NELSON MANDELA UNIVERSITY

Semester 1 Newsletter
2025

Faculty of Science News

Dear Students, Academic and Support Staff, and Members of the Faculty Community,

I take this opportunity to reflect on the journey we have travelled together as the Faculty of Science. Each semester brings with it a rhythm of learning, growth, challenges, and achievements—and Semester 1 of this year has been no exception.

We witnessed many successes in Semester 1 such as a well-executed first-year orientation programme, graduation of the first cohort of BSc Honours in Agricultural Management, successful conclusion of the FORESTRY21 project, STEAM Education Seminar, Resilience and Smart Cities Workshop, Launch of the SAMOS project, Africanization Workshop, World Down Syndrome Day celebration, and a Mandela Uni-UniVen Vhembe District Schools' Outreach. We are also proud of staff, students and alumni achievements. I wish to extend my deepest gratitude to all our staff members—academic, technical, and administrative—for your tireless efforts in ensuring the smooth functioning of our Faculty, your commitment to excellence in teaching and research, and your ongoing support for our students. To our students, thank you for your energy, creativity, and resilience. You continue to inspire us with your pursuit of knowledge, your aspirations, and your ability to adapt and grow in a rapidly changing world. We are assured that you will continue to contribute to our mission of "science for society". In a time where science plays an increasingly central role in solving global and local challenges—climate change, public health, energy, food security, technological disruption—our Faculty must continue to lead with boldness and integrity. We are home to great minds and passionate individuals. It is our responsibility to nurture a culture of enquiry, innovation, inclusion, and impact. Let us continue to support one another in our shared mission: to shape future leaders, advance scientific discovery, and contribute meaningfully to our society. As we look ahead to the second semester, I urge us all to maintain the momentum, to celebrate our successes, and look to the stars. Thank you for being part of this vibrant academic community.

"As Mandela Science, we seek to acknowledge a sense of place, sense of people, sense of inspiration and pursuit of excellence. We embody the ideals of identity and belongings, working beyond norms and identifying human potential despite origins, and seeking inspiration outside of self"

Warm Regards
Professor Zenixole Tshentu (Acting Dean, Faculty of Science)

Contents

THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

BRANDON BARNARDO

Previous qualifications:

2018	Bachelor of Science	Nelson Mandela University
2019	BSc (Hons): Chemistry	Nelson Mandela University
2022	Master of Science	Nelson Mandela University

Thesis:
THE SYNTHESIS OF CRYSTALLINE ORGANIC COMPOUNDS WITH FUSED TRICYCLIC MOIETIES AND DIAMINO LINKERS, AND AN INVESTIGATION OF THEIR HOST POTENTIAL AND SELECTIVITY BEHAVIOUR IN MIXTURES OF ISOMERS AND RELATED COMPOUNDS

The potential separation by means of organic host systems of isomeric and structurally related mixtures was investigated. Isomeric mixtures are extremely troublesome. The boiling points of the guest species are near-identical and as a result, conventional fractional distillations are not sufficient. Furthermore, these distillations are not economically (nor energetically) sustainable. As a result, a great demand for an alternative route of separation is required. This study demonstrated that the one host system could separate industrially relevant mixtures by employing host-guest chemistry strategies. This body of work has produced four articles that were published in international high impact factor journals.

Supervisor: Prof B Barton

PhD Research Spotlight: Host-Guest Chemistry at NMU ‘

’The focus of my thesis involved “host-guest chemistry”, a branch of supramolecular chemistry. I synthesized five novel tricyclic fused systems to explore their ability to selectively separate isomeric mixtures—impossible to separate using conventional methods. Analytical techniques included thermal analysis (DSC, TGA, dTG), gas chromatography, NMR spectroscopy, and single crystal X-ray diffraction. One compound, N,N’-bis(9-phenyl-9H-xanthen-9-yl)butane-1,4-diamine, showed remarkable separation of xylene, dichlorobenzene, and aniline mixtures.

My journey at NMU began in 2016 with the “fees must fall” episode. I majored in biochemistry and chemistry, continued with postgraduate studies in Organic Chemistry, and submitted my thesis in 2024. I am grateful to the Faculty of Science, PGRS, Dormehl-Cunningham, and all who supported me throughout this journey.”

THE DEGREE OF DOCTOR OF PHILOSOPHY
(MATHEMATICS)

LANGSON KAPATA

Previous qualifications:

2017	BA: Mathematics	University of Zambia
2021	MSc: Mathematics	University of Zambia

Thesis:
FISCHER-CLIFFORD THEORY APPLIED TO CERTAIN MAXIMAL SUBGROUPS ASSOCIATED WITH THE SIMPLE GROUPS Fi_{22}, Co_1, $F_4(2)$ AND THE MONSTER M.

The Fischer-Clifford matrices technique is particularly suitable for constructing the ordinary character tables of finite group extensions having abelian p-groups as kernels, especially in the context of maximal subgroups of sporadic simple groups. This thesis contributes to Fischer-Clifford theory by presenting a method, coined the *lifting of Fischer-Clifford matrices* method, to address the construction of the ordinary character tables of finite extensions, say $\bar{G} = P.G$, with nonabelian p -groups as kernels. The approach involves constructing, for each conjugacy class $[g]$ of G, a Fischer-Clifford matrix $M(g)$ of $\bar{G}$ from the corresponding Fischer-Clifford matrix $\overline{M(g)}$ of the quotient group $\bar{Q} = \bar{G}/\Phi(P)$, where $\Phi(P)$is the Frattini subgroup of P. In this thesis, Mr Kapata uses the *lifting of Fischer-Clifford matrices* method to successfully construct the ordinary character tables of finite extensions of generalized extra-special p -groups associated with the simple groups Fi_{22} and $F_4(2)$. The method was also utilized to construct the ordinary character tables of group extensions involving a special 2-group in Co_1 and a 7-group in the Monster M.

Supervisor: Prof AL Prins
Co-supervisor: Dr LN Njuguna

PhD Research Spotlight: Algebra and Group Theory

"In my PhD Mathematics study, I specialized in Algebra, particularly Group Theory. My research focused on the Fischer-Clifford matrices method, developed by Bernd Fischer to compute character tables of p-local maximal subgroups of Sporadic simple groups. I extended this method to handle nonabelian p-groups, contributing to Fischer-Clifford theory by developing a technique I called lifting of Fischer-Clifford matrices.

