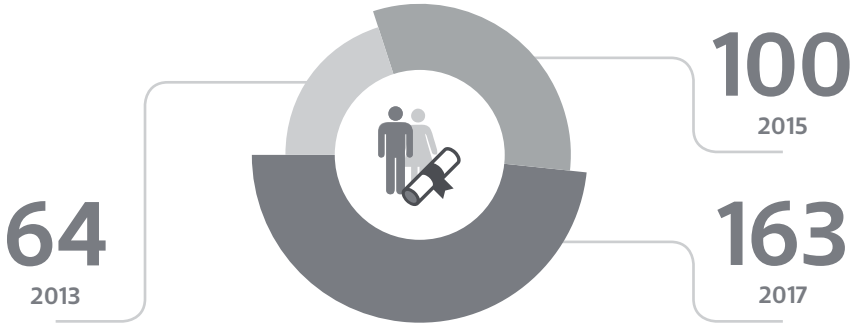
DOCTORAL STUDENTS ENROLLED IN 2017

960

DOCTORAL GRADUATES

DIVERSITY PROFILE – DOCTORAL STUDENTS 2017

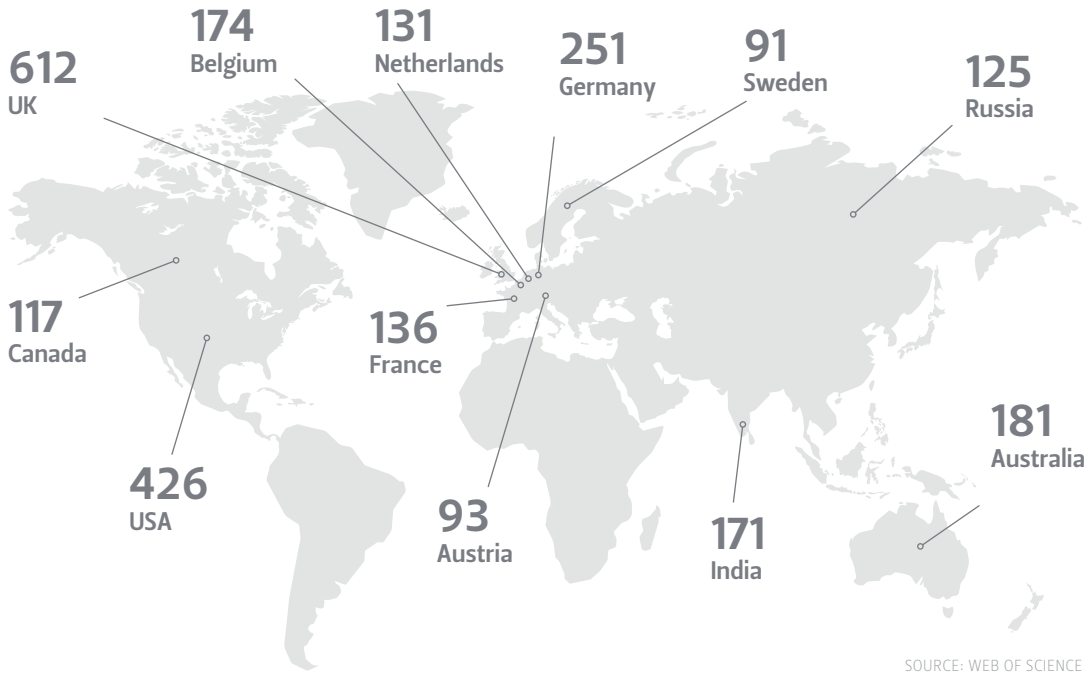
INCREASE IN POSTDOCTORAL FELLOWS



DIVERSITY PROFILE – ORIGIN OF POSTDOCTORAL FELLOWS

REGIONAL AND INTERNATIONAL COLLABORATION

PRIMARY REGIONS OF COLLABORATION (BASED ON CO-AUTHORED PAPERS 2008-2017)



SOURCE: WEB OF SCIENCE

GROWTH IN PAPERS WITH INTERNATIONAL CO-AUTHORS 2013-2017

114%

INNOVATION AND IMPACT

RESEARCH RELATED CONTRACTS

RESEARCH OUTPUT

GROWTH IN DHET ACCREDITED PUBLICATION OUTPUT UNITS 2015-2016

INCREASE IN BOOKS AND CONFERENCE PROCEEDINGS 2015-2017

172%

RESEARCH REPORT 2016/2017

RESEARCH
THAT MATTERS

INTRODUCTION

It is generally accepted that the prominence of research is an intrinsic indicator of the success of a university. Presented in this research report are just some of the research areas and programmes conducted at the University of the Free State. While it is impossible to capture every research project that enriches the research portfolio of the UFS, those that are being presented are testament to the size, complexity and diversity of scholarly activities across the institution.

As we embrace the values of excellence, relevance and innovation in the research we conduct, we aim to break through disciplinary boundaries in order to enhance research discoveries that will improve the quality of people's lives in the Free State, the country, and even globally. These goals are not achievable if the University operates in isolation. We have to engage with all stakeholders, and increase our research footprint by collaborating and engaging with both industry and other leading research institutions nationally and internationally.

The level of engaged scholarship is still growing and the University acknowledges that as the custodian of developing the next generation of scholars and being a significant player in the role of knowledge generation and innovation, we can play a bigger role in society. However, what is encouraging, is that research parameters are established and measured at the institution, we continue to set new records across all fields and aim to continue this trend in the future.

Investment in research at the UFS, from both internal and external sources, has increased significantly over the last few years. This demonstrates our commitment to growing the research enterprise of the University.

Over the years, this approach of engagement about research problems and investment in addressing those problems, is paying dividends and having an impact. The research portfolio has grown substantially in stature and strength, with the number of research outputs increasing year-on-year. However, this is not done at the expense of quality. Increasingly our researchers are publishing in reputable international journals with high impact factors, testifying to the improved quality of our research portfolio. This has also had a synergistic effects on other research indicators, such as the increase in the number of research contracts and the added investment received from both industry and the University.

Conventional bibliometrics provide a valuable indicator of quality of research; however, increasingly we must look at the impact that the research we undertake has beyond academia. To an ever greater extent we are looking at the impact of our research in terms of benefits and influence to society, culture, our environment, and the economy.

I would like to thank the researchers who contributed to the success of research at the University, as well as those departments that support the research portfolio to create a conducive environment in which research can thrive.

Dr Glen Taylor
SENIOR DIRECTOR: RESEARCH DEVELOPMENT

UNDERSTANDING AFRICA – ITS PEOPLE, POLITICS, CULTURE AND RELATIONS

The research identity of the **Centre for Gender and Africa Studies** (formerly the Centre for Africa Studies) rests on two primary pillars – the interdisciplinary nature of its engagements, as well as the exploration and critique of what constitutes the 'human', in itself but also in relation to the 'nonhuman' world. It has an institutional mission to promote an African focus through its intellectual activities and partnerships, aiming to deepen the inter- and transdisciplinary understanding of the burning issues related to Africa and its people, as well as the diaspora. Researchers in the Centre study Africa, its people, politics, culture and relations with the rest of the world – not by romanticising Africa's past, but by taking a long and critical view of past and present. Their research foregrounds African experiences by showing how knowledge is not just constituted through observation or through what can be measured. Their intellectual project is decolonial in the way that they explore the politics of inclusion and exclusion reinforced by the strong postcolonial theoretical flavour that permeates their teaching and research, drilling down to the basic question - what it means to be human in a gendered Africa that has to function within a gendered world.

AFRICA

This approach is evident in the range of research projects and interventions in which they are involved.

- The Free State Indigenous Knowledge Systems Documentation Project was established and housed at the UFS at the behest of the Department of Science and Technology's National Recordal Systems initiative, to preserve, promote and protect indigenous knowledge through documentation of indigenous knowledge systems (IKS). It aims to become a leading treasure hub of IKS for socio-economic development. Currently the communities involved include Thaba Nchu, Botshabelo, and the Xhariep District.
- The State of Gender in the Indian Ocean Rim Association (IORA) study, led by **Prof Joleen Steyn Kotze**, involves a baseline assessment on IORA, a 21-member state association that prioritises international cooperation for sustainability among Indian Ocean Rim states. Part of the key priority areas relate to questions of gender and women empowerment within this multi-member state entity.
- A project led by **Dr Stephanie Cawood** (together with Dr Jonathan Fisher from the University of Birmingham) on "Memorialising struggle: Dynamics of memory, space and power in post-liberation Africa", compares how liberation struggles have been memorialised in South Africa and Uganda by focusing on museums, monuments, spaces, discourses and ceremonies as sites of engagement and contestation among different memorial cultures.
- **Dr Nadine Lake** partners with colleagues from Uppsala University (Sweden) and Eduardo Mondlane University (Mozambique) on a project developing competencies in higher education for gender equality, peacebuilding and gender-sensitive research coordinators. This five-year project is funded by the Swedish International Development Agency (SIDA).
- **Dr Tariro Kamuti** has studied the phenomenon of persecution of predators, which is rampant in areas surrounding livestock and game farms. This is a subject that has become topical in contemporary biodiversity conservation narratives, pitting various stakeholders against one another. The study aims to identify and explain the prevailing contingent circumstances and strategies surrounding predator management in selected cases in the Free State and the Northern Cape.
- **Prof Heidi Hudson** leads a two-year project on sexual violence and peacekeeping, involving a series of consultations with interest groups that will facilitate the creation of a new research agenda and a broad network on the subject. Prof Hudson also has an enviable record of work on feminist issues. Her work primarily focuses on three themes: gender and liberal peacebuilding in relation to post-conflict Africa; feminist epistemic encounters; and posthuman peacebuilding and gender in Africa.

AFRICA

EXTREMISM IN AFRICA

It is estimated that over 33 000 fatalities were caused by extremism in Africa between 2011 and early 2016. Violent extremism in Africa is threatening to reverse the development gains that have been achieved and to derail prospects of future development. **Dr Anneli Botha,** of the **Department of Political Studies and Governance,** was part of a collaborative team supported by the United Nations Development Programme (UNDP), which produced the research findings for the UNDP report *Journey to Extremism in Africa*. The research provides an evidence base about the causes, consequences and trajectories informing violent extremism, something that has hitherto been weak globally, and particularly in Africa. The research attempts to understand the dynamics of the recruitment process, from the initial conditions and factors (including family circumstances, childhood experiences, education, religious ideologies, economic factors, and state and citizenship), through to the "tipping point" that triggers an individual to join a violent extremist group. The findings provide new insights into more effective responses. Dr Botha's book *Terrorism in Kenya and Uganda: Radicalization from a Political Socialization Perspective* (Lexington Books, New York) has received much international acclaim, with the renowned Vienna-based terrorism researcher, Prof Alex Schmid, calling it "path-breaking".

CONNECTING THE COMMUNITY

The need to improve the efficiency of heating mechanisms in his immediate community in Qwaqwa, has become a catalyst in **Dr Lehlohonolo Koao's** current research project on lithium-ion batteries. Many households in Phuthaditjhaba have benefited from the government's project of providing households with solar panels; however, the heat absorption rate of the batteries used by solar panels is insufficient, and the batteries lack enough power to sustain the supply throughout the day. Based in the **Department of Physics** on the Qwaqwa Campus, his research focuses on producing batteries that last longer, store more energy, are cheaper to manufacture, and are environmentally friendly when disposed. These are key factors in solar energy. His research will improve the efficiency of lithium-ion batteries that are now commonly used in portable electronics, such as cell phones and laptops.

