



College of Agriculture, Engineering and Science | Annual Report 2021



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We all acknowledge the fact that 2021 marked the second year of the global COVID-19 pandemic. The College of Agriculture, Engineering and Science (CAES) rose to this challenge, continuing to contribute significantly towards the institution's goal of being the Premier University of African Scholarship and to meet its strategic imperative of excellence in teaching and learning, research, community engagement and targeted internationalisation.

Strategic Objectives

In line with UKZN's strategic plan, the College set out to achieve a number of objectives in 2021 – (i) produce management plans that are tested for effectiveness, with results to indicate the combined measure of collective management in the College Office and Schools; (ii) identify opportunities for improvement in service delivery at all levels linked to new challenges and opportunities related to COVID-19; (iii) produce a comprehensive profile of performance areas and results of their impact in the College with respect to undergraduate and postgraduate students; (iv) improve College human resources through effective participation in the College and School, generating strategies for staff satisfaction with quality of service; (v) enhance communication of College programmes within and externally to the University so as to build relationships and nurture financial investment; and (vi) generate strategies for high level awareness of operation by College staff and a monitoring system for impact at School and College levels.

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 the Academic Development Officers, using online forms for change of qualification, change of curriculum, and concessions and exemptions. A drive by the Dean of Teaching and Learning, Professor Naven Chetty, in partnership with the UKZN Foundation resulted in the College receiving more than R1.5 million in funding that helped increase enrolment numbers markedly.

Innovative blended learning strategies were introduced to cope with the online 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 introduced. The COVID-19 Responsiveness Grant (CRG) was used for the renewal of the Learn Science Online software to the end of 2022 and the Pearson Mastering software. A Teaching and Learning website for both staff and students was developed and an online writing place to help both undergraduate and postgraduate students with writing skills during lockdown was introduced. A worthy partnership was formed with student leadership, leading to supplemental instruction sessions in isiZulu being run parallel to English sessions in some schools, attracting high attendance.

Within the College, the University Capacity Development Programme (UCDP), which involves the mentorship of young and future academics was deemed a success and funds were awarded to successful applicants amongst those



academic staff pursuing doctoral and Masters degrees. The College implemented the M+ programme with a greater than 80% success rate. And the School of Life Sciences hosted a very successful webinar series aimed at improving teaching and learning, as well as research skills of staff as part of the College's capacity building initiatives.

The School of Engineering introduced an interdisciplinary project to investigate the transformation of the engineering undergraduate curriculum in preparation for the 4th Industrial Revolution (4IR). Funded by the JW Nelson Foundation, the project focused on two important areas: to identify 4IR-relevant skill and competency areas and transform the curriculum to equip graduates to find employment; and to exploit the potential of digitalisation and other aspects of the 4IR in teaching and learning.

Professor David Lokhat from the School of Engineering was awarded a UKZN Distinguished Teacher Award for 2021. The College enjoyed global recognition of its teaching programmes with the disciplines of Geography, Ecology, Physics and Chemical Engineering being ranked favourably worldwide and among the top 10 disciplines at UKZN by the Shanghai 2021 Academic Ranking of World Universities. And the recently established Data Science, and GIS and Earth Observation programmes continued to generate great interest from students and the business sector.

Within the Research field, the College boasted sustained improvement in its graduation numbers at Masters and PhDs level, awarding 263 MSc and 156 PhD degrees respectively. The annual Postgraduate Research and Innovation Symposium (PRIS) was once again a resounding success as CAES continued to lead the University in the showcasing of innovative research at the Masters and PhD level.

Several CAES academics featured amongst the top published researchers at UKZN. National Research Foundation (NRF) ratings for staff improved, with CAES submitting the greatest number of applicants for rating, with 18 renewals and 27 first time applicants. At the 2021 NRF Awards, three of the College's distinguished professors were officially awarded A-ratings in recognition of research excellence and achievements. Professor Steven Johnson, Director of the UKZN Centre for Functional Biodiversity and South African Research Chair (SARChI) in Evolutionary Biology received his third A-rating; Honorary Professor Colin Chapman, an expert in restoration ecology, received his first; and in the School of Chemistry and Physics, Professor Fernando Albericio received his second A-rating in recognition of the quality and scope of his research and its extensive international impact. Professor Albert Modi was elected as a Fellow of the African Academy of Sciences (AAS).

