UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

# FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT

# 2024

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# 01 THE FACULTY

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## MESSAGE FROM

# THE DEAN

2024 has been a year! We've had milestones, challenges and transformational shifts. Most of all, I am proud of and energised by the commitment of our students, staff, alumni, donors and partners who continue to shape the Faculty of Engineering & the Built Environment (EBE) into a space of excellence, innovation and impact.

This was a year of notable national events and institutional changes – including South Africa's 2024 national elections, which sparked dialogue across the country about infrastructure, climate, energy and educational reform. In parallel, our faculty took on its future-facing mandate, celebrating new leadership, many prestigious accolades, and an expansion of socially responsive and globally relevant research.

A major highlight was the launch of our EBE Vision 2050 project, which envisions what the faculty landscape will look like by 2050. This exciting project serves as a roadmap to guide our faculty in all aspects of our work, including academics, operations, technical services and support functions.

The EBE Vision 2050 has nine goals to help us chart our path to a future that is caring and collaborative, digitally equitable, curriculum-responsive and shaped by students and staff alike.

### FUTURE-FACING STRATEGY AND LEADERSHIP TRANSITIONS

The EBE Vision 2050 strategy was officially launched following the culmination of a dynamic, multi-departmental collaboration led by the EBE Future Dreamers Group. This pioneering team – 27 members aged 25 to 40 from across the faculty – co-designed our long-term strategic roadmap over multiple curated sessions, tackling empathy mapping, scenario planning, cultural intelligence, strategic alignment and more. Their work laid the foundation for a powerful future vision that will guide academics, operations, technical services and support functions.

Among the nine guiding goals of EBE Vision 2050 are a commitment to inclusive curricula, AI-driven custom learning, streamlined administration, and the integration of research and teaching in areas of strategic relevance. *The Vision 2050 brochure*, released in 2024, outlines this aspirational path, supported by all departments and units across the faculty.

This year also marked significant changes in faculty leadership. We welcomed four new Deputy Deans: Professor Jochen Petersen (Postgraduate Studies), A/Professor Malibongwe Manono (Undergraduate Studies), A/Professor Corrinne Shaw (Transformation & Social Responsiveness) and Professor Paul Barendse (Research and Strategic Initiatives), who begins his term on 1 January 2025.

## CURRICULUM REVIEW AND TEACHING INNOVATION

Establishing an inclusive and transformed culture at EBE remains a priority. At the heart of our efforts on this front is the Curriculum Review Project, led by A/Professor Chris von Klemperer. Running until 2026, this ambitious initiative continues to reshape the student experience, streamline credit totals, reduce content overload and embed responsive teaching and assessment practices.

In 2024, faculty-wide workshops, department-level consultations and student surveys contributed to a deeper understanding of time-on-task, progression challenges and course duplication. New curriculum rollouts – including Civil Engineering's revised programme for 2025 – emphasise South Africa's grand infrastructure challenges, with a deliberate focus on climate resilience, job creation and inclusive development.

Over the course of the year, departments hosted "Changemakers" workshops to build capacity for change, foster collaboration and explore problem-based learning approaches – with promising results seen in Electrical Engineering, Civil Engineering, and Mechanical Engineering.

## EXCELLENCE IN RESEARCH AND GLOBAL IMPACT

In September 2024, Stanford University released its annual list of the world's top 2% most-cited scientists. UCT had 160 researchers featured in the list, with 20 from EBE – a powerful testament to the global relevance and influence of our academic work.

This year, several new and ongoing research programmes addressed pressing environmental, infrastructural and digital challenges – from smart cities and renewable energy to urban resilience and green materials.

Initiatives like GreenQUEST, led by the Catalysis Institute, showcase EBE's contributions to clean household fuel, while the Future Water Institute's Reorienting Research, Innovation & Practice to Address Future Water Challenges in Africa (RRIP) project tackles the complexities of African water systems through interdisciplinary research. Research advances in climate adaptation, smart mobility, urban design and sustainable chemical processes continue to position the faculty as a continental leader.

Several interdisciplinary projects – spanning transport, heritage preservation, robotics and spatial analytics – reflect our commitment to collaborative inquiry, while new platforms like the Research Navigator streamline support for our researchers.

## DEPARTMENTAL HIGHLIGHTS AND INNOVATION

At the core of this progress are our departments and schools, whose work in 2024 has amplified our collective vision and reaffirmed our standing as a faculty of impact.

Our School of Architecture, Planning & Geomatics (APG) ran the Urban Design Africa course, featuring the award-winning Indawo game for safer communities, and launched the Space | Spatial | Links Showcase with the Department of Civil Engineering. APG also co-hosted the launch of Global Digital Heritage Afrika (GDHA), a groundbreaking initiative documenting African heritage digitally.

The Department of Construction Economics & Management (CEM) celebrated strong student performance at the Greenovate Awards and launched a digital departmental magazine, *Masakhe* ("Let us build") as part of its strategic marketing campaign. The introduction of a Practical Liaison role to assist students in securing the holiday work placements required for practical training has further strengthened graduate readiness and alumni networks.

Achievements in our Department of Chemical Engineering included the further integration of AI tools into teaching, the expansion of the Data Science module and the advancement of research into sustainable chemical processing, catalysis and hydrometallurgy.

The Department of Civil Engineering made steady progress on its new curriculum development for the undergraduate programme, with year one of the degree set to roll out in 2025. Research highlights include Antarctic climate work and the launch of the GDHA research group alongside APG.

Our Electrical Engineering Department launched Formula Student Africa (FSA) to develop sustainable electric race cars, and secured international grants for battery testing, smart city modelling and education outreach.

The Department of Mechanical Engineering hosted innovative projects including energy-saving building design and aeronautics research using liquid hydrogen. Professor Brandon Collier-Reed received a UCT Distinguished Teacher Award – the first EBE recipient since 2009 – and a group of six Mechanical Engineering Mechanical and Mechatronic Engineering students won first place at the Lufthansa Technik InnovAero competition in Germany.

## SOCIAL RESPONSIVENESS AND INCLUSIVITY

Transformation and social responsiveness continue to shape our values and operations. The faculty made significant strides through curricular reform and language inclusivity, expanded psychosocial student support, and renewed commitment to accessible, inclusive teaching.

Dr Kathryn Erwing from the School of APG was awarded the Vice-Chancellor's Social Responsiveness Award for 2024 for her outstanding work in helping communities engage meaningfully with societal needs and address urban inequality.

## CHARTING THE ROAD TO 2050

The faculty remains committed to excellence, equity and bold innovation. Whether through Vision 2050, curriculum reform, global research contributions or local community partnerships, our work is rooted in a desire to build a fair and sustainable future.

I am endlessly grateful to our staff, students, alumni, and supporters – those who ask difficult questions, dream beyond disciplinary boundaries, and challenge us to do better. As we prepare for 2025 and beyond, I am confident that EBE will continue leading the way, inspiring transformative action through engineering and design.

Sincerely,
**PROFESSOR ALISON LEWIS**
**Dean: Faculty of Engineering and the Built Environment**

# ORGANOGRAM OF THE FACULTY

**Deputy Dean:**
**Research and Strategic Initiatives**
Professor Hans Beushausen

**Deputy Dean:**
**Postgraduate Studies**
Professor Jochen Petersen

**Dean**
Professor Alison Lewis

**Deputy Dean:**
**Undergraduate Studies**
A/Professor Malibongwe Manono

**Deputy Dean:**
**Transformation & Social Responsiveness**
A/Professor Corrinne Shaw

**Assistant Dean:**
**Curricula Review**
A/Professor Chris von Klemperer

**Architecture, Planning & Geomatics**

- Architecture
- Conservation
- Landscape Architecture
- City & Regional Planning
- Urban Design
- Division of Geomatics
- Zamani Project
- African Centre for Cities

**Chemical Engineering**

- Catalysis Institute
- Centre for Biopress Engineering
- Centre for
- Minerals Research
- Crystalisation & Precipitation Unit
- Environmental & Process Systems Engineering
- Hydrometallurgy
- Minerals to Metals
- Process Modelling & Optimisation

**Civil Engineering**

- Centre for Transport Studies
- Computational & Optimum Mechanic Research Group
- Concrete Materials & Structural Integrity Research Unit
- Geotechnical Engineering Research Group
- Structural Engineering & Mechanics Research Group
- Urban Water Management
- Water Research Group

**Construction Economics & Management**

- Urban Real Estate Research Unit

**Electrical Engineering**

- Control Engineering
- Image Processing & Vision Systems Instrumentation
- Machines & Power Electronics
- Power Systems Engineering
- Radar Remote Sensing
- Radio Frequency & Microwave Engineering
- Robotics
- Signal Processing & Inverse Problems
- Soft Computing
- Software Defined Radio Group
- Telecommuni-cations

**Mechanical Engineering**

- Advanced Manufacturing
- Bioengineering
- Blast Impact Survivability Unit
- CERECAM
- Centre for Materials Engineering
- Computational Fluid Dynamics
- Composite Materials Laboratory
- Engineering Management
- Engineering Education
- ATProM Research Unit
- Non-destructive Testing
- RARL (Robotics)

**Dean's Office**

- Continuing Professional Development
- Electron Microscope Unit
- Facilities & IT
- Faculty Office
- Finance Section
- Human Resources
- Marketing & Communication
- Psychologist

**Future Water Institute – Interdisciplinary research**

**Global Digital Heritage Afrika**

# DEPUTY DEANS

Supporting the Dean in her academic and operational leadership role are four Deputy Deans. These members of the executive team take responsibility for certain leadership portfolios, taking on management and administration responsibilities in specific areas.

## POSTGRADUATE TEACHING AND LEARNING PORTFOLIO

### Message from Professor Jochen Petersen

**Deputy Dean for Postgraduate Studies**

Postgraduate studies remain a pivotal part of the faculty's research strength, and 2024 has been marked by important progress and meaningful contributions from our postgraduate community. Their work continues to drive innovation, and advance solutions to some of the most pressing challenges of our time.

Our students played a vital role in interdisciplinary initiatives across the faculty. The Future Water Institute's RRIP project addressed the complexities of African water systems through collaborative research, while the Catalysis Institute's GreenQUEST initiative developed clean household fuel solutions with tangible community impact.

Beyond research outputs, we also strengthened student support structures. Initiatives such as writing workshops, professional development opportunities, and closer engagement with supervisors have helped to create a more enabling environment for postgraduate success. Ongoing curriculum review efforts continue to ensure our programmes remain responsive, inclusive, and internationally competitive.

We are mindful, however, of the challenges that remain. Supervision capacity, administrative bottlenecks, and the financial pressures faced by many of our students require continuous attention. Addressing these issues collaboratively will be key to sustaining the excellence and resilience of our postgraduate programmes.

As we look ahead, our focus is on improving collaboration across disciplines, expanding support for students, and fostering postgraduate education that is not only academically rigorous but also socially responsive and globally impactful.

## UNDERGRADUATE TEACHING AND LEARNING PORTFOLIO

### Message from Associate Professor Malibongwe Manono

### Deputy Dean for Undergraduate Studies

The EBE Faculty at UCT continues to lead the continent in shaping a responsive, future-fit, and inclusive engineering education landscape. This 2024 Teaching and Learning Report reflects the faculty's commitment to academic excellence, transformation and innovation, in alignment with UCT's Vision 2030 and EBE's Vision 2050. Guided by a strategic focus on student success, equity and digital advancement, the faculty has implemented data-informed, student-centred approaches that address the complex challenges facing undergraduate education today.

This report provides a comprehensive overview of key projects and interventions undertaken in 2024 to improve student progression, embed inclusive pedagogies, expand digital and multilingual learning environments and build institutional capacity. It highlights the faculty's strategic partnerships, research-informed innovations and systems-level transformations aimed at producing graduates who are not only technically competent but socially conscious and globally competitive. In so doing, the report demonstrates EBE's role as a continental and global leader in 21st-century engineering education.

### UNDERGRADUATE TEACHING AND LEARNING OVERVIEW

The Undergraduate Teaching and Learning Portfolio remained a cornerstone of academic excellence and innovation in 2024. The faculty continued to align its educational priorities with UCT's Vision 2030, which emphasises transformative and socially responsive education, and EBE's Vision 2050, which aspires to produce future-fit, skilled graduates with a strong sense of ethics and innovation. The drive to improve student success, curriculum inclusivity, digital fluency and institutional sustainability was central to the 2024 mission. Through strategic leadership, departmental collaboration and student-centred initiatives, EBE enhanced both the quality and accessibility of undergraduate teaching and learning.

**Academic success and progression**

In support of student progression and success, EBE revised its progression rules under the leadership of Associate Professor Chris von Klemperer, Assistant Dean for Curriculum Review. The revised criteria aim to reduce attrition while providing structured pathways for students with academic potential who fall short of automatic progression benchmarks. This change was implemented in tandem with improved mechanisms for academic concessions, ensuring that capable students are not excluded due to structural or contextual challenges. These efforts are in direct alignment with Vision 2050's goal of creating a caring, inclusive and student-responsive learning environment that prioritises excellence and innovation.

**Targeted academic support in foundational courses**

Building on previous years' achievements, EBE intensified its efforts to support first-year students in high-risk courses such as mathematics and physics. The faculty expanded its supplementary exams and Tutored Reassessment Programmes (TRPs), combining academic support with psychosocial awareness. Collaboration with

lecturers and tutors in departments ensured the delivery of discipline-specific support strategies that address common learning barriers. These initiatives not only improved first-year retention rates but also contributed to foundational understanding, reflecting the EBE Vision 2050 objective of offering skills-focused, fundamentals-driven curricula supported by customised learning solutions.

**Digital transformation and Amathuba integration**
In line with UCT's commitment to digitally enabled education, the faculty deepened its integration of Amathuba, the university's digital learning platform. Through the use of analytics, adaptive learning pathways and interactive media content, EBE enhanced both learner engagement and instructional delivery. Teaching staff received continued support to develop digital competencies and innovative pedagogical tools through the Centre for Innovation in Teaching and Learning (CILT). This advancement supports Vision 2050's call for AI-driven solutions and personalised learning experiences, ensuring that students are equipped for a rapidly evolving technological landscape while maintaining academic rigour.

**Student success coaching and psychosocial support**
A key milestone in 2024 was the employment of a full-time Student Success Coach, Athenkosi Nzala. He is a UCT BSc (Eng) Civil Engineering graduate with a Master's in Educational Technology from UCT, and is also completing his PhD studies at the University of Pretoria, focusing on educational technology and computer integrated education. Athenkosi brought engineering, academic, mentorship and leadership experience to the role, overseeing the design and implementation of data-driven student success interventions. Under his guidance, 22 Student Success Ambassadors (SSAs) were recruited from across departments to serve as Peer Student Success Ambassadors and project facilitators. Together, they launched several campaigns, including "Student Success Stories", early intervention workshops, the Student Success Hub, and a widely adopted Student Success Toolkit for first years at UCT EBE. This model exemplifies EBE's commitment to excellence, collaboration and student-centred innovation outlined in our Vision 2050.

**Workshops, time management, and mock tests**
Between October 2024 and March 2025, EBE will host 15 workshops focusing on academic and life skills development. These workshops are tailored to address challenges such as deciding whether to extend a degree amidst rigorous academic demands in subjects like physics and mathematics. They aim to improve study techniques and exam strategies critical for mastering complex technical content. Participants will learn time management and procrastination avoidance to balance demanding coursework in quantitative disciplines. Support includes facilitating study groups or accountability partnerships to collaboratively tackle challenging problem-solving tasks in STEM fields. Resources are provided to enhance access to specialised learning tools and academic support for understanding advanced physics and mathematics concepts. Mental health sessions coordinated by our Faculty Wellness Manager, Nazeema Ahmed, focus on mitigating stress and burnout arising from high-pressure first-year curricula and personal circumstances. Guidance is offered to manage financial stress that may hinder focus on intensive STEM studies. Workshops also help in setting academic goals and maintaining motivation to persist through difficult subjects. Lastly, they assist students navigating university life by building strategies to adapt to the rigour of EBE programmes. These initiatives strongly reflect the Vision 2050 priority of embedding responsive, skill-based and inclusive pedagogy.

**LOOKING AHEAD...**
The Undergraduate Teaching and Learning Portfolio will, through its strategic initiatives, continue to align with UCT's Vision 2030 and EBE's Vision 2050 by:

- continuously reviewing its undergraduate degree programmes' progression rules through data-driven analysis to enhance student retention and graduation rates
- scaling up mathematics and physics support through GearUp, integrating discipline-specific learning strategies and peer-assisted interventions
- expanding industry-linked experiential learning, particularly through vacation work training opportunities
- strengthening student support structures, including academic advising, mental health resources and life coaching, to provide a holistic learning environment
- advancing sustainability and digital learning in line with EBE's Vision 2050 goal of preparing future-fit graduates
- expanding the multilingual glossary of terms in first-year engineering, supported by newly secured funding from the Deputy Vice-Chancellor: Teaching and Learning, to enhance inclusivity and accessibility
- preparing for the 2026 Engineering Council of South Africa (ECSA) accreditation visit, ensuring that all programmes meet the latest accreditation standards and that the faculty continues to offer world-class engineering education.
- Through these initiatives, the Undergraduate Teaching and Learning Portfolio will continue to drive a transformative undergraduate experience, ensuring that EBE graduates are equipped to meet the evolving challenges of engineering and the built environment in South Africa and beyond.

## TRANSFORMATION AND SOCIAL RESPONSIVENESS PORTFOLIO

### Message from Associate Professor Corrinne Shaw

### Deputy Dean Social Responsiveness and Transformation

In 2024, EBE continued to strengthen its commitment to transformation and social responsiveness through collaborative, innovative, and community-driven initiatives. These efforts are central to EBE's Vision 2050 Goal 3, which recognises that our curriculum must be socially inclusive and responsive to both local and global challenges.

This year saw progress in projects that prioritise social justice and local relevance. The School of Architecture, Planning and Geomatics' iThemba Walkway Project in Gugulethu, co-developed with the City of Cape Town, stands out as an example of how engineering and urban design can contribute to safer and more dignified public spaces.

Dr Kathryn Ewing, a Senior Lecturer in the School of Architecture, Planning and Geomatics (APG) was awarded the 2024 UCT Vice-Chancellor's Social Responsiveness Award. She was recognised for her valuable contribution made to research, advocacy and practice of urban design and architecture in Southern Africa, as well as her commitment to improving the quality of life and safety of marginalised communities in Cape Town. Ewing's approach to social responsiveness scholarship and pedagogy is built from over twenty years of participatory spatial research and experience as a co-founding director of Violence Prevention through Urban Upgrading Non-profit Company from 2013 to 2023.

Dr Sarah George from Mechanical Engineering contributed towards the (Y)our UCT Campus Nexus initiative in collaboration with the UCT Properties and Services Department. The exhibition is a creative platform for UCT community members to share their ideas, designs, and proposals in an open, collaborative setting that values respect and inclusivity.

Equally impactful were grassroots efforts within the faculty, including the Community Build Programme in the Department of Construction Economics and Management (CEM), which is run annually in partnership with the Association of Built Environment Students (ABES). CEM students assist a selected community in building or renovating facilities as part of their practical training requirement. These types of initiatives bridged a gap between academic knowledge and lived realities, allowing our students to learn from and serve the communities around them.

We also advanced the transformation agenda through the faculty-wide curriculum review project, which looks at how our teaching practices and content reflect principles of inclusion, relevance, and equity. New course content - such as the exploration of engineering's historical role during apartheid - challenged students to think critically about the broader implications of their profession.

The faculty also made strides in cultural and linguistic inclusion. The isiXhosa engineering glossary project continued, and the renaming of faculty spaces were practical steps toward promoting a sense of identity within our institutional environment.

EBE's transformation efforts were further supported by wellness initiatives, the continuation of the Academic Incubator, and improved gender and demographic representation in staff appointments. Events like Heritage Day, staff and student sports day, and wellness workshops also contributed to building a more connected faculty culture.

## RESEARCH PORTFOLIO

# Message from Professor Hans Beushausen

## Deputy Dean for Research and Strategic Initiatives

In 2024, research at the EBE Faculty continued to reflect a strong commitment to addressing urgent global challenges through innovative and interdisciplinary approaches. The focus expanded across a broad spectrum of critical areas, with the faculty tackling issues related to the future of sustainable infrastructure, smart cities, industrial waste management and climate-resilient urban design. Researchers also made significant strides in renewable energy technologies, with a continued emphasis on improving the efficiency and scalability of green energy solutions. Other notable research fields relate to the role of advanced materials in optimising mechanical systems, particularly in the context of high-performance applications like energy storage and robotics, and advances in the areas of sustainable chemical processes and materials development.

In line with global priorities, several 2024 studies investigated innovative solutions to mitigate the environmental impacts of urbanisation. This research was particularly timely, as the world faces increasing pressures related to rapid urban growth, resource depletion and climate change. Furthermore, the faculty's contributions to advancing climate adaptation strategies for infrastructure were particularly impactful, offering valuable insights into how cities can evolve in the face of environmental stressors. These studies, which explored the integration of sustainable materials, green building techniques and energy-efficient designs, are at the forefront of shaping resilient built environments for the future.

A notable advancement this year was the deepened focus on the intersection of technology and urban planning, with work being done on smart city solutions in the African context. This includes improving transportation networks, energy usage and waste management systems, all aimed at optimising resource efficiency and enhancing quality of life for urban residents. Many of these research projects are of interdisciplinary nature and involve colleagues from different departments across the faculty.

However, despite the ongoing success in these key research areas, challenges persist in the research landscape. The reduction in public funding remains a significant constraint, limiting the resources available for expansive scientific inquiry and innovation. Additionally, the increasing complexity of administrative processes for research management has presented hurdles that occasionally slow progress. Nevertheless, UCT's commitment to improving research support services continues to bear fruit. Noteworthy initiatives, such as the introduction of the Research Navigator platform, are expected to ease the navigation of research administration, making processes more streamlined and user-friendly for staff members. Furthermore, the establishment of a Faculty Research Hub, with effect from 2025, is poised to enhance collaboration between EBE researchers and central support services, facilitating more effective funding applications, project management and administrative support.

Despite these challenges, the outlook for research at UCT remains positive. With the continued development of research infrastructure and support services, the faculty is expected to make even greater strides in 2025, ensuring that its research remains impactful, forward-thinking and integral to addressing the most pressing challenges in engineering, urban development and sustainability.

# 02 TEACHING AND LEARNING

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## UNDERGRADUATE AND POSTGRADUATE PLANNING & ADMINISTRATION COMMITTEES

The following two committees manage the faculty's teaching activities:

- Undergraduate Teaching & Learning Committee
- Postgraduate Planning & Administration Committee

Chaired by the two Deputy Deans, these committees are responsible for all aspects of the undergraduate and postgraduate programmes – quality assurance, planning and approval of new programmes, programme committee business and the credit rating of courses, to mention just a few. All programmes in the faculty are managed by a Programme Convenor who is responsible to the Head of the Department for the management of the respective programme(s). The Programme Convenors and Heads of Departments work closely together to ensure that the programme is professionally managed and resourced in every respect.

Both the Undergraduate Teaching & Learning Committee and the Postgraduate Planning & Administration Committee played a key role in ensuring that the faculty's commitment to outcomes-based programme objectives and best practice in student assessment are carefully managed, especially with respect to the teaching and learning challenges experienced because of the pandemic.


## CURRICULUM REVIEW PROJECT

The EBE curriculum review project is part of the larger UCT curriculum review project. Across UCT this project has a number of key focus areas, including student success and pass rates, assessment practices, graduate attributes, and transformation and decolonisation. Within EBE the following aspects were identified as key for the Faculty's curriculum project.

- Credit totals and Content overload for UG and PG taught programmes
- Pass rates and throughput particularly looking at the consequences of the N+1 progression requirements including teaching pedagogy and student support for success
- Duplication of courses and content within EBE and the possible integration of cross-cutting curriculum content.

The project is due to run for 3 years (March 2023 – February 2026) and is funded by the DVC T&L. Crucially for EBE we feel that curriculum should be thought of as far more than just content and teaching style, but rather the "curriculum" can be considered as a student's experience from the day a student arrives at UCT until their graduation with an EBE degree. Funding is being used to provide administrative support from a payclass 8 contract appointment and is available for teaching relief or for Departments to schedule workshops where they can work on curriculum matters.

**2023 Completed progress on credit reductions and curricula review.**

Progress on the curricula changes targeting credit reductions has been successful with 3 programmes already having submitted paperwork for changes in 2023.

- Materials Science Hons (2024 implementation)
- GIS Hons (2025 implementation)
- Civil Engineering UG (2025 implementation)

The plans for 2024 were to continue the curricula revisions already underway and start data analysis on the time-on-task survey data. This survey was rolled out to all undergraduate students registered in EBE and ran on Amathuba. In terms of 2024 activities, the following additional items were identified:

- Curriculum Transformation: The intention is to identify what transformational and contextual changes EBE staff have already implemented and are carrying out which could be better disseminated throughout the faculty. There is a sense that there have been many course- or activity-level actions, and there is hope that many of these can be scaled up.
- More focus on duplication and cross-cutting curriculum content. While large faculty-wide courses are probably not feasible due to resource requirements on upper campus, there is a hope that we could use a modularised approach to sharing resources across EBE.
- Student success and throughput. As a key part of the UCT curriculum review project, this task is ongoing. There is a data-based focus on courses with high failure rates, especially those which have consistently high failure rates. These courses, which impede graduation, need to receive attention. There is also a need to identify and learn from programmes and courses with higher student success rates.

## EBE CURRICULUM REVIEW PROJECT WORKING GROUP

The EBE Curriculum Review Project meets four times per year, with the meetings scheduled after the new course paperwork deadlines. The 2024 group was comprised of the following members:

| | |
|---|---|
| **Assistant Dean: Curriculum Review** | A/Prof Chris von Klemperer |
| **Architecture, Planning & Geomatics** | Prof Tanja Winkler, Dr Tom Sanya, Dr Clinton Hindes, A/Prof Patroba Odera, Ms Simone le Grange |
| **ASPECT** | A/Prof Pierre Le Roux |
| **Chemical Engineering** | A/Prof Marijke Fagan-Endres |
| **Civil Engineering** | Dr John Okedi, Dr Nicky Wolmarans |
| **Construction Economics & Management** | Dr Louie Van Schalkwyk, Prof Manya Mooya, Dr Saul Nurick |
| **EBE Faculty Office** | Ms Gita Valodia |
| **EBE Students Council** | Ms Sabelo Motlou (Chairperson), Mr Jacob Dlamini (Academic Chair) |
| **Electrical Engineering** | Dr Yunus Abdul Gaffar, Dr Stephen Paine, Dr Robyn Verrinder |
| **Mechanical Engineering** | Prof Brandon Collier-Reed, A/Prof Malebogo Ngoepe, Dr Reuben Govender, Prof Steeve Chung Kim Yuen, Dr Arnold Pretorius, Mr Ernesto Ismail |
| **Servicing Officer** | Ms Grace Kumwenda |

The key discussions this year were around the need to manage students transitioning onto the new curricula as they roll out. This is crucial for students who fail a course(s) and end up straddling years. The new National Student Financial Aid Scheme (NSFAS) continuation of funding requirements rule change was also escalated for further discussion. Many other discussions not directly related to curriculum review took place, including student response rates to curriculum and course surveys, the need to manage mid-year academic progression, and high-failure-rate courses (such as those on the Courses Impeding Graduation (CIGS) list). Some topics, such as the value of TRPs were redirected to other EBE committees (such as the Undergraduate Teaching & Learning Committee) where these discussions would be better held.