AFRICAN MANUSCRIPTS

African manuscripts represent the recorded intellectual and cultural legacy of Africa and its peoples throughout the ages, and stand as a living testimony to the highly advanced and refined African civilizations. Besides religious works, these manuscripts contain anthologies of African and Arabic poetry, literary biographies, classical Sufi doctrines, philosophy, history, geography, and medicine. They have survived foreign invasions, colonialism, tribal conflict, insect and climate impacts. The African Written Heritage is a UFS research project led by **Hamid Fernana,** of the **Department of Biblical and Religious Studies**, which, in partnership with the University of Michigan, aims to translate rare manuscripts from Africa, in particular those from Timbuktu, West Africa and the Cape of Good Hope. The *Conquest of Mallorca* (submitted for publication) is the first manuscript translated from the forgotten Andalusian Legacy, and highlights the expeditions of the native African tribe, Almohad Berber Dynasty. The second planned book will explore Alexander the Great's persona from an African perspective and will shed light on Olympia's faith, Aristotle's creed, and the conquests of Aliens and the Unseen.

THE IMPACT OF MINING ON SMALL TOWNS

Although existing literature covers the relationship between mining and economic development at a country level quite well, it still falls short in terms of discussing the impact of mining at a local level. In particular, the impact of mining on the development of small towns deserves more attention. There are many mining towns in South Africa and hence a significant need exists among community members, policy makers, government officials and mining companies to understand the impact of mining on such towns. Identifying this need, **Lochner Marais, Philippe Burger and Deidre van Rooyen**, from the **Faculty of Economic and Management Sciences**, initiated a project investigating the impact of iron ore mining on the town of Postmasburg in the Northern Cape province. The Beeshoek mine, operated by Assmang, has been operating in Postmasburg since 1960, while Kumba's Kolomela mine opened its doors in 2011, just as the international commodity price bubble burst, which also led to a sharp drop in the iron ore price. Being dependent on iron ore mining, this price drop put significant social and economic strain on Postmasburg. The research involved researchers from various disciplines, across faculties. It also included a number of researchers from other countries, including Australia and New Zealand. The project resulted in a book entitled *Mining and Community in South Africa: From Small Town to Iron Town*, published by Routledge, as well as a number of academic articles. The book investigates the local impacts of mining in South Africa, focusing on employment, inequality, housing, business development, worker well-being, governance, municipal finance, planning and the environment. With the successful completion of the book the research team expanded, with the inclusion of **Maléne Campbell** and **Stuart Denoon-Stevens** from **the Faculty of Natural and Agricultural Sciences**. Their new project investigates the impact of coal mining on Emalahleni, in Mpumalanga. With these two projects the research team is developing into a mining studies group with significant research capacity. It is therefore exploring prospects of future projects investigating the impact of mining on other small towns.

PHOTO: DR RALPH CLARK

RESEARCH IN AND FOR THE MOUNTAINS

Established in 2015 on the UFS Qwaqwa Campus, the main goal of the Afromontane Research Unit (ARU), has been to advance montane research in an environment where relatively little research has been undertaken. The location of the Qwaqwa Campus makes this an appropriate and ideal niche for its research activities. Focusing on the sustainable development of the Maloti-Drakensberg, the ARU has a steadily growing reputation as a leading research unit on sustainable development in Afromontane regions. Researchers have focused on multi- and transdisciplinary scientific approaches to the challenges faced by montane communities. The ARU is strongly attuned to the global research focus on complex systems approaches as it acknowledges that the Sustainable Development Goals cannot be reached by a "business as usual" approach.

With the goal of informing fire management in the Golden Gate Highlands National Park as well as the disaster management strategies of local municipalities, **Dr Samuel Adelabu**, of the **Department of Geography**, is mapping the past, present and projected future patterns of wildfire in the mountains of the Park, using remote sensing techniques.

Dr Patricks Voua Otomo, from the **Department of Zoology and Entomology**, is undertaking an ecotoxicological and bacteriological assessment of water resources in the region, investigating the use of biochar to treat polluted sludge from wastewater treatment facilities.

Mountain ecosystems are particularly sensitive to climate change, and this is the focus of a project led by **Prof Geofrey Mukwada** from the **Department of Geography**, looking in particular

at the forms of climate change in the eastern Free State bioregion, and the impact on agricultural land uses, food security and rural livelihoods.

Based in the **Department of English**, a qualitative research project undertaken by **Dr Rodwell Makombe** and **Dr Oliver Nyambi**, deploys theories of visual culture to critically analyse visual representations in the Maluti area of the eastern Free State and Lesotho. Analysing a wide array of images, architecture, and other visual elements, this study investigates the ways in which local communities have responded to their immediate landscape.

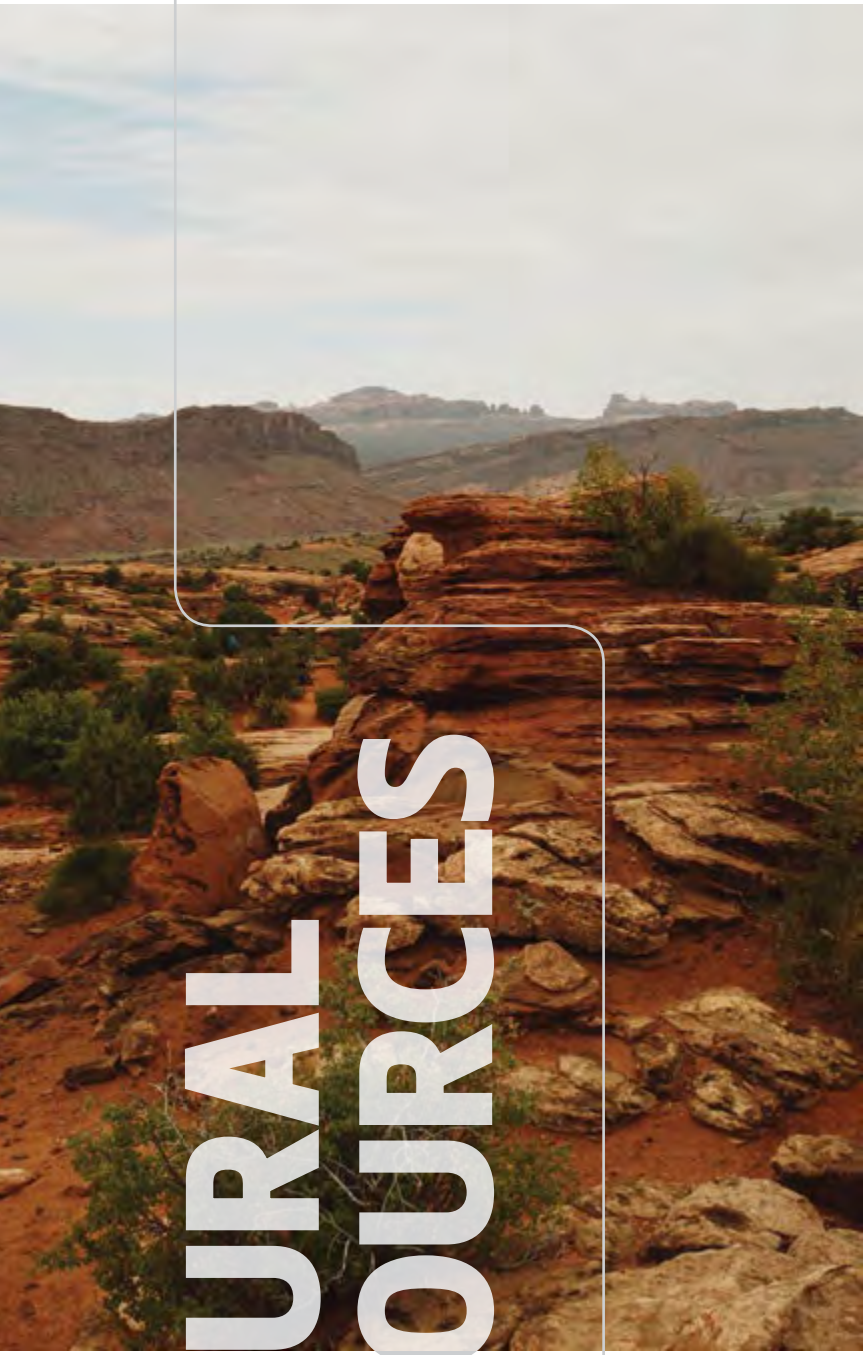
A far-reaching project led **by Dr Melissa Hansen (Department of Geography), Dr Michelle Brear (Faculty of Education), Dr Jared McDonald (Department of History),** and **Dr Samuel Adelabu (Department of Geography)**, interrogates the intersections of migration and sustainable development in mountain societies. This is particularly relevant to the Qwaqwa region, as the local community has been strongly affected by apartheid-era policies and outmigration of family breadwinners in a region that has historically had limited job opportunities and resources.

Prof Aliza le Roux, based in the **Department of Zoology and Entomology**, leads an interdisciplinary project aimed at documenting urban wildlife and the relationship between peri-urban/rural communities and wildlife in the montane socio-ecological system of Qwaqwa. Focused on community engagement, it assesses how citizen science can be used to reconnect an urbanising African community to nature.

Drawn from Le Roux A, Mukwada G, Lombard C. 2018. *The Afromontane Research Unit - Growing the hub of transdisciplinary research. Mountain Research and Development* 38(1):85-87.

PHOTO: DR RALPH CLARK

AFRICA



NATURAL RESOURCES

SAVING A PRECIOUS RESOURCE

Soil is an important, but limited natural resource in South Africa. Soil erosion not only involves loss of fertile topsoil and reduction of soil productivity, but it is also coupled with serious off-site impacts related to increased mobilisation of sediment and delivery to rivers. The siltation of dams is a serious problem in this country, especially dams that are located in eroded catchment areas. The water erosion risk assessment framework developed by **Dr Jay le Roux** of the **Department of Geography**, in collaboration with researchers from the University of Pretoria, the Water Research Commission, the Department of Agriculture, Forestry and Fisheries, Rhodes University, and the Department of Environmental Affairs, illustrates the most feasible erosion assessment techniques and input datasets that can be used to map aspects of water erosion in South Africa. The main feature that distinguishes this approach from previous studies, is that it interprets erosion features as individual sediment sources.

LOOKING AT THE STARS DIFFERENTLY

Scientists from the High Energy Stereoscopic System (H.E.S.S.) have pinpointed the most powerful sources of cosmic radiation in space. **Prof Pieter Meintjes** and **Dr Brian van Soelen**, from the **Department of Physics**, are part of the team which discovered a source of cosmic radiation at energies never before observed in the Milky Way. The scientists discovered a proton PeVatron, a source that can accelerate protons up to energies of ~1 PeV (10^15 eV), at the centre of the Milky Way. The supermassive black hole called Sagittarius A has been identified as the most plausible source of this unprecedented acceleration of protons. They are likely to accelerate cosmic rays to energies 100 times larger than those achieved by the Large Hadron Collider at CERN (the European Organization for Nuclear Research). The detailed analysis was published in the 16 March 2017 edition of ***Nature***.

The H.E.S.S. observatory in Namibia is a collaboration between 42 scientific institutions in 12 countries. The next generation VHE gamma-ray telescope will be the Cherenkov Telescope Array, which is currently in the design and development stage. Dr Van Soelen and Prof Meintjes are part of the project team.

In a further development, a group of international astronomers recently announced the discovery of an exotic binary star system, AR Scorpii, in the Scorpius constellation. **Prof Pieter Meintjes** was part of the five-person team that made the sensational discovery, which could lead to the production of cleaner energy on Earth. The paper was published in *Nature Astronomy* in January 2017. The exotic binary star consists of a red dwarf and a white dwarf revolving around each other every three-and-a-half hours. The binary system showed very prominent pulsations of 117 and 118 seconds respectively; these can be explained by a bundle radiation produced by the white dwarf star. These observations indicate that the radiation is strongly polarised, a sign of synchrotron radiation, which is produced by electrons accelerated to extremely high energy levels in the magnetic field of the white dwarf star. The interaction between the magnetic fields of the dwarf stars induces secondary processes that specifically describe the behaviour of the radiation in the radio band and infrared band accurately. AR Scorpii is the first white-red dwarf binary system of which all the pulsated radiation could be explained by the synchrotron process, which is totally unique. From these findings it is possible that similar processes could also be applied to produce energy on Earth.

