

# Faculty of Science News

## Navigating to the Future

Message from Professor Azwinndini Muronga, Executive Dean of the Faculty of Science

**As we navigate through this relentless pandemic, we deeply mourn the passing on 7 August of our Executive Dean of the Faculty of Health Sciences, Professor Lungile Pepeta. He was a trailblazer and the shining force behind the establishment of our University's new Medical School, which is due to enrol the first cohort of students for the MBChB degree at the beginning of 2021.**

Prof Pepeta was a man of the people and he loved the rural Eastern Cape where he grew up and went to school in Mbizana. As a learner and student he had ambitious dreams which he pursued and he rose to the top of his profession as a paediatric cardiologist. Before joining the University in 2017, Prof Pepeta was the Head of Paediatrics at Dora Nginza Hospital in Nelson Mandela Bay where did so much to improve paediatric cardiology services, including doubling the heart operations on children.

He always emphasised the needs of communities in townships, informal settlements and rural areas, and he believed that every student given the right support could succeed. His death is a gaping loss to each one of us, to the university, and to cardiology and medical training in South Africa. As the Faculty of Science, we mourn the loss of Prof Pepeta, and in his honour we commit to completing the 2020 academic year for he would not have wanted it any other way.

It is very important that all students who have not been able to pursue the multiple curriculum pathways offered during the pandemic, should immediately contact their lecturers and Faculty. 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.

**"As a Faculty we encourage and facilitate the increased use of eLearning, eResearch and eEngagement. We regard these as essential skills for all our students and staff"**



**Prof Azwinndini Muronga**

We are, at the same time, looking forward to welcoming the Class of 2021 and we would like to invite matriculants to explore our website to find out about the many inspiring programmes we offer, and for more details on the Faculty's application process. We had an online webinar

for our Faculty open day. [science.mandela.ac.za/Webinar-Getting-to-know-the-Faculty-of-Science](http://science.mandela.ac.za/Webinar-Getting-to-know-the-Faculty-of-Science)

As a Faculty we encourage and facilitate the increased use of eLearning, eResearch and eEngagement. We regard these as essential skills for all our students and staff, and we need to make sure that all our students are included. It is important for our students to navigate technology-assisted learning with positive attitude. Future careers will require graduates who can navigate the digital and technological spaces they will be working in, including mixed reality, artificial intelligence and quantum computing.

To assist online learning going forward, the Faculty of Science computational forum has organised virtual seminars in the form of webinars on the use of different learning and teaching online tools such as Mathematica and MATLAB. Link: [science.mandela.ac.za/News-](http://science.mandela.ac.za/News-)



**Prof Lungile Pepeta**

*Archive/Learning-and-Teaching-using-Coding-Languages*

Looking to the future, we are all compelled to think out of the box as Einstein did if we want to better understand our world and universe and to contribute to a better world. We are

**“The end-goal of our Faculty and University, emphasised during lockdown, is that our students must be able to complete their modules this year ...”**

living in terrifying times but we are also living in times with a wide open future for change. We look forward to welcoming the Class of 2021 and we wish you great success, happiness and fulfilment at our University.

## Living and Learning during COVID-19

My name is Lesedi Sipuka and I'm from Nqamakwe in the Eastern Cape. I'm in my final year BSc Environmental Science. I want to pursue a career in geochemistry, as my passion is geology and chemistry towards understanding the finest details of our Earth, and how our many minerals can help to better the future of South Africans in an environmentally friendly and sustainable way.

Pursuing my studies has not been smooth sailing, every day has its challenges but the willingness of some of my lecturers to assist with challenges I've faced has made a big difference and being part of the Faculty so worthwhile.

The outbreak of COVID-19 has caused a lot of anxiety; I worry about the plans that I had for the year and next year. I have turned my focus to things that I can do now, including studying exercising, focusing on my nutrition, reading and reconnecting with loved ones. The support from my family is the biggest thing that has helped me pull through every day.

Online learning has been a stressful journey. The drastic change from contact learning to online learning has been a challenge on its own, it took away the real feeling of studying that I was used to. However, becoming increasingly equipped with technological skills has been an added advantage.