**Time-on-task survey**

In 2023, data was collected weekly related to students' time spent on tasks. This was an attempt to close the notional study hours calculation loop by identifying whether the convenor estimates are accurate, and whether and when students experience high workload times during their semester. This data was collected by polling the class representatives and asking them to fill in a spreadsheet. The data was inconsistently provided, and did not cover all programmes and academic years of study. Analysis of the data has begun, to try and identify trends. What is already noticeable is that students may be registered for multiple courses, but they only focus on one or two at a time. This single focus is usually related to the next deadline (assignments, class tests, etc.), but can run for longer than a week. This results in students slipping far behind on other courses. It is hoped that conversations around why this happens and what solutions are available to mitigate this effect can take place in 2025.

For 2024, this survey was integrated into Amathuba, with all undergraduate EBE students asked to complete a weekly survey related to their time-on-task. The implementation was a little rushed, and indications are that the majority of students ignored the survey. Feedback from the EBE Student Council (EBESC) said the survey takes too long to complete. The survey was thus shortened in the second semester, with fewer questions. Unfortunately, there were still teething issues with implementation, and a very low response rate. The data is probably even less complete than the 2023 data, but analysis will take place during 2025.

An alternative going forward in 2025 would be to change to focus groups of a few students, rather than polling all EBE students.

## ONGOING MATTERS 2024

**Curriculum transition arrangements**

One concern which was noted in 2023 is the difficulty around transitioning students onto a new curriculum. With curriculum changes effectively tripping them up, student failure rates increase accordingly.

While it is occasionally prudent to fully teach out an old curriculum, this is most used when a qualification is discontinued. The primary disadvantage with this approach is that it is resource-intensive (more teaching staff, multiple venues, etc.). Our current thinking is to try and look at the old curricula and identify what new courses/ modules of new courses cover the same learning outcomes. A bridging student can then take the new courses/ modules and be given a credit and exemption for the old course they need to repeat, or they can be transitioned onto the new curricula and receive credits and exemptions from their old course(s).


This is administratively intensive and can create issues when students need multiple modules from different new courses (or vice versa). The solution is to map the new curriculum courses onto the old courses. This simplifies the administration and gives the Dean a guide with regard to credits and exemptions and when or how to allow students to transition to the new curricula. The departments were required to create these maps of where the old course content is covered in their new curricula (even if they were modules or parts of multiple new courses). This way, departments could identify if there were any gaps which would need to be double-taught.

A survey of other engineering universities in SA indicates that most follow this type of plan, although Wits University prefers to keep students on their original curricula, and offers multiple re-examinations when the course runs for the final time, to try to keep students on track. Stellenbosch University uses a teach-out model.

**Pass rates and data access**

Pass rate data for 2023 for all EBE and most service courses taken by our students was forwarded to the EBE HoDs. The University CIGS data was also shared with the working group later in 2024. This follows on from 2023, when similar data was provided to HoDs. The question asked of seven departments was to consider "What is an 'acceptable' failure rate for a course?", bearing in mind the need to keep students on N+1 for progression and NSFAS funding.

The unwritten UCT rule of 75 to 80% does not work for the new N+1 progression requirements, unless one is prepared to see significant numbers of academic exclusions. While there is a risk that staff are tempted to simply 'adjust' their pass rates to match a new requirement, the hope was rather to initiate a conversation and bring attention to courses which have become gatekeepers. This should lead to investigations into and analysis of the reasons for these high failure rates, and potentially a revision of the content, teaching and assessment methodologies, and more.

A real concern is that the pass rate data remains difficult to access, and formal lists such as CIGS lag so much that often a full year passes before an HoD or convenor is asked to act on the data. There is a clear need to make access to this type of data faster and easier.

**Transformation and contextualisation of curricula**

Since 2015, there has been a call for UCT to decolonise education. The questions of transformation and decolonisation of curricula are complex and often quite triggering. There are very different meanings for many staff members, especially compared to students. The hope within EBE is to celebrate and highlight curriculum transformation success stories, both big and small. These have value in showing what has been done, and showing what can be done. Many of these are about getting the taught context right. Departments were asked to provide feedback on these successes, with the hope of potentially presenting them at a Faculty Board meeting. While there is some feedback, it was limited, and this is something which will need to be prioritised in 2025.

**Innovative 'Engineering Curricula' project**

(https://iecurricula.co.za/) is a project funded by the UK Royal Academy of Engineering and the Department of Higher Education and Training's

(DHET) University Capacity Development Programme (UCDP). UCT had three representatives on the core team – Dr Nicky Wolmarans, Dr Reuben Govender and A/Prof Chris von Klemperer) – in 2024. Phase 1 focussed on the development of a framework for a contextual integrated curriculum in South African engineering programmes. Phase 2 implemented pilot projects within faculties, and Phase 3 is focussed on staff development, both in providing support to engineering academics as well as preparing them to facilitate active integrated learning and change.

As part of Phase 3, the core team visited University College London for a week in March 2023 to study its integrated curriculum. In May 2024, the team visited Aalborg University in Denmark to study its Problem-Based Learning approach, and then the KTH Royal Institute of Technology in Sweden.

**Service courses and Science Faculty approach to credit reduction**

While the university's curriculum review project has tasked faculties with reducing their credits to the Council on Higher Education (CHE) minima, this task has been approached differently in different facilities. For EBE, with its professional degrees and strict curricula, this has required a holistic approach to reducing degree totals and changing individual courses. One snag has been that many of the courses are service courses offered by the Science, Commerce and Law faculties. These courses are often taken by multiple groups of students from within the servicing faculties, as well as EBE students. Ideally, these service courses would also look to trim credits in line with the EBE courses. Unfortunately, the Science Faculty has taken an alternative approach, whereby they have just adjusted their minimum degree requirements for BSc degrees to 360 credits in total, rather than cutting credits on individual courses.

## DEPARTMENTAL CURRICULUM WORKSHOPS

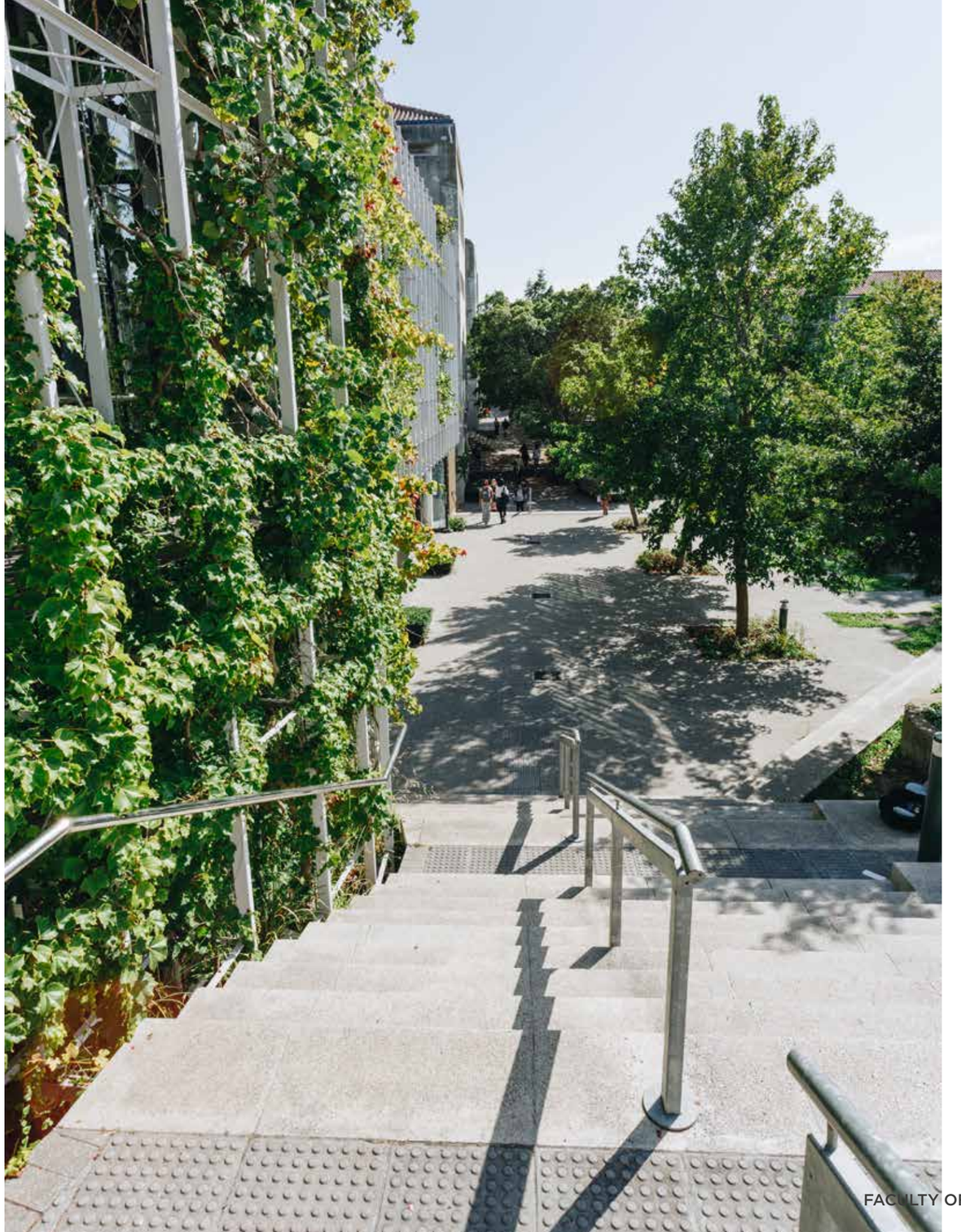
**Civil Engineering – Changemakers**

As part of its curriculum revision rollout plans, the Department of Civil Engineering undertook a two-day workshop in May 2024. It was specifically tailored to engineering curriculum change and structured around developing the resilience and teamwork needed for change. This 'Changemakers' workshop was developed from the national Innovative Engineering Curriculum project in collaboration with University College London (UK), and Aarlborg University (Denmark).

**Electrical Engineering – Changemakers**

On 5 December 2024 the Electrical Engineering Department attended a one-day 'Changemakers' workshop at Cellars Hohenort, presented by A/ Professor Lelanie Smith from UP and Mr Jaco Fourie from Curiosity Campus

The leadership group in the department identified a set of challenges around integration and cohesion in the department, with some underlying tensions between different groups of staff. The transition to a new Head of Department presented a productive impetus towards a re-evaluation of priorities and integrating the various teams. The workshop was attended by all academic and PASS staff members. There was a focus on growing as individuals, getting to know each other, and developing an approach to holistic systemic change. In some ways the workshop was an introduction to a process to build capacity and resilience for change, and more work is needed to work out how this will unfold in practice.



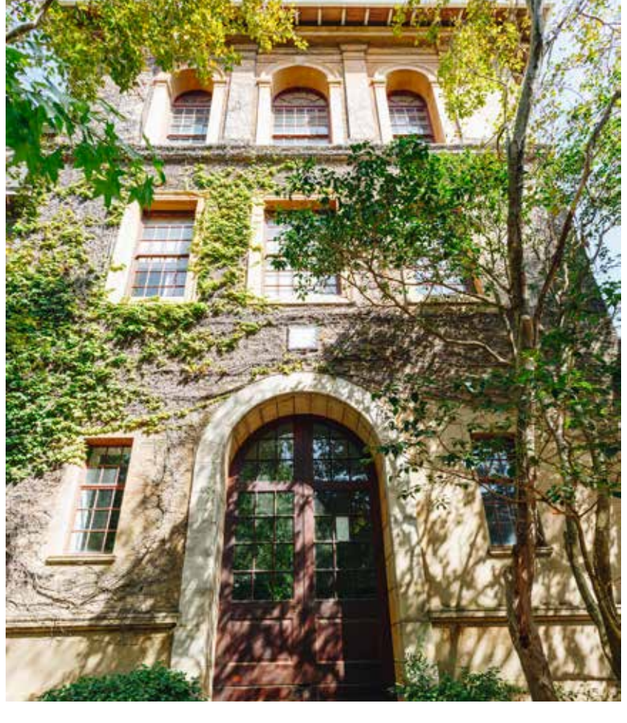
**Mechanical Engineering**

The Department of Mechanical Engineering is planning to run a two-day curriculum workshop built on the 'Changemakers' framework during the mid-semester break in April 2025.

**School of Architecture, Planning and Geomatics**

The various Architecture programmes are undertaking a holistic review of the curricula under the new HoD, Prof Alta Steenkamp, and the Director of the School, Simone le Grange. Their curricula review process will be guided by the following questions:

- Can architectural education be reconsidered as social practice?
- Can architectural pedagogies and curricula themselves seek social justice?

## POTENTIAL ISSUES RAISED DURING 2024 PROGRAMMES

**Geomatics Division**

The 2023 Geomatics proposal to replace its undergraduate offering with two new qualifications looks sound on paper but appeared to be contingent on getting extra staff to then teach out their old qualifications. Given the current financial situation within the university, this seemed unlikely. A series of meetings with the HoDs of the School of Architecture, Planning & Geomatics (APG) took place, and, under the leadership of the Dean, a separate group has been formed with Lisa Cloete from the Institutional Planning Department (IPD), all staff in Geomatics, and the APG HoD, and Assistant Dean. This group is tasked with reducing the workload for Geomatics staff and ensuring the creation of a new curriculum that meets the needs of 21st century graduates and is attractive to potential students. This activity is expected to continue into 2025 – but may remain challenging.

**Finance and credit reduction**

While credit reductions in EBE programmes should result in cost savings to students, there are concerns about the impact on UCT's income stream. It appears that UCT Finance is unaware of these planned credit reductions and is pushing for the programme fees and income to remain unchanged. Managing these divergent requirements may present a risk going forward. This is especially important for programmes within APG, which has expressed a concern that the high relative cost of UCT degrees is affecting their ability to attract students.

**Service courses**

The management of, and relationship with, service courses for EBE programmes remains a sticking point. Most EBE programmes desire more input into the content, teaching pedagogy, as well as course management. It is hoped that the formation of a Science Service Course Committee with representation across the two faculties will enable progress to be made on these often contentious issues. The EBE curriculum renewal exercises are seeing many EBE programmes cut Science service courses from their programmes. It is hoped that this action will motivate the Science Faculty to implement the changes we desire in these courses. For the non-Engineering programmes in EBE, the service course issue, and particularly credit reduction, is a key constraint. It is anticipated that a conversation may be needed at the Dean level with both the Commerce and Law Faculties to find a suitable way forward.

**NSFAS rules**

Significant discussions took place during 2024 regarding the NSFAS continuation of funding rules. It was noted that these were inconsistent and changed from year to year – and often after students have already completed registration. These were escalated to the Student Financial Aid Office and the Deans. This inconsistency, along with changes in the requirements for students to remain funded, affects the programmes' ability to create curricula which do not negatively impact NSFAS-funded students.

## CLOSING

The EBE Curriculum Review Project remains on track to ensure that most EBE programmes will meet the credit minima requested by the university. As originally hoped, this credit reduction requirement has been the disruptor, encouraging departments to consider all aspects of their curricula. While some aspects, such as the time-on-task survey and curriculum transformation/decolonisation have not been as easy to finalise, there is still good progress on these matters. It is also hoped that the EBE Science Service Course Committee will dovetail with this work and bear fruit in terms of student success.

# 03 THE STUDENTS

## CONTENTS

**EBE STUDENT ENROLMENT CAMPAIGN 2025 ACADEMIC YEAR**

The faculty implemented a student enrolment communication campaign from September 2024 to January 2025, with the objective of enhancing first-year enrolment rates for the 2025 academic year. Activities included targeted SMS messages, emails and social media posts.

## GRADUATION

A total of 862 students (564 undergraduates and 387 postgraduates) completed their degrees at the end of 2024 graduated.

## EBE RESEARCHERS IN STANFORD'S TOP 2% SCIENTISTS LIST

In September 2024, Stanford University released an update to its prestigious list of the top 2% most-cited scientists in their fields. The list, widely regarded as a reliable indicator of academic influence and impact, includes more than 100 000 scientists globally, based on their citation impact.

UCT had 160 academics on the list, 20 of them from EBE.

Seven EBE honourees were full-time serving academics:

- Six EBE honourees were retired colleagues: Cyril O'Connor, Trevor Gaunt, Michael Inggs, Mark Alexander, Gerald Nurick and JP Franzidis.
- Another six EBE honourees are deceased: Antony Ball, Mark Dry, Vanessa Watson, Dee Bradshaw, George Ekama and Geoff Hansford.
- Citation-based metrics provide insights into a researcher's work, but they offer only a partial picture. The Stanford rankings, based on the Scopus database, may not include all research outputs such as authored books and patents.

**Prof Megan Becker**
Mining & Metallurgy

**Prof Hans Beushausen**
Building & Construction

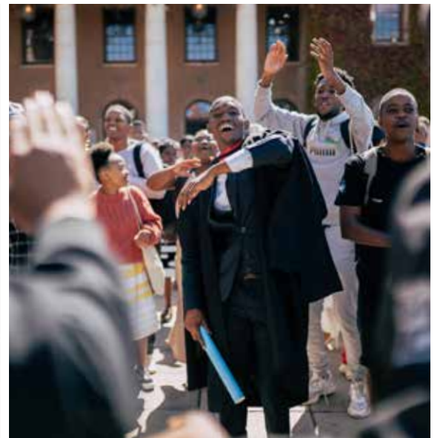
**Prof David Deglon**
Mining & Metallurgy

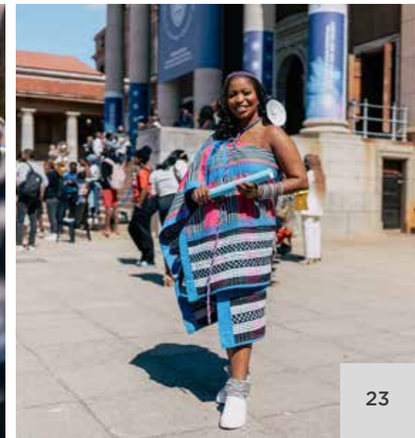
**Prof Alison Lewis**
Chemical Engineering

**Prof Jochen Petersen**
Mining & Metallurgy

**Prof Harro von Blottnitz**
Environmental Sciences

**Prof Alphose Zingoni**
Civil Engineering





# STUDENTS
# IN NUMBERS

## FIRST-YEAR UNDERGRADUATE ENROLMENT BY PROGRAMME

| Bachelor of Architectural Studies | BSc Eng in Mechatronics | BSc Eng Mech & Mechatronic Eng | BSc Eng Mech/ Mechatronic Eng | BSc in Construction Studies | BSc in Geomatics |
|---|---|---|---|---|---|
| 62 | 62 | 33 | 12 | 60 | 42 |

| BSc in Property Studies | BSc Eng in Chemical Engineering | BSc Eng in Civil Engineering | BSc Eng in Elec & Computer Eng | BSc Eng in Electrical Eng | BSc Eng in Mechanical Eng |
|---|---|---|---|---|---|
| 47 | 144 | 107 | 41 | 23 | 48 |

TOTAL **681** first-time entering undergraduates

## TOTAL UNDERGRADUATE AND POSTGRADUATE ENROLMENT OVERVIEW

| UNDERGRADUATE | HONOURS | POSTGRAD DIPLOMA | MASTER'S | DOCTORATE |
|---|---|---|---|---|
| 2908 | 191 | 20 | 922 | 289 |

TOTAL **4330**

## TOTAL UNDERGRADUATE AND POSTGRADUATE ENROLMENT BY PROGRAMME (WITH GENDER SPLIT)

### UNDERGRADUATE

♀ 1045 Female ♂ 1862 Male ⚥ 1 Transgender TOTAL **2908**

| Bachelor Architectural Studies | BSc Eng in Mechatronics | BSc Eng Mech & Mechatronic Eng | BSc in Construction Studies |
|---|---|---|---|
| ♀ 156 ♂ 93 **249** | ♀ 51 ♂ 181 ⚥ 1 **233** | ♀ 63 ♂ 215 **278** | ♀ 93 ♂ 117 **210** |

| BSc in Geomatics | BSc in Property Studies | BScEng in Chemical Engineering | BSc Eng in Civil Engineering |
|---|---|---|---|
| ♀ 67 ♂ 85 **152** | ♀ 90 ♂ 89 **179** | ♀ 255 ♂ 276 **531** | ♀ 119 ♂ 275 **394** |

| BSc Eng in Elec & Computer Eng | BSc Eng in Electrical Eng | BSc Eng in Mechanical Eng |
|---|---|---|
| ♀ 53 ♂ 169 **222** | ♀ 17 ♂ 78 **95** | ♀ 61 ♂ 244 **305** |

### POSTGRADUATE (PG DIP POWER PLANT ENGINEERING)

♀ 3 Female ♂ 17 Male TOTAL **20**

# TOTAL UNDERGRADUATE AND POSTGRADUATE ENROLMENT BY PROGRAMME (WITH GENDER SPLIT) continued

## HONOURS STUDENTS

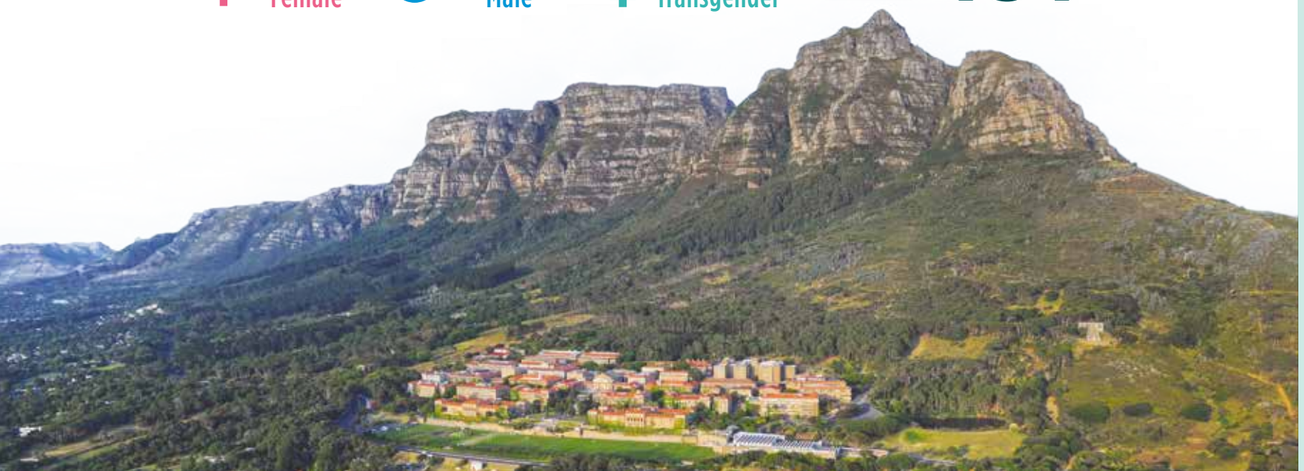
1045 Female | 1862 Male | 1 Transgender | TOTAL 2908

| Bachelor of Architectural Studies (Honours) | Bachelor of Landscape Architecture Honours | Bachelor of City Planning Honours | BSc Honours in Geographical Information Systems |
|---|---|---|---|
| ♀ 24 ♂ 26 — 50 | ♀ 10 ♂ 4 — 14 | ♀ 13 ♂ 11 — 24 | ♀ 7 ♂ 6 — 13 |

| BSc Honours in Construction Management | BSc Honours in Materials Science | BSc Honours in Property Studies | BSc Honours in Quantity Surveying |
|---|---|---|---|
| ♀ 4 ♂ 9 — 13 | ♀ 6 ♂ 7 — 13 | ♀ 10 ♂ 14 ⚥ 1 — 25 | ♀ 19 ♂ 20 — 39 |

## PHD STUDENTS

93 Female | 97 Male | 1 Transgender | TOTAL 191



## MASTER'S STUDENTS

1045 Female | 1862 Male | 1 Transgender | TOTAL 2908

| M Architecture (Professional) | M Structural Eng & Materials | Master of Sustainable Urban Practice | Master of City & Regional Planning |
|---|---|---|---|
| ♀ 22 ♂ 20 — 42 | ♀ 1 ♂ 2 — 3 | ♀ 12 ♂ 14 — 26 | ♀ 6 ♂ 12 — 18 |

| Master of Engineering | Master of Geotechnical Engineering | Master of Landscape Architecture | Master of Transport Studies |
|---|---|---|---|
| ♀ 29 ♂ 59 — 88 | ♀ 11 ♂ 9 — 20 | ♀ 8 ♂ 1 — 9 | ♀ 4 ♂ 15 — 19 |

| Master of Urban Design | Master of Water Engineering | MEng Civil Infrastructure Management & Maintenance | MPhil (120 research 60 course) |
|---|---|---|---|
| ♀ 3 ♂ 4 ⚥ 1 — 8 | ♀ 11 ♂ 21 — 32 | ♀ 2 ♂ 9 — 11 | ♀ 6 ♂ 7 — 13 |

| MPhil (60 research 120 course) | MPhil (by dissertation) | MSc Eng (by dissertation) | MSc Eng (coursework & diss) |
|---|---|---|---|
| ♀ 31 ♂ 25 — 56 | ♀ 5 ♂ 15 — 20 | ♀ 95 ♂ 201 ⚥ 1 — 297 | ♀ 29 ♂ 66 — 95 |

| MSc in Project Management | MSc in Property Studies |
|---|---|
| ♀ 38 ♂ 71 — 109 | ♀ 21 ♂ 34 ⚥ 1 — 56 |

# TOTAL UNDERGRADUATE AND POSTGRADUATE ENROLMENT BY PROGRAMME (WITH POPULATION AND RACE SPLIT)

## UNDERGRADUATE

### Bachelor Architectural Studies

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 88 | 2 | 42 | 12 | 79 | 26 |

**249**

### BSc Eng in Mechatronics

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 129 | 1 | 16 | 44 | 58 | 45 |

**293**

### BSc Eng Mech & Mechatronic Eng

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 126 | 2 | 20 | 32 | 57 | 41 |

**278**

### BSc in Construction Studies

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 144 | 0 | 14 | 2 | 27 | 23 |

**210**

### BSc in Geomatics

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 92 | 1 | 20 | 7 | 19 | 15 |

**154**

### BSc in Property Studies

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 108 | 0 | 15 | 0 | 37 | 13 |

**173**

### BSc Eng in Chemical Engineering

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 330 | 6 | 29 | 34 | 72 | 60 |

**531**

### BSc Eng in Civil Engineering

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 259 | 1 | 37 | 19 | 32 | 74 |

**422**

### BSc Eng in Elec & Computer Eng

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 96 | 3 | 11 | 29 | 40 | 43 |

**222**

### BSc Eng in Electrical Eng

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 51 | 0 | 11 | 9 | 6 | 18 |

**95**

### BSc Eng in Mechanical Eng

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 174 | 2 | 21 | 20 | 42 | 46 |

**285**

## POSTGRAD DIPLOMA STUDENTS

### PG Dip Power Plant Engineering

| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 14 | 0 | 3 | 0 | 0 | 3 |

**20**

**KEY** A African CH Chinese CO Coloured I Indian W White O Other

# TOTAL UNDERGRADUATE AND POSTGRADUATE ENROLMENT BY PROGRAMME (WITH POPULATION AND RACE SPLIT) continued

## HONOURS STUDENTS

### Bachelor of Architectural Studies (Honours)
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 9 | 0 | 12 | 2 | 19 | 8 |

**50**

### Bachelor of Landscape Architecture Honours
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 5 | 0 | 3 | 0 | 2 | 4 |

**14**

### Bachelor of City Planning Honours
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 12 | 0 | 5 | 0 | 3 | 4 |

**24**

### BSc Honours in Geographical Information Systems
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 13 | 0 | 0 | 0 | 0 | 0 |

**13**

### BSc Honours in Construction Management
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 8 | 0 | 0 | 2 | 0 | 3 |

**13**

### BSc Honours in Materials Science
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 8 | 0 | 1 | 0 | 2 | 2 |

**13**

### BSc Honours in Property Studies
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 8 | 0 | 3 | 1 | 11 | 2 |

**25**

### BSc Honours in Quantity Surveying
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 21 | 1 | 4 | 1 | 4 | 8 |

**39**

## PHD STUDENTS

### PG Dip Power Plant Engineering
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 101 | 1 | 19 | 20 | 52 | 96 |

**289**

**KEY** A African CH Chinese CO Coloured I Indian W White O Other

## MASTER'S STUDENTS

### M Architecture (Professional)
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 10 | 0 | 5 | 4 | 15 | 8 |

**42**

### M Structural Eng & Materials
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 0 | 1 |

**3**

### M Sustainable Urban Practice
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 9 | 0 | 3 | 1 | 3 | 10 |

**26**

### Master of City & Regional Plan
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 8 | 0 | 6 | 0 | 1 | 3 |

**18**

### Master of Engineering
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 35 | 0 | 14 | 5 | 10 | 24 |

**88**

### Master of Geotechnical Eng
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 5 | 0 | 0 | 3 | 0 | 12 |

**20**

### Master of Landscape Arch
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 1 | 0 | 3 | 0 | 2 | 3 |

**9**

### Master of Transport Studies
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 14 | 0 | 2 | 1 | 0 | 2 |

**19**

### Master of Urban Design
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 3 | 0 | 1 | 0 | 2 | 2 |

**8**

### Master of Water Engineering
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 14 | 0 | 3 | 2 | 1 | 12 |

**32**

### MEngCivil InfrastructMan& Main
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 5 | 0 | 0 | 0 | 0 | 6 |

**11**

### MPhil (120 research 60 crse)
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 4 | 0 | 1 | 1 | 3 | 4 |

**13**

### MPhil (60 research 120 crse)
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 18 | 0 | 5 | 0 | 13 | 20 |

**56**

### MPhil (by dissertation)
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 6 | 0 | 1 | 1 | 4 | 8 |

**20**

### MSc (Eng) (by dissertation)
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 88 | 2 | 19 | 27 | 74 | 87 |

**297**

### MSc (Eng) (coursewrk & diss)
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 24 | 0 | 9 | 10 | 18 | 34 |

**95**

### MSc in Project Management
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 75 | 1 | 4 | 3 | 6 | 20 |

**109**

### MSc in Property Studies
| A | CH | CO | I | W | O |
|---|---|---|---|---|---|
| 21 | 0 | 9 | 0 | 17 | 9 |

**56**

## TOTAL UNDERGRADUATE AND POSTGRADUATE ENROLMENT BY PROGRAMME AND NATIONALITY (SA VS INTERNATIONAL)

### UNDERGRADUATE

| Bachelor Architectural Studies | BSc Eng in Mechatronics | BSc Eng Mech & Mechatronic Eng | BSc in Construction Studies |
|---|---|---|---|
| 233 | 257 | 249 | 188 |
| 16 | 36 | 29 | 22 |
| **249** | **293** | **278** | **210** |

| BSc in Geomatics | BSc in Property Studies | BSc Eng in Chemical Engineering | BSc Eng in Civil Engineering |
|---|---|---|---|
| 143 | 168 | 477 | 352 |
| 9 | 11 | 54 | 42 |
| **152** | **179** | **531** | **394** |

| BSc Eng in Elec & Computer Eng | BSc Eng in Electrical Eng | BSc Eng in Mechanical Eng |
|---|---|---|
| 188 | 77 | 269 |
| 34 | 18 | 36 |
| **222** | **95** | **305** |

### POSTGRAD DIPLOMA STUDENTS

| PG Dip Power Plant Engineering |
|---|
| 17 |
| 3 |
| **20** |

**KEY** South African

International

## TOTAL UNDERGRADUATE AND POSTGRADUATE ENROLMENT BY PROGRAMME AND NATIONALITY (SA VS INTERNATIONAL) continued

### HONOURS STUDENTS

| Bachelor of Architectural Studies (Honours) | Bachelor of Landscape Architecture Honours | Bachelor of City Planning Honours | BSc Honours in Geographical Information Systems |
|---|---|---|---|
| 47 | 13 | 21 | 13 |
| 3 | 1 | 3 | 0 |
| **50** | **14** | **24** | **13** |

| BSc Honours in Construction Management | BSc Honours in Materials Science | BSc Honours in Property Studies | BSc Honours in Quantity Surveying |
|---|---|---|---|
| 11 | 12 | 23 | 32 |
| 2 | 1 | 2 | 7 |
| **13** | **13** | **25** | **39** |

### PHD STUDENTS

| PG Dip Power Plant Engineering |
|---|
| 198 |
| 91 |
| **289** |

**KEY** South African, International

### MASTER'S STUDENTS

| M Architecture (Professional) | M Structural Eng & Materials | Master of Sustainable Urban Practice | Master of City & Regional Planning |
|---|---|---|---|
| 36 | 2 | 16 | 15 |
| 6 | 1 | 10 | 3 |
| **42** | **3** | **26** | **18** |

| Master of Engineering | Master of Geotechnical Engineering | Master of Landscape Architecture | Master of Transport Studies |
|---|---|---|---|
| 69 | 8 | 7 | 17 |
| 19 | 12 | 2 | 2 |
| **88** | **20** | **9** | **19** |

| Master of Urban Design | Master of Water Engineering | MEng Civil Infrastructure Management & Maintenance | MPhil (120 research 60 course) |
|---|---|---|---|
| 6 | 20 | 5 | 9 |
| 2 | 12 | 6 | 4 |
| **8** | **32** | **11** | **13** |

| MPhil (60 research 120 course) | MPhil (by dissertation) | MSc Eng (by dissertation) | MSc Eng (coursework & diss) |
|---|---|---|---|
| 41 | 12 | 222 | 64 |
| 15 | 8 | 75 | 31 |
| **56** | **20** | **297** | **95** |

| MSc in Project Management | MSc in Property Studies |
|---|---|
| 94 | 48 |
| 15 | 8 |
| **109** | **56** |

## UNDERGRADUATE DEGREES AWARDED BY PROGRAMME

| Bachelor of Architectural Studies | BSc Eng in Mechatronics | BSc Eng Mech & Mechatronic Eng | BSc Eng Mech/ Mechatronic Eng | BSc in Construction Studies | BSc in Geomatics |
|---|---|---|---|---|---|
| 249 | 293 | 198 | 80 | 210 | 152 |

| BSc in Property Studies | BSc Eng in Chemical Engineering | BSc Eng in Civil Engineering | BSc Eng in Elec & Computer Eng | BSc Eng in Electrical Eng | BSc Eng in Mechanical Eng |
|---|---|---|---|---|---|
| 179 | 531 | 394 | 222 | 95 | 305 |

## POSTGRAD DIPLOMAS AWARDED BY PROGRAMME

| BSc in Property Studies |
|---|
| 20 |

## MASTER'S DEGREES AWARDED BY PROGRAMME

| M Architecture (Professional) | M Structural Eng & Materials | M Sustainable Urban Practice | Master of City & Regional Plan | Master of Engineering | Master of Geotechnical Eng |
|---|---|---|---|---|---|
| 42 | 3 | 26 | 18 | 88 | 20 |

| Master of Landscape Arch | Master of Transport Studies | Master of Urban Design | Master of Water Engineering | MEngCivil InfrastructMan& Main | MPhil (120 research 60 crse) |
|---|---|---|---|---|---|
| 9 | 19 | 8 | 32 | 11 | 13 |

| MPhil (60 research 120 crse) | MPhil (by dissertation) | MSc (Eng) (by dissertation) | MSc (Eng) (coursewrk & diss) | MSc in Project Management | MSc in Property Studies |
|---|---|---|---|---|---|
| 56 | 20 | 297 | 95 | 109 | 56 |

## HONOURS DEGREES AWARDED BY PROGRAMME

| B Architectural Studies (Hons) | B Landscape Arch Hons | Bachelor of City Planning Hons | BSc Honours in Geog Info Syst |
|---|---|---|---|
| 50 | 14 | 24 | 13 |

| BSc Hons in Construction Mgmt | BScHons in Materials Science | BScHons in Property Studies | BScHons in Quantity Surveying |
|---|---|---|---|
| 13 | 13 | 25 | 39 |

# 04 DEPARTMENTAL SUMMARIES

## CONTENTS

# SCHOOL OF ARCHITECTURE, PLANNING & GEOMATICS

## MANAGEMENT TEAM

**Head of Department**
Associate Professor
Alta Steenkamp

**Departmental Manager**
Ms Janine Meyer

## Introduction

The School of Architecture, Planning & Geomatics started off without issue. The registration process ran smoothly, and the year started with students in the different disciplines eager to learn and engage. Our students and staff have produced quality work that engages community and promotes research. Staff continue to be committed to engaged scholarship, as can be seen in the national and international presence in civil society and professional institutions. The continued support of our Library, technical, administrative and managerial staff plays a pivotal role in the success of our multi-disciplined academic project as well as continued research.

### STUDENTS REGISTERED IN 2024

**Postgraduate students in Architecture and Planning**

| PhD | Master's | Honours | TOTAL |
|---|---|---|---|
| 17 | 120 | 85 | 222 |

**Undergraduate students in Architecture and Planning**

227 undergraduate students

### STUDENTS REGISTERED IN 2024

**Postgraduate students in Geomatics**

| PhD | Master's | Honours | TOTAL |
|---|---|---|---|
| 16 | 20 | 12 | 48 |

**Undergraduate students in Geomatics**

128 undergraduate students

## UNDERGRADUATE STUDIES

The Bachelor of Architectural Studies programme completed its curriculum review process and were successful in obtaining approval for the changes to the degree that aligns credits to teaching. Discussions around implementation remain on-going. Geomatics were successful in obtaining approval for their curriculum review process and their roll-out started in 2024.

Both Bachelor of Architectural Studies and Geomatics programmes ran successful Open Day events which attracted the interest of many prospective applicants. The BAS programme hosted interactive workshops for applicants that allowed them to engage in entry-level model building to provide applicants with insight into the practical tasks associated with studio culture.

## POSTGRADUATE STUDIES

Our multi-disciplinary postgraduate programmes continue to hold community engagement as a focus in their studio projects. This allows students to engage in real issues within our communities and allows them to shape their continued research and understanding.

## RESEARCH

The School of Architecture, Planning & Geomatics is multi-disciplinary and 2024 has seen growth in research collaborations: Notable achievements have been listed under highlights.

## Highlights

- The School of Architecture, Planning & Geomatics welcomed four new academic staff members to the Architecture discipline in 2024 (Thomas Chapman, Meghan Ho-Tong; Phadi Mabe and Nikheel Joshi). In addition, Ms Shakeelah Lottering was welcomed as the Administrative Assistant for Architecture and Planning postgraduate programmes at the end of 2024, as Ms Naomi Gihwala retired from UCT.

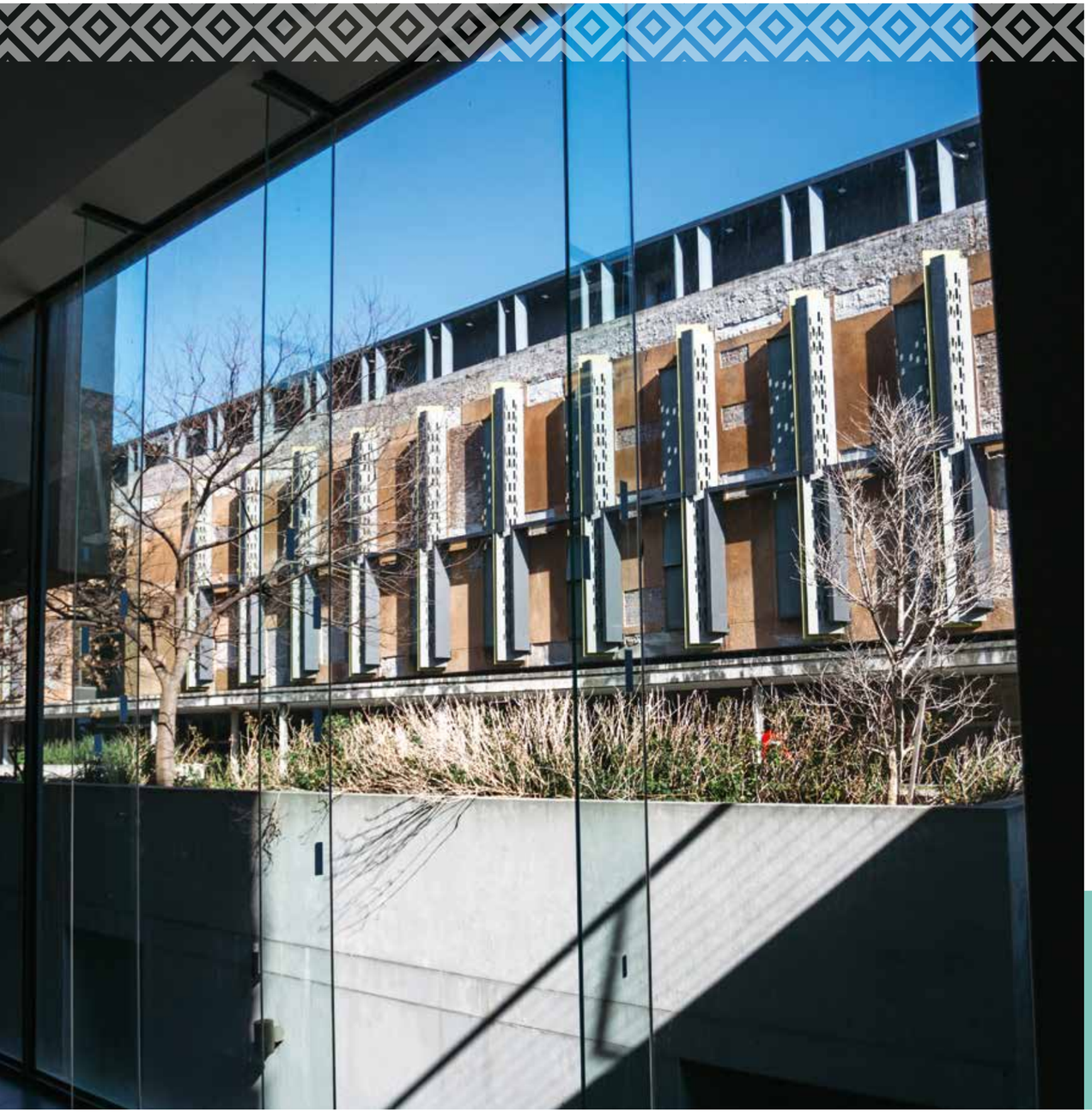
- On the 1 August 2024, Assoc Prof Alta Steenkamp was successfully appointed at Director of the School for a five-year period.

- The Continued Professional Development and Master of Urban Design course, Urban Design Africa was run in the second quarter of 2024 and brought together a diverse group of participants who explored urban design concepts across five African cities. The course was run by Dr Kathryn Ewing and participants gained an understanding of urban structure and performance at the local scale. The highlight of the course was the use of the Indawo game ©, a tool that supports co-designing safer communities. Participants applied resource and budget allocation strategies within specific timeframes, gaining valuable experience in real-world scenarios.

- First year students in the Bachelor of Architectural Studies programme under the guidance of Ms Buhle Mathole, had the opportunity to have their work exhibited at the POZI Exhibition in Rome, Italy. The students have explored their architectural design skills whilst also grappling with their own introduction to architectural language and ergonomics required for habitable spatial creation at first year level. This is a new narrative that fosters workspaces and a creative dialogue.

- Mr Clint Abrahams, a Senior Lecturer at the School of Architecture, Planning and Geomatics successfully hosted the launch of his book entitled: Macassar: An Anthology of Stories, which builds on two award winning projects conducted in Macassar, an exhibition and the refurbishment of a local shack for storytelling and other community gatherings.

- The Space | Spatial | Links Showcase, a collaborative initiative between the Department of Civil Engineering and Geomatics, featured presentations from several research groups utilizing spatial technologies across a range of applications. Topics covered during the event included urban remote sensing, transport research, heritage applications, Antarctic research, and urban water resources.



# DEPARTMENT OF CONSTRUCTION ECONOMICS AND MANAGEMENT

## MANAGEMENT TEAM

**Head of Department**
Professor Manya Mooya

**Departmental Manager**
Ms Anthea Williams

## Introduction

In 2024, the Department of Construction Economics and Management (CEM) achieved significant milestones that enhanced its profile and enriched student experiences.

**Enhanced social media presence**
The department expanded its digital reach, with LinkedIn followers increasing by 17.9% (from 3 500 to 4 129) and Facebook followers growing by 12.8% (from 500 to 564). These platforms have become key in sharing research, news and student achievements, fostering a stronger online community.

**Strategic marketing campaign**
In alignment with our strategic objectives, the department launched a comprehensive multichannel marketing campaign in 2024. This initiative aimed to amplify awareness of our undergraduate and postgraduate programmes. Utilising a mix of digital advertising, content marketing and community engagement, the campaign effectively highlighted the department's commitment to academic excellence and industry relevance. This endeavour not only attracted a broader audience but also reinforced our standing within academic and professional communities.

### STUDENTS REGISTERED IN 2024

**Postgraduate**

| 14 | 6 | 164 | 77 |
|---|---|---|---|
| PhD | MPhil | Master's | Honours |

**TOTAL 261**

**Undergraduate**

**385**
undergraduate students

210 (EB015) and 175 (EB017)

**Introduction of the Practical Liaison role**
To enhance student employability, the department introduced the Practical Liaison function, which was incorporated into the Departmental Assistant position to save costs. This role assists students in securing holiday work placements required for practical training, improving industry readiness and overall throughput of graduates. Additionally, it maintains alumni records and tracks their employment, expanding the department's professional network and facilitating job placements for students and graduates.

These advancements underscore the department's unwavering commitment to operational excellence, strategic growth and the continuous enhancement of student support systems.

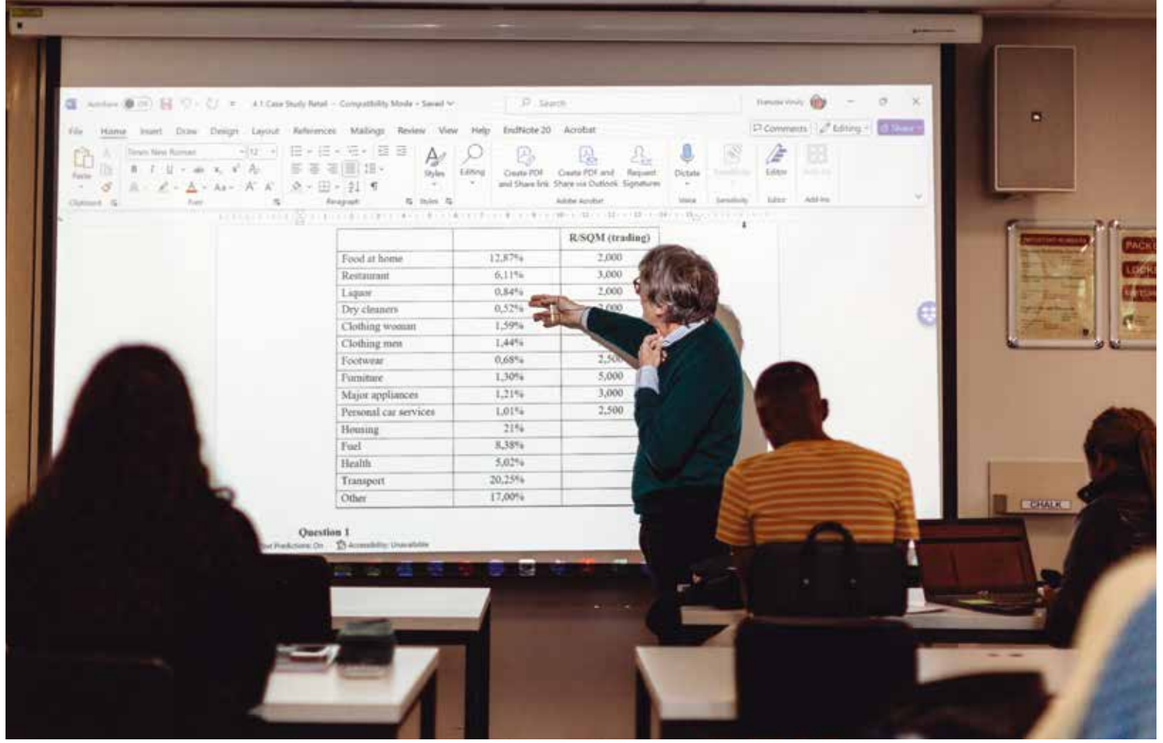
## UNDERGRADUATE STUDIES

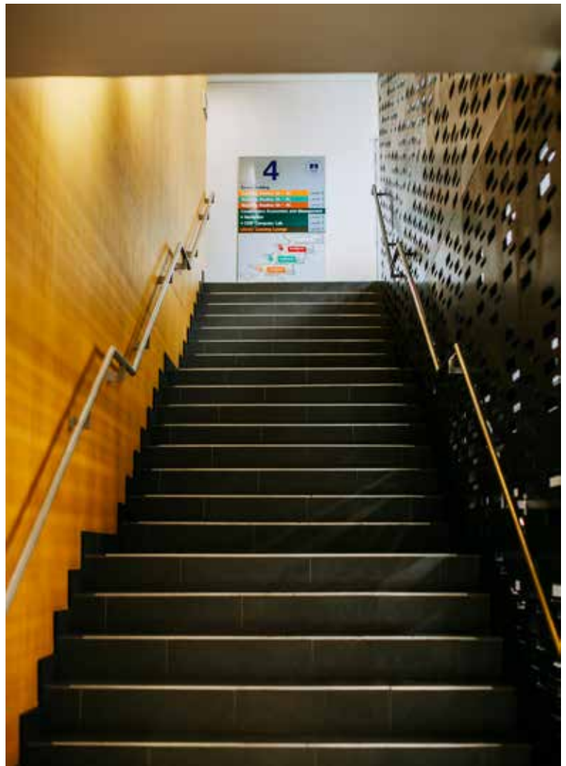
The Programme Governance Committee approved credit reductions for the BSc in Construction Studies and BSc in Property Studies programmes, for implementation in the 2026 academic year. Further reductions are planned, to bring both programmes to full compliance with the CHE requirement of 360 credits.

New progression rules were implemented in 2024, designed to ensure that students graduate within the N+1 timeframe.

## POSTGRADUATE STUDIES

The Programme Governance Committee approved the new curriculum for the MSc in Property Studies for implementation in the 2026 academic year. This marked the culmination of a review process that commenced in 2023 with the objective of redesigning the curriculum of our two MSc programmes. Work on the MSc in Project Management is ongoing.





Also approved were credit reductions for the three honours programmes, namely BSc Honours in Construction Management, Bachelor of Science (Honours) in Property Studies, Bachelor of Science (Honours) in Quantity Surveying.

## RESEARCH

The Head of Department conducted a workshop with academic staff to develop a strategic approach to increasing research productivity. The initiative focuses on gradual progress, recognising motivation as a key driver, enhancing support through postgraduate involvement and time allocation, and setting clear research output targets. These efforts aim to strengthen the department's research contributions, elevate its academic profile, and foster a more research-active environment. Arising from this, a Method and Theory Interest Group (MTIG) was established. This initiative aims to enhance the department's research productivity and theoretical rigour through a series of focused workshops and discussion forums.

The department also continued to host a lunchtime seminar series.

## PUBLICATIONS FOR 2024

Peer-reviewed journals (DoE accredited) – 14
Peer-reviewed published conference proceedings – 14

## Highlights

- The UCT Sustainability Orientated Cyber Research Unit for the Built Environment (SOCUBE) was awarded a Higher Education Partnership for Sub-Saharan Africa grant from the Royal Academy of Engineering (RAE) in 2023 for a project entitled 'Catalysing Sustainable Futures in Africa: Transforming Engineering and Built Environment Higher Education to Bridge Knowledge and Technological Innovation Gaps'. The primary objective of this AfricaSETi (Sustainable Education through Technological Innovation) project is to enhance the knowledge, skills and competencies of African students, academics, policymakers and industries in sustainable development and technological innovation to actively contribute to the development of a sustainable society and an inclusive economy throughout Africa. The collaboration team consisted of nine academic and industry entities, namely SOCUBE (UCT), the University of the West of England (UWE), Cardiff University (CU), the Namibian University of Science and Technology (NUST), University of Botswana (UB), University of Johannesburg (UJ), Engineering Council of South Africa (ECSA), Council for Mineral Technology Research (Mintek), and the Chartered Institute of Building (CIOB). Several capacity building workshops and country visits (to Namibia, Botswana, UK and here in South Africa) took place under the aegis of this project, leading to new connections and the establishment of partnership opportunities.

- The department published the first issue of *Masakhe*, a digital magazine. *Masakhe*, isiXhosa for "Let us build", is a literal allusion to the department's name and disciplinary domain. Part of a strategic marketing campaign, the magazine is meant to assist in the construction of a strong and vibrant network, a virtual community that links staff, students, alumni, industry and all stakeholders that have an interest in the department's status, profile and operations.


- The CIOB has granted unconditional accreditation for five years (from 2022) to the BSc Construction Studies and Honours programmes. This achievement, led by Dr Amanda Filtane, marks a significant milestone for the department, ensuring continued global recognition and industry alignment.

- Continuing its multi-year winning streak, CEM's teams of Oratile Masia/ Mihlali Solombela and Paige Waberski/ Kiah Wallace won joint third place in the Property/ Construction stream at the Greenovate Awards, held annually by Growthpoint Properties and the Green Building Council of South Africa.

- CEM had a strong presence at the South African Property Owners Association (SAPOA) Convention 2024, attended by Dr Louie van Schalkwyk, Dr Saul Nurick, and Department Manager Ms Anthea Williams. This three-day event provided valuable networking opportunities, leading to new industry collaborations and student support initiatives. Further strengthening industry connections, CEM has partnered with Property Wheel to facilitate student holiday work and internships, enhancing practical learning and career development.

# DEPARTMENT OF CHEMICAL ENGINEERING

## MANAGEMENT TEAM

**Head of Department**
Professor Adeniyi Isafiade

**Deputy Head of Department**
Professor Nico Fischer

**Director of Research**
Professor Kirsten Corin

**Director of Undergraduate Studies**
Associate Professor Marijke Fagan-Endres

**Director of Postgraduate Studies**
Dr Tokoloho Rampai

**Departmental Manager**
Ms Sarojini Pillay

## Introduction

The 2024 academic year began smoothly, marking a significant milestone as we fully transitioned into a post-COVID era. Building on the lessons learned during the pandemic, and considering increasingly constrained budgetary allocations, we accelerated our efforts to explore strategies and innovations to enhance our department's growth and resilience. In 2024, we received invaluable advice from our advisory board, emphasising the importance of leveraging the benefits of (AI). Their guidance has been instrumental in shaping our strategic direction, particularly in aligning our programmes with industry needs.