GROUNDWATER – THE HIDDEN RESOURCE

Southern Africa is considered an arid region with limited water resources. The region faces an increased demand for this scarce resource, which is further constrained by climate change and the pollution of its water resources. This has resulted in the exploitation of other sources of water, of which groundwater is recognised as an important one. In acknowledging these challenges, the Southern African Development Community (SADC) has established the regional Centre of Excellence on Groundwater - the SADC Groundwater Management Institute (SADC-GMI) - which is hosted by the UFS **Institute for Groundwater Studies (IGS)**. Preparations for the establishment of the SADC-GMI started in 2008 under the SADC Groundwater and Drought Management Project, when universities in the SADC Member States were invited to express interest in hosting the Institute. After intensive evaluation processes, the IGS was identified as the most suitable host. The SADC-GMI collaborates with Member States to promote sustainable groundwater management and design solutions to groundwater challenges in the SADC region through capacity building interventions, research, supporting infrastructure development, and enabling dialogue and exchange of groundwater information.

PHOTO: SADC-GMI

One of SADC-GMI's priorities is to leverage on previous and ongoing initiatives related to groundwater management in the region, which include improving stewardship of existing groundwater resources and utilising advanced technologies to collect and compile data on groundwater into centralised and accessible databases. According to Mr James Sauramba, the Executive Director of the SADC-GMI, said the vision is to ensure that groundwater management issues are granted equal priority and recognition in national and international water management discourses. The SADC-GMI is currently implementing a major project financed by the World Bank through a US$ 8.2 million grant from the Global Environment Facility (GEF), and US$ 2 million from the multi-donor trust fund to establish Cooperation in International Waters in Africa (CIWA).

Since its launch in 2016, SADC-GMI has worked and collaborated with key partners to accomplish a number of successful initiatives to advance the groundwater agenda in the region. Previous pilot projects implemented in Botswana, South Africa and Zimbabwe under the previous SADC Groundwater and Drought Management Project, were reviewed in order to identify the best practices for upscaling future groundwater interventions. The Institute also resuscitated the SADC Hydrogeological Map which had become unavailable online since its initial development in 2010; the portal is now live on www.sadc-gmi.org.

Currently SADC-GMI is joining forces with IGRAC (Netherlands) and IGS (South Africa) to implement a regional capacity building programme for data collection and management, involving all 15 SADC Member States. The programme includes a Young Professionals component which is aimed at capacitating 32 young professionals through an internship programme for the duration of the project. SADC-GMI is also driving the integration of groundwater in the overall water resources management discourses, especially through collaboration with River Basins Organisations.

CONSERVING OUR BIODIVERSITY THROUGH BUTTERFLIES

Humans are the custodians of the planet, and the way we care for nature reflects the way we value life. We are losing biodiversity faster than at any time in human history, and there is thus an urgency to conserve plants and animals before they are lost forever. **Dr Falko Buschke**'s research focuses on how the distribution of biodiversity in time and space, influences the way we should conserve and manage nature. Based in the **Centre for Environmental Management**, his research investigates where the sandstone outcrops in the Eastern Free State, known as inselbergs, are safe havens for plants and animals. He has selected butterflies as the representative group to study. They are known to be linked to specific habitats and to respond to human pressure, such as farming. Once the butterfly data is collected, it can be linked to satellite information on plant growth patterns, to provide a clearer picture of whether plants and animals can exist side-by-side with commercial agriculture, which is a predominant feature of the Eastern Free State.

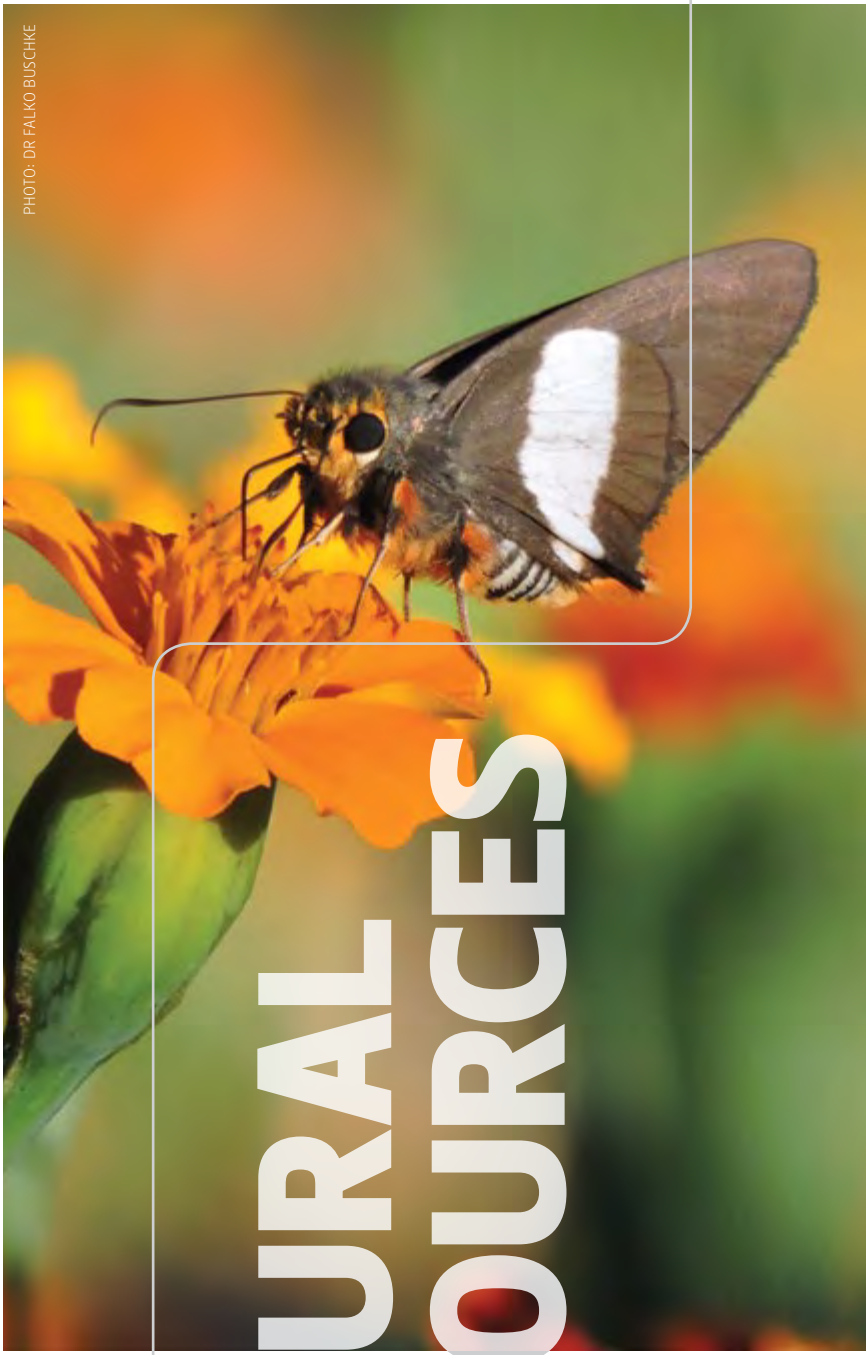


PHOTO: DR FALKO BUSCHKE

NATURAL RESOURCES

VICTIMOLOGY OF STATE CRIME

Prof Robert Peacock from the **Department of Criminology**, is engaged with pioneering research within the specialisation field of the victimology of state crime. The abuse of power, together with organised and collective victimisation, present victimological challenges in transitional societies in Africa and elsewhere. The impact of mass victimisation can be longer in duration and more encompassing than individual victimisation. In such cases there are also usually added concerns about the safety and well-being of significant others. The trauma of extreme group victimisation is also likely to be transmitted from one generation to the next, and may be amplified by hidden victimisation in society and secondary victimisation by the Western criminal justice system.

His research shows that to prevent victim-offender sequelae, it is crucial to remain particularly sensitive to the struggle of vulnerable and marginalised groups in post-conflict and transitional societies (such as

HUMAN RIGHTS

children deprived of their liberty), and to remain mindful that the greatest threat to rights is often from the state itself. His work demonstrates how closely violent patterns of behaviour are tied together with everyday reproductions of social structures. The relevance of examining cultural patterns of interpretation of victimisation together with institutional constructions of power relations and violence, are highlighted as a scientific pursuit to advance just societies in a globalised world. With Africa as the Cradle of Humankind and also a foundational source of both Western and African philosophy though the Egyptian enlightenment and tradition, an ongoing reflection and re-appraisal of the principles of communality, reciprocity and inclusivity could serve to re-emphasise the essential unity of all of humanity, and to promote values that are based on collaborative initiatives to resolve common problems when dealing with state crime and concomitant abuse of power, structural and institutional victimisation, as well as interpersonal conflict on the African continent and elsewhere in the world.

Prof Peacock's research on total institutions (prisons) and the impact and consequences thereof on the identity development of the incarcerated adolescent in particular, emphasised that despite the protracted struggles waged in post-colonial South Africa and Africa in achieving legal and constitutional gains, one always needs to remain mindful of the nexus of law with the historical, political and economic spheres. In this way there is engagement beyond narrow constitutional and legal frameworks in pursuits of justice and nation-building. His work will continue to focus on the development of an African victimology in the quest for a more advanced understanding of the philosophical grounding of the very notions of African communitarianism.

HUMAN TRAFFICKING

Human trafficking is a complex crime that transcends cultural, religious and geographical barriers. Victims are sold as commodities into a life of servitude and sexual exploitation. As a response to the rising number of human trafficking cases in South Africa and around the world, key role players in various fields are working together to find solutions on how to stop the crime and assist the victims. This work is and should be supported by insights from research conducted in communities and by academic institutions. **Prof Beatri Kruger,** from the **Free State Centre for Human Rights,** has been exploring research related to juju rituals, which are used by mainly Nigerian and other West African perpetrators of human trafficking in South Africa and on the African continent to subjugate their victims. Her research, undertaken with Marcel van der Watt from Unisa, explores how traffickers use juju and forms of witchcraft as an effective control mechanism and catalyst to instil profound fear in victims, and illuminates some of the multi-layered complexities associated with its use. This compounds efforts by response agencies and criminal justice practitioners to combat human trafficking. Traffickers operating in and between Nigeria, South Africa and European countries are steadily gaining momentum. A concentrated multi-country effort is needed to take steps within their legal frameworks, as well as academic spaces, to come together to combat the crime across continents.

CHALLENGING DEBATES ON RACISM IN THE CLASSROOM

Exploring numerous norms and assumptions that impede the investigation of racism and racial inequalities in university classrooms, has been central to the research conducted by **Dr Marthinus Conradie**, from the **Department of English**. Conradie specialises in sociolinguistics and cultural studies, and his research aims to suggest directions and methods of exploring issues about race, racism, and racial equality relating to classroom debates. One thread of this body of work deals with the assumption that classroom debates must exclude emotions.

However, he feels that squandering opportunities to investigate the nature and sources of the emotions provoked by critical literature, might obstruct the discussion of personal histories and experiences of discrimination. Equally, the demand that educators should control conversations to avoid discomfort might prevent in-depth treatment of broader, structural inequalities that go beyond individual prejudice.

A second stream of research speaks to media representations and cultural capital in advertising discourse. A key example examines the way art from European and American origins is used to imbue commercial brands with connotations of excellence and exclusivity, while references to Africa serve to invoke colonial images of unspoiled landscapes.