Using this approach, I successfully computed character tables of group extensions of generalized extra-special p-groups, maximal subgroups associated with Fischer and Exceptional Lie-type groups, and some nonabelian extensions of Conway groups and the Monster group.

The journey was challenging, especially as an international student on self-sponsorship, but the Department of Mathematics and Applied Mathematics provided invaluable support, particularly in my first year. This achievement reflects perseverance, dedication, and the pursuit of mathematical excellence".

THE DEGREE OF DOCTOR OF PHILOSOPHY
(PHYSIOLOGY)

OLUWASHOLA SAMUEL OLAOLU

Previous qualifications:

2015 Doctor of Veterinary Medicine — Ahmadu Bello University, Zaria-Nigeria
2019 Masters of Science in Veterinary Microbiology — Ahmadu Bello University, Zaria-Nigeria

Thesis:

THE EFFECTS OF ILOPROST TREATMENT ON MOLECULAR AND NEUROCOGNITIVE RESPONSES TO INHIBITED IL-4R ALPHA FUNCTION IN A MOUSE MODEL OF TRYPANOSOMIASIS

This research addresses a significant and underexplored area, integrating immunology and neurocognition to enhance our understanding of the systemic effects of Trypanosome infection and potential therapeutic interventions for cognitive impairment. By focusing on Iloprost, a prostacyclin analog with known immunomodulatory properties, the study provides novel insights into its ability to mitigate neurocognitive deficits and pathological outcomes resulting from IL-4Rα inhibition—a key receptor involved in immune responses. Iloprost modulated gene expression, reduced parasitaemia, and altered cytokine profiles. Epigenetic changes, including hypomethylation in certain promoters, highlight Iloprost's potential as neuroprotective therapy against trypanosome-induced neuroinflammation.

Supervisor: Dr DC Ajonijebu
Co-supervisor(s): Prof H Davids
Prof GB Dealtry

PhD Research Spotlight: Neuroscience and Immunology

"My PhD in Physiology, with a specialization in neuroscience, focused on exploring the intricate interplay between immunology and neurocognition, particularly the systemic effects of Trypanosome infection and potential therapeutic strategies for cognitive impairment. The study centered on a prostacyclin analog with known immunomodulatory properties, investigating its potential to counteract neurocognitive deficits associated with IL-4Rα inhibition—a key receptor in Th2 immune responses."

"Through this research, I demonstrated that this analog effectively modulated gene expression of some pro- and anti-inflammatory cytokines, reduced parasitemia, and adjusted cytokine profiles. Epigenetic analyses revealed methylation of certain promoter regions, underscoring Iloprost's potential as a neuroprotective therapy against trypanosome-induced neuroinflammation. This study offers novel insights into managing neurocognitive disorders linked to parasitic infections."

"Reflecting on my PhD journey, I am deeply grateful for the opportunity to contribute to a critical yet underexplored area of neuroscience. This experience has honed my skills in experimental design, critical thinking, and scientific communication while instilling resilience and adaptability. As the first PhD graduate in Physiology from my department, I am excited to leverage my expertise to advance research, inspire others, and make a meaningful impact on global health."

THE DEGREE OF DOCTOR OF PHILOSOPHY (OCEANOGRAPHY)

GUSTAV RAUTENBACH

Previous Qualifications:

2017	National Diploma, Marine Science	Cape Peninsula University of Technology
2018	Bachelor of Technology, Oceanography	Cape Peninsula University of Technology
2021	Master of Science, Chemical & Physical Oceanography	Nelson Mandela University

Thesis

THE KWAZULU-NATAL BIGHT FRONTAL EDDIES AND THEIR IMPACTS ON COASTAL CIRCULATION

This doctoral thesis uses an ocean model to study the life cycle of frontal eddies inshore of the Agulhas Current along the east coast of South Africa at the KwaZulu-Natal Bight, a home to valuable Marine Protected Areas. Results from an eddy detection algorithm reveal the semi-permanent nature of these eddies and that they have a significant impact on coastal ocean circulation. Lagrangian particles and potential vorticity analyses show cyclonic eddies to gain their sources from the Agulhas Current. They dissipate due to disruption by the land-boundary shear and mixing with coastal waters. This is the first detailed work on these important ocean features.

Supervisor: Prof M Roberts
Co-supervisors: Prof S Herbette
Dr J Veitch
Dr P Penven
Dr G Cambon

THE DEGREE OF DOCTOR OF PHILOSOPHY (PHYSICS)

NOLUFEFE MURIEL NDZANE

Previous qualifications:

2004	BSc Chemistry	Walter Sisulu University
2012	BSc (Hons) Physical Science	University of the Western Cape
2014	MSc Physics	Nelson Mandela Metropolitan University

Thesis:
ION-IMPLANTED METAL-POLYMER NANO-COMPOSITES FOR SENSOR APPLICATIONS

This study focused on the fabrication of polyaniline (emeraldine base) (PANI-EB) thin films and the effect of copper ion implantation in the structure and electrical properties of the PANI-EB films. PANI-EB thin films of different molecular weights were prepared using spin coating on different substrates followed by copper ion implantation at different fluences. The study investigated the effect of ion fluence on the microstructure, morphology, and electrical properties of the films. The results revealed that the molecular weight significantly affects the implantation-induced modifications and Schottky junction quality. Understanding these effects is critical for optimising polymer-based electronic devices and advancing metal-polymer nanocomposites for future sensor technologies.

Supervisor: Prof: JH Neethling
Co-supervisor: Prof M Msimanga

THE DEGREE OF DOCTOR OF PHILOSOPHY (COMPUTER SCIENCE)

JOSHUA FEMI OLADIPO

Previous qualifications:

2015 BSc Computer Science and Applied Mathematics
Nelson Mandela Metropolitan University
2016 BSc (Hons), Computer Science Nelson Mandela Metropolitan University
2018 MSc Computer Science, (*Cum Laude*) Nelson Mandela University

Thesis:

ANT COLONY OPTIMISATION BASED ROUTING AND WAVELENGTH ASSIGNMENT ALGORITHM FOR TRANSPARENT FLEXI-GRID OPTICAL BURST SWITCHED NETWORKS USING LINK USABILITY METRIC

The purpose of the study was to investigate the application of Ant Colony Optimisation algorithms to solve the Routing and Wavelength Assignment problem in flexi-grid OBS networks. The study introduced a novel approach: the Usability Metric Flexible Spectrum Ant Colony (UM-FSAC). The UM-FSAC algorithm incorporates a dynamic "Link Usability" metric that evaluates network link quality based on fragmentation and wavelength utilisation, enabling more effective resource allocation. Performance evaluation reveals that UM-FSAC significantly reduces Burst Loss Probability compared to earlier algorithms. Additionally, the study provided a holistic analysis of network performance, considering metrics such as fairness and efficiency, to offer deeper insights into the broader impacts on network performance of the algorithms evaluated. Furthermore, the algorithms are benchmarked against analytical and heuristic lower bounds from the literature, providing a robust assessment of their practical effectiveness under various network conditions.

