NELSON MANDELA UNIVERSITY

December 2020

Faculty of Science

News

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

The Close of an Extremely Challenging Year

It's been an extremely challenging year, confronted by the Covid-19 pandemic that not only impacted on us as a Faculty but that has affected all higher education institutions, and the world at large.

Fortunately the human spirit rises above even the most difficult challenges and we have so many success stories to share – of students learning online for the first time, lectures being delivered online for the first time, and research and engagement pursued despite the setback. Our Faculty also enjoyed numerous appointments and achievements this year, including NRF-ratings and awards, with many Faculty members excelling, such as Prof Jean Greyling who has been making waves internationally. Congratulations to each member of Faculty. Each of you rose to the occasion of this unprecedented year. You have done the Faculty proud.

I would like to take this opportunity to deeply thank our Faculty retirees, Prof Richard Cowling and Mr June Simakani. It is very hard to believe the time has come to say goodbye. We appreciate the difference you have made, and your commitment to the Faculty in your respective fields. We will miss you and we're sure you will maintain close ties.

To our colleagues who passed away this year, including my good friend Prof Lungile Pepeta, we honour you and we will never forget you. The loss of our colleagues and their loved ones is very hard to bear and I continue to participate in the modelling of Covid-19 to play my part in helping to control this killer. I am partnering academics and postgraduates from a range of universities across the continent to try and understand the behaviour of the virus in various countries. I am pleased to say that the postgraduates students are at the stage when they are writing the paper based on the findings, which will be presented to our university early in 2021.

Fortunately the human spirit rises above even the most difficult challenges and we have so many success stories to share – of students learning online for the first time, lectures being delivered online for the first time, and research and engagement pursued despite the setback.

Looking back to March this year, we have come a far way. At the start of lockdown we were uncertain of the waters we were entering and we held multiple meetings to navigate how to manage lockdown, and how to rapidly shift online, which the pandemic forced us all to do.

Our Learning and Teaching Committee was the busiest committee this year, chaired

Prof Azwinndini Muronga

by Dr Derek du Preez and he has done an outstanding job, always making sure we address the myriad of issues as they arrive. Thank you to the whole Learning and Teaching Committee for holding the fort and making sure the undergraduate year gets completed.

One of the major issues our Faculty had to address is engaging with students who didn't have devices or connectivity or who had to study in appalling conditions. Our academics have had to accommodate all the eventualities faced by our students and it is not easy to do this.

Our Faculty had to adapt to admissions shifting online for the first time, as well as to assessment modes shifting to continuous assessment. The success rates of students who have come through these difficult times is something of which we can be proud. A significant number of students graduated with their undergraduate degrees in December, while others are aiming to graduate in April next year. Thank you to all of you for ensuring that no student is left behind and for working in overdrive as we assist our students to complete the 2020 academic year.

The Research, Training and Innovation Committee has been highly proactive this year, and I would like to thank Prof Paul Watts for leading this committee and for making sure that the quality of our research, examination and assessment process at the postgraduate level has been solidly upheld. We never lost focus on quality and excellence at any stage of the pandemic. We have been productive in terms of research, which we will see in the research outputs next year and in the number of postgraduates in the December 2020 and April 2021 graduations.

The administration, admissions and processes side for our postgraduates, including the examination processes have been well managed to make sure our postgraduate students are able to graduate under difficult circumstances – our thanks go to the very active Postgraduate Committee.

Postgraduates are hit hardest by disruptions, whether it's protests or pandemics, because of the severe consequences from any lapses in their research. The Faculty has been vocal about this on a number of university platforms, including Senate, the University Postgraduate Studies Committee and the University Finance Department. We are pushing very hard as a Faculty to ensure that postgraduate funding applications and fees are reviewed in light of postgraduates needing to prolong the year.

On the engagement front, individual staff members committed to a number of engagement activities in service to society. At the Faculty level, from the moment the pandemic hit our shores, pre- and during lockdown, we were proactive about making sure that science communication was well channeled through our Science Marketing Team and the university's Communication and Marketing team.

Before lockdown, InnoVenton started producing sanitisers for the university community to help protect us as Covid-19 hit. This grew into a significant partnership with local and provincial government, and Sasol, to provide sanitisers for the greater Nelson Mandela Bay community. The University's Covid Coordination Committee was looking at transdisciplinary ways in which the university could practice its ethos of 'service to society'. Our Faculty should feel proud that in the most practical terms we demonstrated our vision to be an engaged and transdisciplinary 21st century African Faculty of Science that responds to the challenges in society.

The Faculty management team, together with the respective task team leaders and their teams who have been developing our Faculty 2030 Strategy, will be actively developing the actions required, from where we left off in 2019 and 2020.

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Led by our task teams, we look forward to completing our strategic implementation plan in 2021 so that we can start to implement the Org Redesign and Faculty structure.

