Departement Statistiek en Aktuariële Wetenskap
Department of Statistics and Actuarial Science

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CHAIRPERSON'S MESSAGE

Thank you to staff and students

M onday, 16 March 2020: A day colleagues in the Department will never forget. After a blitz faculty committee meeting in the Dean's office, we were advised to get ready to send our students home. COVID-19 was on its way to cause irreversible changes in our lives.

The lecturers had their last face-to-face lectures, a format of lecturing that we miss so much. It is also a term that we hardly used before and something we possibly took for granted for so many years. Some of us believed it would only be three to four weeks before we would return to campus and carry on as normal. The new normal, a phrase that we all use so frequently these days, is certainly not what we thought it was going to be. These past few months have affected the lives of so many people around the globe. Our point of reference changed overnight, and we were forced to modify our habits instantly and discover a new norm for working, teaching and living.

We learned about social distancing, developed (strange) home and work routines that are constantly interfering with each other, implemented Teams meetings and started to prepare all our lecture material online. What a steep learning curve that turned out to be! Our students also needed to adapt to the changes and new format and had to overcome many obstacles.

Many stories and hardships can be shared demonstrating all our struggles, but through this collective experience we, as a Department within the broader University, discovered a new strength. Humanity and communal values are shining through in beautiful ways and for us, as an academic fraternity, technology is helping to break the isolation.

At the end of this academic year, we would like to acknowledge the strength in our Department, in particular the collegiality and the professionalism of every staff member, both administrative and academic. This shone through in all the daily activities and contact we had with each other – we worked tirelessly, harnessing all our energy and skills to meet the needs of colleagues and students. We all do whatever it takes to get the job done with pride and professionalism.

For that, I want to thank each individual staff member, permanent or temporary, who has adjusted his/her way of working and who continues to provide our students with top-class education. Everyone worked non-stop after hours and over weekends.

To our students, we extend our appreciation that you joined us facing the same struggles. It is in these moments of uncertainty that true character shines through. It is true that, even more than before, it is an honour to call each other colleagues of the Department of Statistics and Actuarial Science.

On a personal note, I want to thank our colleagues from the bottom of my heart for all the support, the selfless time given to meet on Teams, the advice and sound-boarding, the cooperation and teamwork and, above all, the professionalism I have experienced.

Prof Paul Mostert

Chairperson: Department of Statistics and Actuarial Science

Working from home: A day in the life of an online lecturer

Author: Stephen Burgess

It has been a challenging but interesting year. In this article, lecturers in the Department of Statistics and Actuarial Science share some of their experiences with online teaching.

Many plans had to be devised at the drop of a hat to keep the show on the road. **Danie** commandeered a kitchen pot and stack of old Statistics journals …

… whereas **David** and **Ayesha** used a lamp with a flexible neck, two hair bobbles and Prestick to McGyver an overhead camera for their online classes so that they could record video lectures while writing on a piece of paper.

''Attached is a picture of the 'kluge' we came up with – quite an ugly thing, but it's been working well since March!'' added Ayesha.
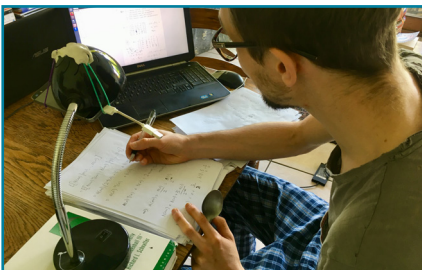
The cast of "A day in the life of an online lecturer" in order of appearance:

Prof Danie Uys – Associate Professor: Statistics

Dr David Hofmeyr – Senior Lecturer: Statistics

Ms Ayesha Bhatti – Part-time lecturer

Dr Trudie Sandrock – Lecturer: Statistics

Dr Chris Muller – Lecturer: Statistics

Mr Hassan Sadiq – Lecturer: Statistics

Mr Simon Louw – Senior Lecturer: Actuarial Science

Ms Natalie van Zyl – Senior Lecturer: Actuarial Science

Prof Willie Conradie – Associate Professor: Financial Risk Management

Ms Annagret Muller – Part-time lecturer

Dr Morné Lamont – Senior Lecturer: Statistics

Dr Carel van der Merwe – Senior Lecturer: Financial Risk Management

Dr Lienki Viljoen – Senior Lecturer: Statistics

Mr Davy Corubolo – Senior Lecturer: Actuarial Science

Dr Surette Bierman – Senior Lecturer: Statistics

Mr Stephen Burgess – Senior Lecturer: Actuarial Science

Prof Paul Mostert – Chairperson and Associate Professor: Statistics

Mr Rob Clover – Senior Lecturer: Actuarial Science

Trudie lost out on the study in their house: "The company my husband works for decided to start working from home before university lectures stopped. This meant that he got to claim the home office/study area first, and I had to set up my office in the bedroom. At first I was convinced it was only going to be for a short while, so I started with a small camping table in the middle of the bedroom, but as lockdown was extended… and extended again… and again… I started moving furniture around and gradually upgraded my setup. Now I have a fully-fledged home office in the corner of the bedroom – although I am still using camping tables in lieu of a proper desk."

Some lecturers, however, were prepared and **Chris** wonders why anyone needs an office space when your set-up at home is, well, perfect.

During the year, new lecturers were appointed in the Department and we have only met our new colleagues in the virtual world.

**Hassan** says he has always been more comfortable working on campus, away from home.

"When the lockdown began, it was quite a challenge for me to work efficiently; particularly because I made multiple trips to the refrigerator every hour! However, since I adopted the popcorn strategy, I have been able to improve my concentration and optimise my work output."