In its most prolific year yet, 2021 saw the Aerospace Systems Research Group (ASReG), which develops indigenous rocket propulsion and launch vehicle technologies, successfully execute two highly challenging experimental test campaigns. Its Phoenix hybrid sounding rocket programme witnessed the successful launch of the the Phoenix 1-B Mk I and Phoenix Mk II-R hybrid rockets, with both rockets reaching altitudes exceeding the previous African hybrid rocket altitude record. In November the team of postgraduate students and staff successfully ground tested its ABLE liquid rocket engine, which serves as the technology foundation of the group's SAFFIRE liquid rocket engine development programme. The performance of the engine exceeded expectations and qualifies it as one of the most powerful liquid rocket engines ever developed by a university, globally.

The Institute for the Development and Dissemination of African Science (IDDAS) boosted interdisciplinary and cross-disciplinary collaboration and produced new research clusters, with an increase in industry partnerships and strategic linkages. This has had the expected impact of solving larger societal problems and producing high end research. Many emerging researchers and students continue to participate in the various IDDAS projects. This has fostered a climate where younger scientists are mentored by more experienced researchers in their disciplines, resulting in



succession planning and human resource capacity development for the different areas of research. A sum of R 2.94 million was allocated to a variety of research projects, including drone technology to deliver medical supplies, utilising non-conventional materials for road construction, water treatment systems, detection of environmental contaminants within the atmosphere and waterways in South Africa, investigating potential preventative and protective roles of dietary therapeutics in medicinal herbal teas, identification of bioactive natural products for cancer, diabetes and HIV, and skills development in STEM education. A further R360,000 was set aside to fund five bursaries to the value of R 72,000 each, one to each of the five Schools where the IDDAS projects are housed.

During 2021 the College remained committed to Community Engagement. The hosting of a successful UKZN World Food Day programme for the second year in a row led to the attraction of national and international partnerships for funding of rural development work into the future by the Department of Science and Innovation's Technology Innovation Agency (TIA), Sustainable and Healthy Food Systems (SHEFS), and the South African National Biodiversity Institute (SANBI). And the acceptance of UKZN membership to the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) led to College participation in African programmes related to fund-raising.

In recognition of the Public Relations Division's outreach programmes, the College won Platinum and Gold at the South African Marketing and Advancement in Education (MACE) annual awards, for its online Open Day and Wonder Women in Science campaigns respectively. Another particularly successful outreach campaign was the Ambassador programme run online in conjunction with the School of Mathematics, Statistics and Computer Science, which exposed school learners to these disciplines and enabled them to interact with industry specialists, lecturers and students in small group settings.

The College continued to set the trend for successful Student Support Services provision online. And in a unique exercise, staff from the School of Engineering contributed to the development of UKZN's new online bursary form. A bursary can now be processed from source to the student's fee account within a couple of minutes.

Significant Challenges Encountered and Action Taken to Address Them

Online teaching introduced a unique set of challenges, including the running of assessments with poor control of plagiarism and cheating. An initial lack of proctoring software had the potential to impede the quality of assessment. The College has subsequently engaged the services of an external provider to develop an intervention for plagiarism.

Working within the parameters of COVID-19, extra efforts had to be 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 severely compromises effective learning.

Reduced access to laboratories and fieldwork, and almost no opportunities for conference attendance was flagged for its potential negative impact on future research productivity and the effect it might have in the short to medium term, on the completion of postgraduate degrees within the minimum period.

Staff working from home inevitably reduced the effective implementation of College strategic plans. Staff and students have both suffered from burnout owing to the stresses of online delivery, and staff resignations have impacted core processes. The staggered return of professional staff to full-time campus presence will reverse this trend.



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, including national and international collaborations. Innovation projects have been identified through the support programmes of UKZN Inqubate, and an application was submitted in partnership with Swansea University to the British Council call for the Centre of Excellence in Innovation and Entrepreneurship, with Professor Bruce Sithole from Chemical Engineering as the Principal Investigator (PI) and Dr Thea van der Westhuizen from the College of Law and Management Studies as co-PI. Other members for CAES are Professor David Lokhat and Dr Alistair Clulow.

The staff return-to-campus process will be optimally managed through an effective roster system leading to full-time return by the end of semester 1 of 2022. An assessment plan to maintain safe and healthy work and teaching spaces continually is in place for regular evaluation in terms of COVID-19 limitations.

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 DVC, 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

The world acknowledges that 2021 will be remembered as the second year of the global COVID-19 pandemic. All of us have been stretched to our limits, as we continue to strive for normality while we respond to the challenges of blended learning and online service provision in an environment that is originally designed for contact learning.

On behalf of the College Management Committee, I commend all staff for bringing a positive attitude to work every day. Staff have worked extra hours - sometimes under very difficult circumstances - in their commitment to service delivery. