

NSTF-SOUTH32 AWARDS

2021/2022



Brought to you by: National Science And Technology Forum

Welcome to the 2021/2022 NSTF-South32 Awards digital magazine – celebrating the achievements of some of South Africa’s most tenacious scientists and big thinkers.

A partnership between the National Science and Technology Forum (NSTF) and mining and metals company South32, these prestigious annual awards recognise outstanding contributions to science, engineering, technology (SET) and innovation.

Brought to you by IOL and produced by the Brandstories team together with the NSTF, this commemorative digimag showcases all the 2021/2022 winners and the work they are doing to help address the most pressing scientific, social and economic challenges of our time.

Also featured is a selection of the finalist institutions that are playing a significant role in ensuring that scientific enquiry is nurtured, supported and enhanced.

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BRANDSTORIES

Content & Co-ordination: MaryAnne Isaac | Design: Robyn Toni Fynn | Editor: Linda Zakas

Today's research, tomorrow's innovation

ANNUALLY, the National Science and Technology Forum (NSTF) partners with mining and metals company South32 to honour and celebrate outstanding contributions to science, engineering, technology (SET) and innovation at the NSTF-South32 Awards.

The NSTF-South32 Awards is South Africa's "Science Oscars" and has grown to be the largest and most prestigious public SET and innovation awards in the country.

The 2021/2022 NSTF-South32 Awards – celebrated under the theme "basic sciences for sustainable development" – took place on July 21, 2022. The theme is in line with this year's international theme proclaimed by the United Nations: International year of Basic Sciences For Sustainable Development.

The prestigious NSTF-South32 Awards ceremony took place simultaneously in Johannesburg and Cape Town, with a live broadcast via the NSTF YouTube channel. The keynote speaker was Higher Education, Science and Innovation Deputy Minister Buti Manamela, standing in for the awards patron Blade Nzimande.

The NSTF Awards were established in 1998 to recognise SET-related professionals, teams and organisations in South Africa. This includes scientists, engineers, innovators, science communicators, engineering capacity developers and organisational managers/leaders, as well as data and research managers.

Speaking at the awards ceremony, NSTF chairperson Professor Ali Dhansay used his welcoming address to congratulate winners and finalists.

"Congratulations to the award winners and finalists. Thank you for your superb contribution to SET in South Africa. Thank you also to the nominees and the host institutions for nurturing practitioners in SET," said Dhansay.

Deputy Minister Buti Manamela, whose department is one of the founding sponsors of the NSTF-South32 Awards, praised the awards and the NSTF for the work they do focusing on the youth and community outreach projects.

"I am particularly pleased by the emphasis on young people and community outreach in the various awards categories. Since its inception, the NSTF has been doing important work as a unified voice for the SET and innovation community in our country. The NSTF has also been a key participant in the evolution of the department," Manamela said.

He added that platforms like the NSTF-South32 Awards are important in recognising the impact of members of the science community.

"It does not require a science degree to appreciate the danger of having a scientific community that believes that science must not actively concern itself with the well-being

of or sustainability of human life. We need more socially conscious scientists and innovators. I believe that platforms such as the NSTF-South32 Awards are useful in helping us identify and support such scientists and innovators."

The finalists and awardees were honoured, announced and celebrated. It is an honour to be nominated, an achievement to reach the finals and an exceptional milestone of excellence to be a winner.

[Click here to view a recording of the awards ceremony.](#)



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A lifetime dedicated to vaccines that save lives

Shabir Madhi, professor of vaccinology and dean of the faculty of health sciences at the University of the Witwatersrand.

It is a cold Wednesday morning as Shabir Madhi makes his way through the boom gates of the Chris Hani Baragwanath Academic Hospital in Soweto, Johannesburg. To first time entrants, the world's third largest hospital presents a frustrating labyrinth of dead ends and wrong turns.

However, having made the same journey each day for more than 25 years, Madhi navigates the roads with ease. Just a short drive from the Clinic Road entrance lies the home of the Wits Vaccines and Infectious Diseases Analytics Research unit (Wits-VIDA), where South Africa and Africa's first Covid-19 vaccine trials (Oxford/AstraZeneca and Novavax Covid-19 vaccine) took place.

On first inspection, one could be forgiven for thinking that the tall and stark building, which is visible from any vantage point in the hospital precinct, would be best suited as the backdrop for a dystopian movie. However, appearances can be deceiving as one soon learns when engaging with Madhi. As the director of Wits-VIDA, in addition to his role as dean of the faculty of health sciences and professor of vaccinology at Wits University, Madhi wears multiple hats with a rare mix of idealism and pragmatism.

As a National Research Foundation A-rated scientist and paediatrician, Madhi's research has focused on the epidemiology and clinical development of vaccines against pneumonia and diarrhoeal disease, as well as vac-

cines for pregnant women to protect the mother and her child. These studies have informed the World Health Organization's recommendations on the use of the lifesaving pneumococ-



Professor Shabir Madhi received the prestigious 2022 NSTF-South32 Lifetime Award.

cal conjugate vaccine, rotavirus vaccine in children and flu vaccination of pregnant women.

In 2020, the focus of Madhi's research necessarily pivoted to Covid-19 vaccines. Never one to shy away from controversy, Madhi has been an outspoken, articulate and ardent advocate of Covid-19 vaccination, as well as for increased access to these and other vaccines in Africa. This is likely why, in quiet deference to his scientific and research prowess, colleagues and staff alike refer to him as "prof".

His demeanour, although reserved, is passionate when it comes to his work. Wits-VIDA days are crammed with two-hour long clinical trial meetings, alternating between Covid-19 and

maternal/paediatric studies, followed by updates from study co-ordinators and medical officers. Afternoons are set aside for surveillance and Covid-19 studies, in between conversations with students and management.

Since taking on the role of dean of the Wits faculty of health sciences, 18 months ago, Madhi has had to relinquish some of the time spent at Wits-VIDA. Although not as dynamic as the previous role, the deanship has afforded him the opportunity to influence change in a new way. Part of his strategic vision includes curriculum reform and establishing a Wits Infectious Diseases and Oncology Research Institute.

On accepting his NSTF-South32 Lifetime Achievement Award, Madhi said that the Covid-19 vaccines had saved an estimated 20 million lives. He dedicated his award to the 300 000 South Africans who lost their lives to Covid-19, partly due to the stymied national vaccine roll-out programme, and to the estimated 13 million people worldwide who succumbed to this now vaccine-preventable disease.

In 2021, Madhi received the South African Medical Research Council Platinum Medal Lifetime Achievement Award and the Academy of Sciences South Africa Science for Society Gold Medal. He serves on multiple international advisory committees, including the World Health Organization. He was executive director of the National Institute for Communicable Diseases (NICD) from 2011 to 2017.



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Training scholars in groundwater and water security

Professor Tamiru Abiye is a hydrogeologist at Wits University.

GROWING up in a poor, rural and water-stressed region gave a young Tamiru Abiye a personal view on humanity's most pressing problem – securing water for people to drink. Understanding and exploring the groundwater hidden inside rocks had attracted Abiye to hydrogeology. Today, Professor Tamiru Abiye is a National Research Foundation-rated scholar and winner of the 2021/22 NSTF-South32 TW Kambule Researcher Award.

Abiye has spent almost 33 years in the field of hydrogeology. Hydrogeology deals with the distribution and movement of groundwater in the soil and rocks of the Earth's crust. The last 15 years of Abiye's scholarship had focused on human capacity building. By training Master's and doctoral-level students to conduct groundwater projects, he aims to address water-related challenges in communities across Africa.

In South Africa, where climate change, water pollution and increasing populations challenge water security, his research and capacity building activities focus on groundwater as both solution and economic opportunity. Out of 26 public universities in South

Africa, only five offer hydrogeology at undergraduate and honours levels and accept Master's students for the MSc by dissertation. However, Wits is the only university in South Africa to offer MSc in Hydrogeology by coursework and research report. Since 2015, Wits has facilitated the enrolment of students from diverse backgrounds.

"Before my arrival at the school of geosciences, there was no MSc programme dedicated to hydrogeology. Since I started the programme, the annual intake now ranges from 8 to 13 students. Of my students that have graduated so far, 94.4% are black Africans with a female proportion of 27.1%," says Abiye.

Abiye has supervised more than 115 MSc and doctoral students, who are capable of conducting groundwater projects across South Africa and Africa.

His research has also identified cancer-causing, radio-active elements and toxic metals in the groundwater used by communities in gold and coal mining areas. Abiye's research has



Professor Tamiru Abiye is the recipient of the TW Kambule-NSTF Researcher Award.

revealed the sources of the chemical element radon – the inhalation of which causes lung cancer – present in radioactive water from mines in Johannesburg. Moreover, his research has found that building materials made from tailings, which are materials left over after the process of separating the valuable fraction from the uneconomic fraction of an ore, were also present.

"South Africa needs qualified manpower with high-level skills to address complex water supply problems through research-based solutions and this is the focus of my research. Water insecurity, as a result of poor water resource management, provokes protest and conflict. Skilled hydrogeology graduates can help improve water management and therefore contribute to sustainable development."

MANAGEMENT AWARD

SAHPRA wins at the NSTF-South32 Awards for exceptional management



From top left to right. SAHPRA executive committee: Gordon Mtakati, executive manager: human resources; Christelna Reynecke, COO; Regardt Gouws, CFO; Dr Boitumelo Semete-Makokotlela, CEO, and Portia Nkambule, CRO.

IMAGINE embarking on the role of CEO of a country's health products regulatory authority and taking office just a couple of months before a global pandemic struck? That was the challenge placed before Dr Boitumelo Semete-Makokotlela, who joined the South African Health Products Regulatory Authority (SAHPRA) in January 2020.

"I had to remain calm amid all the storms and had to learn to become comfortable making decisions based on the facts I had at the time – mindful that the rate of new information available changed daily in the early days of the pandemic," she says.

"I leaned on the resilience I have learned in my efforts

as an amateur triathlete, knowing well that I had to keep going and remain resolute on decisions made, despite threats and attacks from political parties and civil society, both professionally and personally."

Testament to her drive and passion for getting technologies to the public, Semete-Makokotlela, as the head of SAHPRA, successfully led the authorisation of several Covid-19 diagnostic tests, vaccines, and therapies in an effort to ensure that the regulator is an enabler.

To be able to implement these expeditiously, she had to champion collaboration with other regulators across the globe such as the US Food and Drug Administration (FDA), European Medicines Agency, Health Canada,





From left to right: Professor Helen Rees, SAHPRA board chairperson; Dr Boitumelo Semete-Makotlela, SAHPRA CEO, and Dr Obakeng Khaole, SAHPRA board vice-chairperson.

the Namibian Authority and the Ghana Food and Drug Authority (FDA), to name a few.

A partnership with the World Health Organization (WHO) was also critical in bringing best practices to the execution of the regulatory oversight for the Covid-19-related health products.

Semete-Makotlela also had to champion the development of an emergency use authorisation mechanism for public health emergency, which was not available at the time. Furthermore, collaborations with local academic institutions and others such as the National Health Laboratory Service (NHLS), the National Institute for Communicable Diseases (NICD) and the South African Medical Research Council (SAMRC) highly benefited due to the efforts of SAHPRA.

Her ability to network and lead collaborations enabled SAHPRA to access these relationships with the urgency required.

Capacity building is at the heart of Semete-Makot-

lela's efforts as she believes in empowering the next generation of future leaders. She has championed the appointment of younger external evaluators to support SAHPRA's regulatory processes, and in 2020, SAHPRA appointed 32 new young external evaluators from various institutions, as well as re-appointing 106 evaluators. Moreover, there was a strong focus on appointing black and female external evaluators. In 2021, together with other stakeholders, Semete-Makotlela implemented a regulatory clinical assessor training with faculty members from across the world. This programme was not limited to SAHPRA but included assessors from the Medicines Control Authority of Zimbabwe and the Ghana FDA.

Before joining SAHPRA, Semete-Makotlela was at the pinnacle of the establishment of the Council for Scientific and Industrial Research's (CSIR's) Innovation Hub's biotech incubator that housed and supported approximately 50 biotech companies.

Why metals matter in the modern world?

It was at a career fair in matric that Professor Sehliselo “Selo” Ndlovu first encountered metallurgical engineering and its relation to the mining of metals, and that almost everything around us has passed through some metallurgical process.

Ndlovu had always been drawn to mathematics, physics and inorganic chemistry in high school and was fascinated with processing different materials to make products.

“When I saw how chemical and physical characteristic of metals can be manipulated to extract metals from ores and move from a solid rock to a solid metal, I started connecting it to all that I had learnt in high school. I was captivated. I felt this was where I wanted to make a contribution in the future.”

Fast-forward to 30-odd years later, Ndlovu is now a professor of chemical and metallurgical engineering at Wits University and DSI/NRF SARCHI Research chairperson in hydrometallurgy and sustainable development. Ndlovu won the 2021/22 NSTF-South32 Engineering Research Capacity Development Award, which recognises an individual contribution to science, engineering and technology over the last five to 10 years. The award recognises Ndlovu’s work in hydrometallurgical engineering, which focuses on developing processes and building capacity to ensure a sustainable supply of metals for the extractive metallurgical indus-

try in future.

But why do metals matter? Metallurgical research, similar to Ndlovu’s, helps ensure that metals can continue to be extracted in future – metals that the South African and global economy rely on.

“My research in extractive metallurgy involves creating new knowledge, processes and technologies for the hydrometallurgical extraction of precious metals – platinum, palladium, gold, cobalt and vanadium – from mined ores.”

Ndlovu has also graduated more than 40 PhD and MSc students.

Some of Ndlovu’s research has been patented for future commercialisation and is evidence of her innovation. She engineered a novel process to recover platinum, palladium and rhodium from spent autocatalytic converters (SACs) – these are the richest platinum group metals secondary resource.

Ndlovu’s process bypasses the high energy smelting step commonly used and is purely hydrometallurgical. The chemicals used in the process effectively dissolve the metals at lower temperatures compared to the cur-



Professor Sehliselo (Selo) Ndlovu is the recipient of the NSTF Engineering Research Capacity Development Award.

rent process and practices in most existing recycling facilities.