Simon moved down from Johannesburg in August and is looking forward to spending many hours in his wingback chair "reading and contemplating because it has a gorgeous view out to the mountains". He maintains that his desk is so neat because he only moved into his home recently.

Natalie, on the other hand, enjoys the extra space her home office provides her to spread things out a bit.
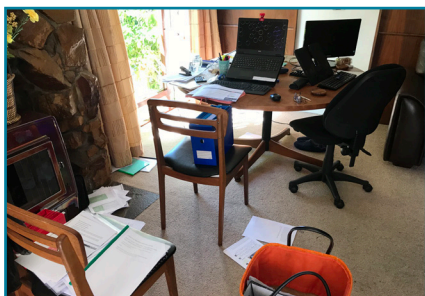
Although **Willie** has a very comfortable set up, he recalls how he recorded his first online lecture on 25 March with light classical music playing in the background to neutralise all the other possible unwanted and unexpected noises that may come up in their open-plan house. However, later on lectures were recorded while the dishwasher was running, the radio was on and the gardeners were working outside with a leaf blower.

Annegret, who stays on a farm, knows everything about noise: "Lockdown on a farm meant roosters crowing and cows mooing in the background of all my video calls. Prof Steel and Dr Sandrock can attest!"

She continues to recall how many of her Stats 186 lectures were recorded with a cat on her lap: "Sometimes I had to wait a few minutes for the purring to be less loud before continuing, because I didn't want the microphone to pick it up. In the end I'm sure my cat probably heard more hypothesis test examples than some students."
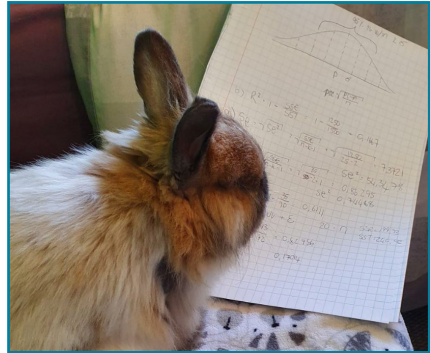

Morne, on the other hand, has been using the work-from-home environment to improve his guitar playing skills and, at the same time, warm up his voice before lectures with a few songs.
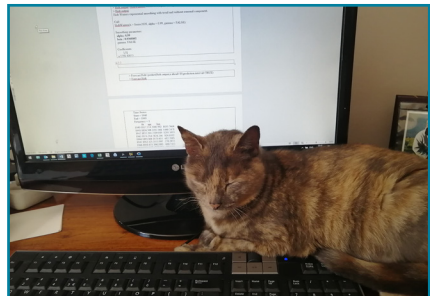

Being at home also allowed lecturers to spend more time with their pets.

Carel has high hopes for his pet rabbit and has already introduced him to the implications of the Gaussian curve...

... whereas **Lienki's** cat seems a little bored with the time series analysis.

Davy recently adopted a cat. The cat was not very happy with the lack of attention and decided that he would put a stop to all the marking that was keeping Davy glued to his desk.

But a dog remains a human's best friend, according to **Surette's** furry companion.


Stephen's dog, together with her trusty bear, kept him company on the steep technology learning curve. However, he still managed to drag-and-drop the incorrect assessment paper into a quiz during the September assessment period, which resulted in some consternation that evening – among students and lecturer alike.

Paul's dog was a frequent guest student in his classes. Mila, his rough collie, thought he was talking to her all the time while he was lecturing.
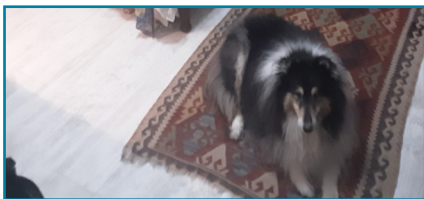
Since he had to transform his guest bedroom into a study, Paul faked his "office" and ended up lecturing from the top floor of his New York apartment!
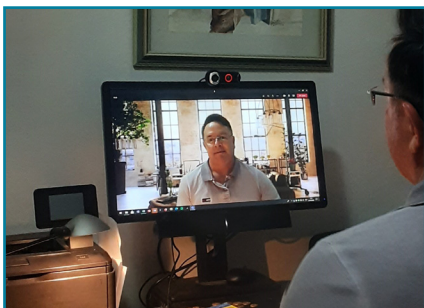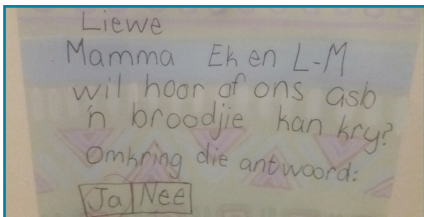

We all received important support from our families.

Rob's daughter provided this handy noticeboard for the rest of the household:

… while **Surette's** children mastered the skill of pushing notes underneath a closed door.

Trudie had less luck: "In between teaching my students online, I also had to home-school my three primary school children (which gave me new respect for primary school teachers). At times it was challenging to keep the kids (and dogs) out of the room while recording, so I resorted to locking the door – which only meant that I had to redo some recordings because of the kids knocking on the window and calling me."

This year has been a year with many opportunities, despite the difficulties. We've had the opportunity to embrace the changes, innovate and make it work. Working at home may have meant longer hours and juggling responsibilities towards our students and our families but it was also a time to really connect with our loved ones. One thing that everyone agrees on, however, is that we have missed interacting with our colleagues and students.

Hassan summarises it well: "Most importantly, the current restrictions have made me better appreciate the precious unrestricted opportunity of being able to exchange ideas and banter with colleagues at work. I now also dearly value the spontaneous interactions with students that enable me to understand their fears. I look forward to better exploiting these precious moments whenever handshakes stop being awkward."

STAFF MATTERS

Stephen Burgess recognised as one of Faculty's top online lecturers

Author: Daniel Bugan

*T*he Faculty of Economic and Management Sciences announced its top online lecturers of 2020 during a virtual prize-giving function on Thursday, 5 November 2020, and the Department of Statistics and Actuarial Science's Mr Stephen Burgess was one of 11 lecturers to receive this accolade.

The Emergency Remote Teaching: Top Online Lecturer Competition 2020 was a departure from the annual competition sponsored by *Die Burger* and presented the Faculty with an opportunity to recognise those lecturers who excelled in emergency remote teaching amid the COVID-19 pandemic.

In her opening address, Prof Ronel du Preez, Vice-Dean (Learning and Teaching), thanked the Faculty's academic staff for keeping the 2020 academic year on track.

"It hasn't been an easy year," she said. "We grappled with things like assessments and curriculum redesign to bring our emergency remote teaching to a level where it could contribute to the success of our students. This event is to thank you and to celebrate the contribution you have made."

In an online poll held from 20 to 28 October 2020, students voted for their best undergraduate or postgraduate lecturer from whom they received emergency remote teaching in the Faculty. In total, five postgraduate lecturers and six undergraduate lecturers emerged as departmental winners after the vote count. A special prize was awarded to Ms Magda Barnard, the Faculty's Programme Renewal Coordinator, in acknowledgement of the huge contribution she made to the success of online teaching in the Faculty.

Department celebrates centenary birthday of Prof CR Rao

Prof CR Rao with colleagues in the Department during his visit in 2004

This year, the Department of Statistics and Actuarial Science celebrates the life of Prof CR Rao, one of the major developers of Statistical Science during the 20th century. Technical terms such as *Cramer-Rao inequality, Rao-Blackwellization, Rao's Score Test, Fisher-Rao Theorem, Rao distance and orthogonal arrays* are household terms to statisticians and appear in all standard books on Statistics.

Prof Rao turned 100 on 10 September 2020, and in celebrating the centenary of his life, the Department reflected gratefully on the honour of receiving him as a visitor in 2004.

Prof Rao received numerous awards for his pioneering contributions to statistical theory and applications. Amongst these awards is the prestigious National Medal of Science that he received from the President of the USA with the citation, *"for his pioneering contributions to the foundations of statistical theory and multivariate statistical methodology and their applications, enriching the physical biological, mathematical, economic and engineering sciences"*.

In 2001 the University of Cyprus honoured late president Nelson Mandela and Prof Rao with honorary doctorate degrees on the same platform. Mr Mandela remarked on the occasion: *"Now I realise, if I want to be fit, I must do statistics half an hour every day"*. A wise lesson to us all!

STAFF MATTERS

D espite the COVID-19 pandemic, the Department of Statistics and Actuarial Science welcomed five new colleagues in 2020. We got to know them a bit better.

Dr Mesias Alfeus

Dr Mesias Alfeus obtained his PhD in Quantitative Finance from the University of Technology Sydney (UTS) in Australia. He has MSc and Honours degrees in Financial Mathematics from Stellenbosch University and undergraduate training in Mathematics and Physics from the University of Namibia.

What is your position in the Department?

Lecturer in Financial Risk Management.

Share some of your career highlights.

After my PhD, I worked as a lecturer at the University of Wollongong, Australia, in the School of Mathematics and Applied Statistics, and as a post-doc fellow at the University of Cape Town. My research focus is to develop new financial mathematical models that capture complex risk phenomena in financial markets using various numerical methods for financial computations. I worked as a research associate at UTS Business School for four years, and as a risk analyst at the Namibian Financial Institutions Supervision Authority (NAMFISA) where I was fully responsible for statistical aspects of model calibration and risk analytics for non-banking institutions in Namibia.

What skills taught in Financial Risk Management are particularly valuable in the "real world"?

The underlying concept taught is to have a firm understanding pertaining to the use of financial derivatives to mitigate uncertain financial risks. Financial risk is becoming more and more critical, and the skills taught in this discipline are crucial to meet the needs of this ever-changing world and financial market risks.

What are the opportunities in Financial Risk Management?

One immediate opportunity is practical research collaboration with financial institutions and banks in the pursuit of developing new financial innovations or model ideas to manage skyrocketing risk phenomena.

What do you think are important characteristics that a student should possess if he/she wants to pursue a career in Financial Risk Management?

Mathematics and statistical background and a keen interest in finance and economics.

In your opinion, what should the Department do to make sure it is keeping up with industry?

An excellent partnership with industry will be crucial to ensure that the Department dwells on relevant and practical concepts in terms of both teaching and research. I am looking forward to using my networks for collaboration, new insights and to advance our Financial Risk Management programme.

STAFF MATTERS

Mr Simon Louw

Mr Simon Louw graduated with a Bachelor of Economic Science (Honours) in Actuarial Science from the University of the Witwatersrand in 1995. He returned to Wits and obtained an MA in Applied Ethics, which was conferred in 2019. He was admitted as a Fellow of the Actuarial Society of South Africa in 2003.

What is your position in the Department?

Senior Lecturer in Actuarial Science.

Share some of your career highlights.

I worked in the life insurance industry for the past 25 years and have had many highlights. Perhaps the most important was becoming a Fellow of the Actuarial Society of South Africa, which took enormous effort and has shaped my life ever since. I am proud of the committee work I have done for the Actuarial Society, notably a complete re-write of the important advisory practice note APN106 for Heads of Actuarial Function. My work in the industry culminated in me becoming a statutory actuary and then a Head of Actuarial Function for four South African life insurance companies. There are only around 60 actuaries in the country currently certified to undertake such work.

What skills taught in Actuarial Science are particularly valuable in the "real world"?