The social life of the department was revived through various activities, overcoming the dullness brought about by the COVID years. We further consolidated our return to full face-to-face teaching and working mode. This transition has been smooth, reflecting our commitment to providing a high-quality educational experience. Embracing the new wave created by AI in higher education, we are exploring how to further integrate AI-driven tools and methodologies into our curriculum. This ensures that our students can grasp complex chemical engineering concepts and are better prepared for the future. Our data science module is now well-established, providing students with cutting-edge knowledge and skills. We continued

## STUDENTS REGISTERED IN 2024

**Postgraduate**

**88** PhD

**120** Master's

TOTAL **208**

**Undergraduate**

**527** undergraduate students

to reflect on our new curriculum to identify ways to enhance student success.

As we move forward, we remain dedicated to adapting and thriving in this dynamic educational landscape. Our focus on embracing modern teaching and learning methods, with an emphasis on student support and success, industry alignment and community engagement, will continue to drive our success.

## UNDERGRADUATE STUDIES

The department offers a four-year undergraduate BSc (Eng) degree, as well as a five-year extended degree option. The degree is structured to allow for specialisation in the chemical, biological or geological sciences, and our core chemical engineering courses have a strong focus on theory underpinning integrated project work. This ensures that students are equipped with the relevant knowledge and skills to take on the challenges of the 21st century. The degree is fully accredited by the Engineering Council of South Africa (ECSA) and recognised throughout the world in terms of the Washington Accord.

The department welcomed 151 new first-year students into the undergraduate degree in 2024, the highest intake in its history, and three students into second year via our conversion programme. We also celebrated 80 students who successfully completed the degree requirements in 2024.

## POSTGRADUATE STUDIES

The department offers a broad range of research projects for postgraduate studies. Academics work closely with industry, and research work is commissioned by leading chemical, bioprocess, petrochemical, mining and metallurgical companies, which provides depth and breadth to the postgraduate programmes. There is a deliberate focus on integrating themes that address Sustainable Development Goals (SDGs) in thesis topics, as a way of ensuring that postgraduate studies are aligned with programmes responding to SDG-related global challenges.

The postgraduate programmes offered are:

- MSc in Engineering specialising in Bioprocess Engineering
- MSc in Engineering specialising in Catalysis and Catalytic Processing
- Master of Philosophy specialising in Sustainable Mineral Resource Development
- MSc Research Master's by Dissertation
- Doctor of Philosophy.

## RESEARCH

As the custodian of the largest national research enterprise of its kind on the continent, the department is recognised as Africa's leading academic centre for chemical engineering. Our research programme is focussed around four University-accredited research groupings: the Catalysis Institute, the Centre for Bioprocess Engineering Research, the Centre for Minerals Research, and the Crystallisation and Precipitation Research Unit. We also have strong research interests in the Hydrometallurgy Research Group, Energy and Industrial Systems Research Group, and Process Modelling and Optimisation Research Group. Many of our researchers are also active in the Minerals to Metals (MtM) signature theme and Future Water interdisciplinary research initiative

**Research groups within the department:**

- Catalysis Institute
- Centre for Bioprocess Engineering Research
- Crystallisation and Precipitation Unit
- Centre for Minerals Research
- Energy Systems Research Group
- Hydrometallurgy
- Process Modelling and Optimisation

The department also hosts:

- DST-NRF [Department of Science and Innovation and National Research Foundation] Centre of Excellence in Catalysis (c*change)
- DST Hydrogen Catalysis Centre of Competence (HySA/Catalysis)
- South African Minerals to Metals Research Institute (SAMMRI)
- Minerals-to-Metals initiative
- Future Water Institute
- Anglo American Platinum Chair in Minerals Processing
- Three DST/NRF SARChI chairs:
  - Nano-Materials in Catalysis
  - Reaction Engineering
  - Sustainable Catalysis.

Research within the department is closely linked to its postgraduate teaching. The strong industrial research in the department supports the undergraduate programme by introducing industry-relevant examples into the undergraduate classroom; servicing the advanced engineering electives in the undergraduate programme; and offering relevant research projects for fourth-year students.

## Highlights

- Prof Eric van Steen was awarded the National Research Foundation (NRF) Champion of Research Capacity Development award.

- PhD student Sancho Nyoni was awarded an NRF Research Excellence Award for Next Generation Researchers.

- Dr Sara Burness received the Young Author Award at the International Mineral Processing Congress (IMPC).

# DEPARTMENT OF CIVIL ENGINEERING

## MANAGEMENT TEAM

**Head of Department**
Professor Mark Zuidgeest

**Director: Undergraduate Studies**
Dr John Okedi

**Director: Postgraduate Studies**
Associate Professor Denis Kalumba

**Director: Research**
Professor Roger Behrens

**Director: Social Responsiveness**
Professor Sebastian Skatulla

**Director: Technical Services and Industry Liaison**
Professor Hans Beushausen

**Departmental Manager**
Mrs Ayesha Dalwai

## Introduction

The Department of Civil Engineering continues to maintain its international reputation for excellence in research and teaching in civil engineering. Our internationally recognised research groups (Future Water Institute, Centre for Transport Studies, Concrete Materials and Structural Integrity Research Unit), continue their stellar research alongside researchers in the fields of polar engineering and engineering education. The department has also established firm relationships in the field of urban and public infrastructure with help of the Department of Public Works and Infrastructure, International Labour Organization, and Municipal Infrastructure Support Agent (MISA) South Africa, with special grants being allocated for research.

We are progressing steadily with the new curriculum development for our undergraduate programme, which will see the rollout of year one of the degree in 2025. The new curriculum is built around (South) Africa's grand infrastructure challenges, remains strong around the fundamentals of engineering sciences, and appreciates the critical role of civil engineers in the developmental challenges of (South) Africa, including those related to infrastructure deficiency, climate change resilience and the challenges of job creation and poverty alleviation.

## STUDENTS REGISTERED IN 2024

**Postgraduate**

| 7 | 50 | 203 | 3 |
|---|---|---|---|
| Post Doc Fellows | PhD | Master's | Occasional postgrads |

**TOTAL 263**

**Undergraduate**

**345**
undergraduate students

In 2024, the department also embarked on a thorough review of its postgraduate offerings, similar to the undergraduate curriculum review. Furthermore, the department continued to focus on building relations and networks in South Africa (including with historically disadvantaged institutions) and across Africa, both for teaching and research.

The Department continues to work on improving its presence on social media and to have a better marketing strategy for prospective students, both in undergraduate and postgraduate studies.

## UNDERGRADUATE STUDIES

Launch of new curriculum: We undertook a significant curriculum review for implementation in 2025. The curriculum revision involved three primary principles:

- A reduction of the required credits in the degree from 584 to 560 to alleviate student overload. This is also in compliance with the university's directive to reduce degree credits.
- The introduction of new content relevant to 21st-century civil engineering practice, with greater emphasis on locally relevant examples and technologies.
- The introduction of pedagogic innovations, including project-linked learning, intentional progressive introduction of graduate competency development opportunities, and a revised timetable structure to facilitate deeper engagement with material.

The curriculum will have a phased rollout as below:
1st year rolls out in 2025
2nd year – 2026
3rd year – 2027
4th year – 2028

Steady improvement in undergrad admissions as follows 2020 (69), 2022 (73), 2023 (112), 2024 (116)

CIV4044S – top student Reyaaz Hoosain Martin, won the following for his thesis topic, The nutrient-trading potential of source-separated human urine.

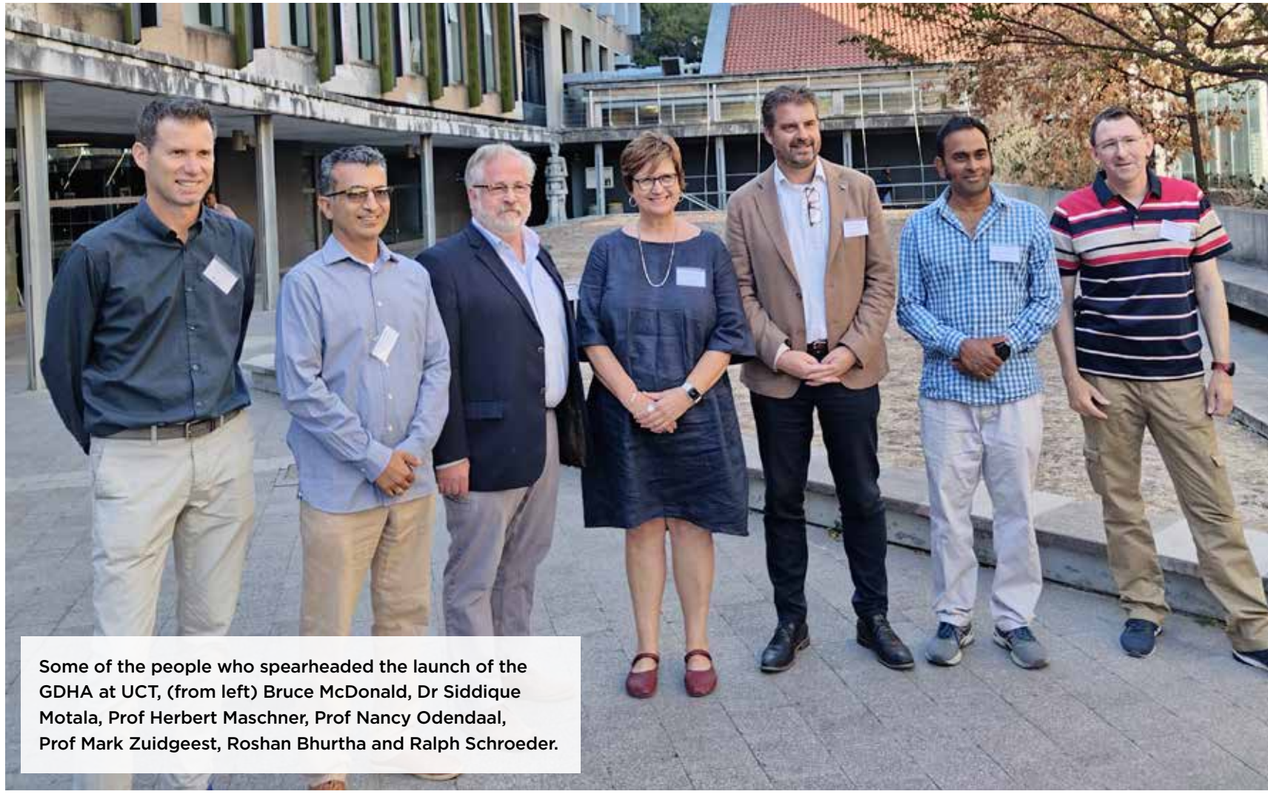
## POSTGRADUATE STUDIES

- All courses continued to operate seamlessly, with the majority adopting a blended learning approach.
- Our partnerships with both local and international institutions have remained robust, fostering continued collaboration in both teaching and research endeavours.
- The PG Review has allowed us to holistically review our postgraduate operations and to allow for
  - more considered course offerings
  - resource allocations – financial, teaching etc.

## RESEARCH

Academic staff are organised into research groupings, including: the Future Water Research Institute; Concrete Materials and Structural Integrity Research Unit (CoMSIRU); Centre for Transport Studies (CfTS); Computational Continuum Mechanics Research Group; Geotechnical Engineering Research Group; Global Digital Heritage Afrika; Structural Engineering and Mechanics Research Group; and Water Research Group.

Members of staff also interact with research groups in other departments and Faculties. The department has fruitful collaborative links with several local and overseas universities, and with local industry. Much of the work done by members of staff finds application in industry and/or civil society. Junior staff members are being mentored through the CIV staff mentoring program to become more productive and qualified.



**Some of the people who spearheaded the launch of the GDHA at UCT, (from left) Bruce McDonald, Dr Siddique Motala, Prof Herbert Maschner, Prof Nancy Odendaal, Prof Mark Zuidgeest, Roshan Bhurtha and Ralph Schroeder.**

The high quality of the research undertaken is evidenced by the considerable number of peer-reviewed publications in ISI-accredited international journals produced by members of staff annually, and the national and international recognition that members of staff enjoy in their areas of research. Members actively participate on the committees of local professional bodies, provide expert advice to industry and government, and serve on the editorial and advisory boards of various international journals and conferences.

In March 2024, a new research group called Global Digital Heritage Afrika (GDHA) was launched. GDHA is dedicated to the digital documentation and research of heritage sites, monuments and landscapes. The group is housed in two departments in APG: Civil Engineering and APG, and the academic lead is Siddique Motala.

## FACILITIES

- Concrete Lab
- Geotechnical Lab
- Hydraulics Lab
- Mobile Polar Lab
- Structures Lab
- Water Quality Lab
- Digital Lab (Transportation)

## Highlights

- Denis Kalumba (Engineering Research Capacity Development Award) and Kirsty Carden (NSTF Water Research Commission Award) nominated at the 2022/2023 NSTF-South 32 Awards.

- Dyllon Randall and Caitlin Courtney registered Pee-cycling – UCT's latest startup company. The company aims to commercialize our urine treatment processes and is valued at R30 million by UCTs R&I.

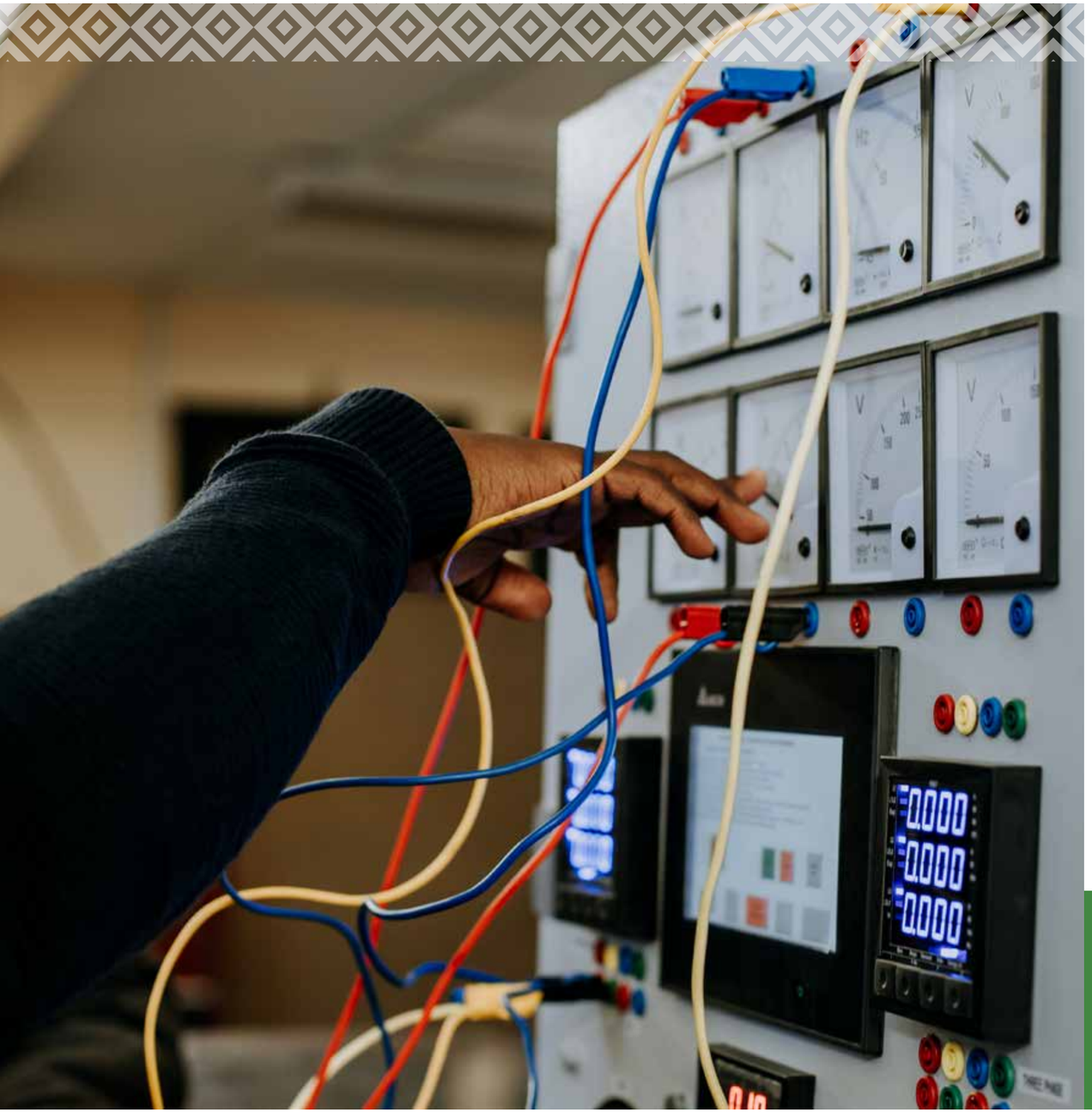
- Sebastian Skatulla led 2-month expedition on the Fimbul ice shelf in Antarctica and was accompanied by four postgraduate students, two from the Geomatics Department.

- Gundo Maswime won the SAICE National award for Civil Engineering academic impact.

- The Centre for Transport Studies hosted two conferences, ATRC(March) and Thredbo (late Sept to early Oct).

- Professor Alphose Zingoni appointed as Stellenbosch University Extraordinary.

- NRF Smart Mobility NRF Chair, Professor Marianne Vanderschuren opens her Smart Mobility Lab.



# DEPARTMENT OF ELECTRICAL ENGINEERING

## MANAGEMENT TEAM

**Head of Department**
Professor Azeem Khan

**Director of Postgraduate Studies**
Professor Paul Barendse

**Director of Undergraduate Studies**
Dr Renee Smit

**Departmental Manager**
Ms Janine Buxey

## Introduction

Electrical Engineering at UCT is at the cutting edge of research and teaching, not just in South Africa, but across Africa and globally. The department has active research groups in the electrical engineering disciplines of radar, control, power and machines, robotics, telecommunications, digital signal processing and image processing. The department attracts many of its own undergraduate students for postgraduate research projects in the aforementioned disciplines. The department's three undergraduate degree programmes prepare students to tackle any of the myriad facets of electrical engineering. A degree from the department equips students with some of the basic requirements for a successful career as an entrepreneur.

In 2024, our strategic focus was on improving teamwork and cohesion between the academic, administrative and technical staff.  Progress was also made in consolidating the department's research focus areas, in order to improve collaboration, share resources and pursue larger funding opportunities. Responsibility for the newly established Menzi Design Lab (MDL) was moved to the department, and effort was made to nurture co-curricular and innovation activities by students in the MDL.

### STUDENTS REGISTERED IN 2024

**Postgraduate**

**53** PhD | **145** Master's | **2** Postdocs

TOTAL **200**

**Undergraduate**

**637** undergraduate students

### POSTGRADUATE STUDENTS WHO GRADUATED IN 2024

**5** PhD | **31** Master's

## UNDERGRADUATE STUDIES

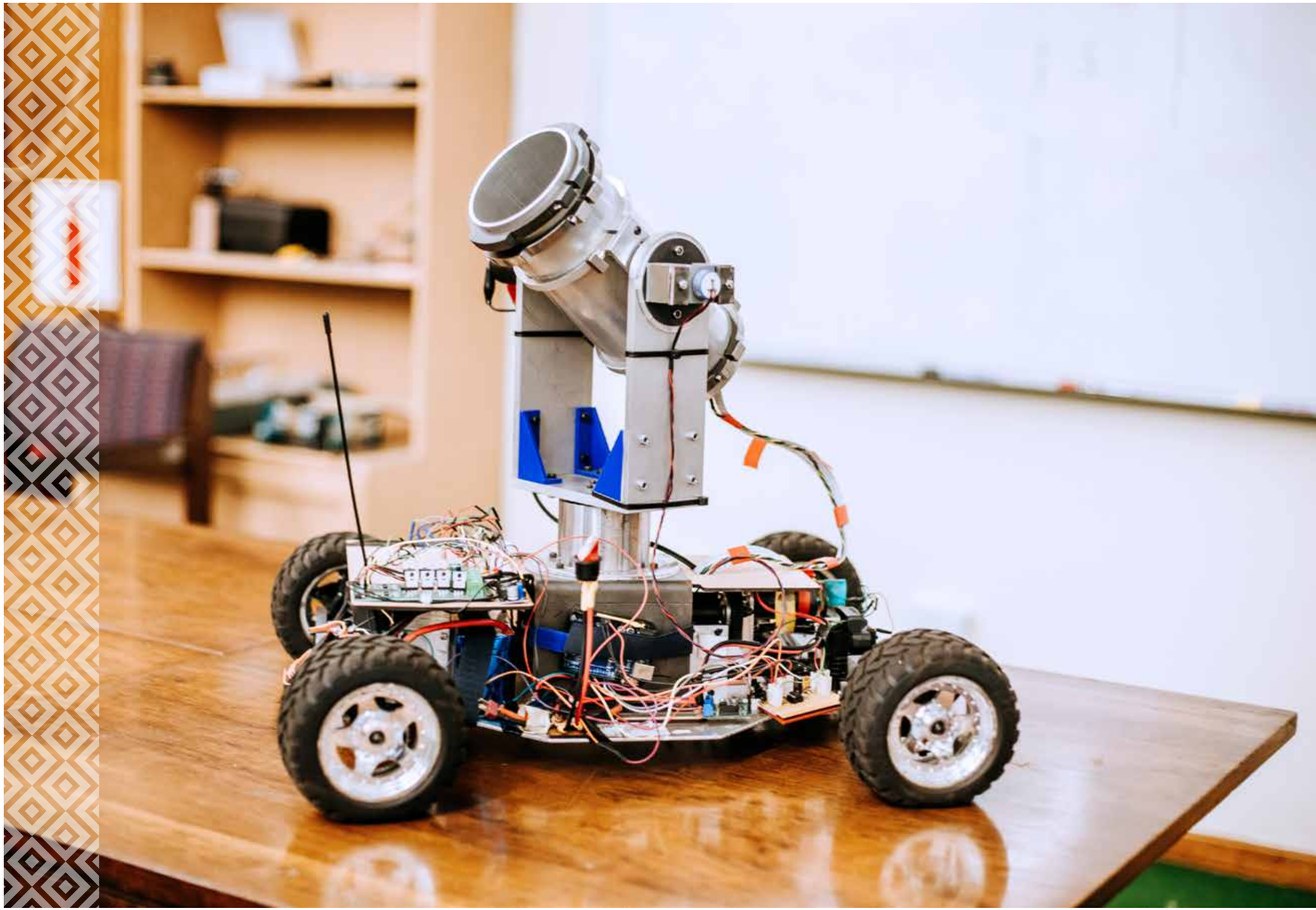
The fields of electrical, computing, and mechatronics engineering offer dynamic and rewarding career paths, driven by continuous technological advancements that fuel economic growth and contribute to a more accessible and equitable future. Graduates from these disciplines are highly sought-after across diverse industries, including robotics, artificial intelligence, biomedical engineering, renewable energy, electrical power systems, telecommunications, electric vehicles, the Internet of Things, mining, and advanced manufacturing. With strong technical expertise, problem-solving skills, and innovative thinking, they are well-equipped to develop cutting-edge solutions that shape the future of technology and society.

A curriculum review process commenced in 2024, which resulted in a reduction in credits for the department's undergraduate degree programmes from 576 to 560 credits, as required by the Engineering Council of South Africa (ECSA). This was achieved through structural changes in the common first- and second-year curricula. An overall reduction in credits for the department's first-year curriculum was proposed to help first-year students manage the transition from high school to university. This is expected to improve student success.

## POSTGRADUATE

Postgraduate programmes are an integral part of the Department of Electrical Engineering. Postgraduate students contribute significantly as teaching assistants in undergraduate courses, making these programmes essential to the department's overall functioning.

The department offers the following postgraduate degrees: a PhD and a research-only MSc(Eng) (both by dissertation), as well as a taught MSc (Eng) and MEng, and a taught MPhil (both by coursework and partial dissertation).



The MEng and MPhil by a combination of coursework and research is offered in specialised fields such as radar, telecommunications and engineering education.
The Electrical Engineering Department currently offers the following taught postgraduate programmes:

- MEng in Radar and Electrical Defence (EM017EEE06)
- MEng in Telecommunications (EM017EEE09)
- MPhil in Engineering Education (EM026EEE04)

A review was conducted of the department's taught master's programmes. The interim findings showed that the programmes are financially viable and that the student throughput and research outputs are comparable with those of other programmes in the faculty.

The research-based postgraduate programmes offered by the department include:

- MSc Eng in Electrical Engineering by Dissertation (EM023EEE01)
- MSc Eng in Electrical Engineering by Coursework & Dissertation (EM024EEE01)
- PhD (ED001EEE01)
- PhD in Engineering Education (ED001EEE04)

All postgraduate studies within the Department of Electrical Engineering involve research projects, often linked to broader research programmes. The department prides itself on the availability of state-of-the-art research facilities that support these postgraduate endeavours.

For PhD students, a proposal is presented in a seminar to the Department of Electrical Engineering staff and fellow postgraduate students. It is then reviewed by a panel of three academics before final registration is approved by the Doctoral Degrees Board.

In 2024, departmental postgraduate students experienced difficulty in securing bursaries, reflecting challenges within the broader higher education sector in South Africa. Despite this challenge, the department continues to attract excellent students into postgraduate degrees in all its research focus areas. The number of postgraduate students registered and graduated in 2024 is provided in the table on page 37 (update once final page extent is confirmed).

## RESEARCH

The department's research groups have linkages with industry and are involved in research projects with local and international collaborators. Several applied research projects are in progress, which have direct relevance to Africa and some of its grand challenges. The research projects cover a wide range of subjects, including the investigation of novel computer systems, the simulation of electricity networks, the use of computer control and instrumentation to optimise process performance, ecologically sustainable power generation, radar sensors, and telecommunications.
The research areas in the department are:

- African Robotic Unit (ARU)
- Control Engineering
- Image Processing and Computer Vision
- Signal Processing and Inverse Problems
- High-Performance Digital Systems
- Electrical Machines, Drives and Power Electronics
- Power Systems Engineering
- Radar and Remote Sensing
- Radio Frequency and Microwave Engineering
- Telecommunication and Computer Networks
- Engineering Education

In 2024, researchers in the department continued their involvement in the following strategic research projects: Antarctic Sea ice formation, ocean pollution monitoring, agricultural robotics, sub-atomic particle monitoring, renewable energy technology, power system modelling and control, and wireless power transfer. Funding from local industry and parastatal organisations appeared to be constrained, which mirrored a sector-wide challenge for research in higher education in South Africa. Increased emphasis was placed on attracting international grants, which resulted in new opportunities from Google and Mathworks. Some research and other highlights are provided below.

