Faculty of

Engineering & the Built Environment

ALUMNI UPDATE

Message from the Dean

November 2019

There is a renewed feeling of energy on campus under the leadership of the Vice-Chancellor, Professor Phakeng. She is passionate about creating a more sustainable future and moving the university forward. Over the past year, I have been chairing the VC's Futures Think Tank where staff, students and alumni have been reimagining the university. I am also part of the task team developing the 2030 vision for the university. We are looking at various futures scenarios, and it is clear that we need to shift our thinking towards the kinds of skills that will be important in the future - complex problem-solving, critical thinking and creativity. Watch this space.

This year the Department of Mechanical Engineering celebrates its centenary. Since its move to upper campus in the late 1920s, the Department has grown its research enterprise. During the last three decades, it has launched many exciting research groups that support a growing number of postgraduate students and produce cutting-edge knowledge – earning the Department an international reputation for excellence. Next year it will be Chemical Engineering celebrating 100 years.

UCT is among the top 100 universities worldwide in the 2020 Quacquarelli-Symonds Graduate Employability Rankings. In the 2020 Times Higher Education World University Rankings, we climbed to 136th position.

We are celebrating our creative students and alumni who have won awards for their innovative start-ups, from a multilingual banking chatbot to a gamified online platform which teaches people software development and coding skills.

It has been rewarding to see so many of our female students receiving awards for their excellent work. This year our focus has been on recruiting more women into engineering as the number of women at undergraduate level is 29% and postgraduate at 35%.

Should you wish to get in touch with the Faculty, please contact Mary Hilton.

Professor Alison Lewis
Dean: Faculty of Engineering & the Built Environment

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Director of environmental sustainability

Manfred Braune, a 1998 Electrical Engineering graduate, is the university's new director of environmental sustainability. He says the UCT campus can become a living laboratory for research on environmental sustainability while fulfilling its commitment to becoming a green campus.

UCT research into the environment and sustainability is renowned worldwide through key entities such as the Climate System Analysis Group, which consults to the United Nations, the Future Water Institute and the African Climate and Development Initiative.

But its own campus needs better integrated environmental management and care, Braune said. This concerns much more than waste management; it's also about water and energy efficiency, human health, green investment and good citizenship.

Braune believes in a holistic, win-win approach, incorporating sustainability into UCT's teaching, learning and research – and into the development of graduates as innovative and committed global citizens, able to drive environmental sustainability in their workplaces.

He has first-hand experience of what is required. After studying electrical engineering at UCT, Braune said that in his final year he grabbed the opportunity to marry his twin passions, science and technology, with sustainability and conservation.

His thesis in the late 1990s examined energy efficiency in commercial buildings, which was very cutting-edge in the South African commercial property sector at the time.

After graduating he developed an energy-efficiency proposal for a large retailer. They put it on the back burner. But when they adopted it five years later, their annual savings ran into millions.

"You need people that can come up with the solution – but you also need the leadership that can support those solutions," he said.

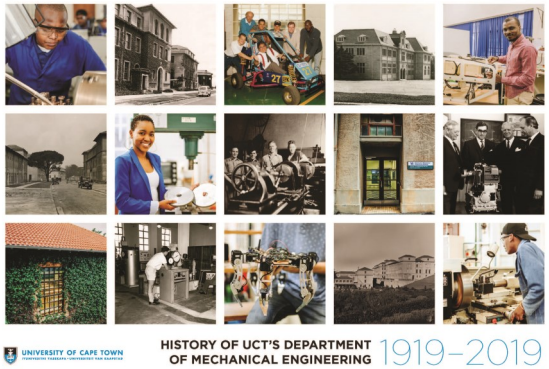
For the past 10 years he worked for an NPO, the Green Building Council, a small but impactful organisation that has been big on driving green change in the built environment.

"I feel privileged to have been appointed to this position, and take this responsibility very seriously, and hope to make a big difference in this space. I'll be working closely with colleagues and students to make it happen."