I have also learnt the importance of independence, working on your own with little supervision and keeping yourself motivated despite the temptation to relax at home. Having a schedule, study plan and discipline are vital and help one go a long way.

Although we are in lockdown, students are still concerned about their studies and are eager

**“I have also learnt the importance of ... working on your own with little supervision and keeping yourself motivated despite the temptation to relax at home.”**

to finish off the year and the two pathways give students that opportunity. We cannot turn a blind eye to the gap and challenges the student community faces in their respective homes and environment but having options that aim to cater for all students is a good start. If these pathways achieve their objectives it will mean no student is left behind and without assistance.

Being a Science student is not easy but it's a necessary journey towards achieving your goals. My advice to first years pursuing a science degree is that you must be determined and ready to give it your all. Make sure you create balance in your life, such as exercising.



**Lesedi Sipuka**

It's challenging with the back to back timetables but it all comes down to time management. And don't be afraid to ask questions. Overcome your fear of asking questions because all fear does is deprive you of knowledge.

# Prediction Models Work but Accurate Data is Vital

In My View by Azwinndini Muronga,  
published in *The Herald* – Opinions & Analysis on Wednesday, 5 August 2020



Has the Eastern Cape hit the peak of the Covid-19 pandemic? While this question is on the lips of many, the answer, at least for the Eastern Cape, is no. Nelson Mandela Bay may well be the driver of the regional surge, hence our statistics will be important if the Eastern Cape wants to know when its peak will be.

Mathematical modelling and computer simulations help us to understand how the disease spreads. One of the simplest models, the D-Model, is being worked on in collaboration with SA and international scientists. This looks at reported daily deaths and the cumulative number over time.

However, adding factors such as demographics and quarantine measures makes it more complex. We have only recently started to see the full effect of lifting lockdown restrictions from level 4 to 3. In other words, we now see the effect of an infection picked up 20-30 days ago.

If a person dies because of Covid-19, the statistics of reported deaths are less ambiguous compared to the number of confirmed cases or confirmed recoveries. The death rate is an indication of reported cases and not synonymous with the number of infections. The daily death rates have a peak. However, the cumulative total deaths will only plateau when people no longer die from Covid-19 or the pandemic has ended.

It is easy to create a predictive model when a population is highly restricted, but each

**“Modelling is not merely an academic exercise; it is essential so we can counter fake news with science communication based on research and data modelling.”**

reduction in restrictions opens another window for the virus. This makes prediction increasingly complex, but doable.

In the beginning, statistics on reported deaths from the Western Cape drove national data, but recently Gauteng and the Eastern Cape saw a surge, which could be attributed to the relaxation of rules from level 4 to 3. Western Cape numbers are gradually winding down

while they are sharply climbing in the Eastern Cape, Gauteng and KwaZulu-Natal.

A model is only as good as reported data and it was alarming when all a sudden, in one day, the number of deaths rose to 572 in SA, 400 of these from the Eastern Cape. This cannot be the case. Consistent and constant reporting of the data is vital for model prediction.

Though the purpose of science is to inform without scaremongering, the number of deaths reported right now is scary. On the positive side, big collaborations are happening behind the scenes. Nelson Mandela University is working across all disciplines and departments to tackle the pandemic. Our findings will also help us with future outbreaks because they will prepare SA and Africa to tackle other health challenges such as HIV, malaria and Ebola more effectively.



**Prof Azwinndini Muronga**



Modelling is not merely an academic exercise; it is essential so we can counter fake news with science communication based on research and data modelling. One thing SA has not done well over the lockdown is to educate. We failed to explain to the public why it is so important to follow the three key guidelines – wear a mask, maintain physical distance and sanitise. We focused on resources and infrastructure, not education.

In lockdown, we should have gone on a massive, evidence-based educational drive which later would have saved resources. Nelson Mandela University has campaigns such as #MaskUpMandela and #ItIsInYourHands. These messages need to go out on a wider scale to more people, not just those linked to the university.

