



College of Agriculture, Engineering and Science | Annual Report 2022

During 2022 the College of Agriculture, Engineering and Science (CAES) continued to contribute significantly towards UKZN's goal of being the Premier University of African Scholarship as well as helping the Institution meet its strategic imperative of excellence in teaching and learning, research, community engagement and targeted internationalisation.



**Professor Fhatuwani
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Deputy Vice-Chancellor
and Head of College
(Acting)

Strategic Objectives

In line with UKZN's strategic plan, the College set out to achieve the following objectives:

- Advancement of technology-enhanced, blended teaching and learning
- Provision of an efficient transitional experience for first-time entry students (First Year Experience Programme)
- Re-designing instructional material online to promote active online learning
- Developing skills in STEM subjects in students in the community
- Academic monitoring and support of students in the College
- Increased third stream research income through industry and governmental partnerships and projects
- Engagement in meaningful and topical research that solves current problems
- Mentorship, nurturing and development of young and emerging researchers
- Infrastructure improvements and upgrades, including the establishment of a Central Analytical Facility
- Increased student registration and fundraising for student bursaries
- Positioning of the College as a hub of science research in Africa through increased relations with other African countries and Universities
- Staffing stabilisation in line with transformation and equity, particularly at professorial level
- A united and improved morale strategy for all College staff, with greater collaboration between disciplines, Schools and the College

Significant Achievements

In the Teaching and Learning sphere, various in-house improvements were made to the way students registered online, including pre-curriculum auditing by Academic Development Officers, and using online forms for change of qualification, change of curriculum, and concessions and exemptions. An efficient First-Year Experience (FYE) programme was launched, including the development of a comprehensive FYE course. Innovative blended learning strategies helped students cope with the digital world. The roll-out of online teaching was supported by a full training plan for staff and students that included the use of technology, advanced Moodle usage, assessment and supportive techniques for academics to embrace the online paradigm. An online practical and tutorial allocation programme was also introduced. The Teaching and Learning website for both staff and students was enhanced as well as the online writing place that helps both undergraduate and postgraduate students with writing skills. The curation of teaching material for online pedagogy was completed in several courses and is ongoing in others.



The curriculum transformation process in the School of Engineering continued, based on the 4th Industrial Revolution. Funded by the JW Nelson Fund the project is being driven by Professor Anne Stark along with the Academic Leader Teaching and Learning and discipline Programme Coordinators.

Within the Research field, the College bagged 22 of the 30 places in the Top 30 most published researchers in the University, who each received well in excess of 1000 PUs, with eight of our researchers coming in the Top 10. In addition, we claimed as our own the Top Published Researcher (Professor Freddie Inambao); Top Published Female Researcher (Professor Colleen Downs); Top 10 Young Published Researchers and Vice Chancellor's Awardees (Dr Jemma Hill-Finch and Professor Lembe Magwaza); and Most Cited Researcher (Professor Yin-Zhe Ma). Congratulations to Professor Fernando Albericio (School of Chemistry and Physics) and Professor Steven Johnson (School of Life Sciences) who again received NRF A ratings for the 2020/2021 cycle.

The College received significant instrumentation for research through the University's Research Development Equipment grant to the value of approximately R7 million. Furthermore, acknowledgement for the highest grant awarded in the College went to Professor Michael Brooks, Dr Jean Pitot and Professor Glen Sneddon who received R20 million from the Department of Science and Innovation for the establishment of the Aerospace Systems Research Institute. This amount was in addition to the R10.45 million received in 2021.

The College held two rounds of very successful University Capacity Development Programme (UCDP) workshops for both emerging academics and postgraduate students. These were well attended and received by both staff and students.

In terms of graduation numbers, the College boasted sustained achievement at Masters and PhD level, awarding 198 MSc and 128 PhD degrees. Some 120 degrees were awarded cum laude and 32 summa cum laude across all degree levels (undergraduate and postgraduate). The annual Postgraduate Research and Innovation Symposium (PRIS) was once again a resounding success as CAES continued to lead the University in showcasing innovative research at the Masters and PhD level.

UKZN's Distinguished Teacher's Award – conferred at the Autumn 2022 graduation ceremony – went to Academic Leader for Chemical Engineering, Professor David Lokhat; whilst SARChI Chair in Waste and Climate Change Professor Cristina Trois received a UKZN Fellowship Award at the same ceremony. Lokhat was also named one of the 20 most influential researchers in chemical and engineering research in Europe, the Middle East and Africa by the Industrial and Engineering Chemistry Research (I&EC Research) journal. Meanwhile, Professors Albert Modi (School of Agricultural, Earth and Environmental Sciences) and Francesco Petruccione (School of Chemistry and Physics) were elected Fellows of the African Academy of Sciences (AAS); and Professors Rituparno Goswami (School of Mathematics, Statistics and Computer Science) and Yin-Zhe Ma (School of Chemistry and Physics) were inaugurated into the Academy of Science of South Africa (ASSAf). Professor Asanda Mditshwa, an associate professor of horticultural sciences at UKZN, was admitted into the South African Young Academy of Science (SAYAS) and Professor Jeff Smithers, Umgeni Water Chair of Water Resources Research and Innovation and Director of UKZN's Centre for Water Resources Research (CWRR), was recognised as a Distinguished International Associate (DIA) by the Royal Academy of Engineering (RAEng) in England.