All of them, without a doubt! Actuarial Science is a very real-world discipline because it is so focused on solving real-world problems in financial services. However, the two skills I have used the most and which are invaluable are critical thinking and cash flow modelling. Almost all life insurance problems can be understood and solved with cash flow modelling. In addition to these 'technical' skills, the 'normative' skills of being a professional are also of utmost importance.

What are the opportunities in Actuarial Science?

There is seldom a lack of opportunity for actuaries. Traditionally most have been employed in the life insurance and retirement fund industries in South Africa, which continue to evolve and innovate. Work in non-life insurance has been steadily increasing. Over the past two decades or so, many have branched out into healthcare and banking, amongst others. However, the further one moves from the core disciplines of insurance and pensions, the more competition there is from other professions. Like many other professions, actuaries of the future will have to adapt to a world where computers do most of their work.

What do you think are important characteristics that a student should possess if he/she wants to pursue a career in Actuarial Science?

Perseverance. It takes a lot of hard work and many years to qualify long after university. And it does not stop there as we have a strong focus on continuing professional development and lifelong learning. Other than that, critical thinking and professionalism as I said earlier, as well as a regard for the public interest. I do think actuaries, as a whole, need to work on emotional intelligence and humility.

In your opinion, what should the Department do to make sure it is keeping up with industry?

Having staff with industry experience is very beneficial, as well as doing committee work for the Actuarial Society. Society conferences and seminars are an excellent way of keeping in touch and forging connections. I would love to see collaborative research with companies and other organisations, as there are so many opportunities, as well as presenting at Society events.

STAFF MATTERS

Dr Johané Nienkemper-Swanepoel

Dr Johané Nienkemper-Swanepoel was born and raised in Bloemfontein and completed her BSc, BSc (Hons) and MSc degrees in Mathematical Statistics at the University of the Free State. She joined the Department of Genetics, specifically the unit for Biometry, at Stellenbosch University in 2013 and started her PhD under the supervision of Professors Niël le Roux and Sugnet Lubbe in 2016. Her PhD focused on biplot visualisation of incomplete categorical data.

What is your position in the Department?

Lecturer in Mathematical Statistics.

Share some of your career highlights.

I have been fortunate to attend numerous international conferences since the start of my PhD. This greatly contributed to the development and completion of my studies since new topics were researched and presented frequently. In 2017, I received the biennial award for outstanding researchers younger than 30 years from the International Federation of Classification Societies (IFCS). The Helga and Wolfgang Gaul Stiftung Award was awarded in Tokyo, Japan, during the IFCS conference in 2017. Most recently, I received the first prize for the postgraduate oral competition at the 2019 South African Statistical Association (SASA) conference in Port Elizabeth, South Africa.

What skills taught in Statistics are particularly valuable in the "real world"?

The importance of Statistics has been highlighted during the global COVID-19 pandemic. The general public is more aware of data and it has become part of daily routines to read and interpret infographics. I am passionate about data visualisation since it empowers users to comprehend complex data and consequently enables data to become more relatable to a wider audience. I think the emphasis is on producing trustworthy results and we as scientists should hold one another accountable.

What are the opportunities in Statistics?

The opportunities for the application of Statistics are truly limitless with the rapid availability of data on any emerging topic. One of my primary research interests is the appropriate handling of missing data and therefore it could be argued that Statistics is so broad that there is even a focus area for 'nothing' (i.e., missing information).

What do you think are important characteristics that a student should possess if he/she wants to pursue a career in Statistics?

Students should be inquisitive and must ultimately be able to work independently. There are various data repository platforms available which enable students to explore data on their own without waiting for instructions from lecturers. An important skill is to be able to filter through the chaos of (uncleaned) data to extract meaningful information.

In your opinion, what should the Department do to make sure it is keeping up with industry?

Continual collaboration with industry partners in the form of postgraduate projects, guest lectures and seminar presentations allow students to grasp the real application and importance of the theory they currently have to engage with. Possible student internships during recess periods could also provide valuable insight and prepare students for their future endeavours.

STAFF MATTERS

Mr Hassan Sadiq

Mr Hassan Sadiq obtained an MSc in Decision Sciences and Analytics from the University of Cape Town (UCT) in 2015 and is currently working toward a 2021 completion of his PhD thesis in Bioinformatics in affiliation with UCT.

What is your position in the Department?

Lecturer in Statistics.

Share some of your career highlights.

My PhD journey has been full of career highlight reels. It has afforded me the privilege to travel to some exciting parts of the world to work with and present my work to doyens of the field of Phylogenetics and Bioinformatics. It has also involved being invited to work on a project with the former vice-chancellor of the University of Cape Town, Dr Max Price.

What skills taught in Statistics are particularly valuable in the "real world"?

Statistical science teaches the skill to unravel exciting and useful detail from sometimes chaotic data sets. Such detail may, most likely, otherwise have been undiscovered. Since data sets hold historical evidence that is key to informing the future, data analytics as taught in the Department represents the most powerful key to modern day advancement in almost all fields of human endeavour: Science, technology, economics, finance, biology, ecology, psychology and so on. John Tukey stated the beauty of Statistics aptly when he said that statisticians "get to play in everyone's backyard".

What are the opportunities in Statistics?

Wherever data is being collected, a statistician is needed. Interestingly, the evolution of technology has been such that data is now collected daily and in bounties. These data sets need more statistical brains to make sense of them using innovative techniques. Thus, there are very rewarding roles for statisticians in academic and industrial spaces. Some of the most intriguing opportunities are the unexploited entrepreneurial openings all around Africa where appreciation for technology is only beginning to peak.

What do you think are important characteristics that a student should possess if he/she wants to pursue a career in Statistics?

An aspiring student of Statistics should have a quality quantitative aptitude, be able to persevere and be hardworking in order to understand and appreciate the course. It is also important to have an eye for detail.