There is a clear outline of what needs to be done and the task team leaders will be asking for your individual input as to whether you feel the final strategic plan carries the aspirations of the Faculty. They will also be asking you to share activities that you feel the Faculty should undertake in the short, medium and long term. Please participate as it is your future and you need to make sure that you contribute to what is included in the final implementation plan.

Over the break I will be drafting a communication that will remind the Faculty community of where we started in terms of our strategy and the rational for the strategy in our Org Redesign structure – in particular why we are shifting from the Schools model to the Clustering and Streams model, as well the introduction of various portfolios in the Faculty.

In terms of academic promotions, I am sure you are eager to hear about these. Due to the large number of applications the process needed to be conducted over several days and I am pleased to announce the process is now concluded. What remains to be done is for myself, the DVC Learning and Teaching, the VC and HR to conclude the process, and I am confident by the end of January 2021 it will be concluded. Thank you for your patience.

As we take a few days of rest, we need to remember the words of Nelson Mandela: "…I have discovered the secret that after climbing a great hill, one only finds that there are many more hills to climb. I have taken a moment here to rest ….but I can only rest for a moment, for with freedom comes responsibilities, and I dare not linger, for my long walk is not ended."

We need to pause, take stock, reflect and enjoy some well-deserved relaxation time to restore our energy so that you can return refreshed in 2021 to climb the next set of hills for 2021.

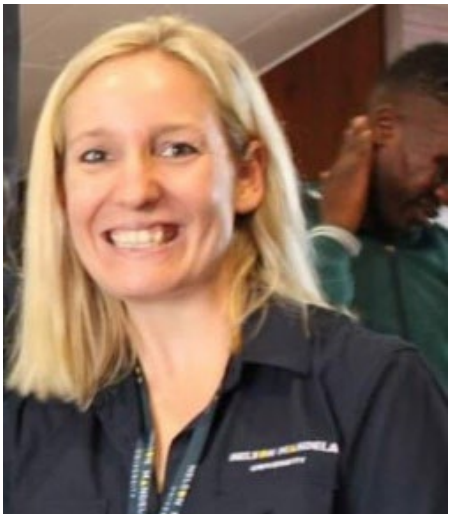
Thank you all again. Keep well and keep safe

Azwinndini Muronga

Executive Dean of the Faculty of Science

InnoVenton started producing sanitisers

Deep cleaning the statistics department



Dr Chantelle Clohessy

Completing semester 1 teaching in the COVID-19 pandemic

Dr Chantelle Clohessy, Department of Statistics

The COVID-19 pandemic has taught me that challenges in life teach you more about yourself and your abilities. You also gain valuable life skills that you might not have learnt under normal circumstances.

As we know, Nelson Mandela University provided a multiple pathway system approach to learning and teaching in the pandemic. The Faculty of Science took up this challenge and spent most of level 5 lockdown preparing an online teaching plan. Developing a plan to address this complex problem, with many unknowns and missing data (statistician's worst nightmare) made it clear that not just one plan, but many plans had to be made, with many adjustments over time.

Lengthy discussions took place during departmental and faculty meetings. Academics were faced with many questions. How do we teach online? How do we preform assessments? How do we give the students the best quality teaching under lockdown? How do we achieve a fair teaching platform? How do we keep students and staff motivated with the change in learning and teaching environments? How do we reach out to students in different environments to give them all the best possible opportunity to complete the academic year?

The challenges the lecturers faced were numerous, but the science faculty staff forged ahead in every way possible. The challenges included Wi-Fi, data and connectivity for our students in the rural areas. Laptop access, with many students only having access to smart phones. Many departments in the faculty perform practicals that require access to labs.

There have also been some really positive outcomes. One thing that really struck me during this time is how science faculty staff have gone out of their way to care for every student in their classrooms.

I have personally been involved with projects within the science faculty to resolve the ongoing obstacles faced. One of the first was working with Mr Lwando Goxo from Science Marketing and our deputy dean, Dr Gaathier Mahed, to phone students who were not replying to emails. This was one of the responses following a survey that was sent out to all PW2 students within the faculty, with questions relating to internet access, devices and comments on their current learning situations. Over 220 students responded. The purpose was to understand student struggles and use this information to help the faculty to make informed decisions about the way forward. This qualitative data collected, provided insight and more understanding of the challenges faced by our students and highlighted the struggles of our fellow South African citizens.

As the lockdown levels were lifted, some students had no option other than return to residences or to make use of on campus facilities. To help manage this as a faculty we created an online "return to campus application", handled by a team that included, Ms Lithauer, Dr Mahed, Mr Goxo, Ms Tembo and myself. We spent a large amount of time going through these applications, and as part of the process we had to ensure that we complied with government regulations, and that campus was ready and prepared for these students to return. From the 1057 students applying to return, over 53% were first year students, 60% had access to laptops, 15% tablets, 22% smart phones and the remainder had no access to a device for online learning. A large number of the students wanting to return were from the broader Eastern Cape. The struggles highlighted by the survey included:

- Students could not focus at home due to family responsibility.
- There was confusion relating to the pathway selection.
- Students preferred face-to-face teaching and were finding it difficult to adapt to online.
- Students were selecting PW1 and PW2 learning.
- Load shedding was an issue for scheduled lectures.

Despite the struggles faced during semester 1, it appears from the preliminary data that the science faculty had a successful semester. The modules had an average increase in pass rates across the departments and there was no significant change in the number of students cancelling modules in the faculty when we looked at 2019 and 2020.

Reflecting on the statistics modules I have taught this year, I was forced to think out the box in the way I teach and examine. Another hurdle I found was copyright, and not been able to teach with my prescribed textbook. I spent hours writing my own notes, however these notes will benefit my teaching in the future. I redesigned my course, and my teaching philosophy now focuses more on an *understanding the theory for application to practise*.

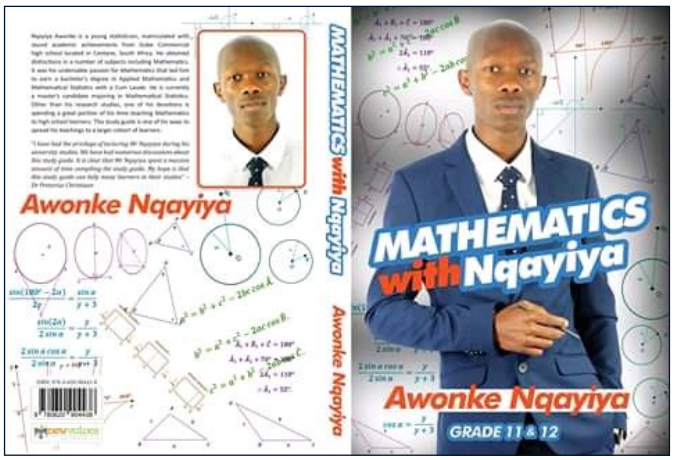
In closing, I'd like to say that for the COVID-19 pandemic, the Faculty of Science has made use of data, both qualitative and quantitative in decision making. The pandemic has reminded us all of the role data plays and the importance of good science for the future of our country.

Meet statistician Awonke Nqayiya

1. Tell us about yourself

I am a 24-year-old statistician and author, born and bred in Centane, in the Eastern Cape. Upon matriculating at Gobe Commercial High School, I enrolled at Nelson Mandela University and graduated cum laude with a Bachelor of Science, majoring in Applied Mathematics and Mathematical Statistics.

I subsequently completed honours in Mathematical Statistics in 2019 at Nelson Mandela University. I am a proud lifetime member of the Golden Key International Honours Society which celebrates and honours students in the top 15% in their universities.



Study guide by Awonke Nqayiya

Currently, I am a master's candidate at Nelson Mandela University in the Statistics Department supervised by Mr Sisa Pazi and Prof Gary Sharp.

My interests are in the explorations of mathematical learnings, teachings, and applications. I find it exciting to see mathematics expressing real-life problems in mathematical equations and working with these equations towards determining solutions for societal challenges.

2. What initiative are you currently busy with and why did you feel it was important to develop such a project?

Since matric, I have been involved in several academic programmes that support high school learners in their studies. I mainly focus on delivering effective Mathematics lessons to Grade 11 and 12 learners. Through this journey, I identified the struggles that the learners have with mathematics, including the lack of basics and I wanted to be part of the solution. I therefore started writing a mathematics study guide in 2017 titled 'Mathematics with Nqayiya' which was published in 2020.

Compiling the study guide was not much of a hassle, I enjoyed the process. In the proofreading process of the content, I was greatly assisted by Mr S Njonga, Mr S Fono, Mr WZ Ngolo and Dr C Pretorious. Rea: I'm not sure who these people are, or where they are from. Could you ask Awonke to answer this.. Their feedback was instrumental and invaluable in achieving the standard of the study guide.

The intention of Mathematics with Nqayiya is:

- To smoothly develop the learner's understanding from basic content to more advanced work.
- To simplify the complexities of Mathematics in paper 2.
- To excite Grade 11 and 12 learners about the beauty of mathematical learnings in paper 2.
- To smooth the transition from Grade 11 mathematics to Grade 12 in one study guide.

I firmly believe that the learner who consistently use Mathematics with Nqayiya is most likely to outperform his or her expectations in mathematics. my second hope is for the Department of Basic Education to use this study guide as one of the teaching and learning materials that they distribute to high schools.

3. What are your plans for the future?

In addition to progressing with my studies, I plan to get more involved in contributing to the success of high school learners and to help dispel the fear of mathematics as achievement in this subject opens the gates of higher learning. My next project is to publish a mathematics study guide (paper 1) for Grade 11 and 12 learners. As part of this project I will be working with a number of younger learners to help them progress and to inspire them.

4. What advice would you give to the prospective 2021 Grade 11 and 12 learners?

It is important for the learners to realise that learning mathematics effectively involves two stages: 1) studying mathematics as a theoretical subject to gain a better understanding of the principles, theorems and concepts in mathematics, and 2) practising mathematics by implementing the principles, theorems and concepts understood in Stage 1. Most learners ignore Stage 1 and jump to Stage 2. In Stage 2, but without a sound theoretical understanding of mathematics, they struggle a lot with practising mathematics. I would like to urge Grade 11 and 12 learners to stick to the two stages of effectively learning mathematics.

Penny Lithauer: Teaching during Covid

1. Name and surname: Penny Lithauer

2. Department: Botany

3. Which course/modules are you currently teaching?

Economic Botany and Biotechnology (BOTV212); Science Academic Skills (ALMX110); as well as the support modules for all the first year Botany modules.

4. What are your thoughts on the two pathways for learning and teaching that have been implemented by the university?

It was essential to have two pathways (P1 and P2), as we know that not all our students have access to online resources. Unfortunately, many students were led to believe that Pathway 2 meant Face -to-Face teaching. These students were naturally very disappointed when this didn't happen, and teaching continued online.

In the end, we had many more pathways than just P1 and P2. There was a very staggered approach in many modules. Although this initially created some confusion among students and added immensely to the workload of lecturers (with some of us having to present the same module several times over a period of up to seven months for some term modules) it was the only way we could get the work done at an undergraduate level.

Penny Lithauer

Postgraduate students really suffered though; losing out on valuable research time. In many cases experimental work in the lab or in the field, ground to a halt. Many of the Natural Science projects have a seasonal component and losing one season's data effectively cost one of our students a year. And many lab-based experiments, once interrupted, must be started from scratch.

5. Since the outbreak of COVID-19 what has your experience been with online teaching – the challenges and lessons learnt.

Sjoe, where to start? We were really thrown in at the deep end. All of us, lecturers and students alike. Although many of us have previously used Moodle, we have never had to entirely rely on it. So the learning curve was steep!.

The main challenge for me was adapting material on the fly, for not only online teaching, but also for continuous assessment. Our modules do not lend themselves to online-only teaching, because of the strong practical component. Teaching the practical aspect online and developing relevant online practical material was very challenging.

Another huge issue was that we could not reach all our students, and we definitely could not get them together and online at the same time. There was this constant feeling that some of the students might "be missing out". I think this left many lecturers feeling helpless and disempowered.

I was also involved in the process of issuing permits for students who needed to return to campus for a number of reasons. Their stories were heart-breaking, many of them filled with frustration and fear. Fear for their academic future, but often also fear for their own safety. I became increasingly aware of the great social divide we live in. I also realised how little we know about our students' backgrounds, e.g. the responsibilities they have when they are at home and the severe lack of technological infrastructure in many areas.

For me, the biggest lesson learnt was to be flexible in my teaching approach. Deadlines became fluid, depending on what pathway students were on. And if a teaching approach didn't work it had to be changed quickly.

In all of the chaos I found that my students craved some normality. I tried to keep my interaction with them as "real" as possible.

In all of the chaos I found that my students craved some normality. I tried to keep my interaction with them as "real" as possible. We had regular Teams meetings – with my video on. I felt they needed to see my face. I was surprised to see how many students also chose to switch on their video feed, despite the data implications. It created a sense of connectivity. I realised that, for all of us, campus is much more than a place of leaning and teaching. It is a place of important social interaction. Although Teams was a poor substitute for the real thing, it was the best we could do under the circumstances.

6. How does online teaching differ from face-to-face teaching?

The biggest difference is that online teaching lacks the hands-on approach and the human touch. I found it very frustrating that I could not see my students while teaching them. I could not read their body language or see their eyes. Have I lost them, or are they still with me on a concept?

I am also a very interactive lecturer. I like involving my students in discussions, demonstrations, and problem-solving in class – they can learn so much from each other as well as from me. And I definitely learn from them!. This interaction is very difficult to achieve online and I found this very limiting.

7. Which coping mechanisms have you used to deal with the COVID-19 pandemic?

Initially, I struggled to separate work from personal time and started suffering the consequences. The drive to and from campus forces a break in activity and a change of mindset that is lacking when you are working from home. I learnt that I had to set boundaries and make time for myself and my family.

I also tackled the long "to do list" of things around the house and garden. Not only did this get me out of my study, it was also a good morale booster to get things done.

Getting back into the outdoors when lockdown eased was wonderful. A day trip to Addo, an outing to the Van Stadens Flower Reserve, or a walk at the beach, did wonders.

I have been blessed to not lose any close friends or family to COVID. My heartfelt condolences to those who have.

May all of us here today stay Healthy, Happy and Sane.

Gideon Brunsdon: Teaching during Covid

Gideon Brunsdon

1. Name and surname

Gideon Brunsdon

2. Department

Department of Geosciences

3. Which course/modules are you currently teaching?

A number of different courses in Geology, Structural Geololgy and Palaeontology GIS

4. What are your thoughts on the two pathways for learning and teaching that have been implemented by the university?

I understand the reasoning behind the implementation of the pathways, but I do see that students are taking strain in the second semester. We had almost five months to complete (mostly) the second term of semester 1 on the various pathways, and now we had only 6 weeks to complete term 3 on one pathway. Many students are not able to meet most of my deadlines on time.

5. Since the outbreak of Covid-19 what has your experience been with online teaching? Challenges and lessons learnt.

It has been a huge learning curve. I was not at all prepared for the world of blended learning. In general, I deal with small groups of students, so I just never really had time to learn how to use Moodle.

In the beginning of the lockdown and online life, 90% of my time was spent on setting up PowerPoint presentations and then recording my voice onto the PowerPoints.

The biggest problem we have (especially in the Science Faculty) is the practical nature of our courses. I took pictures of all the fossils, but that is just not the same.

I also made short "step-by-step" explanation videos on my phone to explain certain technical practical problems and concepts. It's effective but data intensive.

I distributed all my work via email and WhatsApp groups and later I got to know a bit of Moodle.

6. How does online teaching differ from face to face teaching?

It is a very "lonely" road. There is a place for both online and face-to-face learning, but we were not ready to launch into the online world the way we did.

Especially during the first semester, it was big challenge, and a very uncertain process. One just does not know how students receive the work and process it all. In a face-to-face lecture one can see on the facial expressions of students, whether one should change focus or repeat a section. Online – it is just a one-way channelling of information. I find this very frustrating and I am sure the students do too, and they get bombarded with information from more than one lecturer at once.

I must commend my students for their patience with me and for allowing me to find my way through all of this ...

7. Which coping mechanisms have you used to deal with the Covid-19 pandemic.

I try to spend time outside as much as possible. This was not possible during the beginning of lockdown and the stress and uncertainty of everything has impacted my health negatively in many ways.

One does not realise that on campus one is more active – merely walking from the car park to the office and back and walking in-between. All of sudden I found myself just sitting at my desk at home and not moving around much at all. I also had to get spectacles – staring into a computer screen for hours.

8. Closing thoughts

I must say so far it has been a steep learning curve. Since the start of lockdown, I was able to take three days of personal leave. It has been a challenging and exhausting year. However, I am grateful that I am still doing what I love: teaching and facilitating learning.

I must commend my students for their patience with me and for allowing me to find my way through all of this. I keep reminding my students that we as academic staff have never taught like this or through a global pandemic – we are all in a similar boat on a very rocky ocean!

Marikana and the importance of youth leadership

We chat to the Science Student's Association (SCI-SA) Chairperson, Lesedi Sipuka BSc Environmental Science about a virtual event they recently held.

1. Event Title:

Marikana massacre commemorative event: Workplace dynamics and youth leadership

2. Tell us about the event

This year marks the 7th year of the tragic killing of miners by the South African Police force in the full view of the nation. We are yet to rationalise and comprehend this violent act against the people of the soil, with whom most of us can relate as many of us are sons and daughters of farm workers, gardeners, maids, brick layers and miners.

The 16th August 2012 continues to raise serious question marks about this so-called new democratic dispensation. Hence, we seek to remind ourselves of this injustice and ask ourselves real questions concerning transformation, injustice, capitalism, and democracy within the working environment. This also puts a responsibility on us as future leaders to be conscience and transformation-driven leaders in the workplace.

3. Who was the target audience and why?

Mainly science students because they are not usually exposed to topics that speak on leadership and the working environment. The target audience was not limited to science students.

4. Why was it important for SCI-SA to host such an event?

Young university professionals are often placed in jobs where they effectively serve oppressive systems in the working environment. We seek to expose this and to empower ourselves with the spirit of conscience leadership to make sure that we include, champion and support less privileged employees and individuals.

4. What did you hope to achieve?

This event was aimed at giving students an insight about workplace dynamics. As some will be going into the workplace soon it helped to give them an idea of what potentially awaits them, and how they can use their leadership skills in an effective and just way.

5. What are your thoughts on hosting virtual events?

The advantage of hosting virtual events is that there is not as much admin and logistics. However, the interaction is challenging. Due to internet connection problems one battles to achieve maximum participation and attendance by students. Also, although data is provided by the university, we wouldn't want to put strain on it, as it sometimes doesn't last one through the whole month. To overcome this, we recorded the proceedings of the event so that when someone is interested they can still have access to the video and information.

These are the challenges and pointers we need to keep in mind when planning a virtual event.

YEEES for Smart Cities

The Department of Computing Sciences hosted an international colloquium titled Digitalisation Solutions for Smart Cities on the 5th November. The colloquium was in collaboration with the Yields of Evocative Entrepreneurial Approaches on Environment and Society (YEEES) project, an inter- and transdisciplinary project that focuses on the resilience of cities and peri-urban areas, while addressing the range of associated challenges, such as agriculture, health and transport/ mobility. The project connects universities from Germany and southern Africa, notably, Mozambique Namibia and South Africa.

The colloquium is part of a series of online colloquiums aimed at building a network of international researchers, brainstorming about ideas for papers, co-authoring publications and benefitting from a peer-support system concerning research ideas. Topics covered at the colloquium include: Beyond Access – The role of ICT in Empowering the Disadvantaged, Value and Decision Making in Smart Communities; and Tools for Analysing Social Media Data for Smart Health & Smart Services.

The colloquium is part of a series ... aimed at building a network of international researchers ...

Speakers at the colloquium were:

Prof Brenda Scholtz (Host & HOD of the Department of Computing Sciences)

Dr Wallace Chigona (Guest Speaker from the University of Cape Town)

Mrs Anthea van der Hoogen & Dr Ife Fashoro (Department of Computing Sciences)

Mr Obrukevwe Okuah (Department of Computing Sciences)

The colloquium was attended by researchers from around the world. It started with a welcome and introduction from the YEEES team and a 30-minute presentation from the speakers listed above. The colloquium ended with a Q&A session with all the speakers. There will be a follow-up colloquium in the upcoming weeks.

TANKS Coding Project Highlights

Although COVID-19 obviously caused havoc with our plans (interactive workshops could not take place during 2020), we can nevertheless look back to some great highlights:

Prof Jean Greyling was invited as a plenary speaker at the **UNESCO Mobile Learning Week**, in acknowledgement for the work we do to reach disadvantaged communities (this resulted in wide media coverage).

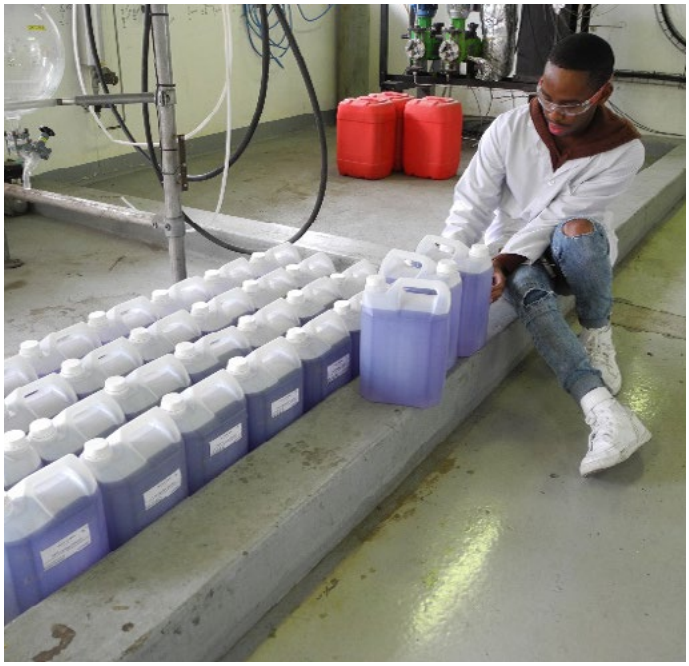
- Three very successful **virtual tournaments reached 1000 learners** from over 200 schools, with sponsorships of nearly R200 000 in total – In addition to various incentives. This resulted in the distribution of our TANKS School Kits to 36 schools across the country.
- We **shared our work at numerous academic conferences as well as other platforms** related to education. Prof Greyling ended off the year as an invited speaker at the Centre For High Performance Computing Conference, as well as a **Global Family Tech Day** organised by **Amazon Web Services.**
- Local coding clubs were started in **Tsomo, Hazeyview and Port Alfred.**
- We presented two **online C# coding clubs** to learners reached through the virtual tournaments.
- We were featured in a 30-minute TV slot on the DSTV programme "Ivor en die Verskilmakers".

2021 already has some great potential to look forward to:

- Early in January Prof Greyling will be doing training in Canzibe, rural Eastern Cape (near Coffee Bay).
- We plan to roll out an **official research project** mainly in schools in Cape Town, and possibly wider.
- There has been an initial positive response from the **Siya Kolisi Foundation** regarding possible collaboration – this is a corporate sponsorship of at least R30 000 to reach 10 schools with our coding kits. It would be wonderful if other sponsors are interested.
- We will be launching a **BOATS School Kit** (with various resources) aimed at the Coding and Robotics curriculum from Grade R to 3. The launch in Mandela Bay will be in partnership with the Mandela Bay Development Agency, but this tool needs to reach the whole country.
- Avenues need to be explored for our **RANGERS School Kit – maybe into Africa?**
- Once again **Mandela Day must be big!**
- There is continuous **scope for smaller outreaches** to individual schools and NGOs.