The College remained committed to Community Engagement during the year, hosting the KZN leg of the 183rd Nobel Symposium in Physics Outreach Programme – which saw the world's leading physicists gather in Africa for the first time – in conjunction with the Nobel Foundation, the Royal Swedish Academy of Sciences and the Stellenbosch



Institute for Advanced Study. CAES also hosted the Fifth Ukulinga Howard Davis Memorial Symposium during which students engaged directly with small scale community farmers under the banner of “Small Scale Farmers and Climate Change Adaptation”. The College contributed significantly to restoration efforts after the devastating KZN floods, hosting a number of online seminars for experts in the field. STEC@UKZN – UKZN’s Science and Technology Education Centre – reached a total of 7 030 school learners through their mobile science laboratory as well as science outreach programmes conducted at the Science Centre. The well-received “What Do Scientists Do?” monthly online public lecture series highlighting research conducted by various members of the faculty continued for the second year running owing to popular demand. Another particularly successful outreach initiative run under the auspices of the Science Centre was the upskilling of 51 cleaning staff via the provision of basic computer literacy courses. And in recognition of the Public Relations division’s successful outreach, the College won Gold at the South African Marketing and Advancement in Education (MACE) annual awards, for its online Registration campaign.

Finally, with the aim of providing sustainable and affordable animal protein to meet the dietary needs of Africa’s growing population, innovative stem cell and skeletal muscle research emerging from the laboratories of biotechnology researchers in UKZN’s School of Life Sciences (SLS) played a key role in the release of Africa’s first cultivated chicken meat. Using an advanced cell culture process, a consortium known as MeatOurFuture (MOF) that included UKZN’s Professor Carola Niesler and postdoctoral researcher, Dr Celia Snyman applied cultivated meat technology to develop a chicken breast prototype in only eight months.

Significant Challenges Encountered and Action Taken to Address Them

The College recognised the challenge of declining enrolment owing to falling STEM marks amongst school leavers, but implemented plans to remedy this trend through school outreach activities, media coverage and innovations such as the introduction of a highly successful and popular matric help line for students in STEM subjects, and the provision of online revision lessons for grade 11 and 12 pupils.

With teaching and learning continuing online during 2022, plagiarism and cheating during online assessments emerged as an area of concern, potentially threatening the integrity of UKZN degrees. Workshops were conducted for staff on academic integrity and the development of robust assessment strategies, and steps were initiated to procure proctoring software. The burnout and alienation experienced by staff and students owing to the stresses of continued online delivery were acknowledged, with support groups set up for students and team-building initiatives implemented for College staff. Extra efforts were made to ensure that lab work and practicals – which traditionally form an integral part of the degree experience within CAES – were delivered timeously in conjunction with online teaching as their absence would have severely compromised effective learning.

Owing to the breakdown in certain pieces of major equipment, the College invested heavily in repairing high-end research equipment to the value of R5 million, thereby ensuring that the necessary infrastructure for research was not compromised.



Plans to Ensure the Future Financial Sustainability and Efficiency of the College

College strategies to ensure future financial sustainability and efficiency include increasing third stream income through funded long-term research projects, such as national and international collaborations; research projects related to industry; and through publications on teaching and learning. Grant writing workshops for both staff and students are in the pipeline to encourage them to apply for national and international grants to support research.

Finally, a College Risk Management strategy for overall College performance in terms of delivery of core business services and mitigation of negative financial impacts, has been developed. Implementation and evaluation of the strategy will be the major responsibility of the Deputy Vice-Chancellor, assisted by other managers across all Schools and divisions of the College. The Line of Sight performance management system will be used to achieve this goal and report to the University leadership.

Recognition and Gratitude

As Acting Deputy Vice-Chancellor, I express my deep appreciation for the resilience displayed by all staff within the College of Agriculture, Engineering and Science. This team of professionals have contributed immensely to the institution, enabling UKZN to retain its place as an innovative leader in teaching, research and community advancement during the 2022 academic year. As an integral part of our truly African University, the College has endeavoured to contribute to South Africa and to the Africa-wide goals on sustainable development.

Despite the continued challenges of COVID-19, staff in the College have worked tirelessly to achieve our strategic objectives to become a centre of excellence, advance opportunities for marginalised communities and participate impactfully in the global knowledge arena. We are so proud of these achievements and we commit to continued improvement in the coming years.

I would like to congratulate the team for making 2022 a year of success.

Professor Fhatuwani Mudau | Deputy Vice-Chancellor and Head of College (Acting)