Mechanical Engineering celebrating 100

The story of Mechanical Engineering at UCT over the past century is not only related to the socio-economic and socio-political developments in South Africa but is also inextricably linked to new scientific findings and technological advances that changed the face of engineering as a whole.

Read the Centenary Book



Three EBE 2020 Mandela Rhodes Scholars

Hlumelo Marepula is a final-year civil engineering student who made her mark in the university space through her involvement with the UCT Global Citizenship Programme. This led to her taking on a lecturing role in a humanities elective for engineers, making her the first undergraduate student to fulfil such a role in the engineering department. The course explores the impact of the engineering profession on communities and how engineers can contribute to a socially just society.

This year, Hlumelo won the local "Falling Walls Lab" competition after presenting on her thesis topic, which explores the use of human urine to ultimately produce jet fuel. She represented UCT and South Africa at the global finals, which were held on 8 November.

She believes in contributing to a sustainable future for Africa by embarking on research which not only tackles climate change, but has the potential to make Africa a global innovation competition.

Sister Kashala graduated in 2016 with her BSc (Honours) in Quantity Surveying and worked as a QS in Namibia before returning to UCT in 2018 to register for her master's in property studies.

During her undergraduate studies, Sister was a mentor to first-year students, she was Vice-Chair for the 2015 EBE Undergraduate Student Council, and was the Academic Chair for the UCT Namibian Student Council.

With a passion for uplifting young people in rural areas, she is the founder of Tekula, which means "to nurture" in her native language, Oshiwambo, and which strives to bridge the gap of access to opportunities between urban and rural communities via mentorship programmes, motivational events and prizegiving ceremonies.

Sister is also passionate about housing and spatial justice. She hopes to find the balance between the redevelopment of dilapidated buildings and justice for illegal occupants.

In 2019, she received the Engineering and Built Environment Special Faculty Award and was also selected as a Mandela Washington Fellow, a flagship programme of the Young African Leaders Initiative .

Nyasha Mashanda is a final-year electrical engineering student. He is the recipient of the Mastercard Foundation Scholarship and is passionate about leadership because he believes that Africa will only thrive when there is a collective drive among Africans to become better leaders in their societies.

In 2019, Mashanda was awarded the Mastercard Entrepreneurial Fund to start a biogas social venture in rural Zimbabwe, through which he hopes to encourage Zimbabweans in rural areas to use alternative sources of energy in an effort to reduce deforestation rates.

During his undergraduate degree, he tutored high school learners in informal areas in South Africa, and mentored first-year university students.

EBE graduate wins prize for innovation

Neo Hutiri, a 2010 UCT electrical engineer graduate, received the Royal Academy of Engineering's 2019 Africa Prize for Engineering Innovation. He is the first South African to win the prestigious Africa Prize. He is presently registered for a MPhil at the UCT Graduate School of Business and is the founder of Technovera, a technology start-up developing smart solutions.

"My coming from an engineering background and having worked in an automation space has definitely influenced the kind of technologies that Technovera has developed," says Neo. "We are constantly asking questions on the role of technology and how it can help us shape some of the most challenging issues in health care." Neo and his team developed Pelebox, a smart locker system designed to dispense medicine to patients with chronic conditions.

Pelebox is used at public healthcare facilities in South Africa, cutting down on long queues and easing pressure on the healthcare system. Pelebox is a simple wall of lockers, controlled by a digital system. Healthcare workers stock the lockers with prescription refills, log the medicine on the system, and secure each locker. Pelebox then sends patients a one-time PIN, which they use to open their locker and access their medicine.

Neo wins the first prize of £25,000. Four finalists from across sub-Saharan Africa delivered presentations at an awards ceremony in Kampala, Uganda, on 4 June 2019, with the Africa Prize judges and a live audience voting for the most promising engineering innovation.