HUMAN RIGHTS

WORKING TO COUNTERACT THE DEADLIEST VIRUS

The **Next Generation Sequencing (NGS)** unit at the UFS was established as an interdisciplinary facility by the Faculty of Health Sciences and the Faculty of Natural and Agricultural Sciences, with the support of the Directorate for Research Development. The facility is used for studies on deoxyribonucleic acid (DNA) sequencing, assembly and bioinformatics approaches using the most advanced Illumina MiSeq NGS platform. The NGS is managed by **Dr Martin Nyaga**, who has vast experience in microbial genomics. The unit has successfully generated data on bacterial, viral and human genomes. There is currently ongoing work on bacterial and fungal metagenomics studies, as well as on plasmid/insert sequencing and whole genome sequencing of animal and human rotaviruses. Rotavirus is the most common cause of diarrhoea in infants and children worldwide, and in sub-Saharan Africa an estimated 450 000 children under the age of five die every year from this not well-understood virus. Dr Nyaga is investigating the different strains of the rotavirus, a segmented virus which rapidly mutates.

The unit also has capacity to undertake other kinds of panels such as the HLA, Pan-cancer and Tumor 15 sequencing. The unit has also invested in other specialised equipment such as the M220 Focused-ultrasonicator (Covaris), 2100 Bioanalyser system (Agilent), and the real-time PCR cycler, the Rotor-Gene Q (Qagen).

MEDICINAL CANNABIS

Cannabis, or dagga as it is known locally, is a single plant that has colonised the world. Cannabis domestication is postulated to have originated in the steppes in Asia around 1200 BC and is believed to be one of humankind's first cultivated crops. Cannabis moved westward and downward to Africa, reaching South Africa around 1400 AD, and then through to southern and northern America around 1800 AD and 1920 AD respectively. It was widely used for spiritual and medicinal purposes. The polarisation of cannabis grew and its medicinal benefits became documented; these include use in treating cancers, diabetes, hypertension, Alzheimer's disease, gliomas, osteoporosis, rheumatoid arthritis, and pain. The different sub-species of cannabis are *Cannabis sativa* (Carl Linnaeus), *Cannabis indica* (Jean-Baptiste Lamarck) and the more rare *Cannabis ruderalis* (DE Janischevisky).

Research on a group of chemical compounds, called cannabinoids, found them to be responsible for some of the medicinal benefits of cannabis. Thus far, about 125 different cannabinoids have been identified, with only cannabidiol (CBD) and tetrahydrocannabinol (THC) being well researched and studied. The content of CBD and THC in the cannabis determines its medicinal uses. *Cannabis sativa*, commonly known as marijuana, has psychoactive properties because of its higher content of THC, while hemp is a non-psychoactive form of the same plant because of its higher content of CBD.

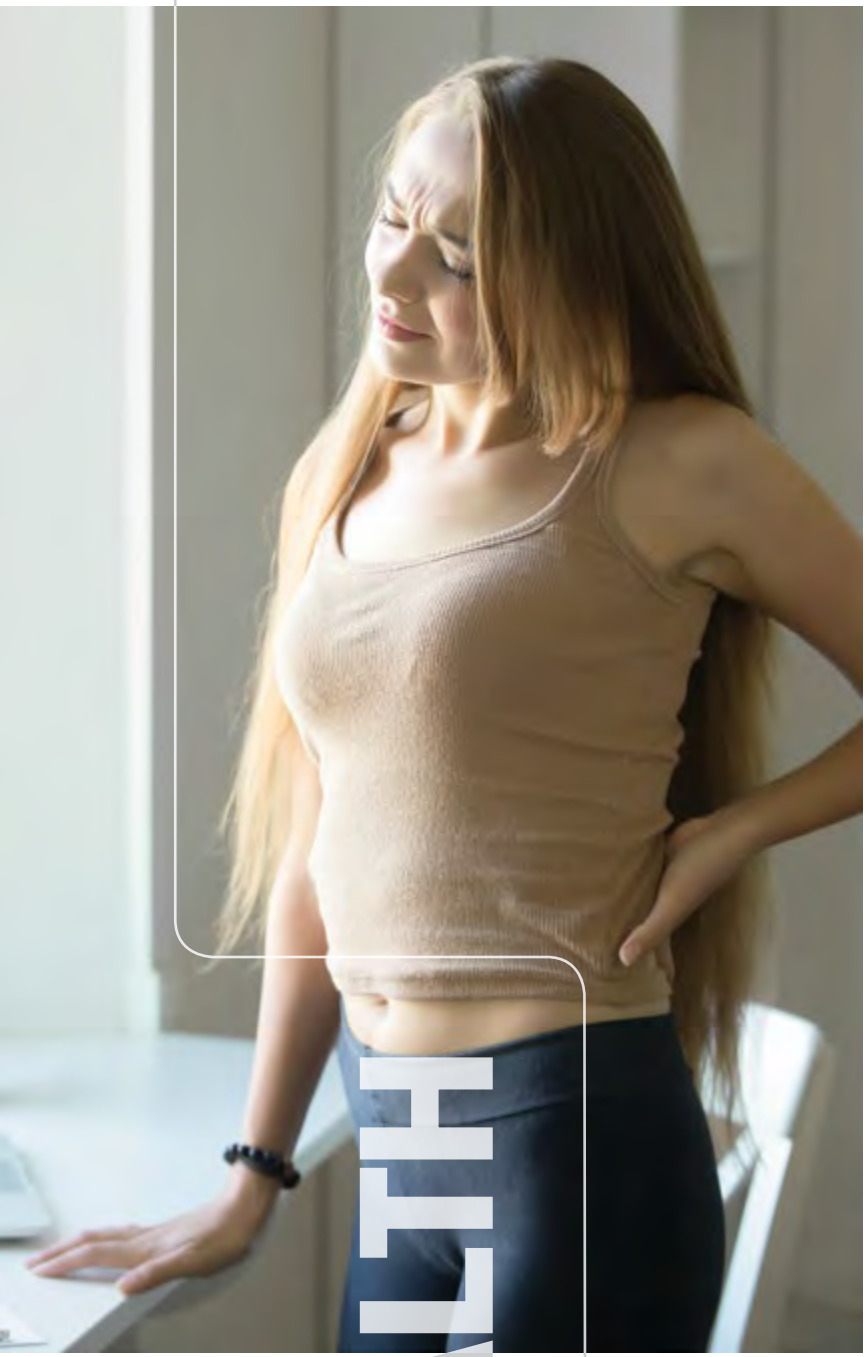
In most countries, including South Africa, cannabis is a banned substance and regarded as a narcotic. Many countries in Europe and the USA have legalised the medicinal use of cannabis. The economic revenue generated from medicinal cannabis was estimated at US$6.4 billion and expected to rise to US$68.4 billion in 2021. Many countries in Africa are only now beginning to realise the potential economic and medicinal benefits of cannabis. The first South African legislation involving dagga was introduced in 1928, despite the plant having been popularly used in the country since the 15th century. South Africa has started with the legalisation of cannabis and has scheduled it down from a Schedule 7 narcotic drug to 4, depending on the product, formulation and intended medicinal use. South Africa is now looking at scientific research on cannabis to provide policy direction for cannabis and medicinal cannabis products. The South African Health Products Regulatory Authority (SAHPRA), which is responsible for regulating the registration and use of drugs in the country, has produced guidelines for

the commercial cultivation and production of cannabis medicinal products for South Africa. This move has sent a flood of interest from multinational and local pharmaceutical companies to try to obtain cultivation and production licenses for medicinal cannabis. The problem is, there is a dearth of research on local cannabis plant varieties whether for cultivation or medicinal production.

The UFS **Department of Pharmacology** has been mandated by the government to undertake systematic medicinal research on cannabis. The UFS is thus the first and only university in the country that has been issued and granted a research permit for cannabis; this recognises the UFS as the leader in pharmacology research and product development of cannabis in South Africa. The permit allows the UFS to obtain, transport, possess, store and handle cannabis plants, cannabis oils, products, CBD and THC for medicinal research purposes.

The current research, under the leadership of **Prof Motlalepula Matsabisa**, focuses on cancer, pain management, diabetes and hypertension. The project is also quantifying the CBD and THC content in the plant varieties collected, and correlating the ratio of CBD/THC to pharmacological activity. The research thus far has shown, *inter alia*, that samples collected in Lesotho and the Eastern Cape performed better in the cancer screening assays. In collaboration with colleagues in the agricultural sciences, cannabis strains will be grown that have been found, through the UFS research, to be the best performing for the specific disease conditions they have been scientifically shown to be effective for.

HEALTH



HEALTH

A PAIN IN THE BACK

The health of employees can impact on their productivity and the optimum functioning of an organisation. Musculoskeletal diseases (MSDs), in which the lower back is most commonly affected, are a group of disabling conditions which can have an impact. It is estimated that approximately 85% of the adult population suffers from low back pain (LBP) at some point in their lives. Studies have shown that LBP related to occupational exposure places a significant burden on the worker population and it has a major impact on productivity of employees. Although most cases of acute LBP resolve after 7 to 12 weeks, it can have a 90% recurrence rate.

As part of the focus on the health status of employees, a study was conducted by the **Department of Community Health** amongst nurses in the public sector who used more than their allowed 36 days' sick leave in a three-year cycle (called temporary incapacity leave). The time of temporary incapacity leave needed for LBP was extensive; almost 15% of the nurses included in the study had taken more than 180 sick leave days during the three-year sick leave cycle. In one case, a nurse applied for 436 sick leave days.

The health care sector in South Africa cannot afford to have health care personnel, and especially nurses, on sick leave for such long periods. It is therefore important for employers to have systems in place for the early identification, and effective management and follow-up of employees with LBP. Given the worldwide prevalence of LBP, it behoves all industries, in particular those that require heavy manual activities in the workplace (such as extensive lifting, lowering, carrying, pushing, or pulling), to give attention to these findings.

ON THE FOREFRONT OF CANCER RESEARCH

There is a visible increase in the occurrence of cancer in the developing world. Rapidly changing lifestyles, uncontrolled urbanisation, pollution, and population ageing are some dynamics that provide a lethal cocktail of infections and lifestyle risk factors resulting in higher risk of people developing cancer. The cost of cancer treatment is multi-tiered, making the provision of care for cancer patients a high-risk business. **Dr Alicia Sherriff**, of the **Department of Oncology**, has studied the combined effects of the exponential rise in cancer globally and the growing cost of treatment. In South Africa cancer cases are expected to increase by 7%. Innovative thinking to embrace technology, combined with a preventive approach, as well as lowering the cost of treatment drugs, are some of the research areas being prioritised.

Breast cancer is the leading cause of female mortality in developing countries. **Susan Acho**, from the **Department of Medical Physics**, focuses her research on using mathematical methods to delineate and classify breast masses. According to Acho, the methods of diagnoses that are currently commercially available, lack a detailed finesse in accurately identifying the boundaries of breast mass lesions. By using mathematics, physics and digital imaging to understand breast masses on mammograms, her research bridges the gap between these fields to provide algorithms which are applicable in medical image interpretation.

The field of nuclear medicine is expanding rapidly due to the development of hybrid cameras and new radiopharmaceuticals. The most advanced technologies are not yet widely available due to their high cost. A more cost-effective alternative focuses on developing new radiopharmaceuticals that can be used with the current cost-effective gamma cameras. The South African National Nuclear Energy Corporation (Necsa) has developed a local synthesis process for ethylenedicysteine-deoxyglucose. In partnership with **Dr Je'nine Horn-Lodewyk** from the **Department of Nuclear Medicine**, the compound was successfully used in various animal models and clinical scenarios, resulting in approval by the South African Health Products Regulatory Authority (formerly the Medicines Control Council) for use in human trials. Research to investigate diagnostic accuracy in cancers such as lymphoma using this technology, is planned.

