

Faculty of Science News

Message to Students from the Dean

Mandela University Rises To Covid-19 Battle

The Faculty of Science, together with our other faculties, academics and the university leadership, have combined forces with hospitals, businesses and communities in the Nelson Mandela Metro to help fight Covid-19.

Our faculty and university strategy mandates us to be an engaged institution and there is no better time than the present to engage and partner with all sectors of our community when society needs us the most.

We know that you are feeling very anxious about the academic year and we are working with the Dean of Learning & Teaching, Professor Cheryl Foxcroft, on pathways for all our students to be able to complete this term's modules and to continue the academic year. No student will be prejudiced in this process and we will share the strategy going forward with you as soon as it is finalised, and as soon as we have a clearer picture of when students will be able to return to classes.

"We are living in a very uncertain world right now and it is important to be innovative, self-motivated and open to multiple learning paths."



Prof Muronga with alcohol sanitisers produced by InnoVenton – the chemical technology research institute in our Faculty of Science. InnoVenton is daily producing hundreds of litres of 70% alcohol sanitisers in our laboratories for distribution to our communities.

For now, the biggest battle right now is to break the Covid-19 chain of transmission. Face masks, regular hand washing and sanitisers are the first and most critical line of defence against the virus. Speaking from a medical perspective, our university's Dean of Health Sciences, Professor Lungile Pepeta, says, "we cannot emphasise enough the importance of the entire population, adults and children, wearing face masks as much as possible. Whether it is a medical or non-medical face mask or a scarf, wear whatever you have, wash it regularly, and do not step outside your home without it". We take safety first very seriously in our Faculty and I have no doubt that our students and staff know the value of safety.

A team of chemists from InnoVenton – the chemical technology research institute in our Faculty – is daily producing hundreds of litres of 70% alcohol sanitisers in our laboratories for distribution to our communities. Face shields are being printed with the 3D printers in our Faculty and in the Faculty of Engineering, which is also working on the production of ventilators and intubation boxes.

Our provincial hospitals are critically short of protective safety gear, and all gear from our laboratories not in use during lockdown, including face masks, goggles, lab gowns and gloves, is being donated to healthcare workers in these hospitals. A team from our Faculty of Humanities'

"A team of chemists from InnoVenton – the chemical technology research institute in our Faculty – is daily producing hundreds of litres of 70% alcohol sanitisers in our laboratories for distribution to our communities."

"Our microbiologists are on standby to advise the hospital in their capacity as experts in virology and how to respond to the spread of the pandemic ... "

Departments of Visual Arts and Media Communication is engaging our local garment industry and communities in a strategy to produce face masks and protective clothing.

Our microbiologists are on standby to advise the hospital in their capacity as experts in virology and how to respond to the spread of the pandemic, as well as contribute to how to model its spread for better management.

Covid-19 has also highlighted the need for South Africa to manufacture life-saving drugs. None of the advanced pharmaceutical intermediates (APIs) or drug substances for HIV, TB and malaria are currently made locally, which makes them incredibly expensive, and, with the advent of the coronavirus there are concerns that there could be a decrease in supply.

Professor Paul Watts, holder of the SARChI Chair in Microfluidic Bio/ Chemical Processing in our Faculty explains their research group has done a huge amount of research into new ways of manufacturing generic drugs in South Africa for AIDS, TB, malaria, cancer and influenza. Prof Watts says that if the ARV/ hydroxychloroquine/anti-viral drug combinations prove to be an effective treatment for Covid-19, they could produce these with their new flow process technology.

It has taken Watts and his team 20 years of collaboration with researchers in the UK to not only develop this technology for South Africa, but to manufacture the drugs for 20% to 30% cheaper. The majority of South Africa's API's are imported from India or China. Watts explains that over the past 10 years South Africa has spent in the region of R120billion buying in AIDS, TB and Malaria APIs from India and China.

The local manufacture of key generic drugs for major diseases and viral pandemics in South Africa and Africa could ensure that more people have access to the drugs, it could save billions, create jobs and establish a new manufacturing industry.

We are living in a very uncertain world right now and it is important to be innovative, self-motivated and open to multiple learning paths. Life is a journey with unpredicted and unexpected detours, and it is vital that irrespective of what the journey presents, that you, our students, continue to reach for your goals.

We'll all meet again soon, and in the meantime, this newsletter features some of the good news coming out of our Faculty in the first few months of the year.



Prof Paul Watts

What We Can Achieve

By Professor Azwinndini Muronga

The way we do teaching and learning in a 21st century Faculty of Science has been the subject of intensive focus in our Faculty as the reality of learning anywhere at any time is a global feature of the Fourth Industrial Revolution (4IR). In our Strategy 2020 - 2030 we foregrounded the need to advance technology-assisted learning

Our Strategy and Organisational Redesign is proactive about what is needed and relevant in these times. It calls for the establishment of a range of new entities, including a Digitalisation Unit to advance online learning and teaching, research and training as well as engagement and partnerships.

Our organisational redesign ensures that our clusters are transdisciplinary and engaged at all levels. Our new Biosciences and Biotechnology cluster, for example, is a stark reminder of the need to think ahead and that our Faculty is thinking ahead to help tackle the challenges of our time, including pandemics and crises like COVID-19, which we are currently doing in collaboration with other faculties.

One of our strategic goals for learning and teaching is: To embrace the use of technology to enhance learning and teaching (informed by 4IR and online learning and teaching-eLearning). We must encourage and facilitate increased use of eLearning, eResearch and eEngagement in the Faculty. We regard these as essential skills for all our students and staff, and we need to make sure that all our students are included.