## Highlights

- Launch of the Formula Student Africa (FSA) team

The Formula Student Africa (FSA) team at the University of Cape Town (UCT) unveiled their ambitious project on 30 July in the Menzies building on UCT's Upper Campus. FSA extends the global Formula Student initiative, challenging university students to design and build electric formula-style race cars. FSA UCT emphasises innovation, interdisciplinary collaboration, and sustainability among African students. FSA UCT's mission is to "design, build, and race the best-performing E-Formula student car from scratch". Their vision aligns with this mission, aiming to "promote technical prowess, project management, teamwork, and entrepreneurship skills, contributing to the global drive for eco-friendly automotive solutions". With hopes of inspiring a new generation of engineers and securing the resources needed to win the competition, the team is committed to integrating cutting-edge electrical technologies to enhance the car's efficiency and performance. Key features include a high-powered density motor, a lithium phosphate battery with a built-in Battery Management System (BMS), and a diffuser to optimise speed.

- Enhancing energy and battery research: Universal Regenerative DC Source Sink

The Power Group at UCT has secured a University Equipment Committee grant for a Universal Regenerative DC Source Sink device, boosting research in power systems, battery technologies, and renewable integration. This 18 kW, 1000 V system enables precise testing of battery performance, lifecycle optimisation, and microgrid stability under real-world conditions.  By integrating it into our microgrid research system, we expand UCT's capabilities in energy storage and conversion, while also providing hands-on training for postgraduate students. This acquisition strengthens UCT's leadership in sustainable energy and battery research.


Formula Student Africa team with A/Prof David Oyedokun in the centre.

■ 2023/2024 NSTF-South32 Awards Nominees
A/Prof Joyce Mwangama is one of three EBE academics who was nominated for the 2023/2024 NSTF-South32 Awards for their outstanding contributions to science, engineering, and technology (SET) and innovation in South Africa. The National Science and Technology Forum (NSTF) South32 Awards are the largest SET and innovation awards in South Africa and have grown to be the most prestigious public SET and innovation awards in the country.

■ 2024 Centre for High Performance Computing (CHPC) National Conference
A team of UCT Electrical Engineering students beat several other senior university students, including postgraduates, to win multiple prizes at the Centre for High Performance Computing (CHPC) National Conference's SANReN Cybersecurity Challenge. Gcinwayinkosi Jula won a merit scholarship that contributes towards his study fees; Shaun Beautement won a paid cyber security internship for being the student with the best "hacker mindset"; Team UCT won the "attack and defend" challenge; and Team UCT placed second overall in the competition. The students participating in the Centre for High Performance Computing (CHPC) Student Cluster Competition also won the Judges Honourable Mention Award. This award was presented to them for making a strong impression on all the judges and for being the first-ever all-women's team in the competition's history. The team also advocated for women in STEM throughout the competition process. Anna Lukose was selected as a reserve to represent South Africa in the international round of the competition. She will be traveling to Texas next year for training at the Dell headquarters.

■ Women in Engineering
Associate Professor Sunetra Chowdhury has been appointed as the Women in Engineering Coordinator for the South African section of the Institute of Electrical and Electronics Engineers (IEEE). Her role will involve enhancing networking and promoting membership among women in engineering by organising workshops and forums at major technical conferences. The IEEE advocates for women in leadership roles within the sector and supports their career advancement in the profession. The efforts include facilitating the formation and revitalisation of Women in Engineering (WIE) Affinity Groups, supporting ongoing activities, and promoting IEEE initiatives to mentor young women in high schools and universities. Additionally, the South African chapter of IEEE develops programs and activities to encourage the entry and retention of women in engineering programmes.

■ Winter University programme in Russia
Dichochi Ramotlou, a third-year mechatronics student, was accepted into a Winter University programme at Yaroslav-The-Wise Novgorod State University in Veliky Novgorod, Russia. The programme was specifically designed for young engineers to equip them with 21st-century engineering competencies. It ran from 25 November to 9 December 2024, with all expenses, including transport, accommodation, and meals, fully covered. The programme featured a series of lectures, laboratory practicals, and a project component. Ramotlou successfully completed the programme and had the privilege of leading a team of six students to develop a radio communications project. Their project earned second place (out of 24 teams) and, as part of the award, they received an offer to pursue a master's degree in Russia, with tuition fully covered. The experience was profoundly enriching and has greatly contributed to Ramotlou's growth as a young engineer.

# DEPARTMENT OF MECHANICAL ENGINEERING

## MANAGEMENT TEAM

**Head of Department**
Professor Brandon Collier-Reed

**Deputy Head: Undergraduate Studies**
Associate Professor Bruce Kloot

**Deputy Head: Postgraduate Studies**
Professor Steeve Chung Kim Yuen

**Departmental Manager**
Ms Carmelita Jonker

## Introduction

The Department of Mechanical Engineering is 105 years old and has a long tradition of excellence in teaching and research. Over the past three decades especially, it has launched several exciting research groups that support a growing number of postgraduate students. The modern, forward-facing curriculum and cutting-edge researchers are helping to develop the next generation of mechanical engineers – passing on the knowledge and skills they need to change the world and our futures for the better. Over the decades the field of mechanical engineering has grown, expanded and changed alongside the world we live in.
As a department we continue to transform the curriculum, the research and the discipline as we listen, learn, experiment and work together.

## STUDENTS REGISTERED IN 2024

### Postgraduate

| 41 | 62 | 12 | 20 | 2 |
|---|---|---|---|---|
| PhD | Master's | Honours | Postgraduate diploma | Occasional postgraduate |

TOTAL 137

### Undergraduate

| 252 | 230 | 73 | 69 |
|---|---|---|---|
| BScEng in Mechanical Eng EB005 | BSc Eng Mech&MechatronicEng EB010 | BScEng in Mechanical Eng EB805 | BSc Eng Mech&MechatronicEng EB810 |

TOTAL 624

## UNDERGRADUATE STUDIES

The department concluded the rollout of an updated and refreshed curriculum. This revision was informed by a review of local and international degrees, a revisit of specific educational objectives and a re-prioritisation of various aspects of the degree.

The most significant change to the curriculum is a restructuring of the final-year project and final-year design courses. The department decided, based on external moderator and advisory board input, to ensure that all students are exposed to a complex design project that includes part- and product-manufacture and assembly, and the associated problem-solving that comes with the process (such as a full product design, build and test experience).

## POSTGRADUATE STUDIES

Our vibrant postgraduate student cohort contributes to the active life of our department. The student numbers are growing steadily. Our offering covers a broad range of topics, including industrial computational fluid dynamics, thermofluids and power plant engineering, materials and manufacturing, blast and impact engineering, robotics and mechanic systems, engineering education, machine learning, computational mechanics and biomechanics. These themes are mostly covered in research degrees, with taught offerings in computational mechanics, computational fluid dynamics, power plant engineering and materials engineering. Many of the projects are multi- or interdisciplinary in nature, ensuring that our students are well equipped to operate in a complex world. Our offering continues to attract some of the best talent, with several of our students having been awarded prestigious scholarships such as the Mastercard Foundation scholarship and the Google PhD scholarship.


## RESEARCH

The department's research activities are aimed at addressing national needs in terms of both the provision of technological solutions and the development of skilled graduates. Researchers in the department have international collaborative research partnerships with universities across the world and work closely with a broad range of industries.

The research groupings in the department are:

- Applied Thermofluid Process Modelling (ATProM) Research Unit
- Bioengineering
- Blast Impact and Survivability Research Unit (BISRU)
- Centre for Research in Computational and Applied Mechanics (CERECAM)
- Centre for Materials Engineering (CME)
- Composite Materials Laboratory and 3D printing
- Engineering Management
- Engineering Education
- Industrial Computational Fluid Dynamics (InCFD)
- Mechatronic Systems.Group

## Highlights

- Professor Arnaud Malan in the Department of Mechanical Engineering developed a team to explore the possibility of using liquid hydrogen in the aeronautical industry. This fuel could reduce carbon emissions by up to 40% and make a significant contribution to combating climate change.

- The NRF upgraded Prof Arnaud Malan's rating to C1.

- A/Prof Malebogo Ngoepe was selected as one of the recipients of the Martha Schwarzkopf Award for Women in Science for her groundbreaking work on the mechanics of curly hair fibers, including the development of a new classification system.

- Professor Brandon Collier-Reed received one of UCT's Distinguished Teacher Awards (DTA). The Distinguished Teacher Award is the highest accolade given to teaching staff at all levels within the university. Through this award, UCT acknowledges the central role of teaching and learning in its work.

- A/Prof Corrinne Shaw was appointed to the position of Deputy Dean: Social Responsiveness and Transformation.

- Two Associate Professors were promoted to Professor during the faculty ad hominem promotion process: Malebogo Ngoepe and Thorsten Becker.

- Jacqui Hulley, a fourth-year Mechanical Engineering student, placed second for her project titled 'Thermal Design and Analysis of Termite-Mound-Inspired Energy-Saving Buildings' in the 2024 Greenovate Awards.

- A group of six Mechanical Engineering (MEC) and Mechanical and Mechatronic Engineering (MMT) students won the Lufthansa Technik InnovAero competition under the supervision of Mr James Hepworth.

  The student group consists of: Paurav Vaidya, MMT final year student Sam Schlesinger, MMT final year student Rivoo Bagchi, MMT final year student Liam Goodfellow, MEC final year student Trent Holm, MMT final year student Abhinav Iyer, MMT 3rd year student . The project placed in the top 10 globally and was invited to compete in the final round in Hamburg, Germany. The final was held in December 2025 where they placed first in the Lufthansa Technik InnovAero competition. The project placed in the top 10 globally, and the group was invited to compete in the final round in Hamburg, Germany. The final was held in December 2025, where they placed first.

- PhD Engineering Education student Shameela Arbi won the Susanne Ihsen Award for the best paper at the SEFI Best Paper Awards. Her topic was 'Using Narratives to Explore Social Influences on the Identities of Women Students in Engineering: Two Case Studies'. She is supervised by A/Prof Bruce Kloot and A/Prof Corrinne Shaw in Mechanical Engineering.

- Alyssa Ramwell, a MSc in Mechanical Engineering student, was awarded the Max Price & Deborah Posel Postgraduate Scholarship for 2024. Alyssa's research project formed part of a larger initiative: Project ARC (Aerial Robotics Capability development), a collaboration between UCT and the Council for Scientific and Industrial Research.

Prof Brandon Collier-Reed received the prestigious UCT Distinguished teacher award.

# 05 AFFILIATED UNITS

## CONTENTS

## CONTINUOUS PROFESSIONAL DEVELOPMENT PROGRAMME (CPD)

The Continuing Professional Development (CPD) programme in the EBE Faculty assists in the organisation and administration of short courses and workshops which are not credit-bearing and are taken for professional development or personal enrichment. The events provide a means for the ongoing education of professionals and technical staff, outside of the formal academic courses offered at UCT for degree purposes. CPD events include individual short courses and master's modules open to CPD participants.  Registered professionals who attend these courses can earn CPD points to assist in the renewal of their professional registration.

## PROFESSIONAL COMMUNICATIONS STUDIES

Courses offered in Professional Communication Studies help to equip students graduating from the faculty to meet the demands of their future careers. Courses comprise written and oral examinations. Workshops combine theory with actual case studies and examples to provide a realistic context for participants to practice their skills. Students work on exercises created from company material and on projects linked to their professional studies.

## ELECTRON MICROSCOPE UNIT

The Electron Microscope Unit (EMU) provides a central microscopy service to all UCT departments, as well as to other universities, research institutions and private companies. EMU staff are able to advise users on many aspects of electron microscopy, light microscopy and digital imaging and can take on joint research.

# 06 RESEARCH

## CONTENTS

## NATIONAL RESEARCH FOUNDATION (NRF)-RATED RESEARCHERS

The NRF rating system is one of its key drivers in building a globally competitive science system in South Africa. It is a valuable peer-review tool for benchmarking the quality of local researchers against the best in the world. This includes the A-rating, which is awarded to leading international researchers. As of 2024, Emeritus Professor Gerald Nurick, Department of Mechanical Engineering, and Professor Alphose Zingoni, Department of Civil Engineering, are the faculty's only NRF A1-rated researchers, and EBE has 52 other researchers with NRF ratings.

**South African Research Chairs Initiative (SARChI)**
The SARChI programme is a capacity-building initiative introduced in 2006 by the Department of Science and Technology (DST) and the NRF, with the intention of growing research capacity through excellence and postgraduate training in areas of national and continental need.

The faculty currently has six SARChI chairs:

- **Prof Eric Van Steen** (Reaction Engineering)
- **Prof Patricia Kooyman** (Nano Materials for Catalysis)
- **Prof Marianne Vanderschuren** (Smart Mobility)
- **Prof Arnaud Malan** (Industrial Computational Fluid Dynamics)
- **Prof Nico Fischer** (Sustainable Catalysis)
- **A/Prof Sunetra Chowdhury** (Energy and Power Systems Modeling)

## NEW ACADEMICS PRACTITIONERS' PROGRAMME (NAPP)

The New Academic Practitioners' Programme (NAPP) is the university's professional development programme, aimed at equipping new academics with the basic skills they need as educators, researchers and members of the UCT community. In 2024, five EBE academics completed the NAPP:

**Dr Sara Burness**
Lecturer, Department of Chemical Engineering

**Dr Elizabeth Musvoto**
Senior Lecturer, Department of Construction Economics and Management

**Dr Rolien Terblanche**
Lecturer, Department of Construction Economics and Management

**Ms Kalpana Maraj**
Lecturer, Department of Chemical Engineering

**Mr Billy Mashele**
Lecturer, Department of Construction Economics and Management

## Research projects and facilities

### MENZI DESIGN LABORATORY (MDL)

The Menzi Design Laboratory was conceived as a space to provide a world-class design and production environment for students and researchers, allowing them to transform their ideas into prototypes and intellectual property using design for manufacturing (DFM) principles.

It serves as an environment within the UCT community where individuals can collaborate, share spaces, be creative, tinker, learn, and turn ideas into tangible objects.

The 2024 academic year saw a significant increase in the number of projects, events and student engagement that occurred at the MDL.

### HIGHLIGHTS OF COMPLETED PROJECTS

**Drone package delivery device**

The purpose of this project was to develop a package delivery device for an existing drone that had already been built. This project was led by Iloke Alusala, an undergraduate student in the Electrical Engineering Department. The design needed to be original – as it would need to fit the unique properties of the current drone but also allow for future modifications so that it could be utilised on other drones. Alusala went through multiple iterations of the design, with the final design streamlined using generative AI. Flight testing as well as delivery drop testing were conducted at UCT and proved successful.

The project was entered into the Autodesk Make it Move Engineering Student Contest and was awarded the Design & Make Judges' Prize. Part of the requirements for entry into the contest was to develop a full 'Instructable', which refers to a detailed tutorial that guides the viewer in recreating the project.

**Perch-Scale: Data-capturing systems for small wild bird research**

This project focused on the design, prototyping and testing of a scale device that can be used in the Kalahari to obtain important data regarding Southern Yellow-Billed Hornbills. The data will be used for research being conducted by Benjamin Murphy, an ornithologist at the Fitzpatrick Institute of Ornithology at UCT. The team consists of three postgraduate students from the Electrical Engineering Department and was supervised by Dr Stephen Paine. The Menzi Design Lab provided ongoing support, including design consultation and 3D-printing of components.

### HIGHLIGHTS OF ONGOING PROJECTS

**African Samurai: Yasuke**

The objective of this project is to develop a proof of concept to take physical sculptures and digitise them, to produce smaller replicas via rapid prototyping. It is a collaboration between the artist Nicola Roos and the MDL. The ability to do this will create more opportunities for commercialisation of artworks and greater exposure for qualified UCT artists.

Roos works with life-size figurative sculptural installations constructed out of recycled rubber tyre tubing. The focus of this project is a sculpture of a 16th-century Mozambican slave named Yasuke, who was taken from his homeland to serve under an influential Japanese shogun ( a military ruler who held de facto power in feudal Japan) and became the only known black samurai, an elite warrior class known for their strict code of honour and martial skill.

**Indigenous games**

This is a project to develop a game for school children that will promote learning and intellectual development. It is a collaboration between the


School of Education and the MDL. This desktop game promotes the development of motor skills and cognitive development in children. The original prototype was tested in the MDL, after which multiple iterations and design changes were made. This led to the development of five unique components that will form the basis of the game. The project has successfully acquired funding, and production of the first batch will be finalised in the coming weeks.

**LoCo AUV**

A LoCo AUV is a Low-Cost Open-Source Autonomous Underwater Vehicle intended for use by school groups and research groups and which requires low levels of funding and personnel. A LoCo AUV can be assembled with general technical knowledge using off-the-shelf and custom parts. The final product can be operated by a small team and used for a range of underwater applications. This project is a collaboration between the MDL and multiple external partners. UCT students will be given exposure to the building and developing of the AUV and will be encouraged to get involved for the entire project, which consists of the building, testing and deployment phases.

## STUDENT ENGAGEMENT

Two 3D-printing courses for UCT students were held at the MDL – a beginner and an intermediate course. These were well received, with maximum attendance achieved.

A masterclass titled ‘Exploring the 4IR and beyond’ was held for students of the GSB Solution Space. The class, which included a robust discussion session, was held online for two hours and was well received by the 40 attendees.

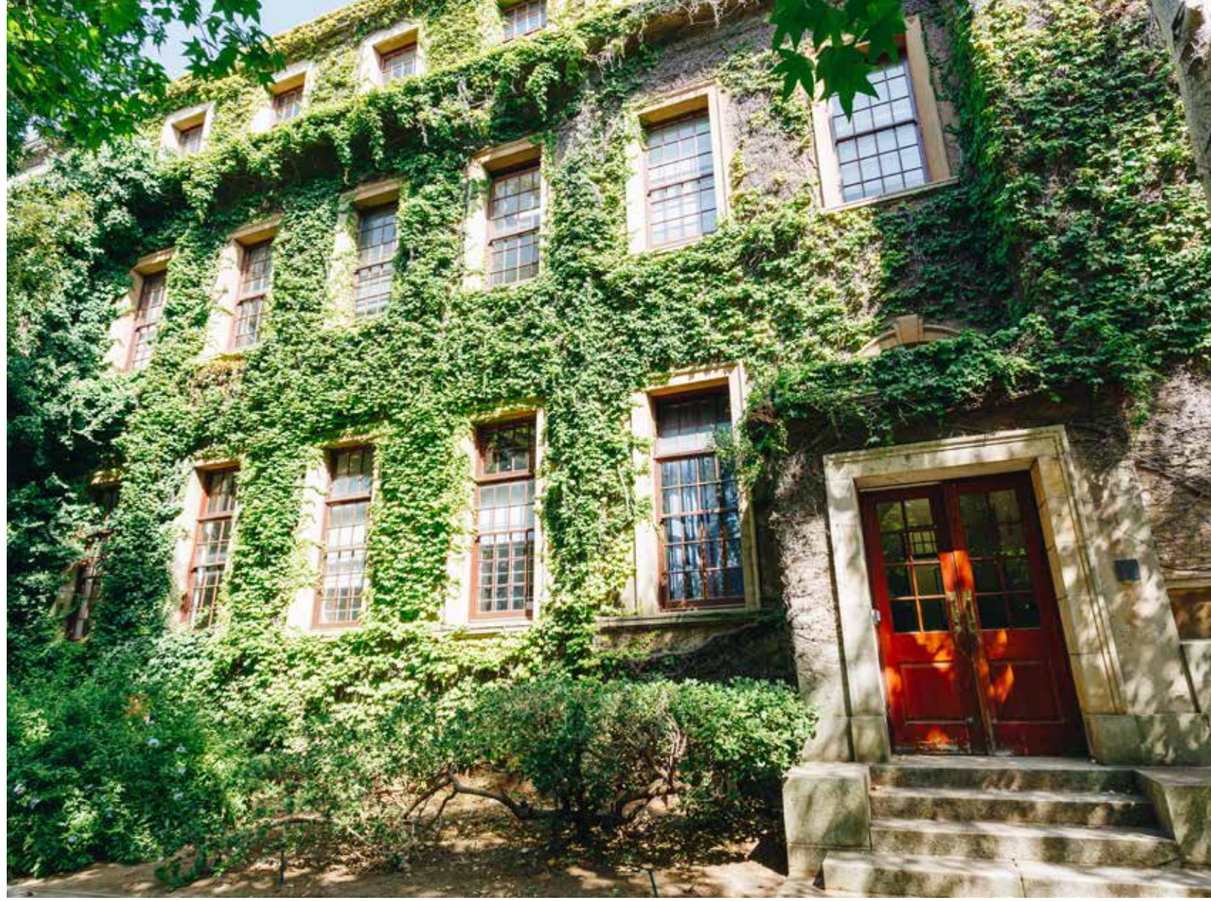
Multiple tours have been conducted at the lab for students and student club representatives to encourage the utilisation of the MDL and, more importantly, to foster experimentation and creation.

## EXTERNAL ENGAGEMENT

The MDL was represented at and participated in two conferences, namely the AfriLabs’ Annual Gathering 2024 and the mAkErverse AU-EU Innovation Ecosystem Summit.

## FUTURE PLANS

Plans for 2025 include training workshops on various technologies, partnership events with internal and external stakeholders and, most importantly, an increase in the number of innovative projects that emerge from the Menzi Design Lab.



## FACULTY ACADEMIC INCUBATOR

The EBE Academic Incubator is a support group for our young academics. Some are new to UCT and have recently joined the faculty, and some are balancing research and teaching while doing their PhD or master's degrees. The forum aims to create a platform where new academics can build on their current skills, learn more about EBE and UCT processes, and create an inspiring and motivating network across the EBE Faculty. Professor Marianne Vanderschuren, Deputy Dean: Transformation and Social Responsiveness, is responsible for the programme and is supported by Nuraan Hartley from the Professional Communications Unit.

In 2024, the following activities took place:

**On-campus Workshop 1**

**'Scheduling your time and prioritising'**

Mr Hilton Heydenrych advised staff around scheduling time and prioritising. A few staff members indicated that time often becomes an issue, especially when trying to do writing. Balancing work, home and life was highlighted as a challenge. Some noted that family responsibilities often come into play.

**On-campus Workshop 2**

**Informal networking lunchtime event**

Attendees spoke about not having enough time to focus on their writing between teaching and life in general and indicated interest in the benefits of a writing retreat.

**Off-campus workshop**

Mrs Elzona Swartz of Lyra Wellness (formerly ICAS) spoke to staff about the services available to them when dealing with students in crisis, as well as the services available to both staff and students. Prof Alphose Zingoni spoke about his experiences and provided advice to academics around research. Staff were very interested in his discussions and displayed their interest by asking questions and engaging in conversation with him. Attendees also raised more questions about the possibility of an EBE writing retreat.

## Research Highlights and Awards

### STEPPING FORWARD AND ASSUMING LEADERSHIP

Professor Alison Lewis was elected to serve as a member of the private, independent, non-profit institution the National Academy of Engineering (NAE) in September 2024. This also served as a significant moment for women in engineering leadership, underscoring the importance of female representation in international leadership bodies. The academy membership honours Lewis for her contributions to crystallisation processes for saline water treatment and extraction metallurgy, along with her leadership in engineering education.

### BEST RESEARCH PAPERS AT AFRES CONFERENCE

Department of Construction Economics and Management academics received top research paper awards at the African Real Estate Society Conference in Zambia, in both Valuation and EDGE categories. At the conference the department won best papers in the following award categories:

- **Valuation Stream**: 'Streamlining municipal property transactions in South Africa for enhanced social value creation' – Dr Louie Van Schalkwyk and Ms Liezl Emsley.
- **Edge Research Award**: 'Investigating the drivers and barriers to implementing Green Building Features and Initiatives (GBFIs) in South Africa's Private Housing Sector' – Mr Raphael Madzingaidzo, Dr Louie Van Schalkwyk and Dr Saul Nurick.

### BIOPROCESS ENGINEERING NATIONAL WIN

Under the Centre for Bioprocess Engineering Research (CeBER), UCT's brewing team won the Best of Show category at the national Intervarsity Brewing Competition – their third consecutive win, reflecting practical excellence tied to research-based education.

### CATALYSIS INSTITUTE'S GREENQUEST PROJECT REVIEW

The Catalysis Institute hosted Professor Dr Sabine Döring, state secretary of the German BMBF (Federal Ministry of Research, Technology and Space), for a progress update on the BMBF-funded GreenQUEST clean household fuel project, reinforcing EBE's research ties with international clean energy programmes.

### CATALYSIS RESEARCH EXCELLENCE RECOGNISED

PhD candidate Mufudzi Chaza (Catalysis Institute) received the Chemical Science Best Oral Presentation award at the 13th Natural Gas Conversion Symposium (NGCS13) in China for outstanding contributions to catalysis research.

### DR KATHRYN EWING AWARDED-VICE CHANCELLOR SOCIAL RESPONSIVENESS AWARDS

Dr Kathryn Ewing from the School of Architecture, Planning and Geomatics was awarded the recipient of the 2024 Vice-Chancellor's Social Responsiveness Award. This is also the second time in three years that the School of APG and EBE have been awarded the Vice-Chancellor's Social Responsiveness Award. This clearly reflects the excellent work that our departments and faculty are doing, not only in research but also in making a meaningful difference to the broader society and communities in South Africa.


Pictured from left to right: Dayni Sanderson, Dr Frank Ametefe, Dr Liz Musvoto, Dr Louie van Schalkwyk, Prof Manya Mooya, Dr Saul Nurick, A Prof Francois Viruly.


Brewing UCT with VC Prof Mosa Moshabela.

## CENTRE FOR MINERALS RESEARCH HOSTS BGRIMM AND JIANGXI COPPER COMPANY

The Centre for Minerals Research (CMR) in the Department of Chemical Engineering recently hosted a Chinese delegation from Jiangxi Copper Company (JCC), the largest copper producer in Mainland China, and BGRIMM Machinery & Automation Technology Co.

The meeting brought together representatives from CMR, JCC, and BGRIMM for a collaborative exchange on advancements in mineral processing and mining technology. Highlights included Dr Song Tao from BGRIMM's review of China's National Key Research and Development Program on fault diagnosis and quality control for mineral processing, along with overviews from CMR's Prof David Deglon and Martin Harris on key research results and digital techniques in mining and metallurgy. Dr Song Tao also presented smart control applications in Chinese mines, attracting discussions on future technical needs and international collaboration opportunities. The session concluded with a visit to the Department of Chemical Engineering and the CMR research facilities.

## CIVIL ENGINEERING HOSTS UNIVERSITY OF ALBERTA

The Department of Civil Engineering hosted a delegation from Canada's University of Alberta. This delegation was led by Dr G Ward Wilson, Professor of Geotechnical and Geoenvironmental Engineering in the Department of Civil and Environmental Engineering, who is involved in mine waste management systems for numerous sites worldwide and currently serves as the subject matter expert for the GeoStable Tailings Consortium. He was accompanied by other members of the department: Dr Nicholas Beier, Associate Professor of Geoenvironmental Engineering, and Vivian Giang, Strategist in Communications, Grants and Events. Part of the visit included a tour of the department's facilities, including the Geotechnical Engineering Laboratory, and an open lecture by Dr G Ward Wilson. The lecture was on designing commingled tailings and waste rock deposits for physical and geochemical stability, which Dr Wilson is heavily involved in research with. UCT's Geotechnical Engineering Group and the University of Alberta Geotechnical Centre will be formalising the coordinating and collaboration opportunities emanating from this visit.

## DR SARA BURNESS WINS A YOUNG AUTHOR AWARD AT THE INTERNATIONAL MINERAL PROCESSING CONGRESS

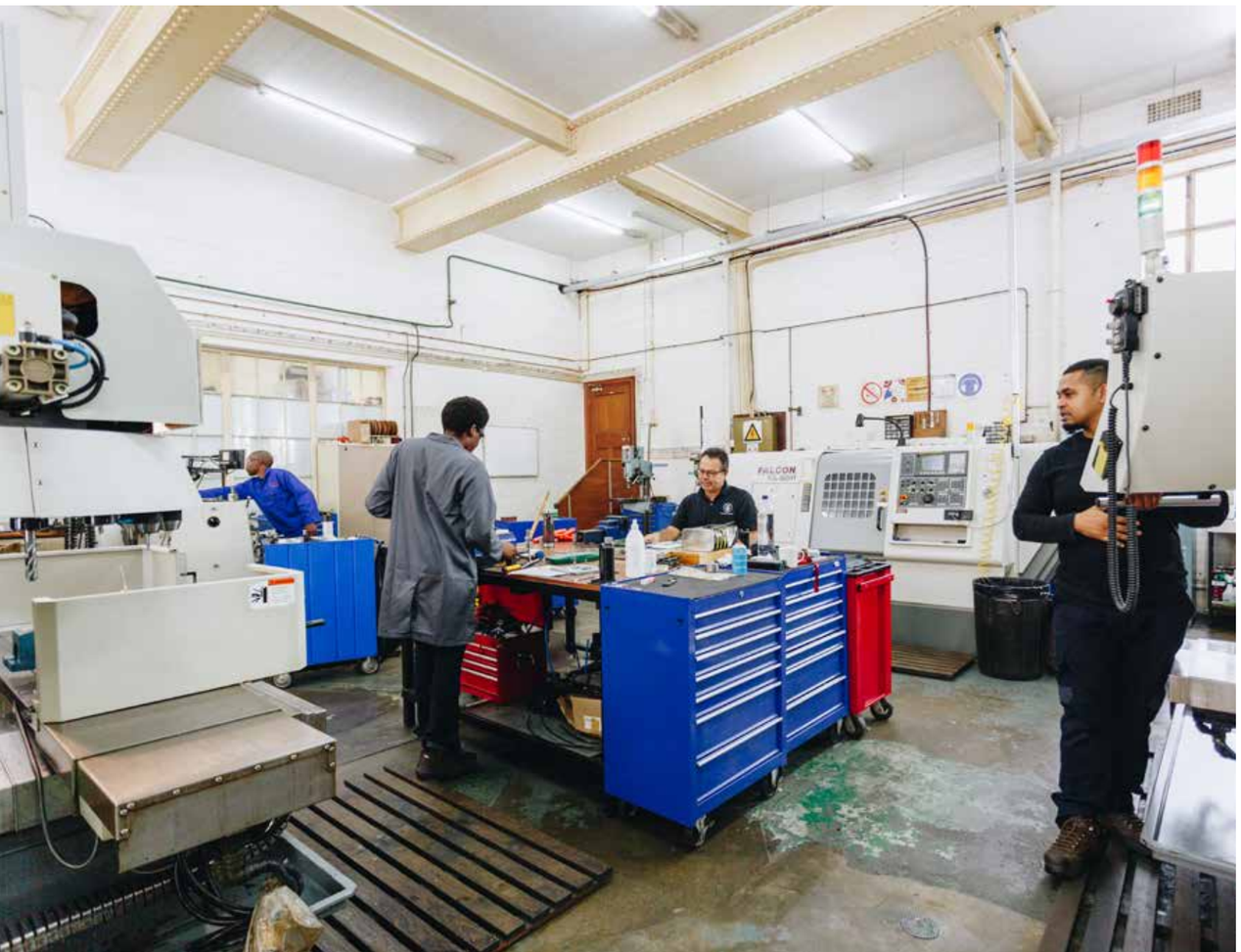
Dr Sara Burness with her award.

Dr Sara Burness from the Department of Chemical Engineering received a Young Author Award at the International Mineral Processing Congress for her paper on characterising diamond breakage, based on a historical collection of diamonds from the Roberts Victor Mine. The International Mineral Processing Congress (IMPC) brings together the world's leading experts to further the latest advances in the science and technology of mineral processing.

## CPD PROGRAMME OFFERS HOUSING FINANCE COURSE TO TACKLE SUB-SAHARAN AFRICA'S HOUSING CRISIS

UCT's Continuing Professional Development (CPD) Programme is stepping up to address Sub-Saharan Africa's housing crisis with its Housing Finance Course for Sub-Saharan Africa. The Housing Finance Course is a collaborative effort between UCT's Urban Real Estate Research Unit (URERU) and the Zell/Lurie Real Estate Center of the Wharton School at the University of Pennsylvania. It also receives valuable support from the Centre


Dr Amber Abrams and A/Prof David Ikumi at the RRIP Launch event.



for Affordable Housing Finance in Africa, the Kenya Mortgage Refinance Company (KMRC), and FSD Kenya. The 2024 programme had a diverse group of attendees from Kenya, South Africa, Botswana, Nigeria, Tanzania and Uganda. This intensive six-day programme, held in Mombasa, Kenya, equipped attendees with the skills and knowledge needed to build robust and inclusive housing finance systems and solutions. The programme is designed for senior decision-makers, including policymakers, bankers, investors, developers and housing professionals.

## ENGINEERING EDUCATION RESEARCH AWARD

PhD student Shameela Arbi won the SEFI Susanne Ihsen Award for her paper 'Using Narratives to Explore Social Influences on the Identities of Women Students in Engineering', supervised by A/Prof Bruce Kloot and A/Prof Corrinne Shaw.

## EXPLORING URBAN DESIGN: A COLLABORATIVE JOURNEY

The Continuing Professional Development (CPD) and Master of Urban Design (MUD) course Urban Design Africa brought together a diverse group of professionals and students for the exploration of urban design within an African context.

The course welcomed a dynamic mix of participants: six CPD attendees hailing from Namibia and two from Cape Town joined six MUD candidates on their Urban Design Theory II course (APG5085S). The group, with backgrounds in architecture, landscape architecture, and planning, adopted a collaborative studio approach to learning.

Participants explored urban design concepts across five African cities: Johannesburg, Maputo, Harare, Nairobi and Addis Ababa. According to Dr Kathryn Ewing, the course presenter, "The week was made up of seminars and collaborative workshops that engaged participants in Southern theory aligned with urban design approaches, strategies, methods, and project applications. As a learning outcome, participants formed two teams to develop and present a situated contextual evaluation and spatial design interventions – one group for Maputo and Harare, the other for Addis Ababa and Nairobi."

Participants gained an understanding of urban structure and performance at the local scale. They analysed neighbourhoods, streets and dwellings to understand the transformation of urban spaces. A highlight of the course was the use of the Indawo game, a tool that supports co-designing safer communities. Participants applied resource and budget allocation strategies within specific timeframes, gaining valuable experience in real-world scenarios.

## FUTURE WATER RESEARCH LAUNCH

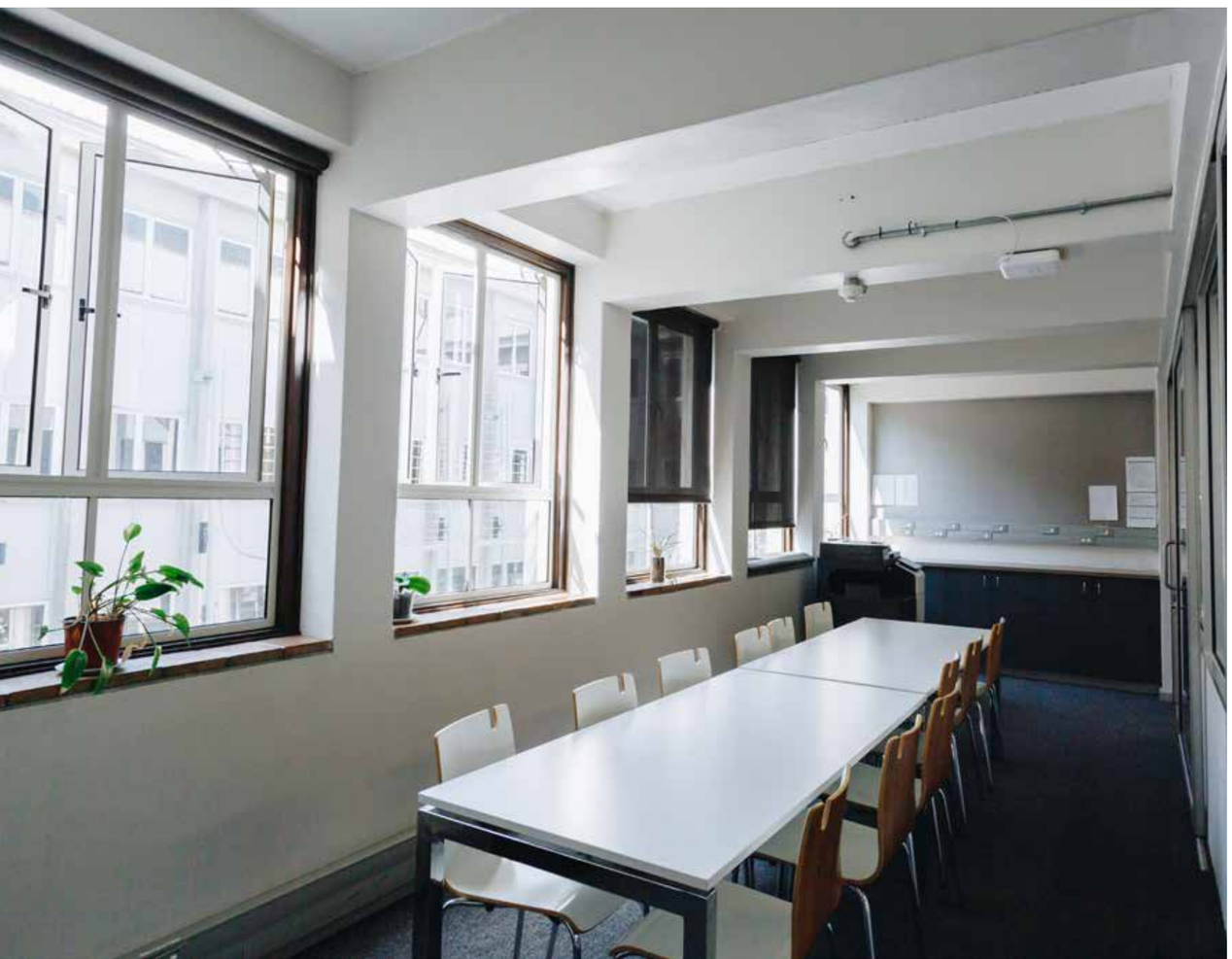
The 'Reorienting Research, Innovation & Practice to Address Future Water Challenges in Africa (RRIP)' project, part of the Future Water Institute and funded by UCT Vision 2030 Grand Challenges, was launched. It aimed to tackle continent-wide water issues through interdisciplinary research and innovation.

The RRIP launch event was held in June and opened with a welcome from A/Prof Kirsty Carden, Director: Future Water, and Dr Linda Mtwisha, Executive Director: Research at UCT. Dr Mtwisha introduced UCT's Vision 2030 Grand Challenges Programme, which aims to drive research advancements beyond academic boundaries and strengthen inter/transdisciplinary partnerships. She highlighted that RRIP covers 11 Sustainable Development Goals (SDGs).

A/Prof David Ikumi, Principal Investigator, and Dr Amber Abrams, Co-Principal Investigator,

Maurine Chepkoech, recipient of a Google PhD Fellowship Africa.

Gundo Maswime at the SAICE Awards



provided an overview and discussion of the RRIP project. Dr Valerie Naidoo from the Water Research Commission then shared insights on the water sector in South Africa in her keynote address. The event featured a panel discussion with Ntombizanele Bila-Mupariwa (DWS), Geoff Du Toit (Zutari), Jane Reddick (Greencape), and A/Prof Kevin Winter (UCT), followed by a reflection and Q&A session. The Research Symposium concluded the event by showcasing ongoing and completed postgraduate student research.

## GEOTECHNICAL RESEARCH EXCELLENCE AWARD

Chazz Seegers (Civil Engineering) received the 2023 Barry van Wyk Award for the best undergraduate geotechnical dissertation in South Africa, supervised by Prof Denis Kalumba.

## GLOBAL DIGITAL HERITAGE COLLABORATION

EBE has partnered with Global Digital Heritage Afrika (GDHA), a research grouping dedicated to digitally documenting African heritage. GDHA is affiliated with Global Digital Heritage, an international non-profit working with EBE on various heritage-focused research initiatives across Africa and beyond.

## ELECTRICAL ENGINEERING PHD CANDIDATE WINS GOOGLE AFRICA SCHOLARSHIP AWARD

Maurine Chepkoech, a PhD student in the Electrical Engineering Department, was awarded the Google PhD Fellowship (Africa). Her research work entails the design and implementation of a high-performance, high-reliability, and dynamic self-healing open-source-based 5G+ mobile network testbed. This testbed will serve as a real-world validation platform for diverse applications and use cases. Specifically, she will work on realising a Telesurgery training suite that will allow for remote, real-time, intelligent and immersive training of surgeon students from remote areas. She is supervised by A/Prof Joyce Mwangama (Department of Electrical Engineering) and Dr Bessie Malila (Division of Biomedical Engineering, Faculty of Health Sciences).

## GREEN ECONOMY STUDENT INNOVATION

Aadil Eyasim, a master's student in Electrical Engineering and leader of UCT's Formula Student Africa team, presented research and development efforts in electric vehicle design at Africa's Green Economy Summit, underscoring student-led innovation in green mobility.

## GREEN FUELS RESEARCH SHOWCASED AT PRESIDENTIAL PLENARY

HySA Catalysis and the Catalysis Institute (Chemical Engineering) showcased their work on producing green diesel from $CO_2$ and hydrogen under the Coal$CO_2$-to-X flagship programme at the inaugural Presidential Science, Technology, and Innovation Plenary.

## GUNDO MASWIME SCOOPS 2024 SANRAL SAICE ACADEMIC STAFF AWARD

Gundo Maswime, from the Department of Civil Engineering has been awarded the prestigious 2024 Academic Staff Award at the SANRAL SAICE Awards. The SANRAL SAICE National Awards promote excellence in civil engineering and built environment professions, and honour members who have delivered outstanding service to the profession and who have made a notable contribution to the field. His award highlights UCT's role as a leading institution shaping the future of engineering in South Africa and on the continent.



### GREENOVATE RESEARCH AWARDS

EBE students received top honours at the Growthpoint and Greenovate awards for sustainability-focused research:

- Julian Banks won for designing an autonomous energy management agent.
- Mahima Maharaj received the IFC prize for related energy research.
- Property students Aiden van Wyk and Isobella Van der Merwe won for evaluating savings from EDGE-certified residential estates.
- Hannah Volker and Sindisiwe Kalumba were awarded for their research on net-zero commercial buildings.

### IEEE APPOINTMENT ENHANCES RESEARCH NETWORKING

A/Prof Sunetra Chowdhury from the Department of Electrical Engineering was appointed the Institute of Electrical and Electronics Engineers (IEEE) Women in Engineering Coordinator for South Africa, contributing to research community development through workshops and technical conference engagement. Her role will involve enhancing networking and promoting membership among women in engineering by organising workshops and forums at major technical conferences. The IEEE advocates for women in leadership roles and supports their career advancement in the profession. The efforts include facilitating the formation and revitalisation of Women in Engineering (WIE) Affinity Groups, supporting ongoing activities, and promoting IEEE initiatives to mentor young women in high schools and universities. Additionally, the South African chapter of IEEE develops programmes and activities to encourage the entry and retention of women in engineering programmes.

### LAUNCH OF THE FORMULA STUDENT AFRICA INITIATIVE

The Formula Student Africa Team at UCT, formed in the Department of Electrical Engineering, had their official campus-wide launch event. During the event, the team presented current progress on designing UCT's first Electric Formula Student car, as well as future plans. It was an excellent opportunity to learn more about the initiative, meet the team, and see how UCT is contributing to the future of sustainable automotive technology.

### REDUCING THE CARBON FOOTPRINT OF PLANES

Professor Arnaud Malan in the Department of Mechanical Engineering has developed a team to explore the possibility of using liquid hydrogen in the aeronautical industry. This is a fuel that could reduce carbon emissions by up to 40% and make a significant contribution to measures to combat

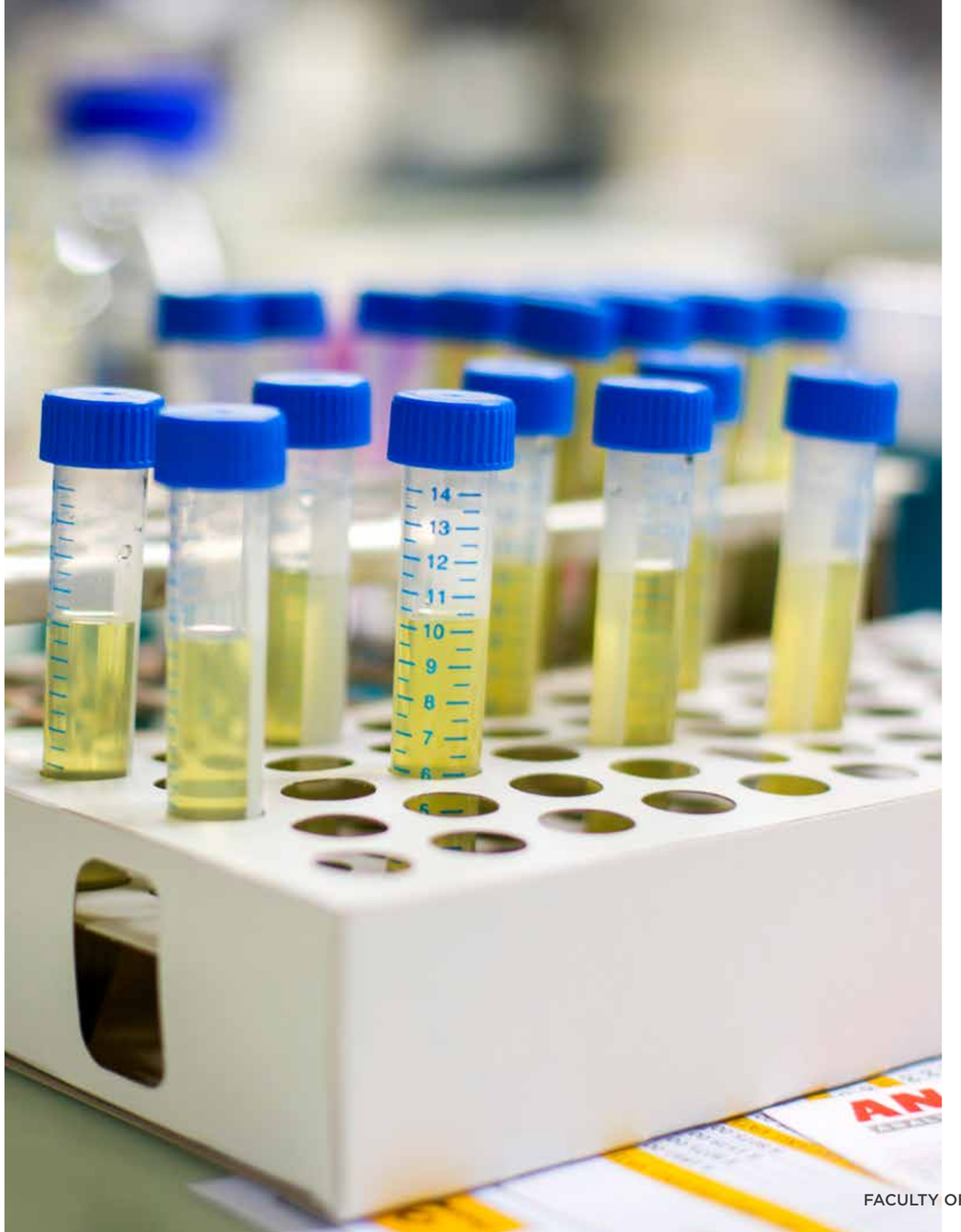
climate change. While South Africa has long been a leader in knowledge production in Africa, its impact has seldom been obvious in the aeronautical industry.

Professor Malan's work in Industry Computational Fluid Dynamics (CFD) provides evidence that South Africa can join the global project of significantly reducing carbon emissions in commercial jetliners. His research unit links South Africa to Europe and across the Atlantic with the US. This is good news not just for work on climate change but for the global South and its mission to be included in global research developments.

### MAKERERE UNIVERSITY DELEGATION ENGAGES IN STRATEGIC TALKS AND FACILITY TOUR

Professor Denis Kalumba and the Department of Civil Engineering hosted a distinguished delegation from Uganda's Makerere University. The primary objective of the visit was to shape a strategy that will guide Makerere University's journey towards developing a comprehensive concept of research and innovation. Throughout the visit, the delegation engaged with the university's leadership. They held discussions with Prof Elelwani Ramugondo, Deputy Vice-Chancellor: Transformation, Student Affairs and Social Responsiveness. They also met with Prof Mark Zuidgeest, Head of Civil Engineering. These interactions provided a valuable opportunity for the exchange of insights and perspectives on academic and institutional matters.

The primary objective of the visit was to further shape a robust strategy that will guide Makerere University's ambitious journey towards building a comprehensive concept of research and innovation. As part of their visit, the delegation toured the Geotechnical Engineering Laboratory. This allowed the Makerere University team to gain firsthand experience of our state-of-the-art facilities and capabilities.



### MAX PRICE & DEBORAH POSEL MASTER'S SCHOLARSHIP

Alyssa Ramwell (Mechanical Engineering) was awarded the Max Price & Deborah Posel Master's Scholarship, supporting her MSc research in engineering.

### MINE CLOSURE RESEARCH DISSEMINATION

Lita Nolutshungu (Civil Engineering) co-presented at a Canada-hosted workshop focused on mine closure technologies and challenges in Africa, contributing to the global research dialogue on sustainable mine rehabilitation.

### NRF STORIES OF IMPACT – PROF ALPHOSE ZINGONI

In 2024, the NRF celebrated a major milestone as they commemorated 25 Years of Research, Innovation, Impact and Partnerships. In a series, the NRF shared the accomplishments and impact of the many students and researchers they have supported during various stages of their careers. Prof Alphose Zingoni has been associated with the NRF for exactly 25 years. He currently holds an NRF A-rating and has served as an assessor on specialist NRF panels.

### THE MARTHA SCHWARZKOPF AWARD FOR WOMEN IN SCIENCE

A/Prof Malebogo Ngoepe was selected as one of the recipients of the Martha Schwarzkopf Award for Women in Science. The award, which includes a financial prize of €10 000, recognises A/Prof Ngoepe's groundbreaking work on the mechanics of curly hair fibers, including the development of a new classification system.

The award ceremony was held in December 2024 in Düsseldorf, Germany, where A/Prof Ngoepe, alongside other awardees, presented her research

Prof Hans Beushausen elected to lead global construction research organisation

Participants from the Department of Civil Engineering and the Division of Geomatics

and engaged with fellow scientists. This recognition highlights her innovative contributions to hair research and its significance for consumers, the environment and the cosmetics industry.

### NATIONAL INFRASTRUCTURE HACKATHON

The Department of Civil Engineering hosted SA's first National Infrastructure Hackathon, themed 'Constructing Tomorrow: Public Infrastructure Policy Dialogue & Research Excellence', fostering collaboration between academia and government to co-develop research priorities.

### PIONEERING WOMEN IN ROBOTICS

Dr Stacey Shield is a trailblazer in the field of robotics and a lecturer at UCT's Electrical Engineering Department. Her research in the African Robotics Unit focuses on the movement of fast-legged animals, like cheetahs, to develop more manoeuvrable robots. She is passionate about challenging the cultural norms surrounding women in science and engineering. Her goal is to inspire the next generation of female scientists to embrace their femininity while excelling in their fields.

### PROF ERIC VAN STEEN WINS THE NRF CHAMPION OF RESEARCH CAPACITY DEVELOPMENT AND TRANSFORMATION AWARD

Prof Eric Van Steen was awarded the Champion of Research Capacity Development and Transformation Award at the Annual NRF Awards. This award category recognises individuals within the research community who contribute to the transformation, and thus diversity, of South Africa's science cohort through the research students they supervise. The aim of the award is to encourage and promote researchers who have identified and are mentoring young scientists to become highly productive academics and even international leaders in their areas of expertise.

### RILEM PRESIDENCY FOR CONSTRUCTION MATERIALS RESEARCH LEADER

Prof Hans Beushausen (Civil Engineering) was confirmed as President-Elect of RILEM (International Union of Laboratories and Experts in Construction Materials, Systems and Structures), a global research network for construction materials and systems, affirming UCT's leadership in materials research.

### SANCHO NYONI RECEIVES THE NRF EXCELLENCE AWARD FOR EMERGING RESEARCHERS

Sancho Nyoni, a PhD candidate and Research Assistant in the Department of Chemical Engineering, was awarded the NRF Excellence Award for Emerging Researchers in the Engineering category at the Annual NRF Awards. This award recognises outstanding research performance by current Early Career/Emerging Researchers, in any discipline, who are NRF grant-holders.

### SOCIETAL IMPACT RECOGNITION FOR CATALYSIS LEADER

Prof Michael Claeys (Chemical Engineering) was nominated for an NRF Societal Impact Award, recognising his research's broader societal contributions.

### SPACE | SPATIAL | LINKS RESEARCH SHOWCASE

The Space| Spatial | Links Showcase, a collaborative initiative between the Department of Civil Engineering and Geomatics, featured presentations from several research groups utilising spatial technologies across a range of applications. Topics covered during the event included urban remote sensing, transport research, heritage applications, Antarctic research and urban water resources.

### THREE MINUTE THESIS AWARD

Dime P Kekana earned second place in the UCT Three Minute Thesis competition for articulating their research concisely and engagingly in under three minutes.

### TWAS FELLOWSHIP FOR RESEARCH EXCELLENCE

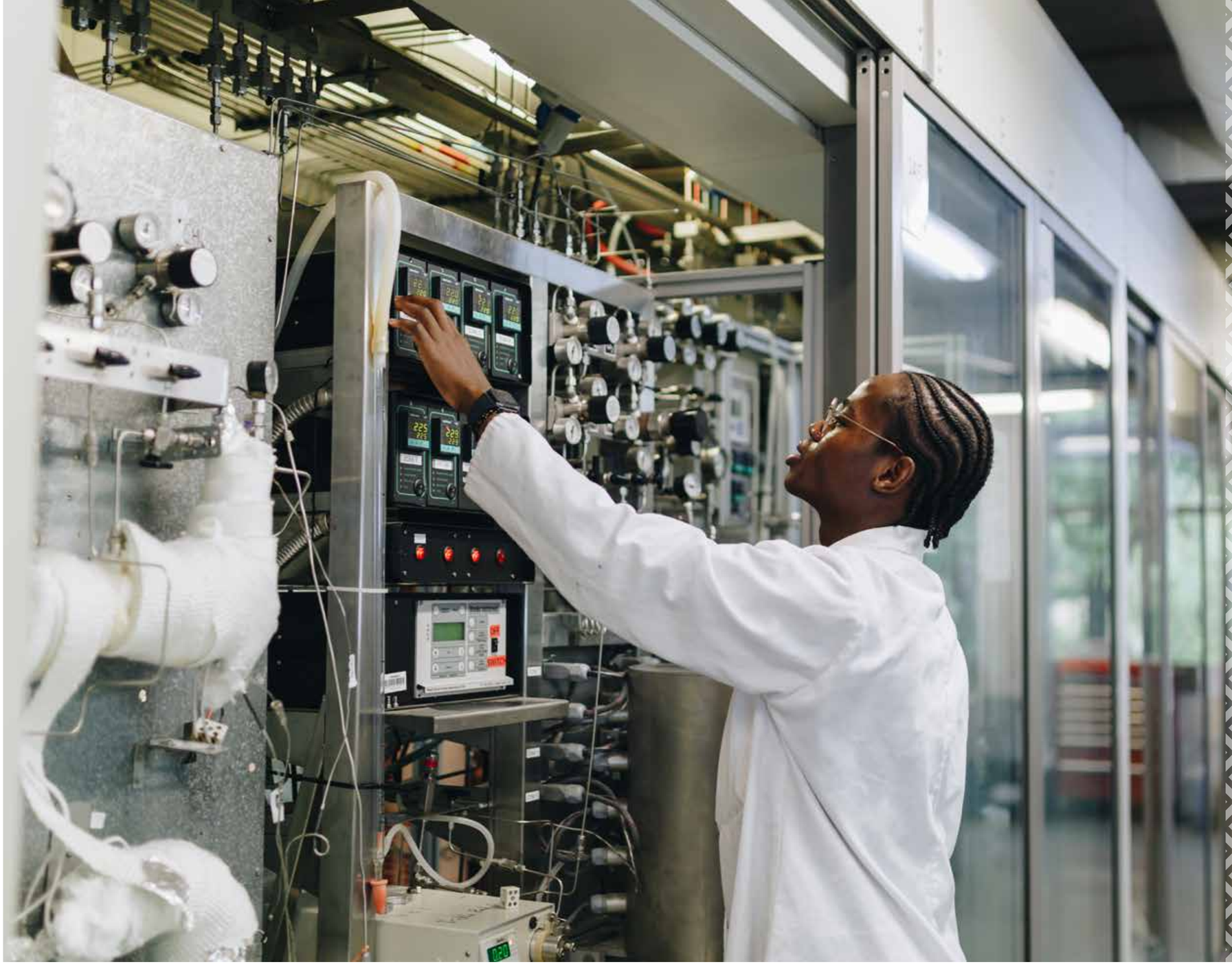
Prof Alison Lewis was elected as a Fellow of The World Academy of Sciences (TWAS), acknowledging her leadership in crystallisation research and science advocacy in developing countries.

### UCT SHOWCASING: RESEARCH IN FOCUS

At the 2024 UCT Showcasing event, research conducted at the Future Water Institute and the Catalysis Institute was highlighted through presentations aimed at alumni and external stakeholders.

### CO-HOSTING OF LAUNCH OF THE BUILT ENVIRONMENT NATIONAL LOGBOOK

UCT and the Council for the Built Environment (CBE) co-hosted the official launch of the Built Environment National Logbook (BENL) in March. This significant launch coincided with International Women's Day under the theme 'Inspire Inclusion', highlighting the BENL's potential to benefit women in the male-dominated built environment sector. The BENL will revolutionise the industry by addressing the slow pace of transformation, standardising the professional registration process in South Africa, and tracking candidates on their journey to professional registration. It will also provide centralised statistical data for the built environment's professionally registered persons, candidates, students, artisans and mentors, while offering career pathing support and guidance for unemployed built environment graduates. EBE students, staff and members of the external media were invited to attend the launch.



# 07 FACULTY SOCIALLY RESPONSIVE

## CONTENTS

By their nature, Engineering and the Built Environment (EBE) practitioners contribute to social responsiveness.

Dr Kathryn Ewing, a Senior Lecturer in the School of Architecture, Planning and Geomatics (APG) was awarded the UCT Vice-Chancellor's Social Responsiveness Award for 2024. She was recognised for her valuable contributionmade to research, advocacy and practice of urban design and architecture in Southern Africa, as well as her commitment to improving the quality of life and safety of marginalised communities in Cape Town. Ewing's approach to social responsiveness scholarship and pedagogy is built from over twenty years of participatory spatial research and experience as a co-founding director of Violence Prevention through Urban Upgrading Non-profit Company from 2013 to 2023. Ewing's transformative Southern practice integrates a taught interdisciplinary design studio, Studio Hope Gugulethu, and a small design-build public space project iThemba Walkway, situated within a larger research initiative The Walkway Project.

The Centre for Bioprocess Engineering Research (CeBER), within EBE, launched an innovative Waste-Energy-Food-Water Nexus project in support of UCT's Vision 2030 and its sustainable campus initiative. This five-year, R10 million project aims to promote environmental sustainability by converting food waste into valuable resources for energy, water, and food production on campus. Led by Dr Thanos Kotsiopoulos, the project uses a process called anaerobic digestion (AD) to break down food waste and produce biogas, which can be used for cooking or other energy applications. A key component of the system is the use of an algae scrubber to remove carbon dioxide from the biogas, with the resulting algal biomass being repurposed into biofuels and natural pigments. The nutrient-rich water that remains after digestion is used in aeroponic systems-vertical farms that

grow plants without soil, to produce fit-for-purpose water and fertiliser, while also enhancing campus aesthetics and potentially reducing building cooling costs. The project was initiated to address growing environmental concerns, such as increasing volumes of food waste, the cost of waste disposal, and the environmental impact of landfill usage.

Elsewhere, Dr Sarah George from Mechanical Engineering contributed towards the (Y)our UCT Campus Nexus initiative in collaboration with the UCT Properties and Services Department. The exhibition is a creative platform for UCT community members to share their ideas, designs, and proposals in an open, collaborative setting that values respect and inclusivity.  The catalyst for the concept was the urgent need to relook at the Urban Design Framework for the UCT upper campus, and more specifically the “green frame”. But no part can be viewed in isolation. UCT have a unique opportunity to start a conversation about all the aspects of (y)our upper campus. From the infrastructure, transport and access considerations, through to ideas of transformation and decolonisation.  The process and outcomes will be documented, creating a resource to inform the development of an urban design framework that truly embodies Y(our) UCT Campus Nexus.

The Future Water Institute successfully launched the “Reorienting Research, Innovation & Practice to Address Future Water Challenges in Africa (RRIP)” project, funded through UCT’s Vision 2030 Grand Challenges program, led by A/Prof. David Ikumi (Principal Investigator) and Dr. Amber Abrams (co-Principal Ivestigator).

The launch event provided a platform to share insights on the program’s long-term vision and first 18 months progress. The RRIP program seeks to innovate water governance, technologies, and societal engagement, fostering impactful collaborations for real-world solutions.

# 08 PROMOTING AN INCLUSIVE AND TRANSFORMED CULTURE IN EBE

## CONTENTS

## TRANSFORMATION REPORT 2024

The Faculty of Engineering and the Built Environment continues to uphold the principles of transformation and inclusivity outlined in the strategic goals of both the faculty and the university. We actively commemorate events such as Youth Day, Women's Day and Heritage Day, fostering a sense of community among students and staff.

While there has been a commendable willingness among our community to participate in transformation-focused events, we recognise the need for significant improvement in this regard. These functions play a crucial role in promoting inclusivity and diversity within the faculty. Notably, our recent Sports Day celebration, which featured games to bring students as staff together, was positively received by departments across the faculty.

We take pride in publicly celebrating the achievements of our staff, with the Dean acknowledging these accomplishments in the field. Furthermore, we are witnessing an increasing number of women within the faculty actively participating in various professional bodies and receiving national research awards, underscoring the impactful contributions of their work.

The faculty ran several workshops and activities:

- Staff Welcome Event 2024
- Mental Wellness Day 2024 Event
- EBE Winter Social Soup Day
- Women's Day 2024 Event
- Heritage Day 2024 Event
- EBE Sports Day 2024 Event
- Academic incubators for emerging academics.

The faculty has seen significant improvements in terms of demographics, and employment equity (EE) targets have been seen and reported in the EBE EE Report 2024.

**Major achievements:**

- The faculty has been offering proactive psychosocial support through life coaching for students in the faculty. This addresses life issues that affect academic performance, such as low self-esteem or self-confidence; insecurity about the future; feeling inadequate; self-doubt; alienation; and personal relationship issues. This service has reported significant successes.
- The staff demographic profile in the faculty is changing significantly due to a concerted effort in hiring academics and PASS staff from designated groups.

**Other achievements and initiatives:**

- Departments arrange regular check-in sessions for staff aside from normal staff meetings, just to ensure that staff are coping with a sometimes-overwhelming workload.
- The Department of Mechanical Engineering launched two courses that frame engineering as a socio-technical endeavour. These courses also explored the role of engineering during apartheid and resulted in a research project led by A/Profs Bruce Kloot and Corrinne Shaw.

## TC-SPECIFIC CHALLENGES

Time is a challenging factor as many of staff in the Transformation Committee (TC) are not allocated time for TC work.

There has been a notable decline in academic staff members attending TC events.

While staff demographics at Lecturer and Senior Lecturer level look promising, the demographics of our targeted groups at the Prof and A/Prof level have regressed since 2021.

The promotion of PASS staff to senior positions without needing to move to other departments or faculties.

## FACULTY/ DEPARTMENTAL CHALLENGES

Time allowance restricted by some line managers, especially when PASS staff are to act on selection committees.

There have been a few incidents related to the issue of student mental health. The faculty has launched programmes to address this, but more work needs to be done to support students.

Some departments do not take the work of the TC seriously, which puts TC reps in a precarious position when the need arises to solicit feedback from their departments.

Attracting a more diverse range of students and staff to the department remains a challenge.

Staff and student access and support for people living with disabilities remains a challenge for EBE.

# ENGAGEMENT OF THE TRANSFORMATION COMMITTEE/ FACULTY/ DEPARTMENT WITH INSTITUTIONAL GOVERNANCE STRUCTURES

Quarterly meetings were held to plan the year's initiatives, with members forming subgroups to tackle specific barriers. Progress has been made across departments in hiring staff from underrepresented groups. This is reflected in the 2024 Employment Equity Report for EBE.

**STRATEGIC INTEGRATION OF TRANSFORMATION**

Demographics and diversity are monitored concerning student intake and throughput. Faculty Transformation Committee (TC)-run events and initiatives are consistently communicated and reported on via the Faculty Newsletter. Staff movements, targets and progress are monitored monthly to ensure the transformation, inclusion and diversity of EBE's workforce. Departmental advisory board reports include sections on transformation and the enhanced success of vulnerable students, attributed to curriculum changes in our departments. EBE's annual report also incorporates a section on transformation, diversity, inclusivity and employment equity, highlighting our gains as well as strategies. The faculty also hosts the Centre for Research in Engineering Education (CREE), which focusses on the promotion of innovative and engaged research in engineering education.

**Key communications on transformation, inclusion, and diversity to faculty/ department stakeholders**

Various departments host lunchtime seminars on transformation and diversity, offering tours to different sites to explore social behaviour within specific industries and communities. The *Dean's Desk* has incorporated messages of inclusivity, care and appreciation. Addressing instances where anxiety resulted in disrespect of personal boundaries, discussions centred on the code of conduct regarding operating hours. Additionally, there have been talks concerning curriculum transformation, spearheaded by the Assistant Dean for Curriculum Review, where considerations are being made on opportunities for decolonising the curriculum. Furthermore, departmental posterboards include posters supplied by the Office for Inclusivity and Change (OIC) on sexual harassment, mental health, and awareness, to ensure a healthy and mindful staff and student body in the faculty.

**Annual budget spent on transformation, inclusivity and diversity**

A budget is allocated to the EBE Transformation Committee (TC) and is utilised for various initiatives. Annual celebrations such as Women's Day, Heritage Day, and EBE Fun Day which are significant events for both staff and students, were supported by a dedicated budget in 2024. Additionally, at the end of the year, members of the faculty, representing UCT collectively, participated in the Santa Shoebox Project, with individuals pledging gifts and essentials for less fortunate communities.

Regarding specific allocations:

- 0.7% of the staffing budget is designated for NGAP posts, constituting 5% of the total staffing budget.
- The faculty hosts two cross-faculty posts aimed at EE candidates, using existing faculty funds.
- EBE operates an in-house counselling system, with a full-time psychologist, and pays for three T1 contract posts.

**The TC recognises that some planned activities have become annual events which the faculty is** looking forward to, therefore it requests a budget each year from the faculty to build a stronger culture among faculty staff and students.

EBE is also looking into appointing three Student Success Coaches for psychosocial support, which will increase the annual budget allocated to transformation, inclusion and diversity.

## STUDENT ACCESS, SUPPORT AND SUCCESS

The faculty remains committed to ensuring diversity within its undergraduate and postgraduate student body. While the undergraduate space has not posed significant challenges over the past 12 months, the primary focus has been on addressing issues within the postgraduate student body. Notable progress has been made in this regard, largely due to shifts in funding structures and grants held by supervisors, which prioritise the awarding of bursaries or scholarships to previously marginalised individuals and those with disabilities.

Annual departmental reports, coordinated by the Departmental Manager, capture the student profile and enable monitoring of these shifts. Setting undergraduate intake targets presents an opportunity to further diversify the student population. Regular contact between Heads of Department, Programme Convenors, administrative staff, and student class representatives ensures that vulnerable students are identified, tracked and provided with necessary support, including extra exam time, extended assignment deadlines, assistance with acquiring laptops and resolving data or connectivity issues.

The faculty disseminates information to the student body through the Communications and Marketing Manager, using the *Dean's Desk* platform to highlight institutional services available, including the Student Wellness Centre, ICAS, etc. Additionally, psychological support is offered through a faculty-specific psychologist, with many students utilising this service over the past 12 months, with generally positive feedback. Furthermore, students receive psychosocial support from a lecturer stationed in the Department of Chemical Engineering, originally designated for first-years but widely utilised across the faculty. The EBE Faculty houses an onsite psychologist, supported by six part-time colleagues, with announcements on Vula regarding available support services.

In the last round of curriculum renewal in the Department of Mechanical Engineering, the complementary studies courses were streamlined and consolidated into two courses, one of which is a core third-year course called Engineer in Society. This course frames engineering as a socio-technical endeavour, and the first module was designed to introduce students to ways of thinking about society, and to then specifically address the social context of South Africa and apartheid. In a lecture that focused on the role of engineering under apartheid, a few large engineering projects were described, and the students were shown how these contributed to supporting apartheid in one way or another.

As might be expected, the class discussion that followed in the lecture was lively, with most students being of the view that engineers who worked in South Africa during apartheid were guilty for not standing up to such an unjust system. Some empathised with the inaction of engineers, pointing out that engineers were probably weighing up the personal cost, and the cost to their families, if they spoke out against what was a very brutal regime, but this was not a popular perspective. Since all students in the class were born after 1994, the discussion revealed a profound moral question that needed to be answered, as well as students' lack of understanding of what apartheid was really like, and the lived experiences of engineers under apartheid.

## STAFF ACCESS, SUPPORT AND SUCCESS

**Monitoring and promoting staff diversity in the faculty/ department**

The faculty has consistently used the faculty-specific EE Calculator to monitor its progress against targets, and recruitment and selection processes have aligned consistently with the faculty's goals. Significant strides and achievements have been made in reducing the gap.

The staff profile is updated periodically throughout the year, as needed, allowing for the determination of annual shifts in profile. New staff members joining the faculty in 2024 are incorporated and represent designated groups on the majority.

EBE embarks on aggressive campaigns in terms of student recruitment and access to the faculty. The undergraduate body across departments is comprised of about 50% women and 50% men. The faculty recognises that it needs to improve in the area of ensuring access for students and staff living with disability.

**Advancement programme for black, women, and disabled academics and managers**

The faculty continues its support for new and younger academics, facilitating their participation in programs such as NAPP, the Emerging Researchers Programme, URC Block Grants, the NGP (two senior lecturers participated last year, and one was promoted to A/Prof at the end of 2023), and the Academic Incubator for Younger Academics within the faculty.

Utilising UCT staffing initiatives, the faculty aims to expand the group of young academic staff of colour and women academics, promoting their development through the Academic Incubator launched in 2020. This year, at least three meetings were held.

In the past, the Academic Incubator has addressed various topics, including:

- student management, particularly addressing issues with students facing significant challenges
- workload balancing, encompassing administrative tasks, teaching, research, publications and personal responsibilities
- administrative support, including navigating purchasing systems, contract research, postgraduate student administration, etc.
- funding opportunities, guidance on grant acquisition, and proposal writing
- understanding the NRF evaluation and rating system
- preparation for ad hom promotions
- teaching strategies and rule application
- managing diversity in the classroom.

The faculty uses the EE Calculator, and significant shifts have occurred in the past 12 months. Demographics on postgraduate students and post-docs are monitored by the Deputy Dean for Postgraduate Studies and Deputy Dean for Research.

**Integration of UCT's transformation, inclusivity, and diversity commitment in new employee briefings**

In 2024, the Dean appointed a committee to advise the faculty on the need for an induction programme, and what the structure of that programme should look like. After wide-ranging consultations, the faculty decided to adopt a comprehensive induction programme for new employees starting in 2025. Additionally, new employees are continuously encouraged to participate in programs such as NAPP and the Emerging Researchers Programme, development dialogues, etc.

The faculty hosted a series of workshops on mindfulness and personal well-being. The workshop was facilitated by external professionals and run by the TC.

## PLACE AND SPACE: LANGUAGE, NAMES, SYMBOLS, ARTWORKS AND IDENTITY

The faculty is represented in the current language policy that is in review at an institutional level.

**Faculty-/ department-wide interventions promoting transformation, inclusivity and diversity**

The faculty hosts an annual heritage event to celebrate the diverse heritage of its staff and students. It is also represented and contributes to the Council on the Built Environment's Transformation Collaborative, which seeks to improve working conditions for early-career built environment graduates entering the workplace. EBE also hosts the Menzi Design Laboratory, which encourages students across the faculty to collaborate on extracurricular design projects and links them with relevant industry partners when such opportunities exist.

The Department of Mechanical Engineering has also embarked on a process to rename the Electro-Mechanical Building, where they are housed, to instead use an isiXhosa name to foster a culture of inclusivity. This is after the same department developed the groundbreaking mechanical engineering isiXhosa glossary. The Department of Electrical Engineering has submitted a proposal to restructure various sections of the Menzies Building office spaces into a more modern, socially inclusive structure that fosters a culture of collaboration.

**Advocacy product addressing historical privilege and power from colonialism and apartheid**

After developing courses that frame engineering as a socio-technical endeavour in the Department of Mechanical Engineering, A/Profs Bruce Kloot and Corrinne Shaw launched a research project to find out how engineers (and engineering academics) negotiated apartheid, and to bring this back into the course. They also aim to explore the dimensions of the resistance that engineering students often have to a course like Engineer in Society (something that has thankfully dissipated since it was first offered). Publications emerging from this research project thus far include two conference papers presented at the conference of the European Society for Engineering Education (SEFI), the first of which is entitled 'Re-imagining Engineering Education in South Africa', and the second 'Engineers' Perceptions of their Role in Society'). The second was very well-received and has led to a journal article titled 'Engineering Under Oppressive Regimes: Exploring the Roles of Engineers During Apartheid South Africa'. This was published in the *European Journal of Engineering Education*.

The findings from this work have enriched the course in that they have given students a better understanding of the lived experience of engineers under a system like apartheid, and they have shown students that not all engineers were complicit with apartheid: some had the courage to oppose the system as they recognised their role as "inseparable from the sociopolitical context, [which resulted] in action to divert technology from serving the interests of the regime".

## INSTITUTIONAL RESPONSES TO DISCRIMINATION, BULLYING, HARASSMENT AND VIOLENCE

Departments in the faculty arrange, on an annual basis, talks on sexual harassment, bullying and discrimination. Meetings or workshops are also run at a faculty level to forge conversations around these issues and sensitise faculty members around best practices related to these issues. Communication goes out via the *Dean's Desk* expressing well wishes on behalf of the faculty on various religious observations.

## COMMUNITY ENGAGEMENT: ANCHORING UCT IN COMMUNITY

**Collaborative agreement with community-based organisations for social justice and transformation**

EBE engages in a number of collaborations with community-based organisations through the School of APG, CEM, Civil Engineering and Chemical Engineering, among others.

**Multilateral engagements for social justice and diversity: Community-based collaboration**

The faculty participates in nationwide boards aimed at addressing issues of transformation, inclusivity and diversity within engineering and the built environment. One example is the Transformation Board for the Built Environment linked with the Council on the Built Environment. The Department of Construction Economics and Management link with the African Real Estate Society has ensured that we have strong links with the rest of the continent.

The faculty participates in nationwide boards aimed at addressing issues of transformation, inclusivity and diversity within engineering and the built environment. One example is the Transformation Collaborative Board of the Council of the Built Environment.

**Community-based partnerships for learning and support**

EBE is involved in several civil science projects.

- URERU/ Western Cape Property Development Forum
- African Real Estate Society
- Construction Industry Development Board
- NHBRC
- MBA
- Communicare

The Civil Engineering Department continues its Feed a Family scheme in Langa. CEM, together with the Association of Built Environment Students (ABES), runs a Community Build project annually. CEM students help a selected community build or renovate facilities as part of their practical training requirement. Service learning is seen as an integral part of the learning experience for our students. The department organises an annual Community Build programme for first-year Construction Studies students. This forms part of the Practical Training Course CON1007X. The focus of Community Build is involvement with projects which are identified, planned and managed by ABES. Civil engineering and chemical engineering students in third year do their practical training on campus during the June-July vacation, working on municipal energy and water data with representatives from the government. This has been well-received.

## TEACHING AND LEARNING SUPPORT: DECOLONISATION, MARGINALISATION AND ACCESSIBILITY

The faculty has engaged departments as well as students on a curriculum review project, which it started embarking on in 2022, beyond all its other measures of increasing student support and success, such as the appointment of Dr Disa Mogashana, who provides psychosocial support to the students and advises the faculty on appropriate measures.

All departments in the faculty have embarked on a curriculum review process to address issues impeding student success. For example, the faculty had the Stats Working Group, the Maths Working Group and the Physics Working Group address academic performance issues, and some agreements have been arrived at between EBE and the Faculty of Science.


## INNOVATIONS, ALTERNATE APPROACHES AND BEST PRACTICES

This year, the EBE TC launched its inaugural EBE Fun Day in collaboration with the EBE Student Council. The aim of this initiative was to allow students and staff to interact outside the formalities of classrooms and offices. Much fun was had as students and staff competed and collaborated along departmental lines in the games organised for this occasion.

The EBE TC also organised its second annual potjiekos competition as part of its Heritage Day celebrations. Departments within the faculty competed against each other and the faculty office to see which department has the best cooks and celebrate our shared yet diverse heritage as South Africans.

Departments also host various off-campus activities to allow students and staff to interact in an informal setting and humanise the university experience. This is particularly important for first-year students coming into the university environment, to ensure that they can interact with and get to know each other and staff more informally and bond as a cohort.

Lastly, the Department of Mechanical Engineering hosts a weekly session where students can show up (without an appointment) to ask the HoD anything or just have a chat. This humanising experience is also geared towards ensuring the university experience is not intimidating, and to help reduce student fear around asking questions or interacting with staff members.

## NEW STAFF

- **A/Prof Lukas du Plessis** joined the Department of Mechanical Engineering.
- **A/Prof Wei Hua Ho** joined the Department of Mechanical Engineering.
- **Dr Charles Mokwatlo** joined the Department of Chemical Engineering as a Senior Lecturer.
- **Mr Ayman Abufalgha** joined the Centre for Bioprocess Engineering Research as a Junior Research Fellow.
- **Mr Thomas Chapman** joined the School of Architecture, Planning and Geomatics as a Senior Lecturer.
- **Mr Matthew Church** joined the Department of Electrical Engineering as Chief Technical Officer.
- **Ms Danielle Cloete** joined the Future Water Research Group in Civil Engineering as a Research Admin Officer.
- **Mr Adriaan de Villiers** joined the Department of Mechanical Engineering as a Senior Lecturer.
- **Ms Talisa Fisher** joined the Faculty Office as Postgraduate Administrative Officer.
- **Ms Meghan Ho-Tong** joined the School of Architecture, Planning and Geomatics as a lecturer.
- **Mr Nikheel Joshi** joined the School of Architecture, Planning and Geomatics as a lecturer.
- **Ms Grace Kumwenda** joined the Faculty Office as the Admin Assistant on the Curricula Review Project.
- **Mr Cameron Lesalaise** joined the Department of Chemical Engineering as Technical Officer.
- **Ms Nangamso Lisana** joined the Faculty Office as Senior Secretary.
- **Ms Shakeelah Lottering** joins the School of Architecture, Planning and Geomatics as Postgraduate Administrative Assistant.
- **Mr Phadi Mabe** joined the School of Architecture, Planning and Geomatics as a Lecturer.
- **Mr Billy Mashele** joined the Department of Construction, Economics and Management as a lecturer.
- **Ms Rayaanah Savahl** joined the School of Architecture, Planning and Geomatics as HR Business Partner.
- **Ms Gadija Salie** joined the Faculty as the Dean's PA.
- **Ms Rachelle Schneuwly** joined the Urban Water Management Research Unit as Senior Technical Officer.
- **Mr Abraham Snyders** joined the Department of Chemical Engineering as Chief Technical Officer in the Electronics Workshop.
- **Mr Asnath Tsita** joined the Department of Mechanical Engineering as a lecturer.
- **Ms Anthea Williams** joined the Department of Construction, Economics and Management as the Department Manager.

## RESIGNATIONS

- **Prof Amit Mishra** left the Department of Electrical Engineering.
- **Prof Pieter Rousseau** left the Department of Mechanical Engineering.
- **Dr Thanos Kotsiopoulos** left the Centre for Bioprocess in Engineering Research (CeBER).
- **Dr Reinier Weber** left the Catalysis Research Unit.
- **Ms Itumeleng Likhoele** left the Faculty Office.
- **Ms Lerato Motsepe** left the Department of Chemical Engineering.
- **Ms Belisa Rodrigues** left the Klaus-Jürgen Bathe Leadership Programme.
- **Mr Khaya Salman** left the Faculty Office.
- **Ms Warda Samaai** left the Department of Construction Economics and Management.
- **Mr Jamie-Lee Swarts** left the Department of Construction Economics and Management.