The Africa Prize for Engineering Innovation, founded by the Royal Academy of Engineering in the UK, is Africa's biggest prize dedicated to engineering innovation. Now in its fifth year, it encourages talented sub-Saharan African engineers, from all disciplines, to develop innovations that address crucial problems in their communities in a new and appropriate way. www.pelebox.com

Vac work with a difference

Vacation work remains a requirement for engineering students, but it is becoming harder for the students to find placements. In July this year Lubabalo Luyaba, a 2013 civil engineering graduate, and Wiebke Toussaint, a 2011 mechanical engineering graduate, organised a pilot programme where 19 chemical engineering students gained both experience and an appreciation of critical career opportunities in the public sector, this time in the beleaguered water category.

The students spent their winter vacation in the Snape Building, gathering, sifting and digitally capturing critical water and sanitation infrastructure data for the water-stressed Amathole District Municipality in the Eastern Cape.

This will help the municipality, a Water Services Authority, improve its water and sanitation asset-management practices and service delivery to residents, and comply with national legislation.

The project called #DATA4WASI, short for Data for Water & Sanitation Infrastructure, was such a success that from 18 November it will run again, this time with 60 students from across all four disciplines of engineering.

Read more

Helping Africa prepare for 5G

As the fourth industrial revolution becomes part of our future, Dr Joyce Mwangama is leading the way with the development of Africa's first 5G testbed.

Joyce is an alumnus of the university. She graduated in 2008 with a BSc in Electrical and Computer Engineering. In 2011 she received her master's degree, and in 2017 her PhD. She joined the Department of Electrical Engineering in 2012 as a lecturer, and in 2019 received a promotion to Senior Lecturer.

Most people are familiar with the connectivity that comes with 4G cellular network service: swift loading times while surfing, quick transfer of photos and videos, and cloud computing.

With the next generation of connectivity, things get even faster. 5G network service not only amplifies the speed of technology, but also creates the potential to use it to improve livelihoods.

5G can be viewed as an enabler of the fourth industrial revolution, also known as the 4IR, which has been described by the World Economic Forum as a "fundamental change in

the way we live, work and relate to one another".

While the 4IR has great potential, it must be developed with consideration of the people it will help. In Africa, that means addressing issues of economic impact and social justice.

"From smart cities to mobile health, our facility enables us to test 5G services on a live network to help achieve 4IR goals in a structured and organised way," says Mwangama.
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UCT in top 20 globally for mining and mineral engineering

The recently released ShanghaiRanking's Global Rankings of Academic Subjects (GRAS) 2019 has placed UCT among the top 50 in two academic subjects: mining and mineral engineering (20th) and oceanography (36th).

"These rankings help to affirm UCT's excellence. They show that our researchers and the excellent work they do can hold their own on the world stage," says UCT Vice-Chancellor Professor Mamokgethi Phakeng. "But, ultimately, rankings can't reveal the full picture. And, at UCT, we strive to see our excellence deliver real research impact for the benefit of our country, the rest of Africa and the world. In fact, all four of our top-performing subjects are exemplars of this impact. "For instance, UCT's focus in the area of mining and mineral engineering is enabling countries to mine the minerals society needs in ways that are sustainable for communities and the planet."

The ShanghaiRanking's GRAS ranks institutions according to the number of papers, citations (compared to the world average), international collaboration, papers in top journals and staff winning significant awards. UCT performed best in mining and mineral engineering, placing 20th in the world. The top three universities in this subject were the Central South University, China, followed by the China University of Geosciences (Beijing), China, and the University of Queensland, Australia.

UCT News

Retirees

This year there are 6 academic staff members who will be retiring at the end of December.

Professor Jane English has spent 36 years at UCT in different capacities with Professional Communication Unit and then Professional Communication Services in EBE. Her family, which includes four sons, have nine degrees from UCT, six of them from EBE! While Jane is retiring from UCT, she is not retiring from doing what she loves and will continue as Jane English Consulting.