Demonstrating the truly interdisciplinary nature of cancer research, a group of researchers under the leadership of **Prof Jannie Swarts** and **Prof André Roodt** from the **Department of Chemistry**, is playing a major role in the design of medicines to better detect and treat cancer. In collaboration with researchers from the Departments of Nuclear Medicine and Medical Physics, amongst others, they are studying the chemical manner in which drugs are absorbed in cancer cells. Using techniques involving different radioactive isotopes, they can detect the location of the cancer spots on bone or in soft tissue within a few hours. The same technique can be used to identify inactive parts of the brain in Alzheimer patients. Using similar techniques, a dosage of isotope Rhenium-186 can be used as palliative therapy. Designing new clever chemical agents and the chemical pathways in which these agents are taken up in the body, make a major contribution in terms of cancer therapy and imaging.

MATTERS OF THE HEART

The UFS continues to maintain its position at the forefront of cardiovascular research. Researchers led by **Prof Francis Smit** at the **Robert WH Frater Cardiovascular Research Centre**, which has a distinctly Afrocentric focus, are undertaking pioneering research on idiopathic dilating cardiomyopathy, a disease which weakens the heart muscle and leads to heart failure. It is a disease that is quite common among people of African descent. There is currently no curable treatment for the condition, and 50% of patients that have shown heart failure died within five years. According to **Prof Mokoali Makotoko**, Head of the **Department of Cardiology**, more than 1500 new cases of heart failure are identified annually at the Universitas Academic Hospital, of which approximately 30% can be attributed to cardiomyopathy. With the use of endomyocardial biopsies, the team hopes to treat viruses unique to southern Africa as well as underlying causes of dilating cardiomyopathy. According to **Prof Stephen Brown**, Head of the **Paediatric Cardiology**, children suffering from the disease never reach a mature age and those under his supervision will also undergo these tests.

Prof Francis Smit and his team at the Robert WM Frater Centre have also been involved in the development of heart-valves. Their redesigned poppet valve has the potential to provide a low cost solution for mechanical heart-valve replacement. The advantages of this valve over current mechanical valves is that, due to the effective laminar flow characteristics as well as the simple locking mechanisms, there is a reduced chance of valve thrombosis, and the need for anti-clotting drugs is therefore limited.

Pulmonary homografts remain the golden standard for Right Ventricle Outflow Tract reconstruction in children with congenital heart defects requiring a valve conduit. Availability is shortened by an international donor shortage. Currently donors are restricted to beating heart donors, less than six hours, or limited to less than 24 hours, post mortem. Research undertaken by the **Department of Cardiothoracic Surgery**, with the Central University of Technology and the CCM Klinik für Kardiovaskuläre Chirurgie, Charité Universitätsmedizin Berlin, demonstrated that extending post mortem harvest times beyond 24 hours did not increase homograft failure rate. They recommend that a re-evaluation of cadaver-based donor programmes is required, in an attempt to address the worldwide homograft donor shortage.

The new Cardiac Simulation laboratory, hosted within the **School of Biomedical Science's** Clinical Simulation and Skills Unit, will further enhance the quality of research and training. The new laboratory, a result of a partnership between Medtronic and the UFS, will not only benefit the training of specialists but will also improve patient safety and reduce complication and mortality rates. The programme is designed as a hub-and-spokes model for South Africa and sub-Saharan Africa, combining distance learning with an on-site high-fidelity simulation and assessment centre.

OBESITY IN CHILDREN

Obesity is a global pandemic, with a growing prevalence amongst children. **Prof Louise van den Berg** and doctoral students from the **Department of Nutrition and Dietetics** conducted research as part of a nation-wide campaign to raise awareness of the problem of obesity. The study found that one in four children from the schools surveyed were overweight when they started primary school, and that children who are overweight by the time they are six years old, are five times more likely to be overweight when they are 12. Evidence has shown that overweight children and teenagers have a greater risk of developing lifestyle diseases, such as Type 2 Diabetes, hypertension and cardiovascular disease, later in life.

Although there are many factors that can contribute to preventing childhood obesity, parents' perceptions of their children's weight play a significant role. A recent study found that more than 50% of parents underestimate the weight of their obese children, and are unaware of the risks their children face.

The high prevalence of weight problems among six-year olds in this study, is an urgent call to healthcare professionals to step in and empower parents, educators and children with the necessary skills for healthy dietary practices and adequate physical activity.

IMPROVING RURAL POULTRY PRODUCTION

One of the most effective methods of poverty alleviation in rural communities is small-scale poultry farming. However, there are three main stumbling blocks to the successful development of a rural poultry industry; these are the availability and cost of poultry feed, disease control through vaccination, and high levels of mycotoxins. All of these aspects are addressed in commercial poultry production, but not in rural poultry.

The use of yeast can have a massive impact on the success of rural poultry production. In order to address the feed problem, **Prof Rob Bragg**, together with **Dr Charlotte Boucher** and **Dr Wouter van der Westhuizen** of the **Department of Microbial, Biochemical and Food Biotechnology**, have expressed six enzymes in a patented yeast-based expression system. These enzymes make the available feed more digestible by breaking down the cellulose and other non-digestible parts in the feed. The addition of the yeast expressing these enzymes also acts as an additional source of nutrients. By treating waste products with the enzymes to make them more digestible, it could be possible to make use of waste products from mushroom production and beer brewing to produce a cost-effective poultry feed for small-scale farmers.

Viral diseases are serious problems in poultry production and can result in 100% mortality in poultry flocks. Commercial vaccines are not suitable for rural poultry due to storage requirements and sale package size. The high levels of mycotoxins in the feed have severe effects on the health and production of chickens.

The research by the UFS team demonsstrated that the patented yeast has the ability to bind mycotoxins, and the current research is attempting to use the yeast expression system to express antigens of various poultry pathogens on the surface of the yeast. Thus, as the chickens ingest the yeasts when eating their food, they are also vaccinated against a number of poultry diseases.

FOOD

UFS FOOD SCIENCE RESEARCH TO THE BENEFIT OF THE SOUTH AFRICAN CONSUMER

Over the last two decades, consumption of poultry in South Africa has increased dramatically, with the poultry industry providing over 60% of the total animal protein consumed. In 2017 the per capita consumption was estimated at more than 41 kg. It is estimated that South Africa consumes thirteen times the average per capacity poultry consumption in sub-Saharan Africa and almost three times the average per capita world poultry consumption. With such high demand, it is essential, for all concerned, that quality is at its best and consumers received the best product and value

Brine injection of chicken portions has been part of the processing adopted by the poultry industry for some time. They justify the injection of poultry meat with brines in that it improves juiciness, tenderness and flavour and makes chicken more affordable. However, there have been complaints and concerns raised by customers. In particular, consumers were not fully aware of the increased amount of brine injected into poultry meat, and this became a controversial issue.

The research team, led by **Prof Arno Hugo** of the Food Science Division of the **Department of Microbial, Biochemical and Food Biotechnology**, was commissioned to undertake a number of research studies to investigate the effect of brine injection on poultry meat quality, and to develop a screening method to determine extraneous water content of frozen chicken pieces.

Their findings indicate that, at the time of the study, the levels that the South African poultry industry were injecting were considered excessive, at between 30% and 60%, resulting in very high thawing and cooking losses during preparation of frozen chicken by the consumer. Such injection levels could not make a significant nutritional contribution or result in improved quality of the product. Their research results indicated that there is no advantage in injecting chicken portions at levels more than 10-15% prior to freezing. They expressed concern regarding increased levels of brine injection, and recommended that the practice should be regulated, and that this regulation should preferably be done by the chicken industry itself, as it is a large industry which is proud of its product.

As a result of this research new government regulations came into effect in October 2016, allowing for 10% absorbed moisture calculated as QUID ±1% for whole chicken carcasses, and 15% absorbed moisture calculated as QUID ± 2.5% for individual frozen chicken portions. Inspectors from the Department of Agriculture, Food and Fisheries (DAFF) are responsible for regulating brine injection levels in poultry abattoirs. The improvement in the quality of frozen chicken is already clearly visible on supermarket shelves. Prof Hugo and his team are currently assisting various chicken processing companies in monitoring and improving the quality of the brine injected and their products.

These research findings and the implementation thereof, have been important for improved product quality and better value for money for the South African consumer.

FOOD

CHEERS!

Craft beer brewing is becoming an increasingly popular trend. **Kovsie Brewing** is an initiative that was started by postgraduate students from the **Department of Microbial, Biochemical and Food Biotechnology** in 2012. Over the subsequent years the small-scale experimental brewery steadily grew to the point where it obtained institutional support to establish the first campus-based microbrewery in the Brewing and Fermentation School. The microbrewery exposes UFS students to brewing as a fundamental application of microbial and biotechnological sciences. The brewery is used as a vehicle for training postgraduate students, and has been incorporated into various undergraduate programmes within the Department of Microbial, Biochemical and Food Biotechnology. Kovsie Brewing will also function as a multi-disciplinary platform to stimulate the interaction between students from various fields of study, including business management and marketing. At postgraduate level the focus is on yeast development and characterisation. The Department already has an extensive yeast collection, and finding new and locally isolated yeasts for beer development forms an interesting part of the research.

IMPROVING PECAN NUT CROPS

By knowing how to use photosynthesis and plant sap data for determining plant health, fast and effective solutions can be established for the optimisation of crops. This technique, which could help farmers utilise every bit of usable land effectively, is the focus of research of **Marguerite Westcott** from the **Department of Plant Sciences**.

She uses this technique to prove that a newly-developed bio-stimulant, produced by the research team, can stimulate plants in order to metabolise water and other nutrients better, yielding increased crops. Westcott and her colleague, **Dr Gert Marais**, are also researching the effectiveness of this new plant stimulant on the physiology of pecan and citrus trees in order to optimise the growth of these crops, thus minimising disease through biological methods. Field trials are being conducted in actively-producing orchards in the Hartswater and Patensie areas in conjunction with the South African Pecan Nut Producers Association, amongst others. The principles which are applied in this research are also used in combination with the bio-stimulant in other studies on disturbed soil, such as mine-dump material, for establishing plants in areas where they would not normally grow.

MUSHROOMS – FROM GOURMET FOOD TO FODDER

What started as a small, project of personal interest, has grown to a small enterprise with zero waste. The research team, headed by **Prof Bennie Viljoen** of the **Department of Microbial, Biochemical and Food Biotechnology**, focuses on quite diverse aspects of mushrooms. Firstly, gourmet mushrooms are grown on agricultural waste under controlled environmental conditions to achieve the tastiest edible mushrooms. This group of mushrooms is comprised of King, Pink, Golden, Grey, Blue and Brown Oysters. The postgraduate students involved also run it as a business, with the mushrooms being sold to restaurants and food markets. Secondly, the research encompasses the growth and application of medicinal mushrooms. The research focuses on six different medical genera, each with specific attributes. Another research focus involves the bio-mushroom application phenome, which breaks down the wood of encroaching and alien plants. This research is potentially very valuable to the agricultural sector in areas where Acacia is an encroaching problem. With this process, waste products are upgraded to a usable state, converting woody biomass into high-quality animal fodder.

ECO-FRIENDLY FEATHER WASTE DISPOSAL

The poultry processing industry experiences substantial problems with the disposal of feathers. In an attempt to address this, researchers under the leadership of **Dr Charlotte Boucher** of the **Department of Microbial, Biochemical and Food Biotechnology,** investigated how microbial enzymes, which are essential for sustainable technology and green chemistry, could be used. In particula *Chryseobacterium carnipullorum* 9_R23581^{T}, isolated from raw chicken is a potential keratin degrader, was considered. Feather degradation is a challenge for most conventional protease enzymes due to the structure of keratin material which makes up more than 90% of the feathers. This study focused on identifying, purifying, and characterising proteolytic enzymes produced by the bacteria *C. carnipullorum*. Its use as a keratin degrader may help to alleviate feather waste disposal problems experienced by the poultry processing industry, as it may be an eco-friendly alternative to the use of heat and chemical treatments. Keratinases have very promising potential applications in various other industries, such as the production of rare amino acids and semi-slow nitrogen release fertilizers in organic farming.