In your opinion, what should the Department do to make sure it is keeping up with industry?

The Department needs to continuously ensure that it engages with the industry by inviting speakers to showcase how they use Statistics. This should encourage collaborative works that will ensure that the modules being taught in the Department are always relevant. It will also provide the opportunity to query the perceived misinterpretations by the industry of some subtle statistical concepts.

STAFF MATTERS

Mr Hans-Peter Bakker

Mr Hans-Peter Bakker holds degrees in Philosophy and English Literature, Journalism, Business Administration, Mathematical Statistics and Data Science as well as a postgraduate diploma in Higher Education.

What is your position in the Department?

Lecturer in Statistics.

Share some of your career highlights.

I served as a foreign correspondent to cover wars in Somalia, Eritrea, Mozambique and Angola and was Head of New Product Development and Marketing for a large media group. I was also Head of Marketing and Communications for Stellenbosch University. I did business development work in East and West Africa and consulted for USAID in Liberia and Mozambique. Before this appointment, I was a senior lecturer in Marketing and part-time lecturer in Statistics.

What skills taught in Statistics are particularly valuable in the "real world"?

I would not single out specific skills in Statistics. I consider the discipline as a whole to be a base knowledge in virtually all other knowledge types. It's fundamental in engineering, business, economics, all of the sciences, psychology and much more. Also, I would argue that Mathematical Statistics is the "science" in Data Science, making Statistics a discipline of growing importance in the "real world".

What are the opportunities in Statistics?

I believe the discipline of Mathematical Statistics is still in the process of adjusting to a world with more data than we know what to do with. While this can be challenging, it also presents many interesting opportunities for the discipline.

What do you think are important characteristics that a student should possess if he/she wants to pursue a career in Statistics?

To be comfortable in the worlds of both mathematics and advanced computing and have a broad range of interests.

In your opinion, what should the Department do to make sure it is keeping up with industry?

I believe we should be careful not be drawn too much into the Data Science buzz at the cost of our core, traditional expertise. Our traditional Mathematical Statistics basis, complemented with relevant computing skills (for example R and/or Python and the use of distributed and parallel computing methods and platforms) should ensure that we reinforce our relevance in the general excitement and uncertainty surrounding big data and data science.

STUDENT MATTERS

Department's students win Hackathon's Data Science challenge

*T*he annual Stellenbosch University Hackathon went virtual for the first time in 2020 with a very topical theme: Participants had to develop solutions that could help small businesses function effectively in the post-COVID-19 environment.

The winners of the Hackathon's Data Science challenge

More than 80 students took part in the Data Science and FinTech challenges. Ulrich Kotze, Niel van Zyl and Claudia Di Santolo, Master's students from the Department of Statistics and Actuarial Science, and Thamu Mnylawa from the Department of Applied Mathematics were the winners of the Data Science challenge.

The Hackathon was hosted by Innovus, SU's technology transfer office responsible for the commercialisation of the University's intellectual property assets. The sponsors were Capitec, Entersekt and Explore.

According to the winning group, Capitec provided them with a data set of transactional data.

"We were challenged to identify ways in which the data could be used to provide actionable insights into small businesses, and we were required to supplement the available data from small businesses with additional open-source data sets (e.g., weather, traffic, and relevant location-based services such as ATMs) to build out specific insights for small businesses.

"We created an application called CAPITEC/AIR. This app provides Automated Industry Reports (AIR) for small businesses to assist them in making better buying decisions. The application has the ability to provide merchant-specific reports as well as industry-wide reports to small businesses who are Capitec banking clients. This gives them access to information such as the purchasing patterns of their customers, demographic information of clients and sales forecasts for their own business as well as the industry they are in. Along with the reports, a geospatial map was also integrated into the app, with information such as the location of competitors, points of interest, location of public transport and density of transactions. When you add business information to location information you get an unbeatable competitive edge. CAPITEC/AIR makes gaining insights from analytics more accessible and intuitive when you can pinpoint events and trends on a map, quite literally. This makes it easier to understand critical information and take action.

"It was a great experience to be given a tough real-world Data Science challenge. We had to think beyond the statistical techniques in our toolbox, since the solution had to make sense in a real-world context. This forced us to not only use the skills we have, but also to think outside of the box and come up with innovative ways to aid our solution.

"The Hackathon was a great experience, and we learnt many valuable skills that we will be able to use in our careers as data scientists."

After winning the Hackathon, the students were given the opportunity to host a webinar for the SU School of Data Science and Computational Thinking. This gave them the opportunity to pitch their solution in more detail to a wider audience of industry stakeholders. A link to the webinar can be found here:

CLICK HERE

STUDENT MATTERS

2020 Honours project presentations

*E*ach year, the Department of Statistics and Actuarial Science's Honours students have an opportunity to present their Honours projects to the Department and fellow students. This year, the presentations took place during the week of 19 October and were presented as a five-day series of lunchtime talks. Due to the current circumstances it was necessary to switch to MS Teams online presentations, but everyone adjusted seamlessly. Below follows a summary of all the sessions as described by the various chairs.
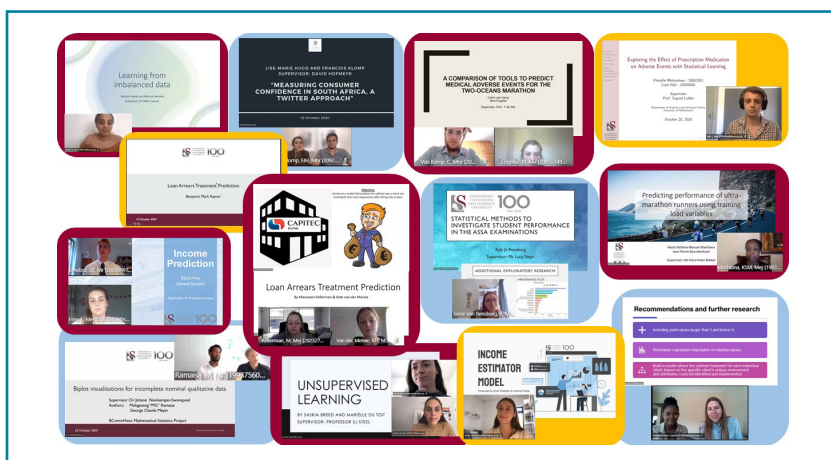
Monday 19 October 2020 to Thursday 22 October 2020
(Statistics and Mathematical Statistics)
Chair: Prof Sugnet Lubbe