Supervisor: Prof MC du Plessis

Prof Zenixole Tshentu, Acting Dean of the Faculty of Science, with the Autumn 2025 PhD graduates: Brandon Barnardo (Doctor of Philosophy in Chemistry), Langson Kapata (Doctor of Philosophy in Mathematics), Nolufefe Muriel Ndzane (Doctor of Philosophy in Physics), Oluwashola Samuel Olaolu (Doctor of Philosophy in Physiology), and Gustav Rautenbach (Doctor of Philosophy in Oceanography).

Celebrating PhD Graduates – Autumn Graduation 2025

The Faculty of Science proudly celebrated its latest cohort of doctoral graduates during the **Autumn Graduation 2025** ceremonies. Acting Dean, **Prof Zenixole Tshentu**, joined the Faculty's PhD recipients in marking this milestone achievement, reflecting the Faculty's commitment to research excellence and innovation.

Their success showcases the breadth and depth of research within the Faculty of Science and stands as a testament to their dedication and perseverance. We celebrate their achievements and look forward to the impact they will make as leaders in their fields.

GAME RANCH MANAGEMENT FIRST YEAR ORIENTATION 2025

On the 25th of March 2025, game ranch management students from the Department of Agricultural Sciences had the opportunity to go on an orientation camp to Groendal Nature Reserve.

They arrived with excited faces and were ready to put up camp for the night. After lunch the lecturers Ms Ferreira & Ms Breedt had a few teambuilding activities planned for students which included an egg drop challenge. Students had to figure out how to protect their raw egg using only straws and masking tape. This created an echo of laughter when students had to drop their egg structure from 3 meters above the ground. In preparation for the night's braai students had 30 minutes to come up with a modelling contest - where each group chose one model and they had to dress them using a black bag, newspaper, masking tape and things they could pick up from the ground. Students had lots of fun while doing these activities**.** The next day after breakfast they went on a hike in

the riverbed admiring nature with its clear skies, babbling rivers, mountain views, plants, and animals - it was then time to return. An adventure that every game ranch student will remember.

An Honours success story – First cohort of BSc Honours in Agricultural Management at Nelson Mandela University, Gqeberha campus

Agricultural Management Honours Students

For the first time in 36 years since its inception, the Department of Agricultural Sciences at Mandela University was proud to welcome its first cohort of BSc Honours students at the Gqeberha campus in 2024.

The new degree is an exciting programme designed to equip students with critical thinking skills, the ability to construct well-reasoned arguments and develop problem-solving skills to address various challenges facing the agricultural sector. It is a unique programme suited to the Eastern Cape region, where small-holder farmers face different challenges affecting production and market access.

The 2024 Agriculture Honours students' research topics were in multidisciplinary fields, investigating possible solutions to the problems facing small-holder farmers and rural communities in the region, in a bid to combat hunger and poverty. The class of 2024 achieved an excellent pass rate of over 90%, with one of those graduating Cum Laude. The Department was pleased to retain more than half of the Honours graduates for MSc by dissertation, which highlights the confidence in our students' abilities to conduct research.

Shallow Water Ecosystems Research Chair

The Shallow Water Ecosystems Research Chair at Nelson Mandela University is involved in several impactful research projects. The SOMWAT project, in collaboration with Tanzania and Germany, investigates the role of seagrass in improving water quality and supporting livelihoods in South Africa and Tanzania.

This project is part of the UN Decade of Ocean Science for Sustainable Development (2021-2030). A major output includes the Proposed Water Quality Management Programme for the Knysna Estuary.

Current research is focused on mapping the distribution of the endangered Zostera capensis, a seagrass species, to support conservation and inform Estuary Management Plans. Collaborative research with Professor Richard Barnes (Cambridge University) is also ongoing, involving MSc research by Minyonne Verster on macroinvertebrates and seagrass in various South African estuaries.
Notable student accomplishments include

Professor Janine Adams with her colleagues

Saudiqa Benjamin, who passed her MSc cum laude and Priscah Lakane, who published a PhD chapter on phytoplankton responses in a Ramsar estuarine lake.

Events include presentations by Professor Janine Adams on the national importance of Knysna's salt marsh and seagrass habitats, and on World Seagrass Day, at the University. Professor Adams is also part of the Scientific Advisory Board for the One Ocean Science Congress (OOSC) in Nice, France, in June 2025, which aims to provide scientific insights into ocean health.

Publications in 2025 include a variety of studies on coastal wetlands, biodiversity conservation, and environmental factors affecting coastal ecosystems. Notable publications feature work on hypersaline coastal wetlands, coastal wetland resilience, phytoplankton responses, and the influence of macrophytes on estuarine pH levels.

Forest 21
Climate-Smart Forestry Entrepreneurs

The Forest21 project

The Natural Resource Science & Management Cluster of the George Campus

The Natural Resource Science & Management Cluster of the George Campus formed part of a multi-national consortium of tertiary education institutions that participated in the European Union funded Forest21 project. This R20 million project, which ended in January 2025, was aimed at *21st Century Climate-smart Forestry Education for Livelihood and Sustainability in South Africa*, with objectives related to curriculum reform, adaptation to climate change, promotion of entrepreneurship, as well as advanced pedagogical techniques such as problem-based learning in South African higher education.

The Director of the Cluster, Prof Jos Louw, explains: Forest21 came at a very opportune time for our cluster and campus, and was very much part of the sustainability vision of the NMU and Faculty of Science, with the George Campus serving as a centre of excellence in Sustainability Science.