The intellectual property generated in the project culminated in the establishment of a Wits affiliated spin-off company called AltMet, which is founded by an MSc student Ndlovu had supervised. The company is now on the radar of the Gauteng provincial government for location in the OR Tambo Platinum Special Economic Zone, currently under construction.

Ndlovu adds that metals matter due to its role in all the technological advancements around us.

“I think people tend to forget this and minimise the value of metals. This NSTF-South32 award says metals matter and, furthermore, those involved in extracting, processing and engineering metallic components also matter.”

ENGINEERING RESEARCH CAPACITY DEVELOPMENT AWARD

Sponsor: Eskom

Professor Thwala wins prestigious award for his engineering research

Professor Wellington Thwala received the NSTF-South32 Engineering Research Capacity Development Award from Higher Education, Science and Innovation Deputy Minister Buti Manamela.



THE University of South Africa's (Unisa) Professor Wellington Thwala was awarded the coveted NSTF-South32 Engineering Research Capacity Development Award for his impressive work in the area of sustainable construction management, digitalisation, design error containment and leadership within the built environment.

Thwala is a research professor at the department of civil engineering at Unisa's college of science, engineering and technology.

The category in which Thwala won recognises individuals or teams that have trained and guided significant numbers of diverse post-graduate

students, to the completion of both Master's and doctoral studies in engineering fields, at South African universities.

His work started as a response to the challenges that South Africa and the developing world still faces with its high levels of unemployment and poverty. Thwala's research focus is in the area of sustainable construction management, digitalisation, design errors containment, cost overruns and leadership in the built environment. His research in the last five to 10 years had demonstrated how design error containment and prevention through digitalisation in the built environment can improve infrastruc-

ture project performance, in order to minimise project cost overruns in mega infrastructure projects.

Moreover, his research has led to improved physical, economic and social infrastructure delivery for the benefit of South Africa, at large.

Thanking Unisa in his acceptance speech, Thwala singled out the outstanding support received from senior management. He also thanked the National Research Foundation for funding research and students at the university.

** By Philip van der Merwe, Editor, Department of Institutional Advancement.*



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NSTF-WATER RESEARCH COMMISSION (WRC) AWARD

Sponsor: WRC

Professor Evans Chirwa wins at the NSTF-South32 Awards



Water Research Commission CEO, Dr Jennifer Molwantwa and Higher Education, Science and Innovation Deputy Minister, Buti Manamela present Professor Evans Chirwa with the NSTF-South32 Water Research Commission Award.

THE University of Pretoria's (UP) academic Professor Evans Chirwa walked away with the NSTF-South32 Water Research Commission Award.

Chirwa, a professor and Rand Water Research chair: Water utilisation in the department of chemical engineering at UP, was awarded for his work on 'The introduction into South Africa of the use of biological analogues in advanced water treatment and water recovery with applications in metal-halide heterogeneous photocatalysis'.

On receiving this award, Chirwa said being nominated for the award alone had been an honour. "Being nominated for this award by the University of

Pretoria was the greatest recognition that I could receive, since I joined the university. My research group and I, based in the university's south campus, are overjoyed with this achievement. My postgraduate students work very hard every day and they are the true winners of this honour. My family supported and encouraged me through the process and I thank them from the bottom of my heart for the love and support."

UP vice-chancellor and principal, Professor Tawana Kupe, who attended the Johannesburg gala dinner in support of UP's nine finalists, expressed his pride in Chirwa's achievement.

"We are very proud that Professor Chirwa won an award at the NSTF

Awards. The depth, excellence and quality of his research and the fact that he is training a generation of students to do the same level of quality research, while not forgetting the impact and difference which his research makes to society, make us truly proud of him. We wish him well and may he go on to attain even greater success," said Kupe.

Prof Chirwa said he plans to continue working hard with new projects underway.

"We are still working on new projects for water treatments and the research group is growing. We hope that by next year, we will have doubled our graduates."



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UJ scholar bestowed with innovation award at the NSTF-South32 Awards

PROFESSOR Simon Connell, a professor of physics within the faculty of engineering and the built environment at the University of Johannesburg (UJ), was bestowed with the Innovation Award: Corporate Organisation at the 24th annual NSTF-South32 Awards. Led by Connell, the UJ Mining Positron Emission Tomography Research Group (MinPET) is a revolutionary fourth industrial (4IR) invention that detects diamonds in mined rock. The project represents technology transfer, R&D and innovation as a result of participation in fundamental research with the ATLAS experiment at the European Organisation for Nuclear Research (CERN). Connell founded this participation in South Africa in 2008, leading to SA's participation in the discovery of the Higgs Boson. Today, more than one hundred South African researchers and students are involved at CERN. "The project has worked in a laboratory in a full dress rehearsal with all its components integrated together, showing scalability to detect at least a 6mm diamond within a kimberlite rock of at most 100mm diameter, in a run-of-mine scenario with a throughput of 700 tons per hour. All its scaled-up components are also shown to work in separate contexts. "The technology partners, who can



Prof Simon Connell received the NSTF-South32 Innovation Award: Corporate Organisation from Higher Education, Science and Innovation Deputy Minister Buti Manamela.

build the components – the university, the venture capitalist and first customer – are engaged in de-risking work packages. The decision to build a commercial pilot is expected in February 2023.” MinPET’s early business case is expected to allow large diamonds to be recovered with much less damage. Many of the larger diamonds have evidence of recent breakage. As the recovery process involves a lot of crushing steps, many experts believe that this places larger diamonds at risk. With MinPET, which enables early discovery of diamond within kimberlite, the research team will finally know what nature has to offer in terms of large diamonds. “Even the Cullinan has a shattered rear side and could have been originally twice the size. MinPET is also ex-

pected to ultimately eliminate most of the energy intensive plant to reduce the need for water to eliminate the slimes dams. Diamond mining will become greener and cheaper with more diamonds to be found, and also less damaged diamonds. The world will run out of new sources of natural diamond long before it runs out of oil and coal. In fact, we can consider world diamond mining to be approaching the end of commercially viable life. However, MinPET will change that.”

Improving sensors, big data, artificial intelligence, detailed microscopic level simulations and faster computation are game changers. The low hanging fruit for an application in a sorting context is provided by diamonds in kimberlite.

“This is actually the extreme example of a rare object among waste. Once trialled here, the MinPET technology could also be applied in other areas. These include medicine, various other mining areas, homeland security, landmine recovery and many others. “We hope innovation is going to make a wealthier Africa. It will be the start of transforming universities to a culture of innovation, so that they become the African MIT’s and Harvards. Science and technology can play a role in building sustainability, democracy and decolonisation.”

Vuwani Science Resource Centre emerged victorious at NSTF-South32 Awards

UNIVEN's Vuwani Science Resource Centre, led by Dr Nnditshedzeni Eric Maluta, won the communication award for exceptional sharing and promotion of science, technology, engineering and mathematics (STEM).

This award recognises those who have made STEM accessible through innovative and remarkable programmes and approaches. Dr Maluta is the co-ordinator and team leader of the centre.

A team led by the vice-chancellor and principal, Dr Bernard Nthambeleni attended the NSTF-South32 Awards to support the award recipient.