Several projects centred around topics provided by Capitec Bank on loans and income and the South African Medical Research Council (SAMRC) on data from the Two Oceans Marathon, while there were also some other interesting themes.

The topics of projects centred around data provided by Capitec were: Loan arrears treatment prediction (by Ben Rayner; Marezaan Kellerman and Kate van der Merwe); Income prediction (Elizza Frey and Samual Sendzul; Victoria Pedlar and Erich Wiehahn); and Loan arrears treatment analysis (Jana Nieuwenhuizen and Zanele Mwelase).

The topics of projects centred around data provided by the SAMRC were: Predicting the performance of ultra-marathon runners using training load variables (Jean-Pierre Bezuidenhout and Keyla Machiana); Exploring the effect of prescription medication on adverse events with statistical learning (Phindile Mkhatshwa and Liam Rall); and A comparison of tools to predict medical adverse events for the Two Oceans Marathon (Nina Engelke and Calvin van Kamp).

Other topics covered were: Statistical methods to investigate student performance in the ASSA examinations (Kyla Janse van Rensburg); Measuring consumer confidence in South Africa, a Twitter approach (Lise-Marie Hugo and Francois Klomp); Unsupervised learning (Saskia Breed and Mariëlle du Toit); Biplot visualisations for nominal qualitative data (Claude Meyer and Mokgeseng Ramaisa); and Learning from imbalanced data (Melissa Davids and Melissa Swindon).

STUDENT MATTERS

2020 Honours project presentations

In the first session of the Financial Risk Management presentations, five groups delivered their talks.

The first two groups (Daylan Leibrandt and Michael Purchase, as well as Melissa Carstens and Anika Kotzé) both compared volatility patterns of the JSE all share index and other international indices during the COVID-19 pandemic, the Tech Bubble and the Credit Crunch. One group assumed the t-distribution as the distribution for the daily log returns of the indices while the second group assumed the normal distribution. A number of interesting observations were made. One of the most outstanding of these is that the volatility of all the indices were significantly higher in the beginning of the COVID-19 period than in the other periods but it very quickly, within two to three months, stabilised to normality.

In the third presentation Wilmari van Dyk and Edela Von Ahlften discussed the performance of triplots with polybags over various distributions and illustrated its applications in the financial world.

In the following session Neha Gihwala and Taryn Petersen discussed how biplots can be used to graphically display certain aspects of the COVID-19 pandemic. They were very creative in building an app with which the biplots can be constructed.

In the last presentation Ian Chambers and Jason Abbot looked at predicting South African call option prices using ANNs. They found that the advanced ANN was still unable to outperform the BSM formula, but it did improve upon the simple ANN.

The second session of the FRM Honours presentations started with Monique Thomson and Karla Vetten. They discussed the difference between Basel III and Basel IV and its impact on South African banks. They specifically looked at the leverage ratio and liquidity requirements and how much additional capital banks require to meet the same capital ratios held under Basel III.

Thereafter, Lisa-Mari Bosman discussed the findings of her project which investigated probability of default models. She reviewed various models and discussed their practical implementation on a publicly available credit-risk data set.

The third presentation was presented by Hitji Kamupingene and Cara Weyers. They discussed how pension fund investments and withdrawal strategies can be optimised. They considered the bucket and static approaches to asset allocation and simulated various scenarios, choosing the approach which had the highest amount of capital at the end of the period.

To end off the FRM Honours presentations, we listened to Michael Meyer and Khayalethu Mlonyeni who looked at analysing equity manager returns based on sector and stock selection based on various performance measures.

ALUMNI

Actuarial skill set enables alumnus to make a contribution

Andrew and his son, André, took part in the Cape Town Cycle Tour in 2018 to raise funds for Stellenbosch student bursaries.

*G*rowing up in East London, **Andrew le Roux** didn't know much about the Actuarial profession, but he knew that he liked mathematics and that making good money also didn't sound too bad …

So, with a bursary from Old Mutual, he started his Actuarial degree at Stellenbosch University in 1990, just days after FW de Klerk's historic speech in which he unbanned the ANC and announced the release of Nelson Mandela from prison.

"My dad drove me down (to Stellenbosch), bought me my trusted HP12C calculator and dropped me off at Eendrag, my home for the next three years. I chose to study BSc (Actuarial Science) based purely on the fact that it had fewer subjects than the BCom equivalent. Thankfully, it also meant that I met my wife in the Physics class," Andrew recalls.

"I always knew that I would need a bursary to be able to study, so I felt the pressure of making sure that my marks kept the people at Old Mutual head office happy. To give you an idea of what a nerd I was: before my Financial Mathematics Actuarial exam in my second year, I spent three days doing nine old papers under exam conditions. The exam didn't go too badly after that preparation!"

He needed four more years, while working at Old Mutual, to qualify as an actuary.