We still have time. We should not say afterwards “we should have educated our people”. Let’s invest in the evidence-based

education campaigns even while in the eye of the storm. For example, schools have been closed but we have seen viral videos of children playing around with sanitisers; then there are those people making jokes about alcohol. This indicates a lack of evidence-based education. We must show with evidence what happens if we adhere to preventive measures.

Some countries have seen second Covid-19 waves. If or when a second wave of Covid-19 hits us, we should have prepared our communities by empowering them with evidence-based education so they can defend themselves. People need to know why they must sanitise. We do not want to be in the position where we say “we should have”, so let us rather act now.

Covid-19 is teaching us many lessons. Firstly, it has driven home the importance of evidence-based education and clear, simple communication from scientists and

government to communities. This will help to save lives and livelihoods, as well as limited medical resources. Secondly, we need to collaborate across health, science, engineering, social sciences, humanities and others. Thirdly, modelling alone, using data without understanding the micro and social dynamics of the population, is not enough. The resultant model will miss fundamental problems and causes. Fourthly, the disruptive nature of the pandemic is asking us to view things differently, not only in what we do and how we live, but in terms of technology.

One benefit of Covid-19 is that it has forced Africa to immediately embrace technology. Before we would look to the West for production; now we have been innovative and developed our own sanitisers, ventilators and face shields. Success in fighting this pandemic will only come once the right information has been placed in the community’s hands.

# Living and Learning during COVID-19

My name is Baxolele Ntsime and I’m from from Middledrift in the Eastern Cape. I am doing my second year in analytical chemistry with the aim of pursuing a career in the pharmaceutical or forensic industry. I have always had a desire to help my community and I like solving problems.

My role model is my cousin, Sivuyisiwe Tyelboyi, an alumnus of the Mandela University. I have learnt a lot of from him, he has always been there for me and done his best to steer me the right way. One of the most lessons I have learnt from him is “Never give up”.

I have applied this consistently during the COVID-19 pandemic, which came as a shock. We have had to learn new ways of living and learning, and the adjustment has been stressful. One of the things that made the transition a bit easier was knowing that my family is following the regulations.

The change from face to face learning to online learning has been hard for me because it brought challenges that did not make it easy to study and to focus on my studies. Two of the challenges that stood out for me was the bad network at home, and being in a household with people who had little knowledge about what it takes to do online learning. I had to seek out places with good network to do my work and assessments and that worked better for me.

The pathways implemented by the university were confusing at first because people interpreted them so differently, but when the institution explained how the pathways work it helped a lot in understanding them and not to panic. The pathways in my view are a good way of learning because they cater for all students, I chose the online pathway 1 and it has been good. My lecturers have made it easy for me to adapt and feel comfortable with online learning.

Another challenge I had to face is procrastination. It is very easy for me to lose focus when doing my assessments online because there is no one there to remind you to get them done in good time if you want to pass. The lesson learnt is: “Take assessments seriously” because this is how to secure my future.

**“Two of the challenges that stood out for me was the bad network at home, and being in a household with people who had little knowledge about what it takes to do online learning.”**



**Baxolele Ntsime**

# Incubating Great Engineering and IT Minds

The iGEMS Nelson Mandela University Engineering and IT Career Webinar took place on 17 July 2020 in collaboration with our Engineering, IT and Computing Sciences departments. Under the Unity in Africa banner, iGEMS (Incubating Great Engineering Minds), an education-to-employment initiative, is a 4-phase model (starting in Grade 11) which aims to create employable engineers. They give youth the opportunity to enhance their education and transition through an internship year and onto tertiary education with possible employment once they graduate.

Every year the iGEMS co-ordinators embark on a recruitment process where they visit in the region of 60 schools in the greater Nelson Mandela Bay area including Addo. The target is Grade 10 learners who take core Maths & Physical Science as subjects and it's a bonus if they are interested in Engineering or IT.

With Covid-19's challenges, the normal recruitment process has not been able to take place via school visits. The idea was born to approach Nelson Mandela University Engineering & IT Departments/Schools to find out whether they would be willing to collaborate in a virtual career webinar where they showcase all things Engineering & IT to Grade 10 learners. The virtual career webinar will also focus on the details of the iGEMS Programme and the recruitment process.

The following Nelson Mandela University staff members formed part of the webinar panel:



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- Associate Professor Brenda Scholtz – HOD at the Department of Computing Sciences
- Dr Sue Petratos – Director of the School of IT
- Mr Vuyo Mdunyelwa – Lecturer at the School of IT
- Dr Ann Lourens – HOD of the Department of Industrial Engineering
- Mr Karl du Preez – Director of the Advanced Mechatronic Technology Centre
- Mr Howard Theunissen – HOD at the Department of Marine Engineering
- Mr Alan Roberts – Director of the School of Engineering
- Mrs Belinda van der Wat – Lecturer at the Department of Civil Engineering
- Mr Damian Mooney who is the Drone Technologist at the Advanced Mechatronic Technology Centre.

The webinar began with a short video from each of the above mentioned departments and the learners had an opportunity to ask the panel any Engineering or IT related questions. Thereafter the webinar focused on the iGEMS Programme 2021 recruitment drive.

## Mandela Day BOATS Tournament a National Triumph

The Computing Sciences Department held a virtual BOATS Tournament in celebration of Mandela Day.



**Muller du Plessis (Gill Primary School), one of 90 learners winning 500mb data.**

This national virtual coding tournament included 95 schools and non-profit organisations from across the county, such as Khayelitsha, Port Elizabeth, Dutywa, Hazeyview, Lenasia, Heilbron, Tsomo, Hammanskraal, to name a few. In total, 490 learners participated, with 10 227 score submissions.

"It's an important, fun way of introducing learners to coding at a young age," says Professor Jean Greyling, the driving force behind the tournament.

"There's a desperate shortage of developers, not just in our country, but in the world. Without access to computers, the majority of South African learners cannot take advantage of this and pursue software development as a career option."

In 2019 Prof Greyling's team developed the BOATS app as part of the project to introduce learners to coding without the use of a computer. BOATS allows for online tournaments and learners can participate from home.

Two Eastern Cape pupils, Zukhanye Swartbooi from Khulani High School in Mdantsane and Simamkele Dekeda from Nowell High School in New Brighton, were the top two winners of



**Simamkele Dekeda (Newell High School), one of the top two winners of the tournament.**

the Mandela Day tournament, each receiving a tablet as a prize.

The other prizes were awarded to Park Primary School from Lenasia which was the best participating school, winning R4000. Two of the best participating organisations were Keep That Gold Shining from Pretoria and Good Work Foundation from Hazeyview, each winning R3000. 90 learners each won 500MB free data, and a learner from Grey Junior School in Port Elizabeth won the R500 lucky draw.

Thanks to Amazon Web Solutions (AWS), the Centre of Science and Technology in Khayelitsha was awarded R4000 as a winning Cape Town school. Six schools from Cape Town each won a TANKS coding school kit. AWS will also be making a donation on behalf of Nelson Mandela University to SANCCOB (South African Foundation for the Conservation of Coastal Birds) in keeping with BOATS' marine pollution theme.

The Department of Computing Sciences will reach out to all participants through WhatsApp with more information on software development as a career. The Mandela Day BOATS Tournament was a huge success and promises to be an even bigger one in the future.



**Zukhanye Swartbooi (Khulani High School), one of the top two winners of the tournament.**

# Secret of Earth's biodiversity hotspots discovered

Professor Richard Cowling of the African Centre for Coastal Paleoscience at Nelson Mandela University has spearheaded international research aimed at casting light on the most enduring question in biology: why do some areas support more species than others? In other words, why are there "hotspots" and "coldspots" of biological diversity on Earth?

The most pervasive explanation is that areas with high amounts of energy (sunshine) and water can support high productivity and, hence, species diversity, because there is an abundance of resources that can support many more species than in areas of low production (such as deserts or tundra). This hypothesis is consistent with the high numbers of species in the tropics and the tendency for species numbers to decline as one moves towards the less productive higher latitudes. This pattern is termed the latitudinal gradient in species diversity, and has dominated biogeography since the middle of the last century.

Interestingly, there are exceptions to this pattern, one being the extraordinarily high diversity of the Cape Floristic Region (CFR). The CFR is as rich in plant species as the richest tropical forests, yet the area has relatively low productivity (winter-rainfall and highly infertile soils).

The study showed that the richest parts of the Cape were those parts that retained a relatively stable climate over the past 140 000 years. This stability reduced extinction, thereby enabling a larger accumulation of species than the less stable parts, which comprise the eastern part of the CFR, stretching from Mossel Bay to the Mandela Bay region. Here, CFR biomes were repeatedly replaced by subtropical biomes at various times during the past several hundred thousand years.

Nature abhors exceptions and we argue that the CFR – identified as an exception to the latitudinal gradient – is actually an example of the rule,

with biome stability as the primary determinant of diversity patterns. This hypothesis is also consistent with the latitudinal gradient: the tropical biomes remained relatively intact during the climatic vicissitudes of the Pleistocene, whereas higher-latitude biomes underwent extensive shifts in distribution and large swathes in the Northern Hemisphere were covered by ice during the cold phases that dominated the Pleistocene.

Thus, environmental stability begets diversity; productivity is invoked as a factor only because the productive biomes of the tropics have been little disrupted by climate fluctuations of the Pleistocene.





# Open Day 2020

The COVID-19 pandemic has forced everyone to change their way of living and embrace the ever changing times. Due to the outbreak of the virus the university had to cancel Open Day 2020 as large gatherings are not allowed according to South Africa's COVID-19 regulations.

In an effort to reach prospective students, the university embarked on a "Getting to know the University" project where each faculty advertises their courses using digital platforms such as social media and webinars. The faculty webinars were aimed at providing valuable information to prospective students while also giving them the opportunity to address important questions during the question and answer session at the end of the webinar.

The Faculty of Science held our Open Day Webinar on 20 July 2020 at 6pm. The Executive Dean, Prof Azwinndini Muronga with support from the Directors of Schools, Dr Anton Schmidt, Prof Janet Wesson, Prof Zenixole Tshentu, and Dr Derek Du Preez, held presentations which outlined what each school offers. The webinar was broadcast live on both Eden FM and on our Facebook Page, reaching a large audience. The webinar was well attended with prospective students sending through their questions.

We look forward to meeting the first year Class of 2021.



**"The faculty webinars were aimed at providing valuable information to prospective students while also giving them the opportunity to address important questions ... "**

## Learning and Teaching with Python, R, MATLAB and Mathematica Webinar Workshop (July 13-15, 2020)

**On the 13-15 July 2020, the Faculty of Science hosted a webinar workshop on the use of coding languages for learning and teaching online via Microsoft Teams for students, staff and external participants. The coding languages that were discussed include Python, R, MATLAB and Mathematica with presentations by academic experts in their fields as well as a Master's student in Mechatronics.**

The three-day webinar workshop was hosted from 09:00 – 15:00 with a one-hour break. The workshop featured a series of presentations, with each speaker presenting for 45 minutes, followed by a 15-minute Q&A session. The presentations were aimed at teaching concepts and applications of the various programming languages to students and staff members.

In all fields of science, the need to understand and be familiar with coding language is increasingly essential. It is good to see Faculty of Science positioning itself well for the 4<sup>th</sup> Industrial Revolution and impressing on all science students the imperative to gain these skills for their academics and research, as well as the world of work and industry. Departments such as Computing Sciences, Statistics and

**"In all fields of science, the need to understand and be familiar with coding language is increasingly essential."**

Mathematics & Applied Mathematics offer coding languages such as R, MATLAB and C# (with students still using Python for their Projects and broadening their programming skills)

At the close of day 3 of the workshop, the Executive Dean of the Faculty of Science, Prof Azwinndini Muronga thanked the speakers for fantastic presentations, facilitators and moderators and all participants who showed interest in the topics and had inputs during the discussions. Our special gratitude goes to Dr Adeniyi Ongulaja and his organising team for making the webinar workshop such a success. The Dean was well pleased and highlighted how this sort of webinar significantly contributes to the Learning and Teaching strategy of the Faculty.

# Get in touch with us

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