The end-goal of our Faculty and University, emphasised during lockdown, is that our students must be able to complete their modules this year, and we commit to walking this uncharted road together. Those students who do not have laptops or smartphone, or access to online support will not be prejudiced or left behind, as emphasised in our University's #NoStudentLeftBehind pathway approach.

When we resume classes, students without devices and online access will pursue a more intensive learning and teaching pathway, with more face-to-face time with lecturers so that they can complete their modules. Students who have continued learning during lockdown will pursue combinations of digital and face-to-face learning.

What the Covid-19 pandemic and lockdown has done is to accelerate higher education capabilities in terms of eLearning and blended learning and teaching spaces. This is happening throughout our university and the higher education sector. The government's Basic Education Department is going down this route as well. This means we have to be ready for those learners. As a laboratory intensive Faculty we need to incorporate both forms of learning: online and face-to-face.



L-R: VC Prof Sibongile Muthwa, Premier Oscar Mabuyane, Health MEC Sindiswa Gomba and Executive Dean of the Faculty of Science Prof Azwinndini Muronga with hand sanitisers produced and donated by the University to the Nelson Mandela Bay Metro.

We have a window of opportunity to shape the future of science, technology and innovation ...

In the next article, our University's DVC of Learning & Teaching, Professor Cheryl Foxcroft elaborates on the digital and face-to-face pathways we have been working on to ensure our students can complete the first semester and continue the year.

Looking to the future, we are at a crossroads that requires all of us in the Faculty of Science to shape our future. We are compelled to think out of the box as Einstein did if we want to better understand our world and universe. I would like to refer my colleagues to the book *The Structure of Scientific Revolutions* by American physicist, historian and science philosopher, Thomas S. Kuhn. He explains that the history of science teaches us that major scientific breakthroughs only happen because of radical thinking away from the norm or traditional scientific thinking.

Kuhn challenged longstanding linear notions of scientific progress as he argued that transformative ideas do not arise from the day-to-day gradual processes of experimentation and data accumulation, but rather through the

revolutions in science – those breakthrough moments that disrupt accepted thinking and offer unanticipated ideas outside of normal science.

Everything we do as a Faculty needs to be forward thinking because our students and graduates must survive and thrive in the 21st century and the rapidly evolving 4IR, which will bring with it careers and opportunities that do not yet exist. We need to move radically away from everyday thinking in order to achieve this. It means that systems and processes that stand in our way will have to be dismantled.

At the crossroads there is an expectation by the university and society at large that the Faculty of Science should play a leading role in navigating the threats and opportunities of our time. For example, the convergence of data with the advent of computational storage and cognitive power will transform industry and society at every level, thereby creating opportunities that were once unimaginable – from education and health to agriculture, manufacturing and services.

Our Faculty should lead in the approach to and preparedness for the convergence of several important technology shifts, such as mixed reality, artificial intelligence and quantum computing.

We have a window of opportunity to shape the future of science, technology and innovation in ways that promote the common good, enhance human dignity and health, and protect the environment. If we miss this window, the challenges we face today of inequality, poverty, unemployment, environmental degradation and health pandemics, will only become worse and compromise the wellbeing of all.

Catching up the Academic Year

By Professor Cheryl Foxcroft

Deputy Vice-Chancellor: Learning & Teaching, Nelson Mandela University

The Covid-19 pandemic and lockdown has created significant challenges for the higher education sector, and our universities and colleges are working hard on strategies and solutions to achieve the end-goal of catching up and completing the 2020 academic year.

Students throughout South Africa and globally are expressing their growing anxiety about the extended lockdown. To address this, universities worldwide have shifted to online learning and teaching, with platforms that previously supplemented face-to-face lectures becoming the main learning portal.

It's only a partial solution for South Africa because, for example, at Nelson Mandela University, many of our students live in the townships, informal settlements and rural areas where they do not have online access or a private space to study. We estimate that about 55% of our students have laptops and connectivity and a further 10% could learn via their smartphones. This means that about 35% of our students are currently not able to participate in digital learning and teaching off campus.



By Professor Cheryl Foxcroft

A "one-size-fits-all" approach, such as only adopting online learning to complete the first semester, would exclude many of our students. Given our strong commitment to social justice and equality, this is not an acceptable option for us, hence we have developed two learning and teaching pathways (and variations of these) to enable our students to complete their first semester modules and the academic year.

The pathways range from digital to face-to-face when classes resume, to a blended approach which are combinations of the two. Navigating them will take collective, ongoing effort from the university to care for and support our students and staff. We are in the preparation phase and the pathways will start on 28 April.

A collective effort was required to design our pathway approach. We have had many virtual discussions with the university management,

Executive Deans and Deputy Deans, academics, the Chief Information Officer, learning and teaching professionals, the Executive of the Student Representative Council (SRC), and students. We also consulted colleagues at other universities in South Africa and internationally and we studied many articles on teaching during times of disruption.

A "one-size-fits-all" approach, such as only adopting online learning to complete the first semester, would exclude many of our students.

A summary of the pathway approach is as follows: Pathway 1 learners (those with suitable devices - laptops and smartphones - and connectivity) will complete most of their learning digitally. This makes it possible for Pathway 2 learners to get greater access to intensive face-to-face teaching when students return to campus. It also serves the purpose of reducing numbers in our venues for social and physical distancing purposes.

It is daunting to adapt to online learning, and our Pathway 1 learners will take a compulsory preparatory module on digital learning that our learning development staff worked around the clock to design in the past few weeks. It includes helping learners to adapt mindsets to learn effectively online, and how to develop a schedule for themselves in the absence of a prescribed timetable. For example, if students need to complete six modules and a test in a week, they need to plan how to achieve this. They need to know how many hours they should spend on each module, and how to organise their schedule.

Pathway 2 learners will have preparatory sessions to enable them to re-ignite their learning when they return to campus. Lecturers will stay in contact with students in both pathways during lockdown to encourage them and address queries and concerns. There will also be a hotline to call for all queries. This will be particularly useful for students living in areas with limited or no telecommunication network coverage as lecturers will be unable to contact them via email, SMS, or WhatsApp. Keeping connected is so important during this time when many people feel isolated.

For students on both pathways, tutors, supplemental instruction leaders, academic advisers, student success coaches and counsellors will provide online and, when possible, face-to-face learning and psycho-social support to help students to adapt to new ways of learning and to succeed.

Lecturers are also anxious and stressed about facilitating learning digitally as it moves many of them out of their comfort zone of mainly using contact teaching. We are supporting our lecturers to teach and facilitate digital learning in a number of ways. Our learning and teaching experience development teams and ICT services are working with them, and a range of resources have been made available, including the recently curated Online Teaching 101 Module on our university's Moodle learning management system.

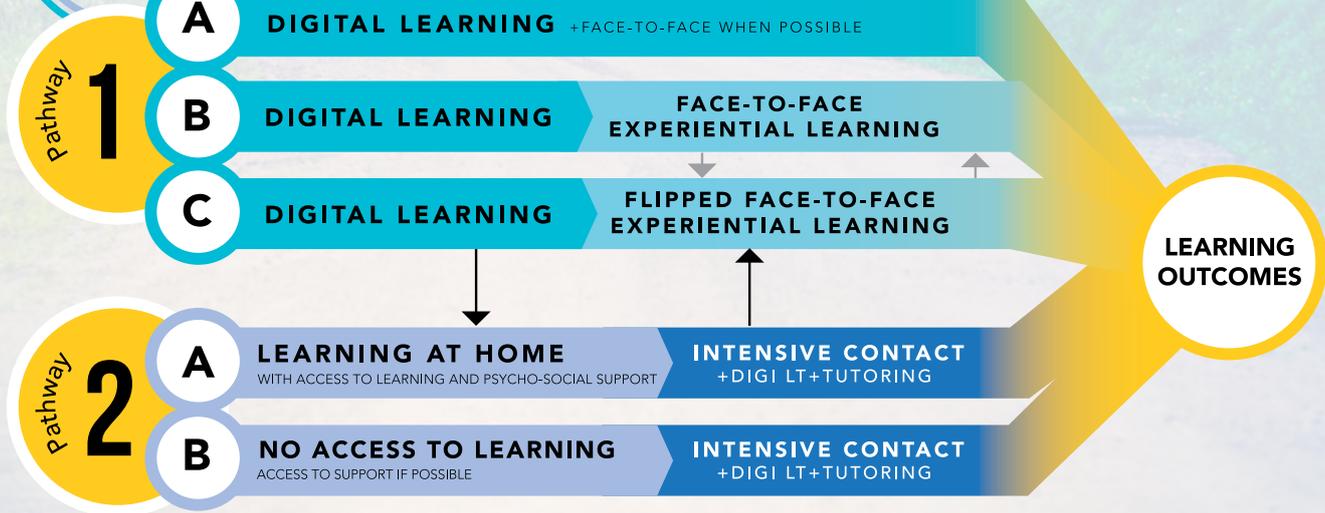
We are committed to walking this uncharted road together as a university community. And, when we finally complete the 2020 academic year, we will pause to look back over the rocky terrain we have traversed. We will see the courage, creativity, intelligence, agility and grit we mustered during and after lockdown to get to the end of our journey. I know that we will be amazed at the power of our collective effort as the staff and students of Mandela Uni to get the impossible done.



Pathways FOR LEARNING



Exactly the same work is covered in the two pathways - just delivered in differing ways



PATHWAY 1:

- 1A:** includes digital learning as the main focus with face-to-face revision when possible
- 1B:** theoretical aspects are completed digitally but experiential learning is completed face-to-face (F2F)
- 1C:** theoretical aspects are completed digitally but a few flipped class contact sessions and experiential learning

PATHWAY 2:

Assumes that a student had limited or no possibilities to learn from their textbooks and notes at home. This pathway will rely heavily on intensive contact LT and tutoring. Students on Pathway 2 will take longer to achieve their learning outcomes, especially if there is a long delay before contact teaching is possible, but they will nonetheless be able to achieve their module outcomes.



WHY TWO BLENDED PATHWAYS?

There is **immense value** in having two pathways. We have committed ourselves, as students and staff, to walk **side by side** to help each other to complete Semester 1 and the 2020 academic year. Those students that follow Pathway 1, make it possible for Pathway 2 learners to get greater access to intensive F2F LT when students return to campus and we need to reduce numbers in our venues for social distancing purposes.

 We have a team working on how to provide **pathway two** learners with learning and psycho-social support





First Year Welcoming Ceremony 2020

On 25 January Nelson Mandela University held a welcoming ceremony for first year students at a number of venues on South Campus.

Vice Chancellor, Professor Sibongile Muthwa's welcoming address, delivered at the indoor sports centre, was live-streamed to all the venues.

The VC encouraged students to seek support through the services available at the University and emphasised that the diversity of students from all walks of life at Nelson Mandela University is welcomed and embraced.

The Faculty of Science hosted their first year students at the South Campus Auditorium where the Executive Dean, Professor Azwinndini Muronga welcomed the students and parents in attendance. He discussed all the departments within the faculty and encouraged parents to play an active role in their children's education.

The programme ended with an exhibition in the foyer, showcasing the departments in the Faculty of Science. Students and parents enjoyed the opportunity to speak with lecturers about the various courses on offer.

Pre-Registration Session

The Faculty of Science held a BSc pre-registration session on 29 January where first-year students were welcomed by Dr Derek du Preez, the Director of School for Environmental Sciences. The session was geared towards assisting first-years to get to know their lecturers and ask questions related to their courses in order to make informed decisions during registration.

The programmes offered during the session included in-depth presentations on the various qualifications and modules within the Science Faculty, providing students with knowledge on what to expect during the academic year.

There were also presentations from Science Communication, the Library, the Faculty Academic Advisor, Science Students Association (SCI-SA), and the Universal Accessibility & Disability Service (UADS), all giving the students guidelines on how to have a dynamic university experience, utilising the tools and facilities made available to them by the University.

At the end of the programme the students were offered an opportunity to have a one-on-one interaction with their lecturers before registering at the New Science Building, with the assistance of the Faculty of Science team.





Computing Sciences Smart Lab

The Computing Sciences Department is proud to be part of leading research in Smart Environments. Sponsored by Amazon, Telkom and Mandela University, a first of its kind Nelson Mandela University Smart Lab and

Amazon Web Services Lab has been built to propel efforts in Smart Environment Research.

Thanks to these labs, our postgraduates and researchers are using leading edge technology to tackle a range of questions related to Smart Environments.

The Mandela University Smart Lab is a functional tool to develop and test Smart Environment services, sensors and actuators. Researchers interested in pursuing groundbreaking discoveries can join the journey to make meaningful contributions to the way people live, work and play.

“As scientists we don’t only want our students to be equipped for the 4th Industrial Revolution, we want them to drive the 5th and 6th Industrial Revolutions and make an impact on the economy in South Africa. Through these sponsorships the department is facilitated to lead research in the field of Smart Environments including Smart Homes, Smart Offices, the future world of work and, of course, Smart Campuses

– **Dr Brenda Scholtz, Computing Sciences Head of Department.**

Strengthening International Relations through Fulbright Scholarships



Mr Raj Sashti, a Fulbright specialist from the Georgia Institute of Technology, Atlanta, Georgia, USA, visited the university on 3- 4 March to engage with our students and staff in meetings, presentations and interactions. Raj shared information on best practice, strategies, techniques and approaches to secure Fulbright and other externally funded fellowships and grants which will enable scholars to visit, study, travel and engage in pure and applied research in the United States and other countries.

Raj gave a presentation on the topic “Enhancing International Opportunities Through Fellowships and Grants”. He went on to have a one on one session with students to further assist them by sharing information on the requirements for applying for a Fulbright scholarship.

Raj engaged with our academics to develop collaborative relationships with their American counterparts with the goal of developing short-term programmes with an emphasis on faculty and student exchange.

His visit was successful in further enhancing our Faculty’s ongoing efforts in the area of international education, training and development to strengthen institutional partnerships and cooperation, and to promote educational and cultural exchanges.



Successful International Physics Masterclasses 2020

iThemba LABS and the Department of Physics at Nelson Mandela University invited top-performing science and mathematics learners from Grade 10 to 12 to join us in the Physics Department for the 16th International Masterclass in particle physics.

The Masterclasses were presented by Dr Siegfried Förtsch and Prof Zinhle Buthelezi, Senior Research Scientists at iThemba LABS as well as PhD student Tokozani Mtetwa.

The range of interesting Masterclasses included lectures about the fundamentals of particle physics, an introduction to the Large Hadron Collider (LHC) and ALICE (A Large Ion Collider Experiment) as well as an introduction to large-scale analyses and concepts: centrality, yield calculations and strangeness enhancement.

Learners were introduced to hands-on exercises through measurement first by virtual analysis and finding the value of V_0 in different centrality classes. They collated the results, filled out spreadsheets and did the final processing of the results. They then nominated learners among them to share their results during the video conference with scientists at CERN, as well as with international participating learners from Mexico, France, The Czech Republic and Italy.

In closing, certificates were handed out to all participating learners. Overall, the International Physics Masterclasses 2020 were a huge success. Apart from the experimentation aspect, learners thrived on the international collaboration and the opportunity to engage with scientists at CERN, which is, after all, the largest particle physics laboratory in the world.

Nelson Mandela University represented at the AI Expo Africa

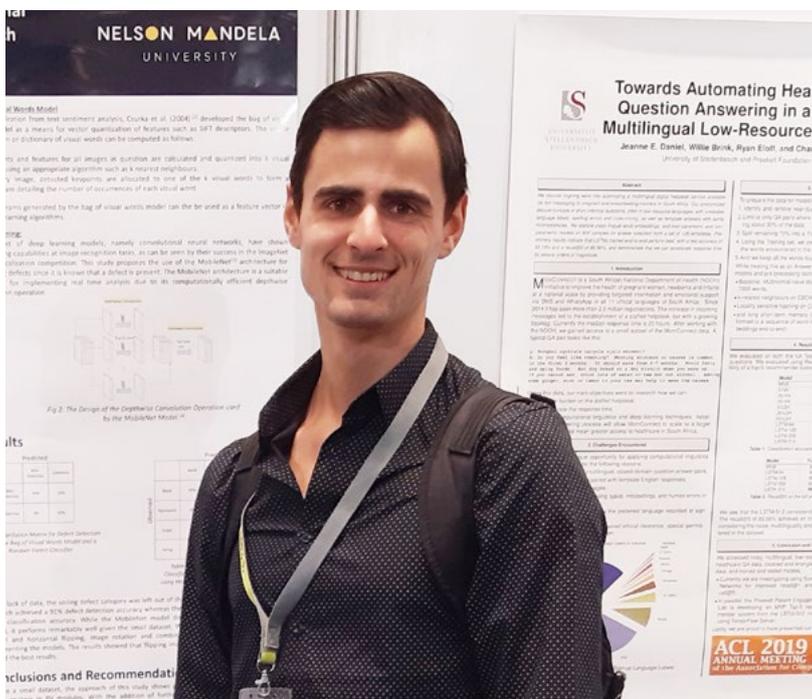
AI Expo Africa, now entering its 3rd successful year, is the largest business-focused Artificial Intelligence (AI), Robotic Process Automation (RPA) and Data Science trade event in Africa. The phenomenal success of the 2018/2019 event held in Cape Town, established it as the largest business gathering of its kind in the region, with over 1000 registered delegates, decision-makers, investors, buyers, suppliers, innovators, SMBs and global brands, all focusing on real world business applications that can be deployed today.

At AI Expo Africa 2019, delegates were given the opportunity to vote for nine award categories to reflect the standout effort and dedication of individuals and companies.

The categories were: best plenary keynote, best main talk, best flash talk, best workshop, best demo, best stand, best startup, best poster, and the AI media directors award.

Mr Christopher Dunderdale, a Master's student in our Statistics Department won first place in the best poster category. He presented a poster on Photovoltaic Defect Classification Through Thermal Infrared Imaging using machine learning.

The Faculty of Science celebrates with Christopher.



Science Communication Developed at FameLab

Rhodes University hosted the FameLab competition on 16 March 2020 at the Amazwi South African Museum of Literature in Grahamstown.

FameLab is a programme that aims to develop science communication skills, and more specifically public speaking skills in young scientists. While it takes the format of

a competition, it is primarily a development initiative. For many participants, it is their first exposure to science communication and presenting to a public audience outside their science community.



The first phase of the competition involves the running of heats across the country. Each heat is preceded by a science communication workshop. From each heat two speakers are selected to go through to the semi-finals. A Masterclass in science communication and public speaking is presented prior to the semi-finals by a trainer brought in from the UK by the British Council. The top ten from the semi-finals compete at the national finals and the winner of FameLab SA goes to the Cheltenham Science Festival in the UK to present at the international finals.

At the Rhodes University-hosted FameLab, all participants were given an opportunity to give a three-minute presentation in front of a panel of judges and they received feedback as to why the top five were selected. Nelson Mandela University had four students in the top five with Malibongwe Mambu (NMU – 5th), Afikile Rasmeni (NMU – 4th), Awonke Nqayiya (NMU – 3rd), Yenziwe Mbuyisa (Rhodes – 2nd) and the overall winner Sendibityosi Gandidzanwa (NMU – 1st). The top two will represent the Eastern Cape in the Nationals later on this year. Congratulations to our outstanding science communicators!

New Staff: Science Marketing Team

Name: Reatile Mosia

Position: PR & Marketing Coordinator

Qualification: BA (Media, Communication and Culture); BA Hons (Corporate Communication)

Science communication and marketing is important in order to be able to simplify the concepts of science so that the non-science or non-specialist audience can appreciate and understand what science offers, and, where appropriate, to partner on or implement science solutions and innovations.



Reatile Mosia

Science communication bridges the gap between the university and the community to create an interest and awareness in science.

Favourite quote: "You are destined for better things in life" – anonymous.

I chose this quote because I feel that whatever situation you might be faced with in life, it does not define who you are as a person. We are all destined to receive all the good things that life has to offer.

Name: Lwando Goxo

Position: PR & Marketing Coordinator

Qualification: BSc (Applied Mathematics & Mathematical Statistics)

Science communication is the practice of informing, educating and raising awareness of science-related topics. Science communication provides the capacity to communicate science effectively to a wider audience such as communities, business and non-science academics and scholars. It promotes the understanding of various scientific concepts in a simpler, logical and relevant context. It also helps to reach more people within a

short period of time. Science communication will play an increasingly significant role in a changing 4IR world.

Favourite quote: "The first responsibility of a leader is to define reality. The last is to say thank you. In between, the leader is a servant." – Max de Pree.

This quote directly speaks to how I live my life. As a leader, I believe in service. Leadership should be about putting the interests of others first. This creates an uplifting, motivated culture that inspires confidence in everyone.



Lwando Goxo

We need to be Innovative, Adventurous, Daring

The Organisational Redesign

By Professor Azwinndini Muronga

The Organisational Redesign started with our Faculty of Science special publication entitled *Shaping the Future of Science at Nelson Mandela University*. This paved the way for the creation of our Faculty's Strategy.

Our Strategy is key to the Org Redesign process, based on our approach that *Structure Follows Strategy*.

At some point our Faculty was a few paces behind the rest of the institution in terms of engaging the Org Redesign process because we did not have a Strategy. The first essential step was therefore to create a Strategy to foreground our Org Redesign Structure. I am pleased to report that our persistence in this is starting to bear fruits and our Org Redesign has since been hailed as innovative and groundbreaking by the University Management and Council

Developing the Strategy required several Strategic Planning Sessions, led by our six Task Teams. In the Special Publication we emphasised that the Task Teams should be of a diverse and inclusive nature, inclusive of students and PASS staff, gender and demographics, and different views. The Task Teams were duly formed and in 2019 they focused on six focus areas which became our Faculty's six Strategic Priorities.

We met on several occasions in order to co-create two documents – our Faculty's *Core Ideology and Academic Structure* – including our Strategic Priorities (SPs), Strategic Goals (SGs) and Strategic Objectives (SOs) – and *The Academic Project at the Heart of the Faculty of Science Structure*. If the need arises, these can be refined during the forthcoming discussions on the implementation of the Strategy,

It has not been easy to come up with the Strategy for our Faculty due to our process of including diverse views that need to converge to create

a collective understanding so that the Strategy is collectively owned by the Faculty for the Faculty.

If you read the current draft of the *Core Ideology and Strategy*, you will see that our Faculty has adopted the Academic Project as the heart of our Strategy and Structure moving forward. This approach led us to a very different path to the one that we are used to. For example, we are moving away from the Schools System, and replacing this with Academic Clusters, Academic Streams, Disciplines, Entities and Programmes.

We are now starting the Implementation Phase – the final phase of our Strategy, which will entail the Task Teams completing the Strategic Objectives, discussing and developing the Decadal Plan (2020 – 2030 and beyond), and starting with the 2020 deliverables. All views and inputs are encouraged as we try to prioritise new niche ideas while at the same growing our existing competencies and capabilities.

Once again, we are calling upon diverse and inclusive Task Teams to assist the Faculty in finalising our Strategy and mapping the journey ahead. It is up to each Line Manager and Task Team Leader to make sure there is maximum participation in keeping with our Mission: *To offer a diverse range of life-changing pure and applied science-based learning, teaching, research, training, innovation, engagement and transformational experiences, which develop excellent graduate- and staff attributes for sustainable futures.*

After adopting our Core Ideology and Strategy, it will become the leading document to which we refer, whether it is during interviews, performance management and promotions approvals, in motivations for support from the Faculty and the University or grant applications inside and outside the University. We will live by our Core Ideology and Strategy and it will guide us to new frontiers.

FACULTY OF SCIENCE

ACADMIC CLUSTERS

Life, Earth, Environmental and Agricultural Sciences	Physical Sciences	Mathematical and Computational Sciences	Biosciences and Biotechnology	Natural Resource Science and Management (George Campus)	X-Stream
** Disciplines, Programmes & Entities					** Programmes & Entities
Agricultural Sciences	Chemistry	Computing Sciences	Biochemistry and Microbiology	Agricultural Management	Experiential Training
Botany	Physics	Mathematics	Human Physiology	Conservation Management	Institute for Advanced Studies
Geosciences	Material and Nano-micro Sciences	Statistics	Biomaths, Biostats, Biophysics, Bioinformatics and Genetics	Forestry	Research Experience for Undergraduates
Zoology	Particles and Forces: minute to massive	Computational and Data Sciences	Biotechnology	**Sustainability Research Unit	Science and Technology in Society
Atmospheric and Oceanographic Sciences	Space Sciences	Digitalisation for Enhanced Academic Project			Science Communication, Awareness and Advancement
**African Centre for Coastal Palaeo-Science	**Centre for High Resolution Transmission Electron Microscopy	**Centre of Expertise in Forecasting			Science Education
**Centre for African Conservation Ecology	**Centre for Rubber Science and Technology	**Govan Mbeki Mathematics Centre			The Scientific Method – History and Philosophy of Science
Resources Security	**InnoVenton and the Downstream Chemicals Technology Station	**Telkom Centre of Excellence – Smart Unit			Forensic Science
	**Telkom Centre of Excellence – Optical Fibre Research Unit	**Centre for Advanced Scientific Computing			**Smart Connected Society
	**Telkom Centre of Excellence – Photovoltaic Unit	**Institute of Theoretical and Computational Sciences			
	**Centre for Broadband Communication				
	**Energy Solutions				

Streams will articulate from various combinations of Disciplines, Programmes and Entities chosen by students and reflects relevant and meaningful career paths for students.

** Denotes Entities (Centres, Units, Institutes)

Green text items refers to emerging and future disciplines to be grown.

PROPOSED "TO BE" | FACULTY OF SCIENCE

Key

- Role stays the same
- Role is new
- Role is potentially changing
- Role is potentially redeployed

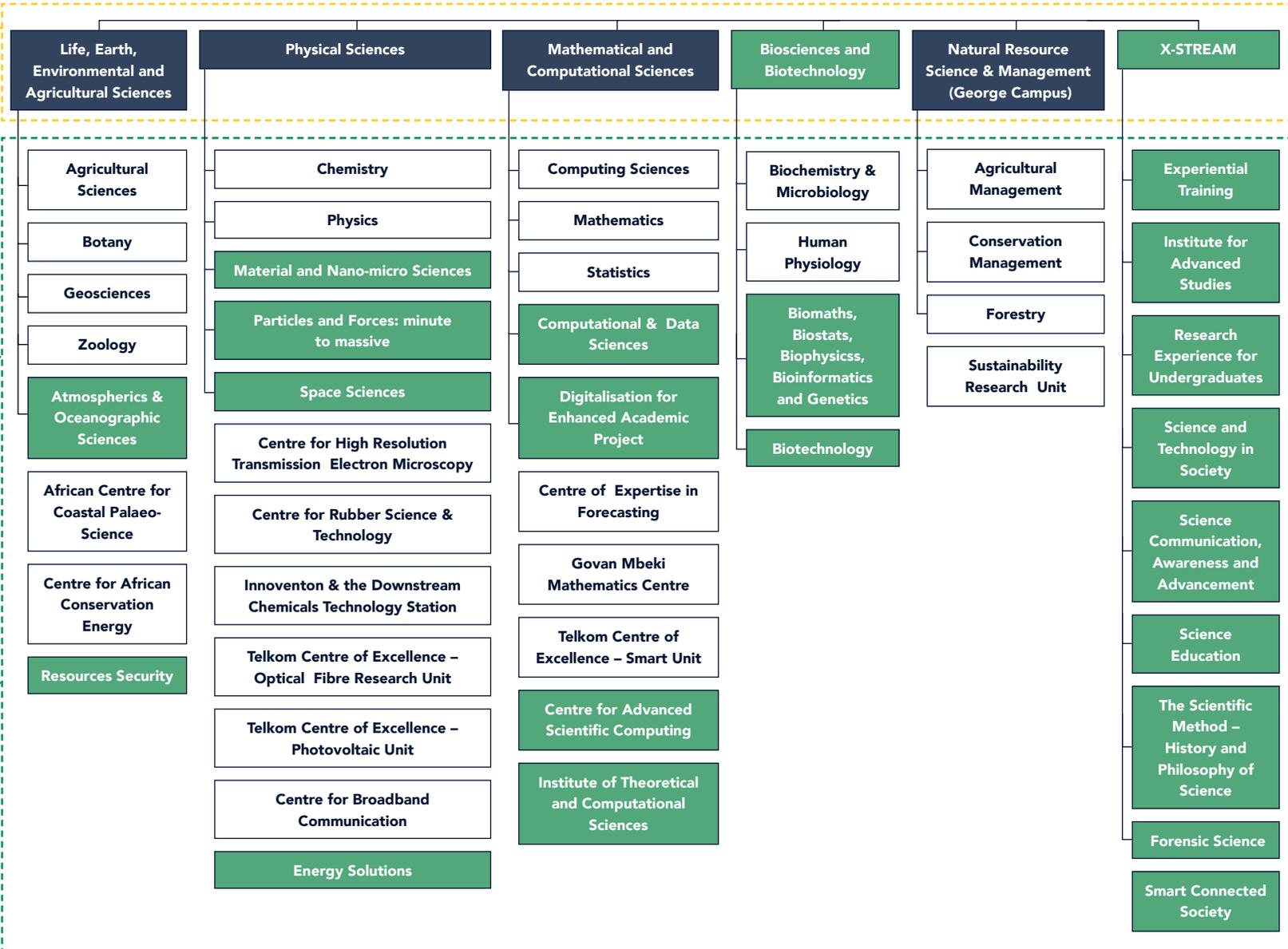


ACADEMIC CLUSTERS

- Transversal portfolios* emanating from the Strategy:
- UG Studies Portfolio & FLTC
- PG Studies Portfolio, Postdocs, Chairs, RAs & FRII, PG Administrator (Registrar's Office)
- Public Engagement & Partnerships Portfolio & FEC
- Transformation, Structure, Systems and Processes (TSSP) Desk
- Strategy, Planning, Monitoring and Evaluation, and Resources Portfolio
- People's Wellbeing Unit including the
- SHE unit

LEADERSHIP

- A Director of Strategy Deployment for each Academic Cluster
- A Head for every Department
- A Co-Ordinator for every Portfolio*
- A Co-Ordinator for every Programme
- A Head for every Entity



On the Hot Seat – International Scholars



Prof Jori Cromsigt
Research Associate
Centre for African Conservation
Ecology (ACE)
Nelson Mandela University

Jori Cromsigt, an Honorary Professor at the Faculty of Science since 2012, is a visiting Associate Professor from the Swedish University of Agricultural Sciences in Umea, Sweden. Jori has worked in South Africa since 2002 as a large mammal biologist, studying African wildlife and researching whether large mammals can be used to limit climate change.

He is a part of a programme between Nelson Mandela University and the Swedish University to supervise Master's and PhD students in his field.

When asked about his experience of South Africa, particularly Port Elizabeth, he said "seeing the positiveness through all the challenges has greatly contributed to my experience and education". Responding to why he chose Nelson Mandela University, he replied that the university is growing rapidly, it is very diverse and it feels like a true African University.

"Seeing the positiveness through all the challenges has greatly contributed to my experience and education".

Dr Marike te Beest
Honorary Professor
Centre for African Conservation
Ecology (ACE)
Nelson Mandela University

Dr Marike te Beest is a Plant Ecologist, studying the effects of climate change on vegetation. She has been working with the Centre for African Conservation Ecology within the Zoology Department. She is a Professor in Environmental Sciences at Utrecht University in Netherlands

Marike has worked in South Africa before, travelling between the Netherlands and South Africa since 2002. She has fallen in love with the country and says, "the people here are warm and welcoming, and the natural environment is beautiful".

When asked why she chose Nelson Mandela University she replied that she likes the fact that the university is a high quality university that is engaged in society and the environment.

"The people here are warm and welcoming and the natural environment is beautiful".



Twenty Months at Mandela

By Dr Mohammed Younus

I arrived in Port Elizabeth on 31st of May, 2018 to join Nelson Mandela University as a postdoctorate fellow under the supervision of Professor Azwinndini Muronga. My research tenure was funded by Mandela University's Research Capacity Development.