Thank you to all of you for the huge role you have played over 3 years in making a difference in the hopes and dreams of over 20 000 learners in our country!

Prof Jean Greyling teaching learners coding with TANKS



Photos: The 250ml and 5L bottles of hand rub sanitiser produced by InnoVenton and distributed by the University to Eastern Cape communities in need.

InnoVenton for Society

Strict COVID protocols allowed operations to continue

At the onset of the COVID-19 pandemic, InnoVenton put strict measures in place to ensure that we were able to continue operating during every lockdown level. Comprehensive workplace plans, risk assessments and training protocols were drafted and put into place. A phased return to work was followed, in line with the University's guidelines. Wearing masks, an emphasis on personal hygiene, daily screening, checking in/out and social distancing processes are still being observed. We believe that the combination of these "new norms" and the diligence of our staff has enabled us to keep things going at the institute.

Proposed Infrastructure Facilities Project for InnoVenton

InnoVenton has proposed an infrustructure project to the University. The purpose is to address Health and Safety Non-Compliance and Maintenance and Spatial Repurposing. This will require the refurbishment of selected laboratory spaces, installation of fume cupboards and much needed maintenance. Plans, cost estimats and design scope have been submitted.

InnoVention summarises their activities and projects this year:

Production of Hand Sanitiser

InnoVenton started producing alcohol-based hand sanitiser for our University at the onset of lockdown level 5, initially producing ~13 000L of hand sanitiser for use by staff and students. We also provide a hand sanitiser testing service and have shared hand sanitiser production information with small to medium enterprises (SMEs) across the Eastern Cape.

The University then entered into a partnership with Sasol ... to boost production and provision of free hand sanitisers to communities in need.

The University then entered into a partnership with Sasol, leveraging our Institute for Chemical Technology and Downstream Chemicals Technology Station, with the support of the Technology Innovation Agency (TIA), to boost production and provision of free hand sanitisers to communities in need. The production capacity developed was used to process Sasol Ethanol and produce between 400 and 500 litres of hand sanitiser per day. This was distributed to beneficiaries at risk in the Eastern Cape. The University's Community Convergence Workstream (CCW) played a key role in working with Community Organisations to ensure that the sanitisers reached those who needed them the most. To date, 35 000 litres of hand sanitiser have been produced and distributed.

InnoVenton projects include:

BIO ECONOMY: Low cost Spirulina Cultivation

This project received funding from the Technology Innovation Agency (TIA) Agricultural Bio-economy Partnership Programme and proposes to demonstrate a low tech, cost effective, high yield spirulina cultivation system based on a simple bucket system (see photograph) to produce fish/animal feeds. The bucket-based growth system has been designed and installed to scale up a spirulina culture and seed the system. The expected output is a Technology Transfer Package.

BIO ECONOMY: Phycocyanin production and extraction

This project received funding from the Technology Innovation Agency (TIA) Seed Fund via the University's Innovation Office. The project aims to optimise the production of phycobiliproteins, particularly phycocyanin, from Arthrospira. The project will investigate and optimise methods that affect phycocyanin production and extraction from the protein complexes through the comparison of various protein extraction methods and phycocyanin release. Critical path activities have been addressed, which includes procurement of the Tangential Flow Filtration (TFF) and pH control systems. We have selected the low-tech bucket system tested at InnoVenton as an appropriate low tech, fit for purpose and scalable cultivation system for arthrospira. The aim is to develop the preliminary technology package through pilot scale production (TRL 6) for eventual deployment by an entrepreneur.

A practical introduction to the Internet of things (IoT)

Two training sessions were held at InnoVenton, the course covered a practical introduction to the Internet of things (IoT) and user interface programming, making use of microcontrollers programming with cellphone applications. InnoVenton has successfully established capability to provide cost-effective, fit-for-purpose remote and real-time monitoring and control solutions that can be leveraged by SMEs that otherwise could not afford such technology.

Funded from the Technology Station core grant, a real-time monitoring and control system was developed for the algae growth system. The system has been demonstrated and can read and transmit sensors as defined in the design (Optical density, pH, temperature, motor run etc.) to the cloud and the data is retrieved to a user interface. An algorithm (at user interface) can send an on/off command back to a solenoid on the CO2 line based on the pH signal. A visual of the components of the algae growth system can also be viewed from any location via the cellphone application to confirm that the system is running correctly. Consequently, we are able to maintain efficient productivity and maintain 24-hour control of the greenhouse algae growing ponds. This has greatly enhanced the availability of historical and real-time data to improve management of the Algae Growth System. It has demonstrated the concept of an affordable control system based on open source Arduino and cloud-based data communication. The system will be incorporated as part of the algae growth system technology package for the commercialisation phase of the Algae to Energy project. The project has resulted in two knowledge innovation outputs, a technology demonstrator and prototype monitoring and control system. The project was successfully completed in 2020 and has been closed.