IN THE FRONTLINE AGAINST LISTERIOSIS

Listeria monocytogenes is a food-borne pathogen bacterium. When a food product which is contaminated with L. monocytogenes is ingested, it can cause a wide range of illnesses. Risk groups include infants, the elderly, and people suffering from illnesses in people with impaired immune systems. **Dr Amy Strydom**, a postdoctoral fellow in the **Department of Microbial, Biochemical and Food Biotechnology**, worked closely with an avocado-processing facility to identify and characterise the contamination problem and to find a solution. She developed an in-house monitoring system which enables the facility to test their products and the processing environment for this potentially lethal pathogen.

FOOD

RESEARCH REPORT 2016/2017

RESEARCH CAPACITY

FACULTY OF ECONOMIC AND MANAGEMENT SCIENCES

RATED RESEARCHERS

5

RESEARCH FELLOWS

6

POSTDOCTORAL FELLOWS

6

PUBLICATION OUTPUT UNITS

32.51
2016

40.51
2017

RESEARCH CENTRES/CHAIRS

- Centre for Development Support

DEAN
PROF HENDRI KROUKAMP

ACHIEVEMENTS AND RECOGNITION

2016

Prof Philippe Burger (Department of Economics and Finances) was selected as a Fulbright Scholar at the renowned Centre for Sustainable Development in the Earth Institute at Columbia University, USA. His research focused on the different dimensions of unemployment in South Africa, as well as policy to reduce unemployment.

The **Centre for Development Support** (CDS), in collaboration with the Johannes Stegmann Gallery, Qala Phelang Tala (QPT) and the Vrystaat Art Festival, initiated a Re-Future project in the Free State. This artist-initiated yet community-controlled project, brings together sustainability, community development and artistic action.

Dr Chris Hendriks (Department of Public Administration and Management) received Best Paper award at 2016 IAISIA Conference.

Dr Reuel Jethro Khoza, a distinguished thinker and businessman, was awarded an honorary doctorate.

Trevor Manuel, former Minister of Finance, was awarded an honorary doctorate.

Dr Petrus Nel (Department of Industrial Psychology) was recognised as Top Achiever in Research in the Faculty.

Dr Rory Pilossof (Department of Economics and Finance), together with Dr Andy Cohen of the University of Kent, received funding from the British Academy's Advanced Newton Fund for a three-year project to make labour data from South and Southern Africa more accessible to scholars worldwide.

2017

Prof Liezel Lues (Department of Public Administration and Management) was the recipient of the Senor Research Award in the Faculty.

FACULTY OF THEOLOGY AND RELIGION

RATED RESEARCHERS

7

RESEARCH FELLOWS

60

POSTDOCTORAL FELLOWS

1

PUBLICATION OUTPUT UNITS

122.78	167.87
2016	2017

DEAN
PROF FANIE SNYMAN

ACHIEVEMENTS AND RECOGNITION

2016

The Dean, **Prof Fanie Snyman**, was awarded the prize for the best academic book published by a UFS academic in 2015/2016.

An international congress was hosted as a joint venture between Yale Divinity School and the Faculty of Theology and Religion.

A new academic series *UFS Theological Explorations* was launched. The first volume was published under the title *Theology and the (Post) Apartheid condition*.

2017

Prof Pieter de Villiers (professor extraordinaire in the Department of Old and New Testament Studies) was elected chair of the International Society of Spirituality, the first person from Africa to be appointed to this position.

Prof Fanie Snyman was invited to read a paper on his *Malachi Commentary* at the Malachi Study Group at the Society of Biblical Literature (USA).

Prof Francois Tolmie (Department of Old and New Testament Studies) edited a special edition of *Acta Theologica*, titled *The socially disadvantaged in Early Christianity*.

The second volume of the series *UFS Theological Explorations* was published, under the title *Making sense of Jesus. Experiences, interpretations and identities*.

Prof Hermie van Zyl (Department of Old and New Testament Studies) was awarded the Pieter van Drimmelen Medal by the South African Academy for Science and Arts.

FACULTY OF LAW

RATED RESEARCHERS

4

RESEARCH FELLOWS

10

POSTDOCTORAL FELLOWS

1

PUBLICATION OUTPUT UNITS

35.75
2016

46.83
2017

RESEARCH CENTRES/CHAIRS

- Free State Centre for Human Rights

DEAN
PROF CAROLINE NICHOLSON

ACHIEVEMENTS AND RECOGNITION

2016

The Faculty of Law established the **Free State Centre for Human Rights**.

Prof Beatri Kruger (Department of Public Law) participated in the Counter Trafficking Summer School of the Cambridge Centre or Applied Research in Human Trafficking. She presented, via Skype, on some of the burning issues on human trafficking in Africa.

Advocate Loyiso Makapela was nominated as one of the top 200 Mail and Guardian Young Achievers of 2016 in the category of Education.

2017

The **Faculty of Law**, in conjunction with the International Association of Women Judges (IAWJ) South Africa Charter, hosted a gala dinner to raise awareness on the development programmes in which women judges in South Africa, and specifically in the Free State, are involved.

Marius Botha, who has played a significant role in financial planning in South Africa, was awarded an honorary LLD.

Dr Denine Smit (Department of Mercantile Law), together with her doctoral candidate, Dr D Viviers, co-published a book *Vulnerable Employees*.

FACULTY OF THE HUMANITIES

RATED RESEARCHERS

42

RESEARCH FELLOWS

39

POSTDOCTORAL FELLOWS

52

PUBLICATION OUTPUT UNITS

256.73	298.46
2016	2017

RESEARCH CENTRES/CHAIRS

- Centre for Gender and Africa Studies
- Centre for Health Systems Research and Development
- International Studies Group
- Unit for Language Facilitation and Empowerment
- Unit for Professional Training and Service in the Behavioural Sciences

ACTING DEAN
PROF ROBERT PEACOCK

ACTING DEAN
PROF MILAGROS RIVERA

ACHIEVEMENTS AND RECOGNITION

2016

Dr Stephanie Cawood (Centre for Africa Studies) was awarded the prestigious British Academy Newton Advanced Fellowship. The grant enabled her, in partnership with Dr Jonathan Fisher of the University of Birmingham, to conduct research comparing how liberation struggles have been memorialised in South Africa and Uganda, analysing the relationship between memory, space, and power. Dr Cawood was also offered a visiting research fellowship at the African Studies Centre Leiden from April to June 2016.

Max du Preez, one of South Africa's leading journalists and political analysts, was awarded an honorary doctorate.

Prof Pieter Duvenage (Department of Philosophy) published a book *Afrikaanse Filosofie: Perspektiewe en Dialoë*, the first-ever publication to cover a century of Afrikaans philosophy.

Ferial Haffajee, newspaper editor and one of the most prominent journalists in South Africa, received an honorary doctorate.

Zubeida Jaffer, writer in residence in the Department of Communications Science, published the book *Beauty of the Heart: The Life and Times of Charlotte Mannya Maxeke*. The book launch was hosted by the UFS Sasol Library, as part of its book launch programme, which fosters dialogue between students and authors.

André Janse van Rensburg (Centre for Health Systems Research and Development) was selected to become part of the Emerging Voices for Global Health (EV4GH), a group of young, promising health policy and systems researchers, decision-makers and other health system professionals. As an EV4GH alumnus, he will become part of the Health Systems Global Network. His research has focused on the implementation of the Integrated School Health Programme (ISHP) in rural South Africa.

Prof Nico Luwes (Department of Drama and Theatre Arts) received the National Arts Council Award for Play Productions at National Festivals.

Dr Elias Malete (Department of African Languages) published a Sesotho text editing book *Metheo ya ditokiso tsa sengolwa: Boitsebelo le tshebediso*.

Prof Iri Manase (Department of English) published a monograph *White Narratives: The Depiction of post-2000 Land Invasions in Zimbabwe*.

The Odeion School of Music produced a book, edited by **Prof Martina Viljoen**, *Musics of the Free State: Reflections on a Musical Past, Present, and Future*.

Prof Joel Samoff, Professor in Africa Studies at Stanford University, was awarded an honorary D. Phil.

Prof Hussein Solomon (Department of Political Studies and Governance) was appointed to the Editorial Board of the *Afro-Arab Social and Economic Review*, the flagship journal of the United Nations Economic Commission for Africa (UNECA). His book *Islamic State and the Coming of Global Confrontation*, published by Paalgrave in London, is the most comprehensive book on the Islamic State, covering issues such as their historical origins, ideology, use of social media, recruitment strategies, and military strategies and tactics.

Dr Daniel Spence (International Studies Group and member of the Vice-Chancellor's Prestige Scholar's Programme) was awarded the NRF P-rating, becoming the first South African historian to be rated in this category. A P-rating is awarded on the basis of exceptional research performance and output from a researcher's doctoral and early postdoctoral research career.

Prof André Wessels (Department of History) was invited to be guest editor the November 2016 edition of *New Contree*, dealing with the history of the Free State province.

Dr Christian Williams (Department of Anthropology) was the recipient of the UFS Book Prize for Distinguished Scholarship.

2017

Prof Jan Coetzee (Department of Sociology) and **Dr Asta Rau** (Centre for Health Systems Research and Development) co-edited the 14-article Special Edition of *Qualitative Sociology Review* Vol XIII(1), titled *The Narrative Study of Lives in Central South Africa*. The articles represent research undertaken within the UFS postgraduate programme *The Narrative Study of Lives*.

Samson Diamond (Odeion String Quartet) was invited as leader of the second violins of the Chineke! Orchestra during two performances in August 2017 at the Snape Maltings in Aldeburgh and at the BBC Proms at the Royal Albert Hall in London.

Prof Nico Luwes (Department of Drama and Theatre Arts) received the National Arts Council Award for writing and production of *Is die bar al oop?* at Innibos Arts Festival 2017. He also received the Pacofs Award for adapting and directing *Cry the beloved country*.

Dr Jared McDonald (Department of History – Qwaqwa) was appointed Editor-in-Chief of *Historia*, one of the leading history journals in South Africa.

Prof Naomi Morgan (Department of Afrikaans and Dutch, German and French) presented her inaugural lecture in November 2017 on the subject "Van Frans na Afrikaans: 100 Jaar van byna eenrigting-vertaalverkeer".

The Odeion School of Music Camerata received first prize at the 2017 International Ictus Music Competition in the USA in the category for Conservatory and University Orchestra.

Prof Robert Peacock (Department of Criminology) served on the scientific committees of two international conferences (Serbia and Hong Kong), focusing respectively on the themes of Victims of Crime, and Abuse of Power, Human Security, Rights and Justice.

Dr Burgert Senekal (Unit for Language Facilitation and Empowerment) in conjunction with various Afrikaans organisations, received the South African Heritage Function award in Digital Heritage Conservation for *The digitalisation of Afrikaner heritage*.

Prof Jaap Steyn (Department of Afrikaans and Dutch, German and French) was awarded the Jan H Marais Prize for his outstanding contribution to Afrikaans. The award was jointly made to Prof Steyn and Prof Jan van der Watt of Nijmegen from the Netherlands.

Dr Chitja Twala (Department of History) received the National Institute for Humanities and Social Sciences Grant for hosting the Free State History Colloquium.

The **Unit for Language Facilitation and Empowerment** hosted the fourth International Symposium on Place Names at the University of Namibia in September 2017, in conjunction with the Joint IGU/ICA Commission on Toponymy. The Unit also established the International Consortium of Universities for Toponymic Education (ICUTE) in conjunction with the Joint IGU/ICA Commission on Toponymy. The four funding universities are the UFS, the Federal University of Rio de Janeiro, the Austrian Academy of Science, and the Sapienza Universitā di Roma, with the UFS as the administrative base.