"I had my share of ups and downs along the way. It took me a while to realise that the second half of the professional exams needed a very different approach to the more mathematical first half. Fortunately, with advice from more experienced actuaries at work, I was able to find my mojo for the last few exams."

He describes his 22-year career with Old Mutual as hugely fulfilling, rewarding and challenging.

"I started out checking data in the Pension Fund Valuations Department, but soon moved to insurance product development, where I found my niche. In 2002

I moved to the Retail Mass Market business, which had been selling funeral policies to predominantly black customers since the 1970s. As a young white guy, educated under Apartheid, working with many black fellow executives broadened and shaped my perspectives in a life-changing way. This included a leadership philosophy with greater emphasis on dialogue and consultation, a business model prioritising sustainable value for all stakeholders and the opportunity for my views to be challenged by colleagues with such different backgrounds. From there my career included working in Namibia, Mexico and Kenya and everything from signing off highly technical market-consistent embedded values to business strategy and people leadership.

"Initially, I distinctly remember finding it hard to describe my 'career plan', but over time, by being mindful about everything that I was experiencing and thanks to many conversations with others along the way, the picture started to become clearer. I knew that I could do the detailed technical work, but that was not what energised me. I realised that I felt most fulfilled solving complex 'big picture' strategic challenges and leading teams to get the job done."

Andrew left Old Mutual five years ago and has since then had the opportunity to help construct a strategy for the high net worth market for the Liberty Group, to lead digital transformation for Momentum Metropolitan Group and, most recently, to lead Lion Life.

"I have done strategic and leadership consulting work for numerous smaller companies, experimented with a start-up to support young 'first-generation' professionals and had the opportunity to mentor many of them as well. From journeying with black professionals, I have learnt so much about the challenges they face, including biases against black people that still exist today, 'black tax' and a lack of any family members who have faced similar work and other challenges."

Andrew is a Financial Director and partner in a digital start-up called The Space Between Us, which is tackling the challenge of improving mental health in South Africa through technology. They have started with the impact of COVID-19 on employees and will expand their proposition over time to contribute to as many elements of mental health as they can.

"Another growing area of involvement for me has been as a company director in addition to my 'day job'. My first opportunity was with the dynamic think tank Cenfri (https://cenfri.org/) for seven years from 2013 and I currently serve on the Council of the

Actuarial Society of South Africa and the board of the professional services company The Shard. I am very passionate about making a positive difference in our country and to support transformation wherever I can. Every instance where I have had the opportunity to contribute has enriched my life in return.

"I have never doubted my decision to become an actuary and my son is currently following in my footsteps, also at Stellenbosch University. My definition of the actuarial 'secret sauce' is that we are trained to be comfortable with and equipped with the skills to manage complexity and uncertainty, in whatever field we may find ourselves. The one thing we know about the future is that complexity will continue to accelerate, and I believe actuaries will continue to be uniquely positioned to add value. This may involve anything from building detailed technical models to leading teams of people to get a better understanding of all the variables that impact their environment.

> ## *"As varied as my career has been, I believe the actuarial skill set has enabled me to make a contribution."*

Andrew has good memories of his time at Stellenbosch.

"It was lovely to see photos of my former Stats professors, Prof Conradie and Prof Le Roux, in the previous edition of this newsletter. The third person tasked with teaching me Mathematical Statistics was Professor Schoeman, who I will always remember as the person who nominated me for Stellenbosch academic colours, one of my proudest achievements. On the actuarial side, I was taught by Prof Greeff and he taught me as many lessons in the numerous marathons where he finished ahead of me!

"I am very proud of my Alma Mater and especially of the way that it is being transformed by the Rector and his team for our country and for the future. My wife and I have been supporting the maths and science bridging program SciMathUS for many years and have seen its amazing contribution in the lives of disadvantaged young people. As much as I loved *koshuisrugby* and the *sokkies*, I believe Matie students in 2020 get an even better launchpad for an impactful future in our country and the world. I hope that my daughter (Grade 11) and younger son (Grade 8) will follow their parents and older brother to make Stellenbosch University part of building their future."

PRESENTATIONS AND CONFERENCES

Cloud Computing: Then, now, and the future

Mr Luca Steyn recently presented a short course in cloud computing with Microsoft Azure at Stellenbosch University's School for Data Science and Computational Thinking. He tells us more about the concept and why statisticians and data scientists should care.

"The term *the cloud* originated as a metaphor to refer to the overlapping of servers connected by a network. Today cloud computing is used by companies globally to increase profit and decrease production time. Modern cloud computing refers to a service where computer system resources are made available on-demand over a secured network – generally the internet. The idea of a virtual cloud dates back to the pre-internet era.

"Around 1955, John McCarthy proposed a theory of sharing compute time among a group of users. However, back then computers were so expensive that only industry leaders used them. This hindered the development of providing compute time as a public service. The next major breakthrough came in 1969, when the Advanced Research Projects Agency Networks (ARPANET) was developed. The ARPANET is considered by many as the "predecessor of the internet". It was the first system that allowed digital resources and services to be shared between computers in different geographical locations. Although ARPANET sparked massive interest, it seemed that a virtual world was a fantasy since these systems were too expensive and computing power was scarce.

"During the 70s to the 90s many technologies emerged that formed the basis of modern cloud computing. The IBM group proposed the virtual machine and by the 90s telecommunications companies started offering customised virtual private networks to keep user data private and secure. Finally, by the new millennium, the fantasy of a virtualised world from the 70s started to look like a reality.

"In 2003, a small Amazon.com development team in South Africa proposed the idea of providing computer resources as web services that are decentralised and automated – allowing developers globally to use the system as a resource in a complicated application.