"I am so happy and proud to represent the Vuwani Science Resource Centre (VSRC) team as a winner of the NSTF-South32 Communication Award. It has been a journey of engaging learners and the public on science-related matters, and a learning curve for me to communicate science to rural learners encouraging them to follow careers in science at institutions of higher learning, such as the



Higher Education, Science and Innovation Deputy Minister Buti Manamela (right) and award recipient Dr Eric Maluta.

University of Venda," said a cheerful Maluta.

Maluta dedicated the award to the late Professor Vaith Sankaran, who was his mentor in science communication.

When asked what attributed to his award, he said: "Vuwani Science Resource Centre is in the middle of communities which makes it unique in its science communications. We also host the Limpopo Indigenous Knowledge System Documentation Centre (IKSDC). The centre has embarked on science outreach programmes to different rural areas, where learners do

not have the knowledge of any science equipment.

"The schools do not have laboratories and learners are unable to identify what a thermometer is. The rural engagement of the learners and public is one of the key issues which had made us to win the award".

Dr Maluta is also a member of the Council of South African Institute of Physics (SAIP) and Commission 14: International Commission on Physics Education member, under the International Union of Pure and Applied Physics (IUPAP).

On the road to improved transport safety

Professor Marianne Vanderschuren, an international leader in the field of intelligent transport systems, won the NSTF-South32 2022 Special Annual Theme Award.



South Africa desperately requires a safe, secure, accessible and sustainable transport system. Using modelling, project assessment and tailor-made decision support tools, Professor Marianne Vanderschuren's research focuses on transport improvements for vulnerable road users - resulting in more than 5 000 lives being saved since 2009.

Prof Vanderschuren is an international leader in her field. Her considerable research outputs and capacity development initiatives have been recognised by her election as a Fellow of the South African Institution of Civil Engineering (SAICE), as a Fellow of the Institution of Civil Engineers UK (one of 63 in Africa), and by the DSI-NRF/CSIR Smart Mobility Research Chair award. For 2022, she was appointed President of SAICE. She holds a PhD in intelligent transport systems and an MSc in systems engineering and policy analysis, both from universities in the Netherlands. She is Deputy Dean for Transformation and Social Responsiveness in

the University of Cape Town's Faculty of Engineering, and is the only woman working as a full professor in the Department of Civil Engineering. "Road fatalities cost South African society more than R142 billion each year, which is 3.8% of the country's GDP," she explains. "Up to 60% of those fatalities are among the country's most vulnerable road users — pedestrians. My research in the Western Cape and around the country seeks to understand the causes of road fatalities, and to identify ways to reduce them."

Vanderschuren uses a unique combination of (big) data collection and analysis, macroscopic and mesoscopic modelling, assessment tool development and applications, as well as policy development and analysis to reduce the transport system externalities. Her research outputs include 28 journal papers, eight books, 16 book chapters, 68 peer-reviewed conference papers, and numerous other reports and publications.

She has also done groundbreaking

work on personal security for women who use public transport. Other successful projects include research into cyclists and passing behaviour; a strategic model assessment for sustainable rail transport that saved R75 million for the Western Cape Department of Transport and Public Works; and the Walkability app, which gathers information on the state of infrastructure, perceived road safety and personal security.

Vanderschuren is part of a consortium exploring sexual harassment in Africa's public transport systems. The project will deliver a unique decision support tool that provides implementation pathways for five types of stakeholders - public authorities, policymakers, enforcement agencies, transport authorities, and non-governmental organisations.

She has also contributed to the management and output growth of the Civil Engineering Department and Faculty of Engineering and the Built Environment at UCT, where she directly mentors six academic staff members.



Inspirational code for the next generation of scientists



Dr Justin Yarrow, Executive Director of CodeMakers, received the NSTF-South32 NGO Award for the non-profit organisation's SuperScientists programme.

White males in lab coats using instruments in a chemistry lab. That's what most children imagine scientists to be. They're perceived to be possibly mad, certainly socially awkward, with crazy hairstyles. These are some of the stereotypes that non-profit organisation CodeMakers is trying to correct with its SuperScientists programme.

CodeMakers Executive Director, Dr Justin Yarrow started SuperScientists in 2019 from an awareness that children's early experiences with science are important influences on their perception of science, and of their own potential to become scientists. The initiative focuses on building positive science identities so as to foster interest or persistence in science, technology, engineering and mathematics.

SuperScientists creates materials for children — activity books, calendars,

cards and posters - that depict scientists as superheroes. In 2021, 15 000 cards, calendars and activity books were distributed to young people across South Africa. Many have been translated into isiZulu, and translation into more South African languages is planned if funding is received. "Having science education materials in a child's mother tongue makes them more accessible - but more importantly, it shows them that the ideas and questions they have in their minds, in their own language, are ideas and questions that matter and can be answered. It brings them and their curiosity into the conversation of what science is and who can be scientists," says Yarrow.

He says that the reaction to SuperScientists has been incredibly satisfying, beyond what he had imagined. "One of the scientists in the project spoke to a tearful person who told her that when she was growing up,

she thought that only white men could be scientists, and that now with these materials she can show her children that anyone can be a scientist. We've heard from people who have said, 'if only I had these when I was a kid, maybe I would be a scientist today'. And at school visits, we've seen learners excitedly comparing the characters they received with each other. It's a very positive project and just great to see people enjoying it as much as they do."

Current projects include efforts to further extend SuperScientists' reach into under-resourced schools. These include a travelling exhibit that could reach children through science centres, libraries and malls. "This project was inspired in part by the trading cards that used to be given out at supermarkets - and it would be amazing to see scientist cards at supermarkets or spaza shops and reaching kids in deep rural areas."

Network for Genomics Surveillance in South Africa wins Data for Research Award

The Data for Research Award for an outstanding contribution to science, engineering and technology (SET) is given to an individual or team who advanced the availability, management and re-use of research data. At the 2022 NSTF-South32 Awards, the Network for Genomics Surveillance in South Africa (NGS-SA) was awarded for bringing together virologists, scientists, bio-informaticians and clinicians in an engagement that resulted in one of the most successful genomic surveillance networks globally. The NGS-SA detected two SARS-CoV-2 variants of concern.

Dr Jinal Bhiman, one of the eight co-founders of NGS-SA, explains: "A lot of people were involved in this consortium and contributed to the data that was generated. We've been looking at how SARS-CoV-2 has been evolving over the course of the last few years. We started at the National Institute for Communicable Diseases (NICD), as this was the sole testing lab for the country - and this is where we sequenced the first cases we received."

Soon after that, the team connected with other laboratories and universities in South Africa alongside clinicians and virologists to create an active team. Initially, the testing generated very similar sequences, which according to Bhiman was "pretty boring".