On the initiative of **Prof Albert Weideman** (Research Fellow in the Unit for Language Facilitation and Empowerment), the Network of Expertise in Language Assessment (Nexla) was established for the purpose of promoting and developing the field of language testing in South Africa.

FACULTY OF HEALTH SCIENCES

RATED RESEARCHERS

10

RESEARCH FELLOWS

2

POSTDOCTORAL FELLOWS

10

PUBLICATION OUTPUT UNITS

86.52	80.59
2016	2017

RESEARCH CENTRES/CHAIRS

- Future Impact Today
- Robert Frater Cardiovascular Research Centre
- Christo Strydom Metabolic Unit
- SARChI Chair in Vector-borne and Zoonotic Pathogens

DEAN
PROF GERT VAN ZYL

ACHIEVEMENTS AND RECOGNITION

2016

Prof Yvonne Botma (School of Nursing) was inducted into the Hall of Fame for Research Excellence in Nursing at the 27th FUNDISA International Nursing Research.

Prof Paul Pretorius (Department of Psychiatry) was appointed to the Scientific Committee of the 2016 International Congress of the World Psychiatric Association.

Prof Chris Viljoen (Department of Haemotology and Cell Biology) delivered his inaugural address in September 2016 on the subject "Are you really going to eat that?"

2017

The **Department of Haematology and Cell Biology** forms part of UNEP-GEF funded six-country project involving Angola, Democratic Republic of Congo, Lesotho, Madagascar, Malawi and Mozambique to strengthen institutional capacities on LMO testing in support of national decision-making (MCP-ICLT). Prof Chris Viljoen was appointed as technical advisor to the project.

Prof Felicity Burt (School of Pathology) delivered her inaugural address in September 2017 on the subject "Catching a virus".

Annamarie van Jaarsveld (Department of Occupational Therapy) received the Discovery Clinical Excellence Award 2017 South African Institute for Sensory Integration prize for research at the Regional International Meeting for Autism Research and the South African Association of Child and Adolescent Psychiatry and Allied Professions Congress.

Prof Corinna Walsh (Department of Nutrition and Dietetics) delivered her inaugural address in October 2017, on the subject "Nutrition in transition".

FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

RATED RESEARCHERS

75

RESEARCH FELLOWS

25

POSTDOCTORAL FELLOWS

85

PUBLICATION OUTPUT UNITS

372.05	320.02
2016	2017

RESEARCH CENTRES/CHAIRS

- Institute for Groundwater Studies
- Centre for Sustainable Agriculture
- Centre for Environmental Management
- Disaster Management Training and Education Centre for Africa
- SADC Groundwater Management Institute
- SARChI Chair in Solid State Luminescent and Advanced Materials
- SARHI Chair in Disease Resistance and Quality in Field Crops

DEAN
PROF DANIE VERMEULEN

ACHIEVEMENTS AND RECOGNITION

2016

Prof Abdon Atangana (Institute for Groundwater Studies) received the prestigious Sentinels of Science Award 2016, which honours the highest achievers in peer review across the world's journals. Recipients are honoured for demonstrating an outstanding expert commitment to protecting the integrity and accuracy of published research in their field. He is editor of 17 international journals, editor-in-chief of two international journals, and reviewer for more than 200 accredited journals.

Dr Susanna Bonnet and **Dr Anke Wilhelm** (Department of Chemistry) were involved in an EU-funded Seventh Framework Programme project on hERFscreen-hERG-related risk assessment of botanicals.

Dr Desiré Dalton (Department of Genetics) was awarded the National Zoological Garden (NZG) prize for research excellence.

Dr Francois Deacon's (Department of Animal, Wildlife, and Grassland Sciences) research was key to the announcement by the International Union for the Conservation of Nature (IUCN) that giraffes are now classified as "Vulnerable". He was the lead author responsible for the submission of the Southern African Giraffe subspecies status report that was submitted for review by the IUCN.

Prof Francis Dejene (Department of Physics – Qwaqwa) delivered his inaugural address in May 2016 on the subject "Light energy in service of mankind – from nanoscale to microscale".

Dr Karen Ehlers (Department of Genetics) was appointed as group leader of the Systems Report and Gap Analysis subcommittee of the National Forensic Oversight and Ethics Board (NFOEB).

Prof Johan Grobbelaar (Department of Plant Sciences) was invited to join a group of scientists at the Institute for Bio- and Geo-Sciences of the Research Centre at Jülich in Germany, where microalgae are used for lipid production, and then converted to kerosene for the aviation industry. The project is probably the first of its kind to address bio-fuel production from microalgae on such a large scale.

PHOTO: WIKIMEDIA COMMONS

Prof Paul Grobler (Department of Genetics) was appointed as Affiliated Professor in the Department of Fish and Wildlife Conservation at Virginia Tech University, USA.

With its accreditation in March 2016 by the South African National Accreditation System (SANAS) the **Institute for Groundwater Studies** (IGS) laboratory now officially meets global standards and is on an equal standing with international testing laboratories.

Prof Maryke Labuschagne (Department of Plant Sciences) received the Continental Lifetime Achiever Award for Education and Training from Africa's Most Influential Women in Business and Government.

Prof Aliza le Roux (Department of Zoology and Entomology – Qwaqwa) was selected to be part of the Africa Science Leadership Programme, an initiative that seeks to create an African network of scientific leaders across disciplinary boundaries.

Dr Gerda Marx (Department of Genetics) was elected to serve on the executive committee of the Society for Endocrinology, Metabolism and Diabetes (SEMDSA).

Prof Zakkie Pretorius (Department of Plant Sciences) received the prestigious Grain Producer of the Year Inspiration Award, presented to individuals or organisations in appreciation of excellent contributions to the grain industry.

Prof Hendrik Swart (Department of Physics) and **Prof Abdon Atangana** (Institute for Groundwater Studies) were nominated as the top performers at the UFS.

Dr Weldemichael Tesfuhuney (Department of Soil, Crop and Climate Sciences) contributed as a crop modeller to the second phase of the Southern Africa Agricultural Model Intercomparison and Improvement Project (SAAMIP), involving a multidisciplinary and multi-institutional team from five southern African countries.

2017

Prof Abdon Atangana (Institute for Groundwater Studies) received the African award of Applied Mathematics at the International Conference "African Days of Applied Mathematics" in Morocco in November 2017. He delivered the opening speech titled *Africa was a temple of knowledge before: What happened?*

Prof Paul Holloway, an internationally acclaimed expert in the science and technology of surfaces, thin films, and nanoparticles, was awarded an honorary doctorate in physics.

Dr Elizaveta Kovaleva (Department of Geology) won the European Geological Union (EGU) photo contest at the EGU General Assembly, with a photo "Movement of the ancient sand".

Prof Maryke Labuschagne (Department of Plant Sciences) was re-elected as the South African representative to the American Association of Cereal Chemists.

Tshiamo Legoale, a Masters student in the Centre for Environmental Management, was named the FameLab Champion at the Cheltenham Science Festival in the UK in July 2017. Her research is on how to use wheat plants to harvest gold from mine dumps.

Prof Rodney Moffett (Department of Plant Sciences – Qwaqwa) published his third book on plants used by the Basotho. *Basotho Medicinal Plants – Meriana ya Demela Tsa Basotho* deals only with medicinal uses, and is based on data from his first book *Sesotho Plant and Animal Names and Plants used by the Basotho.*

Dr Thulisile Mphambukeli (Department of Urban and Regional Planning) was invited to form part of the South African delegation of experts to attend the 2017 BRICS Academic Forum in Fuzhou, China. She was also awarded a research grant by the South African BRICS Think Tank to spearhead a research project between BRICS universities.

The **SARChI Chair in Solid State Luminescent and Advanced Materials** was renewed for a further five years.

More than 5000 minerals have been certified by the International Mineralogical Association (IMA). One of these minerals, tredouxite, was recently named after **Prof Marian Tredoux** (Department of Geology), in acknowledgement of her almost 30 years' commitment to figuring out the geological history of the rock in which this mineral occurs. The name was chosen by the team which found and identified the new mineral, from the Barberton region. The chemical composition of tredouxite is NiSb206 (nickel antimony oxide).

Dr Angie van Biljon (Department of Plant Sciences) was elected president of Cereal Science and Technology South Africa (CST-SA).

FACULTY OF EDUCATION

RATED RESEARCHERS

5

RESEARCH FELLOWS

9

POSTDOCTORAL FELLOWS

6

PUBLICATION OUTPUT UNITS

41.43
2016

49.11
2017

RESEARCH CENTRES/CHAIRS

- SANRAL Chair in Mathematics, Natural Sciences and Technology Education
- SARChI Chair in Higher Education and Human Development

DEAN
PROF LOYISO JITA

ACHIEVEMENTS AND RECOGNITION

2016

Dr Lynette Jacobs (School of Education Studies) secured a grant through the Flemish Association for Development Cooperation and Technical Assistance (VVOB) to undertake participatory research to describe the work that mobile libraries do and to apprise their influence on learners and schools.

Thabo Sithole, a PhD student, was the recipient of a prestigious award during the provincial National Teaching Awards in November 2016. He was recognised for excellence in teaching physical sciences, using a variety of strategies to appeal to the different abilities of learners. His work also focuses on clustering childhood development centres to work together in order to enhance the preparedness of learners entering primary school.

2017

The **SARChI Chair in Higher Education and Human Development** secured funding for another five years, following a favourable evaluation by the South African Research Chairs Initiative.

RATED RESEARCHERS

RESEARCHER	DEPARTMENT/AFFILIATION	RATING
Adeniyi, A	Department of Chemistry	Y
Albertyn, J	Department of Microbial, Biochemical and Food Biotechnology	C
Atangana, A	Institute for Groundwater Study	Y
Basson, L	Department of Zoology and Entomology	C
Beelders, TR	Department of Computer Science and Informatics	Y
Bezuidenhoudt, BCB	Department of Chemistry	C
Botma, Y	School of Nursing	C
Bragg, RR	Department of Microbial, Biochemical and Food Biotechnology	C
Breshears, DL	Department of Sociology	Y
Brown, SC	Department of Pediatric Surgery	C
Burger, P	Department of Economics	C
Burt, FJ	Department of Medical Virology	C
Cilliers, L	Department of Classical and Near Eastern Studies	C
Coetsee-Hugo, E	Department of Physics	Y
Coetzee, JK	Department of Sociology	C
Cohen, AP	International Studies Group	Y
Conradie-Bekker, MM	Department of Chemistry	Y
Conradie, J	Department of Chemistry	C
Conradie, MS	Department of English	Y
De Freitas, S	Department of Public Law	C
De Villiers, PGR	Department of Old and New Testament Studies	C
De Wet, JC	Department of Communication Science	C
De Wet, NC	South Campus	C
Dejene, FB	Department of Physics	C
Du Plessis, LT	Unit for Language Facilitation and Empowerment	C
Du Preez, CC	Department of Soil, Crop and Climate Sciences	C
Du Preez, JC	Department of Microbial, Biochemical and Food Biotechnology	C
Du Toit, JS	International Studies Group	C
Duvenage, PNJ	Department of Philosophy	C
Erasmus, E	Department of Chemistry	Y