Amazon Web Services was founded in 2006 and completely disrupted how organisations think about computing. Soon after, Google Cloud and Microsoft Azure were founded which increased the competition in the field and, in turn, accelerated development in cloud computing.

"Today companies can build, test, deploy, manage and update web applications quicker and cheaper than ever before. This means that data scientists have access to state-of-the-art computer infrastructure at a massively reduced price compared to the total cost of ownership of on-premises infrastructure. At its core, cloud computing refers to renting computer infrastructure-as-a-service (IaaS), such as virtual machines and virtual networks. This has expanded to the Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS) cloud models. PaaS cloud products allow developers to build applications without managing the infrastructure or platform that an application runs on. Alternatively, SaaS products are cloud products offered as a fully managed software (for example Microsoft Office 365).

"When I presented the short course in cloud computing with Microsoft Azure at the School for Data Science and Computational Thinking, I was introduced to the Microsoft Learn platform – an amazing resource to learn about cloud computing and one path to become certified in cloud computing. Cloud computing is moving at a rapid pace. We, as researchers and educators, are responsible for advancing the field to be accessible to all and to share our knowledge with young minds.

"Sadly, cloud computing is not widely taught in South Africa. However, with the services offered by the School for Data Science and Computational Thinking and with future collaboration between our Department and cloud services providers, we hope to make learning about the cloud freely available and provide affordable (and hopefully free) certification opportunities to all students."

PRESENTATIONS AND CONFERENCES

Data Science, Statistics and Visualisation (DSSV) conference – 29-31 July
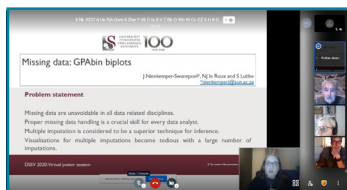
Prof Niël le Roux, Prof Sugnet Lubbe and Dr Johané Nienkemper-Swanepoel attended the virtual Data Science, Statistics and Visualisation (DSSV) conference in July. The conference was attended by 141 delegates, of which five were from South Africa. There were four plenary sessions, 15 invited-papers sessions with a total of 45 speakers, and 11 poster presentations.

Prof Lubbe presented a paper in the Statistical Learning invited session on the 'Comparison of zero replacement strategies for compositional data with large numbers of zeros'. Dr Nienkemper-Swanepoel, Prof le Roux and Prof Lubbe presented a poster on 'Missing data: GPAbin biplots'.

The DSSV conference was aimed at bringing together researchers and practitioners interested in the interplay of statistics, computer science, and visualisation and to build bridges between these fields. The conference highlighted contributions to practical applications, in particular those which link and integrate these subject areas. Presentations were oriented towards a very wide scientific audience and covered topics such as machine learning, the visualisation of data, big data infrastructures and analytics, interactive learning, advanced computing and other important themes.

The virtual Actuarial Society of South Africa conference – 6-8 October

Two actuarial lecturers, Mr Simon Louw and Mr Davy Corubolo, attended the annual convention of the Actuarial Society of South Africa. There were at least two firsts: it was the first entirely virtual convention of the Society, and the first time it spanned three days rather than the usual two (excluding the Africa day).

The programme was very well spaced with decent breaks and specific 'mindfulness' moments sponsored by Liberty to clear one's head and get the energy flowing. There was an online game, bingo and a virtual exhibition hall, which were all very well put together and made the virtual event feel very participative and fun.

The two main themes prominent in the convention were data science (including machine learning) and transformation. Additionally, the following featured strongly this year: COVID-19; Product design issues such as Treating Customers Fairly considerations; and IFRS17, a new accounting standard that the insurance industry is busy implementing. The sessions were thought-provoking and raised interesting questions as to how actuaries should engage with societal questions, rather than being solely focused on narrow technical work. This is a good reminder of professional concern for the public interest. Also, attending sessions that are beyond one's specialisation helps to gain a broader perspective. It is a worthwhile event for actuaries of all levels.

One of the greatest benefits of the online version was that all the sessions were recorded and accessible after the convention – useful for viewing those concurrent sessions that one could not attend and revisiting interesting or complex discussions. Another positive feature of the online version was that many more questions were asked via the Q&A box than would normally be asked at a non-virtual convention. While 'networking' and 'socialising' is more difficult in an online environment, the virtual convention was a good alternative to the usual format.

DEPARTMENTAL SEMINARS

SEMINAR PROGRAMME: FIRST SEMESTER 2021	
Stellenbosch University Department of Statistics and Actuarial Science	
12 March	**David Rodwell** (Capitec, Stellenbosch) *Categorical CVA biplots*
26 March	**Hassan Sadiq** (Department of Statistics and Actuarial Science, SU) *Model-based approach to inferring episodic directional selection in codon sequences*
23 April	**Delia Sandilands** (Capitec, Stellenbosch) *Exploding biplots with density axes in Plotly*
14 May	**Dewald Müller** (Root, Cape Town) *The API economy: how Software as a Service (SaaS) is changing the insurance sector*
28 May	**Hans-Peter Bakker** (Department of Statistics and Actuarial Science, SU) *Explorations in independent component analysis*
11 June	**Manne Bylund and Robyn Berghoff** (Department of General Linguistics, SU) *Experimental approaches to language in the mind*

Seminars that are permitted to be held on campus will start at 13:00 in room 2048 of the Van der Sterr Building, c/o Victoria and Bosman Streets, Stellenbosch. Seminars that are not permitted to be held on campus will be arranged via Microsoft Teams or Zoom. These seminars will also start at 13:00.

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The Department of Statistics and Actuarial Science
wishes its alumni, industry partners, students and staff a

blessed festive season.

*We hope you enjoyed this edition of the
Department's newsletter.*

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Contact Elizna Huysamen (krugere@sun.ac.za)
to be added to the newsletter distribution list.