## ACADEMIC AND TECHNICAL STAFF AD HOM PROMOTIONS IN 2024

### ACADEMIC

Lecturer to Senior Lecturer

**Dr Sampath Amarasinghe Danapathi Ara** (Department of Electrical Engineering)

**Ms Heidi Boulanger** (School of Architecture, Planning and Geomatics)

**Dr Stephen Paine** (Department of Electrical Engineering)

Senior Lecturer to Associate Professor

**Dr Anita Campbell** (A.S.P.E.C.T)

Senior Research Officer to Associate Professor

**Dr Liza Cirolia** (School of Architecture, Planning and Geomatics)

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Associate Professor to Professor

**Associate Professor Thorsten Becker** (Department of Mechanical Engineering)

**Associate Professor Jennifer Broadhurst** (Department of Chemical Engineering)

**Associate Professor Kirsten Corin** (Department of Chemical Engineering)

**Associate Professor Kathy Michell** (Department of Construction Economics and Management)

**Associate Professor Malebogo Ngoepe** (Department of Mechanical Engineering)

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### TECHNICAL STAFF – Ad hom promotions

Chief Technical Officer to Principal Technical Officer

**Ms Portia Johnston** (Department of Chemical Engineering)

**Mr Maysam Soltanian** (Department of Electrical Engineering)

### RETIREES

**Associate Professor Martin Harris** (Chemical Engineering)

**Dr Renee Smit** (Electrical Engineering)

**Dr Nien-Tsu Tuan** (Construction Economics and Management)

**Mr George Du Plessis** (Mechanical Engineering)

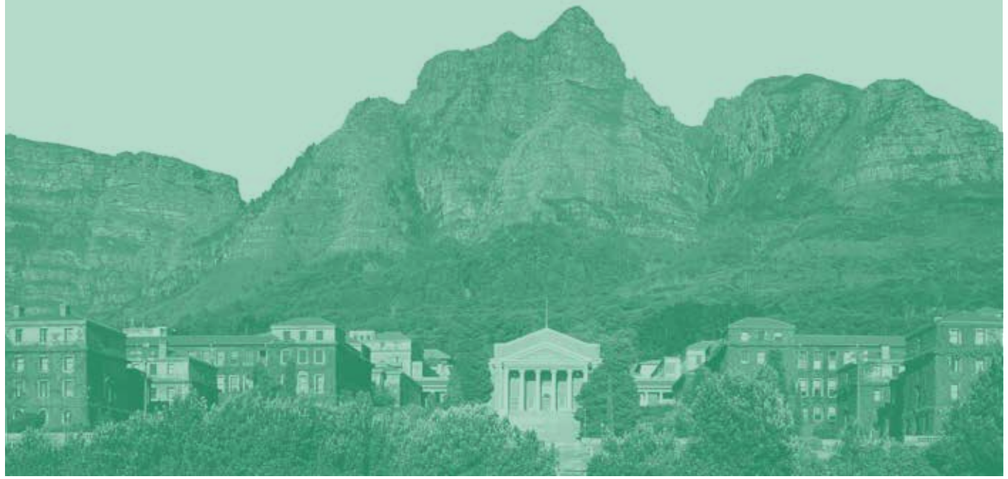
**Ms Naomi Gihwala** (School of Architecture, Planning and Geomatics)

**Ms Shireen Govender** (Chemical Engineering)

**Ms Rosalind Maree** (Mechanical Engineering)

**Ms Heather Sundström** (Chemical Engineering)

**Ms Gita Valodia** (Dean's Office)



## LONG-SERVICE AWARDS (ACADEMIC AND PASS STAFF)

### ACADEMIC

5 years
- Mr Shivasi Mashau, Lecturer, Mechanical Engineering
- Ms Buhle Mathole, Lecturer, School of Architecture, Planning and Geomatics
- Ms Therona Moodley, Lecturer, Professional Communications Studies
- Ms Christine Price, Senior Lecturer, School of Architecture, Planning and Geomatics
- Mr Jarryd Son, Lecturer, Electrical Engineering
- Dr Paul Amayo, Senior Lecturer, Electrical Engineering
- Dr Frank Ametefe, Senior Lecturer, Construction Economics and Management
- Dr Sampath Ara, Lecturer, Electrical Engineering
- Dr Sherry Bremner, Senior Lecturer, Chemical Engineering
- Dr Cecil Madell, Senior Lecturer, School of Architecture, Planning and Geomatics
- Dr John Okedi, Senior Lecturer, Civil Engineering

10 years
- Mr Stefan Geldenhuys, Research Officer, Chemical Engineering
- Ms Sonja Spamer, Lecturer, APG
- Mr Jeremy Woodward, Research Officer, Electron Microscope Unit
- Dr Tokoloho Rampai, Senior Lecturer, Chemical Engineering
- Dr Nien-Tsu Tuan, Senior Lecturer, Construction Economics and Management
- Associate Professor Joyce Mwangama, Electrical Engineering
- Prof Nico Fischer, Chemical Engineering

15 years
- Mr Clinton Hindes, Senior Lecturer, APG
- Dr Tom Sanya, Senior Lecturer, APG
- Associate Professor Sunetra Chowdhury, Electrical Engineering
- Associate Professor Marijke Fagan-Endres, Chemical Engineering
- Prof Denis Kalumba, Civil Engineering
- Prof Sebastian Skatulla, Civil Engineering
- Prof Abimbola Windapo, Construction Economics and Management

20 years
- Mr Fadly Isaacs, Senior Lecturer, APG
- Ms Sofia Papanicolaou, Senior Lecturer, APG
- Dr Mercy Brown-Luthango, Senior Research Officer, APG
- Dr Reuben Govender, Senior Lecturer, Mechanical Engineering
- Associate Professor Alta Steenkamp, HOD, APG
- Associate Professor Simon Winberg, Electrical Engineering
- Professor Nancy Odendaal, APG
- Professor Paul Barendse, Deputy Dean: Research and Strategic Initiative

25 years
- Ms Karen Le Jeune, Senior Lecturer, Construction Economics and Management
- Mr Jason Waters, Research Officer, Chemical Engineering
- Professor Alphose Zingoni, Civil Engineering

30 years
- Professor Eric Van Steen, Chemical Engineering

40 years
- Associate Professor Martin Harris, Chief Research Officer, Chemical Engineering

### PASS AND TECHNICAL STAFF

5 years
- Mr Grant Springle, Senior Technical Officer, Mechanical Engineering
- Ms Yumna Van Der Schyff, Administrative Assistant, Chemical Engineering

10 years
- Ms Denise Botha, Postgraduate Administrative Officer, Mechanical Engineering
- Mr Russell Geland, Technical Assistant, Chemical Engineering
- Ms Lumka Johannes, Administrative Officer, EBE Faculty Office
- Mr Curwin Nomdoe, Workshop and Building Assistant, Chemical Engineering
- Mr Justin Pead, Principal Technical Officer, Electrical Engineering
- Mr Masimthembe Swayiza, Technical Assistant, Civil Engineering
- Mr Michael Woodward, Principal Technical Officer, Electron Microscope

15 years
- Ms Jennifer Breda, Administrative Assistant, Construction Economics and Management
- Ms Vanessa Daries, Senior Secretary, Construction Economics and Management
- Ms Verona Langenhoven, Undergraduate Administrative Officer, Electrical Engineering
- Mr Niven Stanley, Technical Officer, School of Architecture, Planning and Geomatics

35 years
- Mr Sean Karriem, Technical Officer, Electron Microscope Unit

## OBITUARIES

**Staff**

**Richard Drummond**, from the Professional Communication Studies Unit, passed away on 17 August at the age of 62. Born on 27 June 1962, Drummond joined UCT in the 1990s. He had extensive experience in the property, education, environment, advertising and financial industries. At the time of his passing, he was a lecturer in the Professional Communication Studies Unit. The faculty is grateful for all of his contributions to UCT, and the significant impact he made in his areas of research.

**Student**

**Nene Karingi**, a fourth-year Electrical and Computer Engineering student, passed away on 7 June. Karingi joined the faculty in 2021 and was recognised as an academic standout, as reflected by his strong academic record and his progress towards completing his degree. He was well-liked by everyone he encountered, with many describing him as a friendly person who went out of his way for his family and friends.

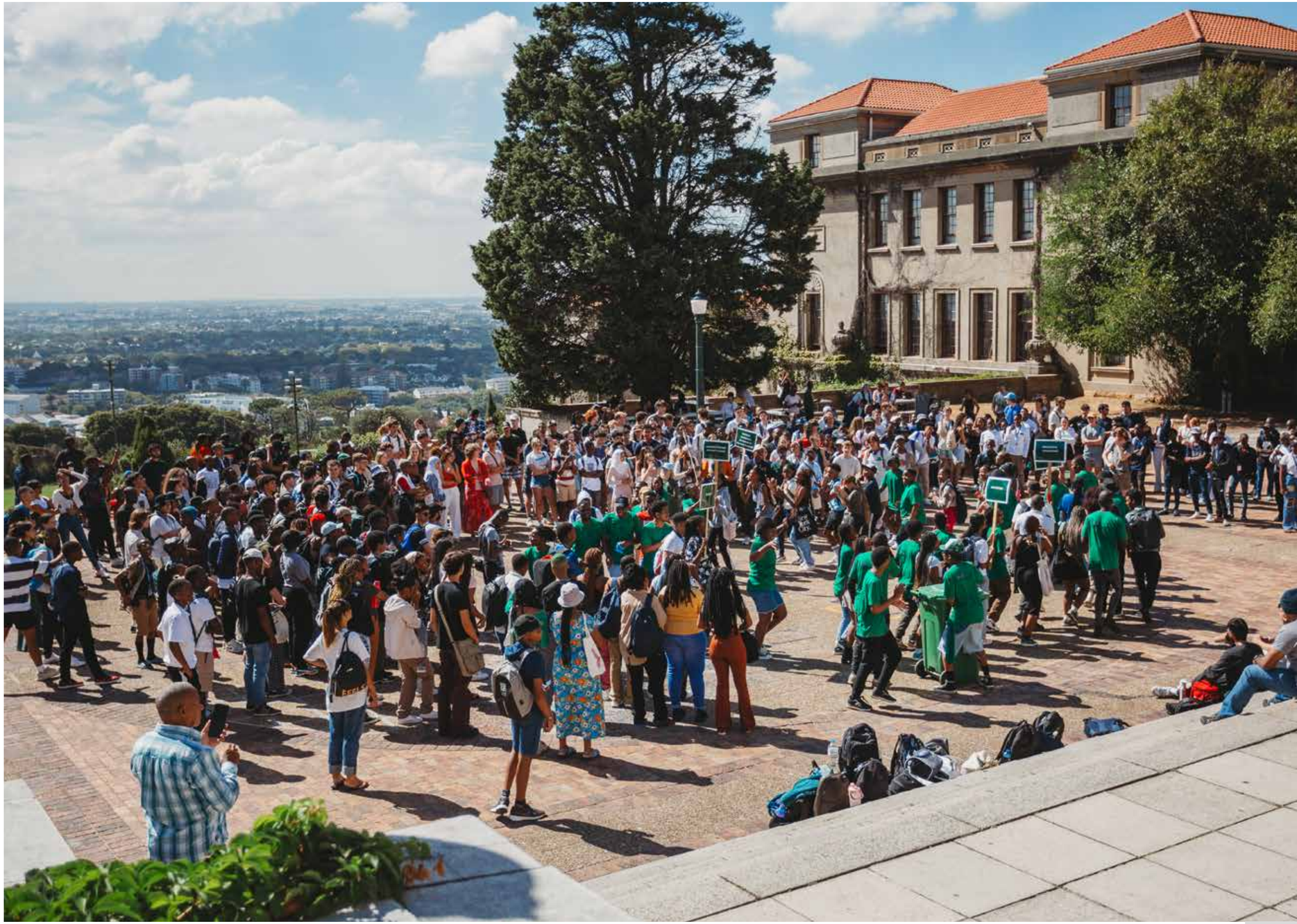
## FACULTY EVENTS AND CAMPAIGNS

**EBE First-Year Orientation**
The EBE First-Year Orientation Programme took place in January and introduced students to the academic, social and cultural environment at UCT. Every year, EBE welcomes hundreds of first-year students onto campus. The orientation programme, led by A/Prof Bruce Kloot and a vibrant group of orientation leaders, ensures that our first-year students feel welcome in the faculty and across their respective departments.

**EBE Welcome Back event**
The faculty held its annual 'Welcome Back to Staff' event early in the year, during which new faculty staff were introduced and colleagues had an opportunity to engage with one another.

**EBE Heritage Day Potjiekos Competition**
The EBE Heritage Day Potjiekos Competition took place in September and was well-attended, with six teams competing. The competition was won by the EBE Faculty Office, followed by the Department of Civil Engineering and Electrical Engineering in joint second place, and CEM in third place.

**EBE Inaugural Fun Day**
The EBE Transformation Committee hosted the inaugural Fun Day event, which was open to all faculty staff and students. The day was filled with exciting activities, games and opportunities to connect. The event provided a platform to reinforce collaboration among faculty staff and students.



**EBE Student Awards Evening 2024**
The annual EBE Students Awards Evening acknowledged outstanding students from the 2023 academic year and featured Zinhle Hadebe as the guest speaker. Congratulations to all the award winners for their excellent academic performance.


Zinhle Hadebe delivering her speech to the attendees.


**LEFT** Prof Alison Lewis with award recipient Lesego Mashego.


**ABOVE** Tammy Matose with Klaus-Jurgen Bathe Scholarship award recipient Takudzwa Matiza.
**LEFT** Naleshnee Reddy from Bain & Company with Bain Merit Award recipient Sam Schlesinger.

**EBE Inaugural Lecture 2024**
Prof Megan Becker delivered her Inaugural Lecture, titled 'Why Minerals Matter: The Role of Mineralogy in the Pursuit of Sustainability'.

***The paradox of mining and sustainability***
Prof Becker acknowledged the inherent contradiction between mining and sustainability. Mining, an industry often associated with environmental degradation, is paradoxically crucial for the materials needed in renewable energy technologies, such as electric vehicles and solar power.

Metals like lithium, copper and nickel are essential components of clean energy systems, and the extraction of these metals is necessary to meet the world's growing demand for low-carbon solutions.

Prof Becker's research focuses on how mineralogical knowledge can help the mining industry operate more sustainably. By understanding the characteristics of the minerals being extracted, mining companies can develop more efficient processing methods, reduce waste and minimise environmental harm.

***South Africa's mining legacy***
As a South African researcher, Prof Becker is acutely aware of the country's mining legacy. South Africa has long been a global leader in extracting valuable minerals – particularly gold and platinum – but this has come at a significant environmental and social cost. In addition to the environmental damage caused by mining operations, South Africa has faced public health challenges, including silicosis, a lung disease caused by exposure to fine mining dust.

Prof Becker addressed these challenges in her lecture, pointing to the need for innovation in the mining industry. She shared examples from her research on platinum group elements and gold mining, highlighting how mineralogical analysis can inform more sustainable extraction techniques. By optimising the extraction process, mining operations can reduce energy consumption, lower costs, and generate less waste.

Her case studies illustrated the potential of mineralogical data to inform decision-making in mining. For instance, by understanding the composition and behaviour of specific minerals, companies can adapt their processing methods to recover more valuable metals while leaving behind fewer hazardous materials.

***Managing mining waste***
One of the most significant issues Prof Becker tackled in her lecture was mining waste management. Mining generates vast waste material, including tailings, which are often stored in large dams. These tailings can pose environmental risks, such as acid mine drainage, which occurs when sulphide minerals in the waste react with water and air to produce acidic run-off that can contaminate nearby water sources.

Prof Becker's research has explored ways to mitigate these risks by "valorising" mining waste; that is, finding new uses for waste materials. She explained that in many cases waste material can be repurposed for construction projects or other industrial uses, reducing the need for new raw materials and preventing the environmental hazards associated with waste storage.


Pictured here are UCT VC Prof Mosa Moshabela, Prof Alison Lewis, Prof Megan Becker and Prof Aubrey Mainza.

**UCT Open Day 2024**

The annual UCT Open Day 2024 was aimed at high school learners in Grades 10, 11 and 12, their families, and their teachers.

This event presented an ideal opportunity to explore the vast range of undergraduate study options that UCT offers.

Faculties, academic departments and support departments participated, and activities included:

- lectures by academic members of staff from the various faculties
- information about financial assistance
- virtual residence tours and information about some of the facilities offered on campus.

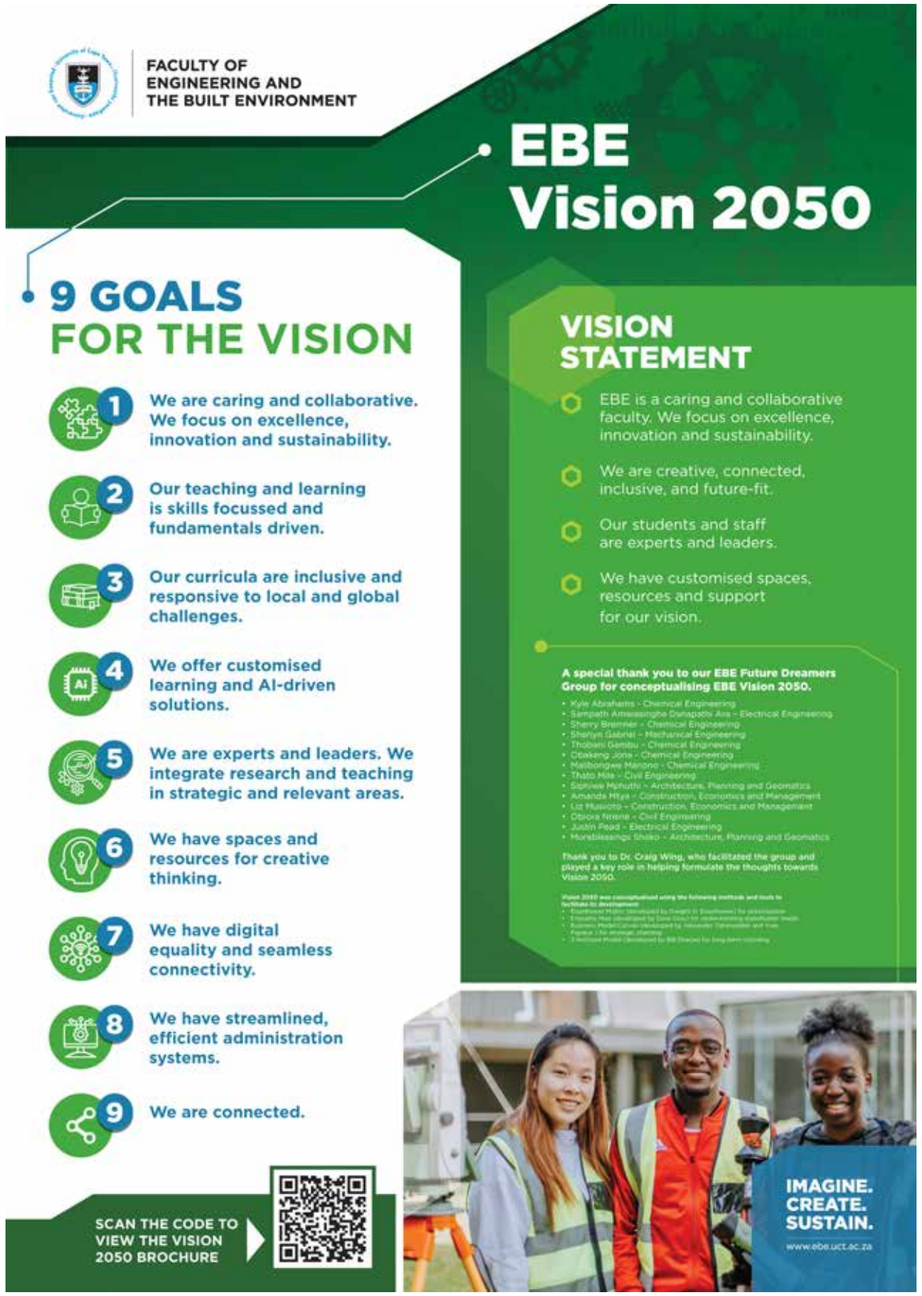
The event was well-attended and a resounding success, providing an ideal opportunity for the target audience to explore the vast range of undergraduate study options offered by UCT and EBE.


**EBE Future Dreamers Programme and launch of EBE Vision 2050**
The EBE 2050 Future Dreamers Programme was initiated as a proactive measure to envision the future landscape of the faculty by 2050. The group, consisting of academic and PASS staff from all EBE departments, was facilitated by Dr Craig Wing and attended a series of workshops to conceptualise goals. This vision was then presented to the faculty at a launch event. As part of the launch, faculty staff received branded lanyards, stickers and posters.

**EBE Transformation Committee Wellness Day**
The EBE Transformation Committee hosted a Wellness Day at the end of November, during which faculty staff were invited to unwind with a free neck-and-shoulder massage. A support coach also conducted a workshop to equip staff with tools and tips for managing year-end stress.

**EBE Dean's Merit List campaign**
At the end of the first semester, the faculty launched a Dean's Merit List sticker distribution campaign to celebrate the first-, second-, and third-year students who made the Dean's Merit List for the 2023 academic year.

The campaign included sending congratulatory emails to recipients and inviting them to collect a limited-edition personalised sticker on a specified day as a token of appreciation. This initiative introduced a new and innovative way for the faculty to engage with students and provide them with a branded item.





# 09 FINANCIAL AND PHYSICAL RESOURCES

## CONTENTS

The financial management of the faculty is the responsibility of the Faculty Finance Manager, Mr Shu'aib Kriel, who reports jointly to the Dean and the university's Executive Director of Finance.

## FINANCIAL SUSTAINABILITY

### GOB

The GOB Budget for 2024 was approved by Council based on the multi-year (2022-2030) Financial Sustainability Plan. The turnaround strategy envisaged by this plan identified key interventions that are essential to securing financial sustainability at UCT. These were as follows:

- improving/ maximising first- and second-stream income by:
  - ensuring we meet or exceed our enrolment target
  - actively encouraging students to take on a full course load
  - improving throughput in both UG and PG
  - ensuring that our SSA returns to pre-2016 levels.
- reducing the current staffing cost by 10% over 5 years
- revising our current financial aid policy.

Although the Financial Sustainability Plan identifies other areas that will contribute to improvements in the overall financial outlook, these were not material enough to attain the required turnaround. The strategies articulated above, if achieved, are the only ones that will change the current trajectory and lead us back to a position of securing financial sustainability, where we can return to the targets as defined by our Council-approved Finance Policy, namely a surplus equivalent to 3% of annual recurrent operating income and maintaining a free cash reserve equivalent to 20 to 30% of annual operating costs. The academic project has and will be further affected should our goals not be achieved over the next five years.

### NON-GOB

NON-GOB activities include the likes of Grant Funding, CPD, Conferences and Workshops, Analytical Services, Student Bursaries, Donations and others not related to the GOB or Research. It is clear from the above that the COVID-19 pandemic severely affected the global economy, which had a direct impact on income-generating activities in 2020 for the faculty. This was especially true for those linked to state funding, which saw grant agreements not renewed and, due to COVID-19 restrictions, many conferences and workshops were either cancelled or held remotely. A significant recovery towards the pre-pandemic status quo on all income-earning activities was recorded in 2021, mainly due to the return to campus, which allowed activities to recommence.

In 2024, revenues returned to pre-COVID averages. While there was an increase in grant funding, donations and services provided to external parties' surpluses built up in prior years meant that significantly less funds needed to be withdrawn from invested funds for operating costs during the year. Sound financial management practices have also been communicated and implemented by departments to ensure the efficient utilisation and investment of funds received and earned.

**RESEARCH**

After being severely impacted by the COVID-19 pandemic in 2020 and 2021, 2022 saw a significant turnaround. In 2024, EBE managed to maintain the significant improvement the Research enterprise experienced, and early indications for 2025 show that the trend will continue. The increased revenue is largely attributable to the fact that research funding is predominantly from foreign sources buffeted by a weaker Rand throughout 2024 – hence the disparity between revenue and costs incurred. While foreign funding is appealing, there is a consequence of increased compliance, due diligence and post-award administration linked to the awards – and should the South African economy and research landscape change for the better, we will not be able to tap into this market, as human capital and infrastructure would be dedicated to long-term foreign contracts.

## Financial highlights

**General Operating Budget funding**

| R'000 | | |
|---|---|---|
| **BUDGET CATEGORY** | **2023 BUDGET** | **2024 BUDGET** |
| STAFF AND RELATED HR COSTS | 2 270 | **2 386** |
| BURSARIES AND SCHOLARSHIPS | 5 | **8** |
| COURSE COSTS AND RESEARCH RELATED | 53 | **53** |
| ADMIN AND OPERATING COSTS | 96 | **97** |
| TRANSPORT TRAVEL AND SUBSISTENCE | 10 | **7** |
| LIB ACQ BOOKS AND JOURNALS | 0 | **0** |
| INFRASTRUCTURE MAINT REPAIRS AND SPACE | 1 094 | **1 171** |
| ASSETS AND CAPITAL PROJECTS | 9 | **8** |
| OTHER COSTS | 122 | **129** |
| DEPREC ASSET DISPOSAL AND CAPITAL PROJECTIONS | 19 | **19** |
| **TOTAL COSTS** | **3 678** | **3 878** |

**Non-General Operating Budget funding**

| R'000 | | |
|---|---|---|
| **CATEGORY** | **2023** | **2024** |
| INCOME | 403 | **418** |
| EXPENDITURE | 503 | **418** |

**Research funding**

| R'000 | | |
|---|---|---|
| **CATEGORY** | **2023** | **2024** |
| RESEARCH INCOME | 3 481 | **3 357** |
| RESEARCH EXPENDITURE | 2 796 | **3 372** |

## MAJOR INFRASTRUCTURE PROJECTS

The Space Allocation Committee (SAC) Capex 2024 funding prioritisation process, facilitated by the the Resource Allocation Advisory Group (RAAG) and the University Finance Committee (UFC), was officially approved and concluded during the December 2023 Council meeting.

Consequently, several projects that may have already received in principle approval, including the EBE Workshop Optimisation project, have been deferred until further notice. During this period, only critical projects will be considered, with approvals granted for the E&M (officially commenced on 10Feb 2025 ) and Menzies (nearing completion, awaiting Fire Chief sign off) Fire Compliance projects. Furthermore, funds have been allocated from deferred maintenance to address roof maintenance issues in the Menzies building, which is still on going.

Due to the ongoing challenge of load shedding, the university will be reallocating resources to ensure sufficient backup power for critical areas and teaching venues.

## ALUMNI IN THE NEWS

### *Mail & Guardian* (*M&G*) 200 Young South Africans

Every year, the *Mail & Guardian* honours young changemakers and influencers who are making an impact in their respective industries. The following EBE alumni have made the list this year:

Tshilidzi Samuel Ramunenyiwa (28) is a project energy engineer at Reonet, which focuses on smarter management of water and energy resources. He focuses on conducting energy audits, as well as designing, developing and implementing energy-efficient systems. He holds an electrical engineering degree from UCT.

Bevan Mongwe (25) holds a BSc in Electrical Engineering from UCT and works for Anglo American Platinum. His practical training involves learning how to use engineering equipment in mines and process plants and shadowing and assisting engineers on site. He is also the co-founder of the Valhuri Community Development Organisation, which teaches learners about the importance of maths and science. He believes the future of engineering is bright in our country and holds myriad employment opportunities for the youth.

Sange Maxaku (27) is the co-founder and chief product officer at Botlhale AI. The UCT BSc in Electrical and Computer Engineering graduate heads product development, focusing on creating solutions that seamlessly integrate African languages. This involves researching user needs, designing user-friendly interfaces, developing code, and overseeing the implementation of the company's language-inclusive product suite.


Chemical engineering PhD candidate and Paralympian Mpumelelo Mhlongo brought home a gold and bronze medal along with two world and Paralympic records from the Paralympic Games in Paris.

Although Mhlongo has competed in two previous Paralympic Games – the first in Rio de Janeiro, Brazil, in 2016; and the second in Tokyo, Japan, in 2020 – this event was particularly memorable for him. And not just because of the medals and records he secured.

Despite the waves that he's made in his disciplines, Mhlongo's journey to the Paralympics wasn't one borne out of an early ambition to become an athlete.

Rather, it was shaped by a desire to over come the stigma surrounding disabilities that's so often rampant in small-town South Africa.

Mhlongo's academic career mirrors his athletic one; not only because of the Paralympian's outstanding achievements, but also how he came to find himself in his field of study.

UNIVERSITY OF CAPE TOWN

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