Looking back at this four-year project, it certainly served as catalyst to modernize our academic programmes and reposition the George Campus in a future environment where sustainability issues will increasingly feature in decision-making regarding the management of socio-ecological systems. The George Campus, with its strong presence of the Faculties of Science as well as Business and Economic Sciences, is ideally positioned to contribute to innovative solutions towards entrepreneurship and employment in the green economy, through multi-disciplinary approaches to the challenges facing contemporary South Africa

STEAM Nexus: Empowering Teachers, Transforming Classrooms

The inaugural Gauteng STEAM Education Seminar, hosted by the Govan Mbeki Mathematics Development Centre (GMMDC) and Marketplace Academy on February 14-15, 2025, in Johannesburg, strategically harnessed STEAM (Science, Technology, Engineering, Arts, Math) to empower over 200 in-service Maths, Science, and Technology (MST) and Art teachers from Gauteng's public schools. Supported by Deloitte, ECSA and key provincial stakeholders in education, the event fostered critical thinking, problem-solving, and digital literacy through expert-led workshops, innovative teaching showcases, and robust networking.

The Deputy Minister of the Department of Science Technology and Innovation (DSI) Nomalungelo Gina's keynote speech highlighted STEAM's transformative power, especially for rural classrooms, while Sifiso EdTech's Sizwe Nxasana promoted tech-driven, project-based learning as a vital strategic asset. GMMDC's Dr. Carine Steyn emphasized educator networks to tackle resource and engagement barriers, extending STEAM's impact.

Conceived as an annual professional development initiative, the seminar equipped teachers with cutting-edge strategies, reshaping classroom practice to meet 21st-century demands. It reinforced the DSI's vision of classrooms as innovation hubs through schools of the future, enhancing South Africa's global edge through empowered educators.

Nelson Mandela University and Carl von Ossietzky University of Oldenburg Strengthen 25-Year Partnership with Resilience and Smart Cities Workshop, joined by a delegate from University of Vechta.

Back row from left: Dr Leizel Williams –Bruinders, Mrs Lydia Izu, Prof. Brenda Scholtz, Prof. Ines Oldenburg and Prof: Jorge Marx Gomez. Front row from_ left: Prof. Zenixole Tshentu, Dr Ife Fashoro, Prof. Clemens Hillenbrand, and Prof. Jean Greyling.

Nelson Mandela University and the University of Oldenburg marked the 25th anniversary of their partnership by hosting a three-day workshop from 11-13 March 2025, titled "Resilience and Sustainability for Smart Cities and Education."

The event brought together academics, researchers, and industry experts to discuss sustainable smart city solutions and resilience in education. The workshop highlighted the ongoing collaboration between the two universities, with a delegate from the University of Vechta also contributing to discussions.

Smart solutions

Day 1 focused on resilience in smart cities and sustainable health research. Prof. Zenixole Tshentu from Mandela Uni opened the session, discussing the benefits of smart cities such as improved quality of life, economic growth, job creation, and reducing the digital divide. Prof. Jorge Marx Gomez emphasised that resilience in smart cities is about more than just technology—it involves perseverance and empathy in addressing challenges.

Smart health solutions aimed at achieving

Sustainable Development Goal 3 (SDG3) were discussed by Prof. Brenda Scholtz and Carmen Bekker, highlighting the role of AI and digital transformation in healthcare. Dr. Ife Fashoro addressed the importance of smart city initiatives tailored to local needs, particularly in Africa, and the need to empower communities for meaningful change. The uYilo Smart Microgrid project was showcased as an example of energy innovation.

Focus on youth

Day 2 hosted discussions on resilience in education and social well-being. Prof. Ines Oldenburg and Prof. Clemens Hillenbrand led talks on educational entrepreneurship and fostering resilience in learners. The session emphasised the role of mentorship programmes and social support systems in helping children from disadvantaged backgrounds overcome adversity. Mental health challenges in students from low-income communities were also addressed.

Tech transformation

Day 3 shifted focus to education through technology, with Prof. Jean Greyling introducing "unplugged coding" to promote resilience in education. The Tangible Coding programme, which has trained thousands of teachers and benefited hundreds of thousands of learners, was highlighted for its role in enhancing critical thinking and engagement, particularly in schools without computer labs.

The Tangible Africa Mandela Bay 100 Project Launch was also held, inspiring educators to empower students through digital literacy.

The workshop showcased a strong commitment to global collaboration for smarter, more resilient cities, underscoring the importance of resilience, sustainability, and education in shaping the future of smart cities. The 25-year university partnership continues to foster groundbreaking research, international collaborations, and real-world impact, paving the way for future initiatives and policy-driven solutions.

The Tangible Africa Mandela Bay 100 Project Launch

Nelson Mandela University and SAASTA Advocate for Inclusive Communities on World Down Syndrome Day

Nelson Mandela University's Faculty of Science and Faculty of Health Sciences, in partnership with the South African Agency for Science and Technology Advancement (SAASTA), hosted a World Down Syndrome Day event at Missionvale Campus. Under the theme "Building Inclusive Communities that Advance Support for People with Down Syndrome," the event brought together academics, medical professionals, parents, and community members to foster discussions on inclusion and advocacy.

Welcoming and Keynote Address

Prof. Zenixole Tshentu, Acting Dean of the Faculty of Science, welcomed attendees and emphasized the university's commitment to inclusivity and community engagement. He highlighted the role of academia in supporting individuals with Down syndrome and recognized key contributors, including Prof. Siyazi Mda, Ms. Sharon Masiza, Dr. Morar Reno, and medical professionals from Dora Nginza Hospital.

The keynote address was delivered by Dr. Nomlindo Makubalo, a pediatrician from Dora Nginza Hospital. She provided insights on early intervention, inclusive education, and the evolution of World Down Syndrome Day themes from 2018 to 2024, emphasizing the importance of societal acceptance and support.

Dr. Nomlindo Makubalo, a pediatrician from Dora Nginza Hospital.

SAASTA's Role in Scientific Literacy and Community Engagement

Simon Rametse, a representative from SAASTA,

discussed the agency's mission to promote science literacy and engage communities. He underscored SAASTA's collaboration with Nelson Mandela University in raising awareness about genetic health conditions like Down syndrome, emphasizing that science should serve society.

Panel Discussion and Community Engagement

A panel discussion, facilitated by Dr. Bruce Damons, provided parents with a platform to share their experiences raising children with Down syndrome. Parents highlighted the joys and challenges, calling for increased emotional and financial support, better healthcare, and safety measures.

Dr. Damons also urged universities to rethink their community engagement strategies beyond financial aid. Suggestions included establishing hospital food gardens and expanding research initiatives to support families and inform policy development.