AN INTRODUCTORY GUIDE TO COSMETIC FORMULATION

This workshop gives delegates the chance to evaluate their formulation ideas; grasp an understanding of formulation technology and learn about packaging and regulatory requirements related to their products. The target audience is investors and entrepreneurs who would like to aquire basic tools to better understand and evaluate their ideas.

YEAST SPRAY DRYING

National Feed Traders approached InnoVenton to assist them with spray drying 800L of waste yeast slurry as a test sample. The scope of the project included amongst other things, determining the % solids, dry the yeast and analyse the spray dried product accordingly.

EXTRACTION OF OIL FROM ALGAE FOR CONTEXTUALIZE

This technology support service involved the extraction of lipids from algae which would be used as and additive in Polypropylene extrusion for a company, Contexualize.

COALGAE ® ACCELERATED TRANSPORT FUELS

This project is a continuation of the InnoVenton algae to energy Coalgae® project and is currently funded by the DST (Hydrogen & Energy Directorate). The project is in the final year of the three-year funding cycle. The main objective of the current cycle was to demonstrate the technologies for production of liquid transport fuel components from Coalgae® feedstock via coal to liquid and pyrolysis processes.

FIRE DAMAGE ASSESEMENT CHLORIDE TESTING

Insurance assessors need to determine the damage done to electronic equipment after fire-caused damage at any facility. InnoVenton can assist in establishing the extent of the damage by carrying out a smiple chloride residue test. This year we processed over 250 samples for this industry.

PRODUCT DEVELOPMENT

In 2020 three entrepreneurs brought 10 products including facial cosmetics, hair tonic and sunscreen for further development at InnoVenton. Vuvu and Co (one of the formulation entrepreneurs) has also been incubated by Propella and has a business mentor to help her take her formulated product to the next level.

Production of Hand sanitiser at InnoVenton kilo lab facility and the 25L drums produced in partnership with SASOL.

Achievements

The Faculty wishes to congratulate our staff members for their achievements.

Nelson Mandela University Vice-Chancellor's Excellence Awards 2020

1. **Dr Gaathier Mahed** (Department of GeoSciences) – Faculty Emerging Teacher Award for the Excellence Awards in 2020.
2. **Ms Hayley Irvine** (Department of Computing Sciences) – PASS (Professional and Support Staff) Excellence Award in 2020.
3. **Prof Jean Greyling** (Department of Computing Sciences) – Engagement Project Award for the TANKS coding project, based on Byron Batteson's 2017 Honours Project.
4. **Prof Mandy Lombard** (Botany Department) – Research Excellence Award – Award 1
5. **Prof Graham Kerley** (Zoology Department) – Faculty researcher of the year – Science
6. **Dr Gavin Rishworth** (Zoology Department) – Faculty emerging researcher of the year – Science
7. **Dr Richard Betz** (Chemistry Department) – Emerging Engagements Awards
8. **Bernard McDonald** (Department of Computer Sciences) – Vice-Chancellor's Awards for Academic Excellence- Best First Degree
9. **Jessica Potgieter** (Statistics Department) – Vice- Chancellor's Awards for Academic Excellence – Best Postgraduate Science, Engineering & Technology

In acknowledgement of these remarkable achievements, a virtual event was hosted under the umbrella of "Celebrating Excellence" showcasing the Vice-Chancellor's Excellence Awards recipients, which encompasses top academic and PASS staff members, and the student Academic Award winners.

Another achievement

Prof Brenda Scholtz (Department of Computing Sciences)

Congratulations to Prof Brenda Scholtz who has been appointed as the South African representative for IFIP TC8.

IFIP TC8 was established by IFIP (International Federation for Information Processing) in 1976 as a Technical Committee dedicated to the field of Information Systems. TC8 aims to promote and encourage the advancement of research and practice of concepts, methods, techniques and issues related to information systems in organisations. TC8 has established eight working groups.

Dr Gaathier Mahed

Ms Hayley Irvine

Prof Jean Greyling

Prof Brenda Scholtz

Prof Mandy Lombard

Prof Graham Kerley

Dr Gavin Rishworth

Dr Richard Betz

Bernard McDonald

Jessica Potgieter

On your retirement

To Professor Richard Cowling from the Botany Department and Mr June Simakani from the Statistics Department, we would like to share these words with you on your retirement. Through your extraordinary commitment you have nurtured thousands of students and sparked a desire in them to learn and grow. You will be remembered for your many years of excellence and dedication. You have made a lasting impact, one that has changed the lives of so many students and left an impression far beyond the classroom and research field. The Faculty of Science has been deeply fortunate to have you as part of the team and we thank you for your lasting contribution and the role you have played in the success of the Faculty.

Welcome to the next stage of your lives. From all of us, we wish you a healthy, happy and stimulating retirement.

"Congratulations on your retirement"

Get in touch with us

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