The topic of my research was relativistic fluid dynamics or hydrodynamics. This theory was developed in the 1960s and '70s by stalwarts like L D Landau and E M Lifshitz, J D Bjorken, S de Groot, W Israel and J M Stewart etc. Although the theory was initially developed for non-relativistic fluid systems, it could easily be extended to relativistic fluids.

Hydrodynamics has been one of the most successful theories to describe the novel matter of quark-gluon plasma (QGP). QGP is a modern interpretation of what our universe was just a few microseconds after the Big Bang. QGP is mainly composed of QCD particles like quarks and gluons but it also contains QED particles, photons, electrons and muons, and EW particles like Z, W bosons etc.

These are the building blocks of all that we see in the universe today. Such novel states of matter have been realised in experiments at RHIC-BNL and LHC-CERN, and remnants may exist in the core of compact astrophysical

objects such as neutron stars. Future experiments such as CBM-FAIR and NICA-JINR are being prepared to complement LHC observations.

I started my work with Prof Azwinndini Muronga on third order viscous hydrodynamics. The calculations were done following Grad's 14-moments method. The second order theory had already been done by Prof Muronga using the above method. Parallel approaches for second and third orders using iterative methods in Boltzmann transport equation are also already in place. The two approaches can be compared at all levels for consistency of the calculations.

Without going into the more specific details of our research, it's important to say that the non-linearity of the equations is becoming more and more important for studying QGP, and my collaboration with Prof Muronga is continuing post my Mandela University tenure.

To date, we have written a paper on our calculations on third order hydrodynamics where we discussed many aspects of theory and compared it to other parallel approaches. The paper is currently under review. Similarly, our work was presented by Prof Muronga at the Quark Matter 2019 Conference and at the SAIP 2019 Conference. The SAIP 2019 conference paper has been accepted for proceedings. In parallel, another part of our work using transport model UrQMD was presented by collaborator Mr Thendo Nemakhavhani, from the University of Johannesburg at the SAIP 2019 conference. The paper has been accepted for publication in the SAIP proceedings.

In addition to the research, I worked as a 'demmie' or practical demonstrator for Physics undergraduate students for 1st and 2nd year courses. I also worked as a tutor to the NITheP 2019 summer interns. The programme was headed by Prof Muronga and coordinated by Dolly Ntintili from our Faculty, and by Rene Kotze from the Stellenbosch University.

After completing my time at Nelson Mandela University, I joined the Federal University of Santa Maria (UFSM) under the supervision of Prof Ricardo L S Farias, Department of Physics, UFSM, Santa Maria, RS, Brazil as a postdoctoral fellow.

Looking back at my time at Mandela University and in Port Elizabeth, I would like to share a bit about this.

My life in Port Elizabeth was very enjoyable. I lived in a bachelor apartment at 16 Ivana drive, Summerstrand. It was comfortable living, especially considering I am single and have no great luxury desires for myself. Life in



Dr Mohammed Younus

Port Elizabeth was fun and I made a number of friends. We would sometimes hang out on weekends at the beach or at one of the restaurants in Summerstrand or at friends' houses.

I visited the Bayworld aquarium and museum and found it interesting and well preserved. I also went Addo National Park with some of my friends. The trip was fun and I gained a lot of information on reserves and animal conservation.

With the Faculty, I went to the SAIP conference at Polokwane, Limpopo province. The venue was inside a reserve. There I met my collaborator Mr Thendo Nemakhavhani UJ, Prof Will Horowitz UCT, Prof Alan Cornell, Prof Bruce Mellado and Prof Mukesh Kumar, Wits University. On the flight from Johannesburg to Polokwane from Johannesburg, I met Prof Chithambo from Rhodes University who is a very kind and knowledgeable person. I was honoured to meet them all.

On the way back I took a road trip from Polokwane to Johannesburg with some of my

friends from iThemba LABS. We had such a good trip.

About my life at Mandela University, I will certainly miss the academic and friendly atmosphere in the Department of Physics, the Dean's Office, and the University. I am most grateful to senior Faculty members like Prof Muronga, Prof Andre Venter, Prof J R Botha, Prof E van Dyke and others who were incredibly helpful and always willing to guide the newest members of the department. I also received a lot of assistance from so many other Faculty members, academic and PASS, particularly Dr Jano Jonker, Dr Urgessa Zelalem and Prof Setumo Motloutung, Dr Crispin Mbulanga, Mr Nyasha Suliali, Mrs Danelle Douglas-Henry, Mr Talah, Mr Ross Dix-Peek, Dr Lindsey Westraadt, Prof Ghatheer Mahed, Mrs Zelna Goldmann, Ms Dolly Ntintili, Mrs Tessa Penrith, Ms Natasha September, Dr Denise Schael and many other staff members at RCD.

No words can express my gratitude. I already miss you all and my time at the Department of Physics at Nelson Mandela University.

I will certainly miss the academic and friendly atmosphere in the Department of Physics, the Dean's Office, and the University.

Get in touch with us

E Science.marketing@mandela.ac.za

 Nelson Mandela University Faculty of Science

 @ScienceMandela

 science_mandelauniversity

 Nelson Mandela Uni Faculty of Science

For any interesting Science articles that you would like to be featured, please contact:

Reatile Mosia: Reatile.Mosia@mandela.ac.za

Lwando Goxo: Lwando.Goxo@mandela.ac.za

science.mandela.ac.za