Prof. Zenixole Tshentu shares a heartfelt moment with a young child during the ceremony

Commitment to Continued Advocacy

The event reinforced Nelson Mandela University's dedication to inclusivity and advocacy for individuals with Down syndrome. Moving forward, the university, SAASTA, and other stakeholders aim to strengthen partnerships with NGOs, researchers, and policymakers to enhance support systems and awareness efforts. The event concluded with a vote of thanks from Dr. Tshabalala Zithulele, representing the Faculty of Health Sciences, acknowledging the collective efforts that made the gathering a success.

Bringing Science to Society: Mandela Uni and UniVen Unite for Vhembe District Schools Outreach

The Faculty of Science, in collaboration with the University of Venda, successfully concluded its 2025 Vhembe Outreach – a five-day engagement aimed at inspiring young minds and strengthening academic partnerships in one of South Africa's most high-performing rural districts.

Held from 12-16 May 2025, this longstanding outreach initiative formed part of Nelson Mandela University's Science Engagement Strategy, under the Engagement and Partnerships portfolio. It brought together representatives from across the University's science disciplines and support services, who visited five top-performing secondary schools in the Vhembe District: Silemale, Luvhivhini, Mbilwi, Thengwe, and Mphephu.

remained innovative and used available laptops to deliver impactful sessions. More than 2 800 learners were reached throughout the week, with several expressing their excitement on the University's Facebook page about applying to study at the institution in future.

The outreach concluded with a visit to the University of Venda, where the team explored areas of mutual interest and discussed the strengthening of academic collaboration between the two institutions. With continued support from exhibitors such as UNISA, Penreach, and the Vuwani Science Resource Centre – as well as team members from across Mandela Uni's departments – the outreach once again demonstrated what's possible when universities come together to promote science for society.

Each day saw interactive presentations, exhibitions and practical science demonstrations – covering physics, coding, engineering, agriculture, chemistry, and more. Learners were also introduced to Nelson Mandela University and its Faculty of Science programme offerings, with a strong focus on Grade 12 learners as they prepare for their post-school academic journey.

Despite logistical challenges such as the lack of projectors or screens, the outreach team

The Faculty of Science extends its gratitude to all involved and looks forward to expanding its reach in the years to come.

Africanisation of the MandelaUni Science Faculty Curriculum – Multilingualism at the Core.

The Faculty of Science recently hosted an engaging workshop at the NMU Business School as part of its Curriculum Renewal Project. The event centred on the Africanisation of the curriculum, with a special focus on integrating multilingualism as a cornerstone of inclusive and transformative science education.

Guest speaker Dr Nomalungelo Ngubane from the University of the Free State highlighted the importance of embracing African languages in higher education, stressing how this enriches teaching, learning, and research. The workshop sparked robust discussions among staff and students on celebrating linguistic diversity, embedding Indigenous Knowledge Systems (IKS), and creating a science curriculum that is relevant and reflective of African contexts.

By foregrounding multilingual approaches, the Faculty of Science reaffirms its commitment to Vision 2030 and to building an educational framework that honours heritage while preparing students to be globally competitive professionals.

Re- establishing Excellence: The Evolution and Future of the Department of Atmospheric and Oceanographic Sciences at Nelson Mandela University – with a Focus on the South African Master in Ocean Sciences (SAMOS)

Originally founded in the late 1970s under the University of Port Elizabeth, the Department of Oceanography was one of South Africa's pioneering centres for marine science education, offering qualifications up to PhD level. However, by 2000, due to institutional shifts and staffing challenges, it was phased out, with remaining programmes integrated into the Department of GeoSciences.

In 2019, the Faculty of Science restructured in line with Vision 2020 and Vision 2030, which prioritised Coastal and Ocean Sciences. This led to the re-establishment of the department as the Department of Atmospheric and Oceanographic Sciences (DAOS), expanding its scope to include atmospheric science alongside oceanography. Currently functioning as a virtual department, DAOS is guided by a five-year development plan focused on launching accredited academic programmes, recruiting staff, and securing a dedicated physical space

at the Ocean Sciences Campus.

The flagship initiative of DAOS is the South African Master in Ocean Sciences (SAMOS), a collaborative, Erasmus+-funded project officially launched from 8–10 April 2025 in Gqeberha. SAMOS is a three-year initiative coordinated by the University of Brest (France) and includes nine South African universities—five of which are historically disadvantaged—alongside the National Research Foundation and five European partner institutions. Its goal is to co-create a multidisciplinary master's programme that integrates both taught

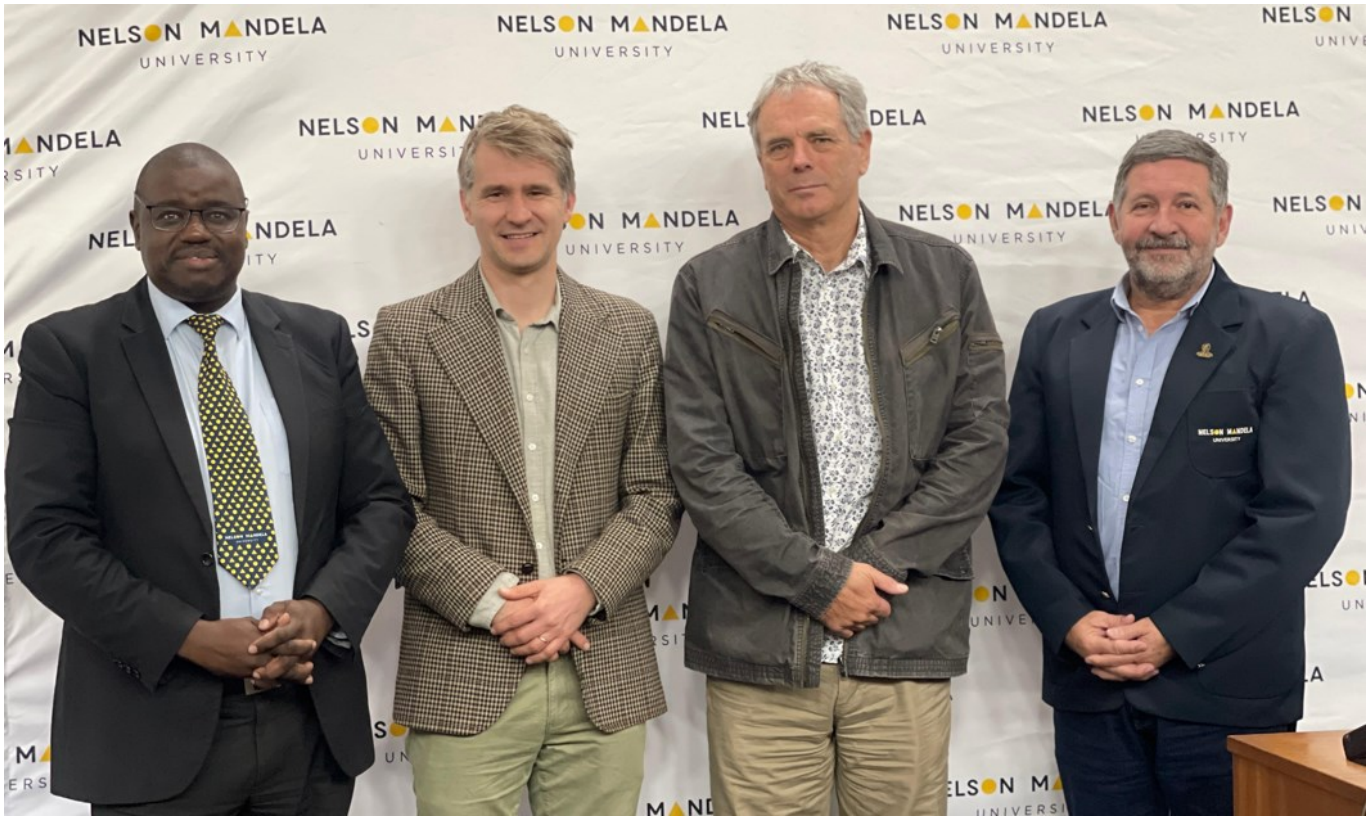
and research components, contributing to capacity-building, academic mobility, and sustainable development within the blue economy.

Key stakeholders at the launch—including leaders from the Council on Higher Education, the Department of Science, Technology and Innovation, and multiple South African universities—emphasised the programme's alignment with national development priorities, particularly higher education internationalisation, responsible marine resource management, and strengthening scientific capacity. SAMOS also celebrates over two decades of Franco-South African collaboration in marine sciences and promotes inclusive participation and mobility through academic exchange and curriculum innovation.

SAMOS is currently undergoing national accreditation and will see its first student intake in 2026, initially registered through the University of Cape Town. Nelson Mandela University will be the official delivery site and will take over full delivery and registration by 2027. Plans are also underway to develop an Honours in Oceanography and Atmospheric Sciences, with curriculum approval expected in 2025/2026 and accreditation by 2028. The department was already offering an MSc in Biological Oceanography (Biological), MSc in Chemical and Physical Oceanography and a PhD in Oceanography under the virtual department.

Planning is ongoing for the renovation of physical facilities to accommodate SAMOS and other DAOS activities. Through these initiatives, Nelson Mandela University aims to reassert its leadership in marine and atmospheric sciences and contribute meaningfully to climate change research and the sustainable blue economy.

Faculty of Science hosts public lecture on rhino conservation on Mandela Day



From left, Professor Zenixole Tshentu, Dr Timothy Kuiper, Professor Joshua Louw, and Martin Loubser

"Arrest more poachers or remove rhino horns?", one of the most pressing questions in African conservation, formed the focus of a recent Mandela University Faculty of Science public lecture at George Campus.

The event formed part of the University's Mandela Day commemorations with conservation professionals, academics, students, and members of the public attending both in person and online via Microsoft Teams. Senior lecturer in the Department of Conservation Management, Postdoctoral Research Fellow and field conservationist, whose work spans South Africa, Zimbabwe, and Namibia, Dr Tim Kuiper's research is at the forefront of conservation science, influencing real world strategies to protect endangered species, particularly rhinos.

His address unpacked research conducted across 11 rhino reserves in southern Africa from 2017 to 2023.

"We recorded 1,985 rhinos poached over this period, about 6.5% of the population annually, despite over USD 76 million (1.1 billion rand) invested in anti-poaching measures," Dr Kuiper explained.

While over 700 poachers were arrested, the data showed no clear link between arrests and reduced poaching.

Instead, the lecture revealed that strategic dehorning, carried out on over 2,200 rhinos across eight reserves, led to a 78% reduction in poaching, using just 1.2% of the total anti-poaching budget.

"Dehorning is not perfect," Dr Kuiper cautioned, "but combined with focused enforcement, it disrupts organised crime, limits incentive, and saves lives."

He stressed the need for multi-pronged approaches that address not only ground enforcement but also international demand, inequality, and systemic corruption driving the poaching crisis.

Dr Kuiper dedicated this work to Sharon Hausman, the CEO of the Greater Kruger Environmental Protection Foundation. "She died three days before the paper came out and I had spoken to her the morning that she died.

She was a wonderful person and the glue that held our team together," Dr Tim concluded his talk.

Professor Zenixole Tshentu, Acting Executive Dean of the Faculty of Science, was Programme Director and facilitator of the event. Martin Loubser, Acting Senior Director of George Campus, spoke to the importance of knowledge sharing and community engagement on issues of biodiversity and sustainability.

Professor Joshua Louw, Director of the Natural Resource Science and Management (NRSM) Cluster introduced Dr Kuiper, as an African scientist focused on research into human–nature relationships.

Dr Timothy Kuiper

Since May 2024, Dr Kuiper has been a senior lecturer in Biodiversity and Statistics at Mandela University, where he teaches postgraduate courses, supervises MSc and PhD students, and leads interdisciplinary research across Africa. His work combines methods, such as statistical modelling and stakeholder interviews to understand biodiversity loss and support African-led conservation.

Though his main expertise is in quantitative modelling, he collaborates with practitioners and policymakers to ensure his research delivers practical, impactful solutions. His goal is to foster African leadership in conservation science through research and teaching.

Following the keynote lecture, Prim Gower, Director of Communication and Marketing, shared remarks on the importance of science communication and the University's intention to collaborate with Dr Kuiper on disseminating the research through an article in a top-tier science journal.

Ms Primarashni Gower

"Our role as communicators is to elevate the voices of scientists and ensure their insights inform policy, awareness, and

"This was not just a lecture; it was a call to action. A reminder that science must serve people, policy, and the plane," Prof Tshentu said.

At the end of the lecture, Prof Tshentu referred to an opening address by President Nelson Mandela at the Conference on National Environment Policy in 1995, where he remarked that "We all understand that the environmental challenges of the modern world extend far beyond the survival of single species or merely the well-being of nature.