However, things then got interesting in December 2020. "This was when we first detected the Beta variant, and it had a concentration of mutations within one part — the spike — of the SARS-CoV-2 genome. This is also the part of the virus that



Dr Jinal Bhiman (picture on left) and Prof Tulio de Oliveira (picture on right) are two of eight co-founders of the NGS-SA, which was awarded for work that included the detection of two SARS-CoV-2 variants of concern.

antibodies target, so we thought that either the virus will enter our cells more easily or it's escaping immune responses," she explains. "Then we were able to show that a large number of these mutations were escaping the immune response. As a result, many people were interested in continuing genomic surveillance, not just in South Africa, but globally." The team also works closely with the Africa Pathogen Genomics Initiative (Africa PGI) that has extensive infrastructure and human resources dedicated to the work. NGS-SA kept sequencing and looking for anything odd or unusual, and then picked up the Omicron variant - which made Beta look timid by comparison, says Bhiman.

"Omicron had between 30 and 50

mutations in the spike region and we were worried as this was a huge collection of mutations, but thankfully because of wide-scale vaccination programmes globally and because many people were previously infected, background immunity was in place so that people handled this variant relatively well."

The NGS-SA is an impressive network that not only came together at speed, but is also one of the most successful genomic surveillance networks in the world. In addition to discovering two variants of concern, the team has established sequencing pipelines at five laboratories, increased infrastructure and developed strong communication with the government to relay insights in real-time.



INNOVATION AWARD: SMALL, MEDIUM AND MICRO ENTERPRISE (SMME)

Sponsor: NIPMO

Nurturing potential and driving entrepreneurial innovation

Innovation requires more than scientific-technical know-how — it also needs passion, vision and a good strong dose of determination. Dr Jacobus Swanepoel (known as Kokkie) has all of these in bucketloads, having worked for more than 27 years in the energy and minerals beneficiation fields under the umbrella of the company Thermtron. In his career so far, Swanepoel has been the project sponsor and manager for more than 250 projects - transitioning mineral processing and green technologies through all the stages of innovation, from laboratory state to viable projects or businesses, through all technology-readiness phases.

In the last 10 years he decided to use the broad knowledge and contacts he had nurtured over the decades to incubate new businesses that can grow into large standalone entities. Most of these have been in the new growth sectors such as biofuels, green mobility, super magnets for electric vehicles, rare earth mineral refiners, renewable energy and hydrogen.

“These companies have the potential to start new industries that can provide work for many people, develop a green economy, and export South African products to the rest of the world,” he explains. “They also benefit South Africa’s raw materials - and I will keep on driving them to success as far as possible.”

Swayana (Pty) Ltd, which Swanepoel views as a highlight of his career, is a biofuels business that he incubated. The intention of its first project is to



Dr Kokkie Swanepoel – winner of the NSTF-South32 SMME Innovation Award.

produce 50 000 tonnes of bio-ethanol per annum. However, it has the potential to generate about 400 000 tonnes of bio-ethanol yearly from about 10 different sites in South Africa. If this is used as a blend in petrol, it will provide about 5% of the country’s petrol requirements. It has investment potential of more than R25 billion, with an annual turnover of more than R4bn, creating 1 500 construction jobs initially over a 10-year period, and then up to 4 000 permanent jobs for the next 25 years.

“Rare Earth Refiners (Pty) Ltd is a catalyst that can open up the beneficiation of South Africa’s rare earth mining and beneficiation industry,” he says. “It can also stimulate the local production of electric vehicles. As one of my goals, I would like to see this business being developed into the next phase — namely, full commercial production — now that the demonstration phase has been concluded.

“The hydrogen economy is one of

the biggest growing industries, and Thermtron Scientific and TSG Africa (Pty) Ltd can play a huge role in opening up this growth sector. We want to help South Africa to become a world leader in green hydrogen and hydrogen products.”

Swanepoel expresses enormous hope for South Africa’s future. “I believe we have very good creative and skilled people in this country, and there are many opportunities in the technical fields that can be implemented, if we can develop a culture of innovation.

“I believe we need training programmes in innovation and business development at university level, together with the technical expertise. This will give young entrepreneurs the skill to join companies such as Thermtron Scientific and then with time, they can transition to owning their own companies, innovating new technology, and creating jobs.

“This is only the beginning — there is so much more to come,” he promises.



Today’s research ... tomorrow’s innovation
2021/2022 NSTF-SOUTH32 AWARDS



Changing the human relationship with the environment

In the 1990s, Professor Guy Midgley, then an assistant agricultural researcher with the Botanical Research Institute (BRI), began to study emerging work on how a secure human environment depended on a secure natural environment - and how climate change could become a major, poorly understood threat to this security. He argued that research into change risks to biodiversity was much needed, precipitating work in the BRI to predict how species, biodiversity and ecosystems might respond to climate change. Three decades later, Midgley is Head of the Global Change Biology Group and Interim Director of the School for Climate Studies at Stellenbosch University.

The work of the Global Change Biology Group, which focuses on species-rich systems of Southern Africa, has had global impact. Its contribution to risk assessment and the development of conservation responses that make sense for species, ecosystems and human livelihoods, added urgency to the adoption of global mitigation targets. This was after evidence was presented to the South African Cabinet, the United Nations (UN) Framework Convention on Climate Change, and the UN Convention on Biological Diversity. The theoretical



Professor Guy Midgley, Head of the Global Change Biology Group at Stellenbosch University, won the NSTF-South32 2022 Green Economy Award.

foundation of Midgley's work is niche theory, quantified using correlative modelling and dynamic global vegetation modelling based on resource capture and investment by plants. It's rooted in fundamental theories of plant productivity, growth and competition, and disturbance by wildfire. For Midgley, communicating their work is understandably important. "We're trying to translate climate change and the human relationship with the environment (and with the species that make up that environ-

ment) in a way that stays inside people's lived experience, their connection with nature," he says.

For this self-described optimist, it's important to communicate the natural world's resilience. "I have no real concerns about the survival of our planet and biosphere. Humans cannot cause the extinction of life on this planet. The planet has been hit by asteroids more than once and I do not think we can destroy life. But we can certainly damage the ecosystem services that we benefit from, in ways that could adversely affect our barely understood modern society. The extractive nature of those few that currently hold the reins of how this planet is being ridden has put us in a position of grave danger. Not to our planet as a whole, but

to our own society and many species that we value," he says.

Midgley believes we have come a long way over the last 30 years and points to the work done by the UN through its Framework Convention on Climate Change, Convention on Biodiversity and Ecosystems, and other multilateral agreements. "These have completely changed the story of the future development of the planet. Aspirations are massively changed and they are starting to roll out in reality," he says.

TW KAMBULE-NSTF EMERGING RESEARCHERS AWARD

Prize sponsor: proSET

Keeping tabs on TB – and stopping interspecies transmission

Diseases moving from animals to humans are more than fodder for thriller-movie plots – it's a reality that Dr Wynand Goosen of Stellenbosch University continues to research. Known as zoonotic pathogens, these simple organisms are the subject of his future goal: to establish a TB One Health intradisciplinary South African research group that will seek to better understand, detect and describe how they are able to transmit between the environment, humans, livestock and wildlife. As Wellcome Trust Lecturer at the DSI/NRF Centre of Excellence for Biomedical TB Research's Animal Tuberculosis Group, in the Division of Molecular Biology and Human Genetics at the university's Department of Biomedical Sciences, Dr Goosen leads numerous projects through to development. These include tests that are able to measure unique blood immunological markers, detect the presence of TB DNA in dirty respiratory samples, and improve TB sequencing directly from such samples. Having started his research career as the Animal Tuberculosis Group's first Honours student in 2012, he now leads South African research on the



Dr Wynand Goosen won the TW KAMBULE-NSTF Emerging Researchers Award.

surveillance of zoonotic tuberculosis (TB) in domestic and wild animals as potential sources of spill-over infections in susceptible people in rural areas. He identified a novel blood marker associated with early TB infection, detected TB DNA in respiratory samples with high sensitivity, and successfully sequenced TB amid various inhibitors.