RESEARCHER	DEPARTMENT/AFFILIATION	RATING
Esterhuyse, KGF	Department of Psychology	C
Finkelstein, MS	Department of Mathematical Statistics and Actuarial Science	A
Franke, AC	Department of Soil, Crop and Climate Sciences	C
Gauert, CDK	Department of Geology	C
Glenn, IE	Department of Communication Science	C
Goedhals, D	Department of Medical Microbiology	Y
Gordon, RJ	Department of Anthropology	C
Grobbelaar, JU	Department of Plant Sciences	B
Grobler, JP	Department of Genetics	C
Gryzenhout, M	Department of Plant Sciences	Y
Haddad, CR	Department of Zoology and Entomology	Y
Heideman, NJL	Department of Zoology and Entomology	C
Henning, JJ	Department of Mercantile Law	B
Heunis, JC	Centre for Health Systems Research and Development	C
Holmes, PJ	Department of Geography	C
Hugo, CJ	Department of Microbial, Biochemical and Food Biotechnology	C
Jansen, JD	Top Management	A
Kigozi, NG	Centre for Health Systems Research and Development	Y
Koorts, L	International Studies Group	C
Kotze, M	Department of Industrial Psychology	C
Kroon, RE	Department of Physics	C
Kroukamp, HJ	Faculty of Economic and Management Sciences	C
Labuschagne, MT	Department of Plant Sciences	C
Le Roux, A	Department of Zoology and Entomology	Y
Le Roux, JJ	Department of Geography	Y
Le Roux, PAL	Department of Soil, Crop and Climate Sciences	C
Litthauer, D	National Control Laboratory for Biological Products	C
Louw, DA	Department of Psychology	C
Luyt, AS	Department of Chemistry	B
Makgalwa, MM	School of Education Studies	Y
Makombe, R	Department of English	Y
Manase, I	Department of English	C
Marais, J	Department of Linguistics and Language Practice	C
Marais, JGL	Centre for Development Support	C
Meintjes, PJ	Department of Physics	B
Meiring, SM	Department of Haematology and Cell Biology	C
Meyer, JH	Department of Mathematics and Applied Mathematics	B
Miller-Naude, CL	Department of Hebrew	B
Morgan, N	Department of Afrikaans, Dutch, German and French	C
Mudzi, WM	Postgraduate School	Y

RESEARCHER	DEPARTMENT/AFFILIATION	RATING
Mukwada, G	Department of Geography	C
Müller, E	Department of Chemistry	Y
Naude, JA	Department of Hebrew	B
Naude, L	Department of Psychology	C
Ndlovu, M	Department of Zoology and Entomology	Y
Neethling, J	Department of Private Law	B
Neethling, TG	Department of Political Studies and Governance	C
Neser, FWC	Department of Animal, Wildlife and Grassland Sciences	C
Noble, JA	Department of Architecture	C
O'Neill, HG	Department of Microbial, Biochemical and Food Biotechnology	C
Olivier, G	Department of Philosophy	B
Opperman, DJ	Department of Microbial, Biochemical and Food Biotechnology	Y
Osthoff, G	Department of Microbial, Biomedical and Food Biotechnology	C
Peacock, R	Department of Criminology	C
Pelser, AJ	Department of Sociology	C
Peters, WH	Department of Architecture	C
Pilosoff, R	International Studies Group	Y
Pohl-Albertyn, CH	Department of Microbial, Biochemical and Food Biotechnology	C
Prakash, J	Department of Physics	Y
Pretorius, JC	Department of Soil, Crop and Climate Sciences	C
Pretorius, ZA	Department of Plant Sciences	B
Prins, R	Department of Plant Sciences	C
Purcell, W	Department of Chemistry	C
Rae, WID	Department of Medical Physics	C
Rivera, M	Department of Communication Science	C
Roelofse, F	Department of Geology	Y
Roodt, A	Department of Chemistry	C
Roos, ND	International Studies Group	C
Roos, WD	Department of Physics	C
Rossouw, JH	Department of Philosophy	C
Scott, L	Department of Plant Sciences	B
Seedat, RY	Department of Otorhinolaryngology	C
Senekal, B	Unit for Language Facilitation and Empowerment	C
Smit, GN	Department of Animal, Wildlife and Grassland Sciences	C
Smit, MS	Department of Microbial, Biochemical and Food Biotechnology	C
Smith , BS	Department of Private Law	C
Snyman, HA	Department of Animal, Wildlife and Grassland Sciences	C
Snyman, SD	Department of Old and New Testament Studies	C
Solomon, H	Department of Political Sciences	C
Spence, D	International Studies Group	P

RESEARCHER	DEPARTMENT/AFFILIATION	RATING
Steenhuisen, SL	Department of Plant Sciences	Y
Steyn-Kotze, J	Centre for Gender and Africa Studies	Y
Strauss, HJ	Department of English	Y
Strauss, PJ	Department of Historical and Constructive Theology	C
Swart, HC	Department of Physics	B
Swarts, JC	Department of Chemistry	C
Terblans, JJ	Department of Physics	C
Thomas, K	Institute for Reconciliation and Social Justice	C
Tolmie, DF	Department of Old and New Testament Studies	C
Urbaniak, JM	Department of Historical and Constructive Theology	Y
Valverdi, A	Department of Microbial, Biochemical and Food Biotechnology	C
Van Coller, HP	Department of Afrikaans, Dutch, German and French	C
Van den Berg, JA	Department of Practical and Missional Theology	C
Van der Merwe, AJ	Department of Mathematical Statistics and Actuarial Science	C
Van Heerden, E	Department of Microbial, Biochemical and Food Biotechnology	C
Van Huyssteen, CW	Department of Soil, Crop and Climate Sciences	C
Van Rensburg, HCJ	Centre for Health Systems Research and Development	C
Van Rensburg, LD	Department of Soil, Crop and Climate Sciences	C
Van Staden, A	Unit for Language Facilitation and Empowerment	C
Van Tol, JJ	Department of Soil, Crop and Climate Sciences	Y
Van Wyk, JB	Department of Animal, Wildlife and Grassland Sciences	C
Van Wyk, PWJ	Centre for Microscopy	C
Van Zyl, JM	Department of Mathematical Statistics and Actuarial Sciences	C
Vermeulen, PD	Faculty of Natural and Agricultural Sciences	C
Verster, A	Department of Mathematical Statistics and Actuarial Science	Y
Verster, P	Department of Practical and Missional Theology	C
Vetrik, T	Department of Mathematics and Applied Mathematics	Y
Viljoen, CD	Department of Haematology and Cell Biology	C
Viljoen, M	Odeion School of Music	C
Visser, B	Department of Plant Sciences	C
Visser, HG	Department of Chemistry	C
Von Eschwege, KG	Department of Chemistry	C
Walker, MJ	Centre for Research on Higher Education and Development	A
Walker, S	Department of Soil, Crop and Climate Sciences	C
Walker, SP	Unit for Professional Training and Services in the Behavioural Sciences	C
Walsh, CM	Department of Nutrition and Dietetics	C
Weideman, AJ	Department of Linguistics and Language Practice	C
Wessels, A	Department of History	C
Wilson-Strydom, M	Centre for Research on Higher Education and Development	C
Witthuhn, RC	Top Management	C

VICE-CHANCELLOR'S PRESTIGE SCHOLARS

In 2010, the Vice-Chancellor's Prestige Scholars' Programme (PSP) was launched in response to mounting concern over the ageing profile of South African academics and an urgent need to transform the social composition of the academy. The PSP supports the accelerated scholarship of permanently appointed junior UFS academic staff in the first five- to eight-years post-PhD. After rigorous selection, based on criteria analogous to the upper-level NRF Y1- and P-rating categories, the scholars participate in an intensive, yet individualised programme of support that includes international placement and dedicated mentorship. Staff members who have been beneficiaries of the PSP are:

PRESTIGE SCHOLAR	DEPARTMENT/AFFILIATION	YEAR OF INTAKE
Alsemgeest, Liezel	Centre for Financial Planning Law	2011
Ashafa, Tom	Plant Sciences	2013
Beelders, Tanya	Computer Science and Informatics	2013
Boucher, Charlotte	Microbial, Biochemical and Food Biotechnology	2015
Brink, Alice	Chemistry	2013
Cawood, Steffie	Centre for Gender and Africa Studies	2013
Coetsee, Liza	Physics	2011
Coetzee, Johan	Economics	2013
Conradie-Bekker, Marianne	Analytical Chemistry	2015
De Wet, Katinka	Sociology	2011
Erasmus, Lizette	Chemistry	2011
Goedhals, Dominique	Medical Microbiology and Virology	2015
Haddad, Charles	Zoology and Entomology	2013
Jama, Mpho	Student Development and Support	2011
Janse van Rensburg, Walter	Haematology and Cell Biology	2015
Jordaan, Henry	Agricultural Economics	2013
Joubert, Lize	Plant Sciences	2015
Kigozi, Gladys	Centre for Health Systems Research & Development	2013
Koao, Lehlohonolo	Physics	2015

PRESTIGE SCHOLAR	DEPARTMENT/AFFILIATION	YEAR OF INTAKE
Le Roux, Aliza	Zoology and Entomology	2013
Marx, Gerda	Molecular Genetics	2011
Masakure, Clement	Centre for Gender and Africa Studies	2015
Matebesi, Zaccheus	Sociology	2011
Matthews, Nicolette	Agricultural Economics	2015
Mould, Kenneth	Private Law	2015
Mphambukeli, Thulisile	Urban and Regional Planning	2015
Mwaninki, Munene	Linguistics and Language Practice	2011
Ngara, Kudzayi	English	2015
Ngara, Rudo	Plant Sciences	2015
Ogundeji, Abiodun	Agricultural Economics	2011
Opperman, Dirk	Microbial, Biochemical and Food Biotechnology	2011
Pilossof, Rory	International Studies Group	2015
Rauch-Van der Merwe, Tania	Occupational Therapy	2011
Roelofse, Freddie	Geology	2013
Schutte-Smith, Marietjie	Chemistry	2013
Sebolai, Olihile	Microbial, Biochemical and Food Biotechnology	2011
Shaw, William	Medical Physics	2015
Smith, Bradley	Private Law	2011
Strauss, Helene	English	2011
Thom-Wium, Matildie	Odeion School of Music	2013
Twala, Chitja	History	2011
Van den Berg, Cilliers	Afrikaans and Dutch, German and French	2011
Van Soelen, Brian	Physics	2013
Van Zyl, Paulina	Pharmacology	2011
Verster, Andrehette	Mathematical Statistics and Actuarial Science	2011
Visser, Jo-Mari	Law of Criminal Procedure & Law of Evidence	2013
Von Maltitz, Michael	Mathematical Statistics	2015
Wahl, WP	Student Affairs	2015
Wilhelm, Anke	Chemistry	2015
Williams, Christian	Anthropology/Institute for Reconciliation & Social Justice	2015
Wilson-Strydom, Merridy	Centre for Research on Higher Education and Development	2013

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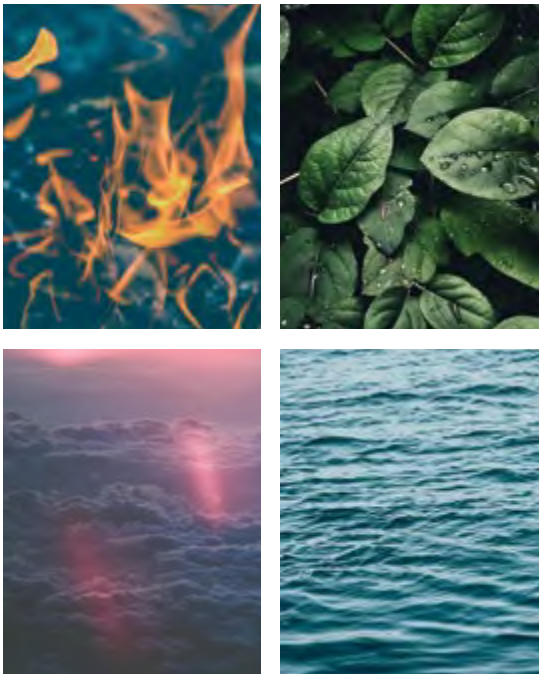

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YUNIVESITHI YA
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