"The many and severe global pressures on the environment will demand innovative solutions from the world community".

Today, we talk about co-creation of transdisciplinary solutions at Mandela University. Let us do our bit species by species and ecosystem by ecosystem," Prof Tshentu added.

Q&A Session

Mandela Uni Fragrance Workshops Empower Aspiring Beauty Entrepreneurs

A new series of innovative workshops and short courses at Nelson Mandela University's InnoVenton Downstream Chemicals Technology Station is opening doors for aspiring beauty entrepreneurs in Gqeberha.

Participants are learning to create their own cosmetics and fragrances, even without prior scientific knowledge. The sessions are led by formulation experts Dr. Nicole Vorster, Anneke Greef, and Carlen Rudolph. According to Dr. Vorster, the workshops cover essential aspects of fragrance creation, from understanding top, heart, and base notes, to learning how to blend and formulate fragrances. These skills empower participants to either launch fragrance businesses or enhance existing ones.

Among the workshop attendees were: Asmahil Goliath and Kim Goliath, siblings who run a cosmetics company; Lucelle Gallant, a former teacher, who joined for personal enrichment and Yondela Ntwamvambo, working in hospitality, who plans to create room fresheners for her lodge.

Participants expressed excitement about learning the science behind perfume-making, and many appreciated the hands-on experience of formulating their own scents. One participant shared: "I wanted to try something new, and I would like to make air fresheners one day."

These workshops, subsidised by the Technology Innovation Agency's Technology Station Programme, make fragrance creation accessible and affordable for small businesses.

Research on Flammable Plant Species Aims to Prevent Veldfires

A pioneering study by Samukelisiwe Msweli, a researcher at Nelson Mandela University, is shedding light on the dangers posed by highly flammable plant species – particularly in regions like the Garden Route that are frequently affected by devastating veldfires.

Through research conducted at the University's George Campus, Msweli assessed the flammability of 30 woody plant species, including many that had not previously been studied. Her findings show that invasive species such as pine, gum, and wattle carry high fire risks due to their rapid ignition and intense burning properties.

Wattle was noted to both carry fire and drain water from the soil, increasing its environmental threat. These insights are valuable for homeowners, urban planners, and environmental managers, helping them make informed decisions about landscaping and fire prevention.

In contrast, native thicket species were found to be less flammable, making them safer options for fire-conscious planning. Msweli said that simple steps such as choosing the right plants, clearing gutters, and removing dry branches and leaves around homes could help protect lives and property.

Msweli plans to expand her research as part of her PhD at the University of Cape Town, using satellite imaging to further assess fire risks. She credited her Mandela supervisors, Dr Tineke Kraai and Prof Alastair Potts, for her success, and expressed her enthusiasm for working with Dr Jasper Slingsby at UCT.

Her work aims to integrate plant flammability insights into broader wildfire management strategies, supporting community resilience in the face of climate threats.

"Fire isn't always the enemy – it is part of nature," Msweli says. "We need to learn how to live with it safely."

PhD student in Mathematics Fundile Nyaweni is the first prize laureate in the Global Challenges University Alliance (GCUA) award for PhD students

Students had to submit their research and communicate their work to a broad global audience, showcasing their research and its impact on addressing global challenges.

Nyaweni's submission was entitled "Mathematical modelling of tumour treatment with chemotherapy" and it was lauded as "high-quality research focusing on the importance of creating mathematical modelling for optimising tumour treatment with chemotherapy".

She succeeded "to effectively communicate the research in a clear way and explained very well how her research contributes to global sustainable development with a focus on SDG 3 – 'Good health and well-being' and SDG 9 – 'Industry, innovation and infrastructure'.

Nyaweni received a prize of €3500 (R72 000) and the opportunity to present her research at a GCUA 2030 webinar.

Relevant research

The winning study developed a mathematical model to analyse chemotherapy efficacy in cancer treatment, focusing on the interactions between immune cells, and tumour and normal cells. The model used predator-prey dynamics to examine tumour progression and treatment outcomes.

The results showed that lower drug concentrations slowed tumour clearance, whereas higher concentrations accelerated tumour eradication, but damaged healthy cells.

The study also emphasised personalised treatment plans, early tumour detection, and careful dosage management to improve patient outcomes, reduce costs, and optimise healthcare resources.

Global reach

GCUA 2030 is a network of university partners from across the globe, representing different disciplines with a key objective to equip the next generation of researchers, teachers and academic leaders with knowledge, tools and networks that will strengthen their capacity to work across disciplines and conduct transla-

tional research.

Nyaweni is currently a contract staff member in the Department of Mathematics.

“Winning the GCUA Prize is a great honour, highlighting the importance of science and innovation in addressing global challenges, like climate change, food security, health disparities, and sustainable development.

"It is both a personal achievement and a call to action, emphasising our responsibility to use scientific discoveries for the greater good and to create solutions that benefit all of humanity,” she says.

As a woman in mathematics, this award demonstrated the importance of diverse perspectives in tackling complex problems and the need for more women and underrepresented voices in STEM to contribute their unique insights and drive progress, Nyaweni explains.

She thanked her supervisor, Dr Willard Mbava, for his mentorship and support and said that this recognition calls for unity among researchers, doctors, and professionals to work together toward lasting solutions in health, sustainability, and beyond.

“The innovations and partnerships we create can have a profound impact, but what’s needed now is collective action and shared commitment.”

Forestry Master’s student Avelile Cishe awarded Abe Baily travel Bursary

The annual Abe Bailey Travel Bursary runs for three weeks, starting in England and ending in Scotland. The bursary is awarded to selected South African university students to enhance understanding of different viewpoints, languages and cultures, encourage leadership and open debate, experience British Culture and promote South African unity.