A/Professor Hennie Mouton joined the Department of Mechanical Engineering in 2013. He had 37 years experience in industry working for Kentron, Denel Dynamics.

Professor Iain Low from the School of Architecture, Planning & Geomatics has been at UCT since 1998. He has been the convenor for the architecture postgraduate programmes.

Ian Jay is a senior lecturer in the Department of Construction Economics and Management. He joined UCT in 2008, and he has taught project management at postgraduate level. Ian is going to be very busy in his retirement, fossil hunting with the Friends of the Museum, being a member of the Constantia Art Society, a photographer, and an artist, and building model aeroplanes, to name a few of his passions.

Philip Titus joined the Department of Electrical Engineering when he was 16 years old – 47 years ago! He left UCT but returned 15 years ago. He is a senior technical officer in the Machines Lab. He will keep himself busy during his retirement as he can fix anything electrical. He has two grandchildren, India and Tatum, and he is looking forward to spending some time with them.

Dr Alexandru Murgu joined the Department of Electrical Engineering in 2009 as a senior lecturer. Hi s research interests are in the fields of Telecommunications, Networks, IP and Network Reliability. He is taking early retirement.

Mining for the future

How can the mining industry continue to provide the materials that are essential to our lives while also becoming more people- and planet-centred? The Minerals to Metals Initiative in the Department of Chemical Engineering aims to answer this question through research, education and engagement that unites technical expertise with a wide-ranging interdisciplinary approach.

"I think globally there is a growing realisation that we have to find more sustainable ways to mine, in which the sector moves from an extractive model towards a developmental one," says UCT Associate Professor Jennifer Broadhurst.

Broadhurst is part of the core leadership team of the Minerals to Metals Initiative, a UCT signature theme established in 2007 that aims to integrate and expand capacity in minerals beneficiation research. Or, as Professor Jochen Petersen, another member of the leadership team, explains it, "We aim to create a platform for sustainable development in Africa through minerals and metals."

Petersen describes the current challenges facing mining as complex. "Whatever solutions we use in the future have to be grounded in an understanding of the complex nature of the problems we face today.

"Mining remains important and necessary, but it must also tread lightly when it comes to people and the planet."
"Africa is not just the cradle of humankind but also the cradle of mining," says Broadhurst. "Modern mining might have emerged during the 17th century but people were mining in Africa centuries before that."

The oldest mine in the world, she says, is in Eswatini. People there were mining haematite – an important ore of iron – 43 000 years ago, around the time that humans were reaching Europe. According to Broadhurst and Petersen, metals and the minerals they are derived from have been indispensable to human development ever since.

Metals and minerals are not just found in the places you might expect, like your smartphone. These materials are in everything we use; even your toothpaste contains about six mined minerals," says Broadhurst.

Petersen explains that some people argue that we no longer need to mine because we have other sources of energy – wind and solar power – or because we can replace minerals with other materials, such as carbon fibre. But that thinking is misconceived.

"In fact, mining is fuelling the green economy. This is because the complex minerals we mine help to build the infrastructure that supports renewable energy and the move away from coal," he says.

Mining is integral to the generation, storage and transport of green energy. For example, new commodities like lithium, cobalt and rare earth metals are used in batteries and communications equipment. Rare earths, together with more established commodities, such as aluminium and copper, are used in wind turbines and electric cars.

"Many of these minerals are found in South Africa," Broadhurst explains. "The platinum-group metals (including platinum, palladium, rhodium and others) are used as exhaust catalysts in petrol and diesel vehicles, but they are also used in fuel cells."

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CHEMICAL ENGINEERING CENTENARY

In 2020, UCT Chemical Engineering is celebrating its 100th anniversary. We would like to mark this important milestone by producing a centenary publication that will capture the department's remarkable story for posterity. We would welcome your input in the form of anecdotes, historical trivia and information and any photographs you might have to include in the publication. Please email chemeng100@uct.ac.za