"South Africa is highly prevalent for M tuberculosis (known generally as TB), HIV, diabetes, and more recently, lung disease caused by SARS-CoV2," Goosen explains. "This makes the human population more susceptible to infection by spill-over of zoonotic animal (livestock and wildlife) adapted - and environmental Mycobacteria spp.

"Existing diagnostic tools cannot

distinguish between these different infections. This is concerning, since many of the animal and environmental strains are naturally resistant to numerous widely used antibiotics for treatment of tuberculosis. The tools I have designed enable society to identify, distinguish and understand these infections better in their preferred and opportunistic hosts, leading to improved public health."

Goosen adds that some of the standout moments

in his work have been how researchers, veterinarians, medical doctors, policy makers, wildlife managers and animal owners have worked together to address the devastating impact of tuberculosis in all potential hosts by improving research methods, collaborating on surveillance, and sharing expertise.

"Funding for our TB One Health project remains a challenge, as does government red tape, wildlife species-specific laboratory reagents, and support for students from government," he says. "However, we have received generous funding from interested parties like the South African Medical Research Council and the Wellcome Foundation, who understand the importance of this research for animals and humans."



Today's research ... tomorrow's innovation

2021/2022 NSTF-SOUTH32 AWARDS



Upcycling waste into repurposed value



Dr Banothile Makhubela – winner of the 2022 NSTF-South32 Emerging Researcher Award.

As a senior lecturer and director of the Research Centre for Synthesis and Catalysis at the University of Johannesburg's Department of Chemical Sciences, Dr Banothile Makhubela chose her career path because she wanted to be part of defining chemistry in the age of concern about sustainability. She wished to push frontiers and unlock new opportunities for the sustainable production and use of chemicals. Her research applies nano and organo-metallic catalysts to convert waste materials such as lignocellulose and carbon dioxide into sustainable chemicals and fuels. Chemical computations are used to understand how carbon dioxide and cellulose feedstocks interact with catalysts while being transformed, providing insights that ultimately support precise, wasteless chemical processes that enhance product yields.

This research—which touches on catalytic materials design, novel synthetic methodologies and reaction engineering—allows access to sustainable commodity chemicals and fuels prepared using inexpensive, widely accessible feedstocks

that otherwise would cause environmental pollution. Thus, waste is chemically upcycled and repurposed to value.

“Through my research, and my students’ work, I hope to demonstrate to manufacturing industries that produce or use chemicals that it’s still possible to improve waste management, and contribute to profitability while doing so,” she says. “For decades, the world’s energy and chemical demand has been met by fossil-based feedstock that’s processed in unsustainable ways. We want to find more sustainable approaches, through renewable alternatives, for meeting liquid fuel and chemical demands.”

For example, one of the products emerging from her research is Fura-Lev, a sustainable chemical technology that produces levulinic acid, which is used in a variety of applications such as resins, medical imaging and textiles.

Waste biomass feedstock in the form of kraft pulp liquor from Sappi, sugarcane bagasse from Tongaat Hulett and Illovo, citrus peels from Onderberg, and corn cobs from GrainSA are used to produce furfural from which

levulinic acid can be made. This waste biomass is widely available locally, and signs are that it will be available at around R100 to R150 per tonne. At 60-65% yield of furfural from waste biomass, and 70-80% yield of levulinic acid from furfural, preliminary feasibility studies indicate a competitive production cost for levulinic acid. This can feed a market that’s expected to generate \$34 million by 2024. Highlights of Makhubela’s career include seeing the postgraduate students she mentored go on to make meaningful contributions in their careers, as well as the significant discoveries they have made together. “Working in a highly demanding research environment makes it challenging to achieve work-life balance,” she says. “One of our other challenges is securing sustained funding so that we can make meaningful contributions through our research. With South Africa being the largest emitter of greenhouse gases in Africa, thanks to electricity generation and synthetic fuels, the country is certainly in need of practical solutions to its carbon dioxide problem - and there are significant opportunities for us to find ways to address these.”

SAHPRA is an entity of the National Department of Health, created by the South African government to ensure that the health and well-being of human and animal health are at its core.

VISION

An agile and responsive African health products regulator that is globally recognised as an enabler of access to safe, effective and quality health products in South Africa.

MISSION

To promote access to health products and protect human and animal health in South Africa through making science-based regulatory decisions.

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Bellville
7530**



DUT – at the forefront of higher education, technological training, research and innovation

THE Durban University of Technology (DUT) is a globally recognised university based in KwaZulu-Natal. It comprises seven campuses – five in Durban and two in Pietermaritzburg. There are six Faculties in Accounting and Informatics, Applied Sciences, Management Sciences, Engineering and the Built Environment, Health Sciences, and Arts and Design. DUT also boasts 19 different research focus areas.

According to the Times Higher Education World University Rankings, DUT was ranked among the top 500 universities globally in 2021, 10th for citations globally and fifth nationally. Furthermore, DUT was ranked in the top 100 universities in emerging economies by the Times Higher Education Emerging Economies World University Rankings 2021. In June 2021, DUT was ranked second in South Africa and 102nd in the world by the Times Higher Education (THE) Young University Rankings 2021. DUT ranked in the top 500 globally, as one of the top five universities in South Africa, first in South Africa, and 12th in the world in the citation category. This year, DUT ranked 112th globally in The Times Higher Education (THE) Young University Rankings.

DUT boasts a recently established business school, under the ambit of the Faculty of Management Sciences, which is ready to advance contemporary leadership in Southern Africa and beyond. The curriculum focuses on applied business that enables leaders to solve real-life problems and contributes to socio-economic transformation.

The innobiz DUT Centre for Entrepreneurship and Innovation serves as an umbrella body for all DUT entrepreneurial units, and offers both theoretical and technical entrepreneurial learning, business support and related activities. The core business is to produce entrepreneurs with a strong focus, innovative, adaptive and problem-solving acumen. DUT aided in disaster relief efforts following the unfortunate floods that affected various parts of KwaZulu-Natal this year. The university was also active in providing personal protective equipment wear (PPE)

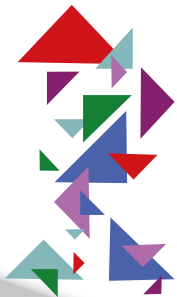


during the Covid-19 lockdown, printing face shields and producing sanitisers.

DUT has a Technology Transfer and Innovation (TTI) unit, which was established to tap into the huge intellectual and business potential that exists within the university. It aims to promote innovation, technology transfer and entrepreneurship in positioning DUT as a centre of excellence in technology. The university is currently involved in the Monaco Solar & Electric Boat Challenge that provides teams from around the globe with an opportunity to compete and showcase their technological and sporting strengths. It's open to students and professionals racing across three boat classes: offshore, solar and energy. DUT will compete in the solar class.

Applications for undergraduate and postgraduate programmes for the 2023 academic year are now open. You can make DUT your preferred university of choice. Visit: www.dut.ac.za for more information on programme offerings, requirements and how to apply.





DUT CONGRATULATES NSTF AWARD FINALISTS



DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWIWI YEZOBUCHWEPHESHE
Creative. Distinctive. Impactful.

Category: Innovation – Corporate Organisation

Prof. Eric Amonsou is a C2 rated NRF-Scientist and a Food Science Professor in the Department of Biotechnology and Food Science, at the Durban University of Technology (DUT). He holds a PhD in Food Science from the University of Pretoria. Prof. Amonsou is the leader of the Food and Nutrition security research focus area at DUT.



His research aims at tailoring major food biopolymers for better functionality and applications with specific focus on grain proteins and their interaction with polysaccharides in food systems. To respond to our food and nutrition security challenges, Prof. Amonsou and his team have been combining indigenous knowledge and modern technology to develop nutrient-rich and functional foods for rural household consumption, scale-up and commercialisation. Through his innovative research, he has developed numerous food products including a breakfast porridge from traditionally grown amadumbe crop by subsistence farmers. The development of these novel food products is a major contribution of Prof. Amonsou towards promoting and creating economic opportunity around indigenous and traditional South African food crops through value addition for local small-holder farmers who are generally women supported families. He won several awards including the DUT innovators of the year in 2018 and is the founder and Director of INOFID, a DUT spin-off company.

Prof. Ian Lazarus is an academic and researcher in the Department of Physics and an advocate for renewable energy at Durban University of Technology (DUT). He manages the successful KZN Industrial Energy Efficient Training & Resource Centre (IEETR) at DUT. Prof. Lazarus has a PhD in Plasma Physics (UKZN) and has received scholarships and qualifications in renewable energy. His credentials, experience and expertise allow him to conduct and lead relevant and innovative research in the Sustainable Energy research focus area, specifically in the key areas of solar energy, energy efficiency, energy management systems, bio-gasification and building energy.



Prof. Lazarus is the recipient of several renewable energy and energy efficiency awards nationally and internationally in recognition of sustainable energy projects which underscore innovation, youth development and its relevance and applicable outcome towards community upliftment. Award winning projects include the innovative renewable energy awareness energyDRIVE truck, the electrification of schools in rural areas using solar and wind energy, renewable energy training programmes offered to communities and the DUT solar photovoltaic rooftop project to support the electrification of the DUT Library using clean energy and mitigating DUT's energy consumption. The most recent project being the design and creation of a solar electric boat called 'SIYAHAMBA' which was acknowledged at the Monaco Energy Boat Challenge in July 2022.



Professor Sibusiso Moyo, Deputy Vice-Chancellor: Research, Innovation and Engagement, congratulated both Professors: Eric Amonsou and Ian Lazarus, on behalf of DUT, for making it as finalists of the NSTF Awards list! This is really a first for DUT to have two deserving finalists featured as part of the awards and thanks to our Technology Transfer and Innovation Director, Professor Keolebogile Motaung, for ensuring DUT successfully submitted competitive nominations. "We are proud of the work our star Professors lead in and its alignment to both the Sustainable Development Goals and ENVISION2030! We wish them every success in their future research development and innovations".

DUT RESEARCH FOCUS AREAS

- Water
- Enzyme Technology
- Nanotechnology
- Food and Nutrition Security
- Computational Modelling and Bioanalytical Chemistry
- Systems Science
- Urban Futures
- Peacebuilding (International Center for Non Violence [ICON])
- Indigenous Knowledge Systems and Drug Delivery Systems – Plant Biotechnology
- Energy
- ICT and Society
- Maternal Health Studies
- GenderJustice, Health and Human Development
- Transformation through the Arts and Design
- Space Science Programme
- Green Engineering
- Smart Grids
- Management Science
- Global Health and Sustainability (with a focus on Public Health and the Burden of Disease)

ENVISION2030 transparency • honesty • integrity • respect • accountability
fairness • professionalism • commitment • compassion • excellence



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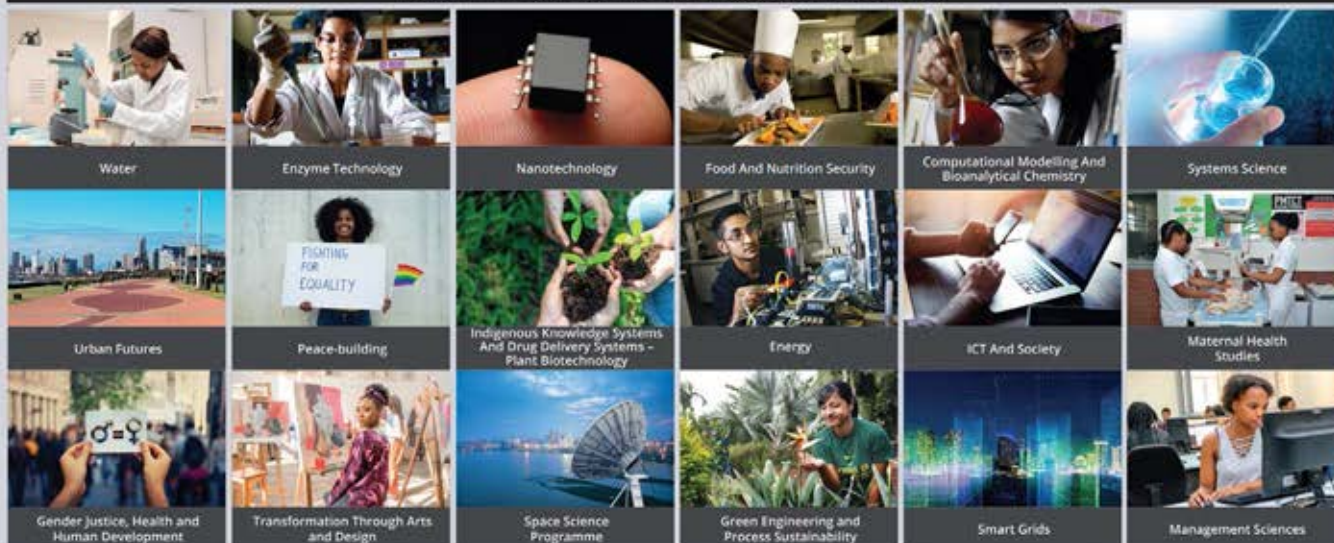


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DUT RESEARCH FOCUS AREAS



FACULTY OF ACCOUNTING AND INFORMATICS

- Auditing and Taxation
- Finance and Information Management (Midlands)
- Financial Accounting
- Information and Corporate Management
- Information Technology
- Management Accounting



FACULTY OF APPLIED SCIENCES

- Biotechnology and Food Technology
- Chemistry
- Clothing and Textile Studies
- Food and Nutrition Consumer Sciences
- Horticulture
- Maritime Studies
- Mathematics
- Physics
- Statistics
- Sport Studies



FACULTY OF ARTS AND DESIGN

- Drama and Production Studies
- Fashion and Textiles
- Fine Art and Jewellery Design
- Media, Language and Communication
- School of Education
- Adult and Community Education Unit
- Video Technology
- Visual Communication



FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

- Architecture
- Chemical Engineering
- Civil Engineering and Geomatics (Durban)
- Civil Engineering (Midlands)
- Construction Management and Quantity Surveying
- Electrical Power Engineering
- Electronic and Computer Engineering
- Industrial Engineering
- Mechanical Engineering
- Town and Regional Planning
- Urban Futures Centre



FACULTY OF HEALTH SCIENCES

- Basic Medical Sciences Department
- Biomedical and Clinical Technology
- Chiropractic
- Community Health Studies
- Dental Sciences
- Emergency Medical Care and Rescue
- Homeopathy
- Medical Orthotics and Prosthetics
- Nursing
- Radiography
- Somatology



FACULTY OF MANAGEMENT SCIENCES

- Applied Law
- Ecotourism
- Entrepreneurial Studies and Management
- Hospitality and Tourism
- Human Resources Management
- Marketing and Retail
- Operations and Quality Management
- Public Management and Economics
- Public Relations and Communication Management

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to our 2022 **NSTF finalists and winners**, and to all our
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For more information on research and innovation at Wits:
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One hundred years of research at Wits University



Wits has embraced the concept of “research with impact” by introducing innovation into its strategic vision.

THE Covid-19 pandemic in 2020 dramatically impacted how Wits University conducts its research. Some of the disruption was positive, as the university realised the importance of human connectedness, scientific research and how to adapt to the changing nature of teaching, learning and work.

The pandemic also demonstrated the digital divide, an alarming prevalence of gender-based harm, mental health challenges, devastation of economies and livelihoods, the dangerous reality of misinformation, and the lives lost to Covid-19. This is the research context in which Wits now operates for 2022 – not only in an uncharted post-pandemic world, but also the university’s centenary year.

Over 100 years, Wits has transcended many latitudes and ultimately produced research that impacts society for good. Evidence of this is not only in the research contributions of Wits researchers, who are finalists in the 2022 NSTF South32 Awards, but also in persistent publication from thousands of Wits researchers across disciplines over the years.

Research output grew exponentially last year, both in terms of quantity and quality. Using the Department of Higher Education and Training metric of research units based

on fractional author counts of published articles, books, chapters and conference proceedings, Wits submitted more than 2 543 units in 2021 – 20% more than 2020. Based on the five-year average approval rate, Wits expects 2 772 units to be approved in its 100th year. This is the largest amount ever produced by Wits. As in previous years, 96% of Wits’ research output was published in international journals, 43 of which were highly cited. This means that these publications were in the top 1% of global publications. Furthermore, 16 were considered “hot papers”, placing these publications within the top 0.1%. As Wits welcomes its centenary year in 2022, there are new opportunities to understand research practice and its use.

Wits has embraced the concept of “research with impact” by introducing innovation into its strategic vision. For Wits, innovation means more than the commercialisation of knowledge, and embraces all the ways in which knowledge can be translated and used for good. Today, the now 100-year-old Wits University remains in the top 1% of the 25000 universities in the world. Its researchers remain among the most highly cited in Africa, and it continues to publish predominantly in high-impact international journals.

UP CONGRATULATES & CELEBRATES nine of our researchers

At the University of Pretoria our researchers work together to research across and beyond disciplines to find African solutions for complex global problems. We are one of South Africa's largest producers of research and we are proud to stand amongst the world's top universities.

Congratulations to all our finalists, who push us to higher levels.



Prof Nigel C Bennett



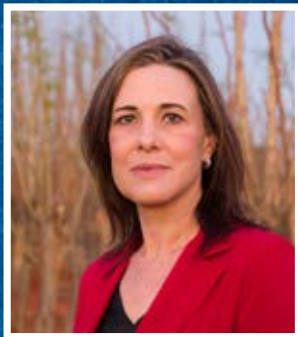
Prof Ryan Blumenthal



Prof Evans Chirwa



Prof Michael Olawale Daramola



Prof Wanda Markotter



Prof Bob Pattinson



Prof Theresa Rossouw



Prof Yves van de Peer



Prof Brenda Wingfield



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www.up.ac.za

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THE motto of University of Pretoria (UP) – “make today matter” – manifests itself in the research the institute undertakes today, which has a significant impact on innovating and creating the future.

None of this would be possible without the pioneering work of its researchers, who dedicate their lives to finding creative solutions. The university’s research features a wide array of innovation, ranging from robotic dogs to possible cures for cancer. UP takes a future-focused and multifaceted approach to research, in order to find African solutions to global concerns. The university conducts intra-disciplinary, inter-disciplinary, multidisciplinary and trans-disciplinary research, because problems rarely exist in silos. UP has four dedicated trans-disciplinary innovation hubs that centre on solving some of the world’s most pressing concerns. These platforms host and develop government, industry and university research entities to address national and pan-African needs for sustainable development and economic growth. The university enables collaboration and partnerships between relevant stakeholders and civil society to co-create new knowledge that translates into solutions. Its hope is to pursue economic advancement and social justice through knowledge and innovation, and so transform lives. UP’s “science for transformation” platforms comprise the following:

- Future Africa Institute - a hub for pan-African thought on complex problems represented by the Sustainable

“None of this would be possible without the pioneering work of its researchers, who dedicate their lives to finding creative solutions.”

Development Goals through research networks within UP and globally.

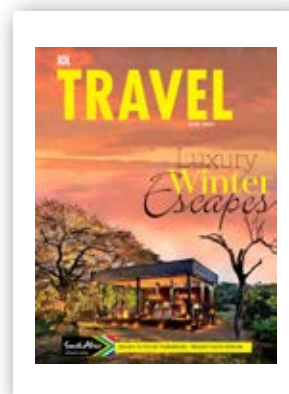
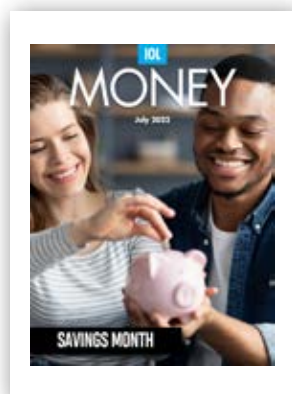
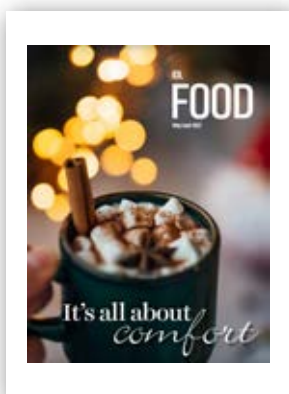
- Javett-UP Art Centre, which serves as a driver of trans-disciplinary research development between the humanities and other faculties, while making the art of Africa accessible, relevant and engaging.
 - Engineering 4.0 – a facility for smart cities and transport systems that uses technology and data science to assist with urban development.
 - Innovation Africa @UP - focused on smart, sustainable and precision agriculture to ensure food security.
- African universities have to take a unique approach to research, because universities often have to leapfrog technologies or take a lateral view of research and solve local problems first with an international outlook. This ensures that context is increasingly future-ready, because the problems that Africa faces are global challenges too.



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