Cishe believes that he has been selected for this bursary because of his academic achievements, leadership skills and experience, as well as his “keen interest in multidisciplinary issues, and my drive to uplift and develop communities around me – these are among the qualities that I think awarded me this opportunity.”
Cishe graduated *cum laude* for both his Diploma in Forestry and his BSc Honours in Natural Resource Management and achieved an average of 81.5% for his Advanced Diploma in Forestry. He has been the President of the Mandela University Forestry Association and served as the Regional Representative for the SADC region, overseeing strategy development and implementation in over eight countries in the region.
He has also contributed to sourcing more than R300 000 from industry and government to clear outstanding student debts in his department, as well as another R150 000 to support the learning development of other students and their attendance at conferences and symposiums.
He is currently a member of the Golden Key International Honour Society and serves on the Mandela University’s Forestry and Wood Technology Curriculum Advisory Board. He is the Assistant Coach for the George Campus Football Team and supports in teaching mathematics and science in high schools around George.
In addition, he is involved in various community development projects. Cishe’s current Master of Science research evaluates the impacts of initial density and varying subse-

Dr Timothy Ajiboye Awarded NRF Y2 Rating

Dr Timothy Ajiboye

Congratulations to Dr Timothy Ajiboye from the Faculty of Science, who has been awarded an NRF Y2 rating as a new applicant, valid from 1 January 2025. This prestigious recognition reflects Dr Ajiboye's growing contribution to research excellence and the impact of his work within the academic community.

On receiving the rating, Dr Ajiboye shared:

"I am happy to have achieved this feat through the grace of God. It shows that my research is not just of quality standard, but it is also widely accepted and read among the researchers. The award will serve as a catalyst to publish more high-quality works in high impact journals. My appreciation goes to the University, Faculty of Science, Chemistry Department, Prof. Sabelo Mhlanga, Prof. Paul Watt, Dr Sunday Ogunlaja, Prof. Tshentu Zenixole and my collaborators."

We celebrate this milestone and wish Dr Ajiboye continued success in his research journey.

quent levels of mortality on pulp-wood growth, uniformity, yield and economic performance. He aspires to be a research scientist with his current sponsor and work for the multinational company Sonae Arauco, whose headquarters are in Portugal – although he does not want to leave his grandmother in South Africa.
Cishe says that he wants to keep ties with Mandela University as a research associate and is also looking forward to engaging with renowned academics, visiting world-class institutions, such as Oxford University and University of Edinburgh, and expanding his professional network during his travel bursary tenure.
Professor Josua Louw, Director of Strategy in the School of Natural Resource Science and Management, aptly describes Cishe as "a young man of unblemished character and integrity, with a strong sense of responsibility, ethics, moral values, and righteousness."
His unwavering commitment to excellence aligns perfectly with the values of the Abe Bailey Travel Scholarship.

Top awards for Mandela University academics at Computing Sciences and IT conference

Mark Brand was awarded the Best Paper award, for his various theories attempting to explain the paradox of a shortage of ICT skills, despite many ICT graduates remaining unemployed. His PhD supervisors are Computing Sciences' Professors Andre Calitz and Jean Greyling.

Dr Barnard received the prize for the Best Reviewer, giving the most comprehensive feedback after reviewing. Reviewers must evaluate the submitted papers, allowing the organisers to know which to accept or not for the conference.

Mandela University's Computing Sciences and the School of IT hosted both the SA Computer Lecturers Association (SACLA) and South African Institute for Computer Scientists and Information Technologists (SAICSIT) with over 170 delegates in total.

From left, Prof Jean Greyling, Mark Brand, Prof Andre Calitz and Dr Lynette Barnard

Simphiwe Magakwe: Inspiring Change in Coding Education

Simphiwe Magakwe, a young woman in her twenties, experienced a full-circle moment when she returned to her hometown in Limpopo to teach coding. Driven by a desire to provide financial stability for her family, she pursued a BSc in Computing Science at Nelson Mandela University, where she excelled despite having no prior coding experience. Supported by the Department of Computing Sciences and a merit-based Bank seta bursary, Simphiwe overcame personal hardships, including her mother's health issues, to continue her studies.

Although she temporarily paused her studies due to challenges with her final module, Simphiwe is now back and determined to complete her degree. She began her professional journey in a data science company before joining Tangible Africa, an engagement project of NMU and the Leva Foundation, which promotes accessible coding education across Africa.

As Programme Manager at Tangible Africa, Simphiwe oversees numerous national projects, manages regional coordinators and interns, and helps train over 40,000 teachers in coding. During a teacher training session at her former school in Limpopo, she was moved by the impact of her presence on local students and teachers, inspiring them to believe in their potential.

Simphiwe credits her growth to mentors like Prof Jean Greyling and Prof Brenda Scholtz, as well as the support of her mother. A proud Black woman living with a disability, she aims to change stereotypes about who belongs in Computer Science and serve as a visible role model for young girls and underrepresented communities in STEM .

Mandela Alumnus Sherwin Barlow Honoured with MTN's Top XtraMile Award

Mandela University alumnus Sherwin Barlow (MSc Computer Science) and his team have been recognised at the MTN Company-wide Extramiler Awards 2024, winning Business Unit of the Year.

Sherwin went on to achieve the overall top honour as MTN South Africa's Best XtraMile Award winner, a prestigious CEO award that celebrates the most outstanding employee across all business units. The recognition is based on peer nominations and votes, highlighting Sherwin's exceptional performance, impact, and leadership.

Dr Nehemiah Latolla shines in M&G's 200 Young South Africans for 2025

Postdoctoral research fellow in human physiology at Mandela University Dr Nehemiah Latolla has been lauded in the *Health and Wellness* category as one of the Mail & Guardian's 200 Young South Africans for 2025.

Dr Latolla, 32, also won the FameLab International competition in 2022, was recognised by the Federation of Commonwealth Chemical Sciences Societies, and was selected as one of 25 emerging higher education leaders globally for the UNILEAD Programme in Germany.

From his national Diploma in Analytical Chemistry to his PhD in Chemistry, Dr Latolla has spent his educational journey at Mandela University.

Nehemiah pioneers the integration of traditional and modern medicine. Raised in the Eastern Cape by missionary parents, his early exposure to community service, education, and indigenous knowledge deeply influenced his path.

Inspired by his grandmother's garden, Nehemiah developed a passion for the healing power of plants, leading to his research on the anticancer and antidiabetic properties of South African medicinal flora.

Currently exploring advanced 3D cell culture models, he aims to create affordable, culturally relevant treatments to combat breast cancer.

Nehemiah credits his late father, Solomon Latolla, a missionary whose life of service and humility shaped his values, and Dr Buyiswa Hlangothi, his mentor who nurtured his academic journey and belief in the value of indigenous knowledge.

Through mentorship, research, and outreach, Nehemiah continues to bridge traditional wisdom with cutting-edge science, inspiring a new generation of African scientists and reaffirming the importance of culturally conscious healthcare innovation.

Dr Nehemiah Latolla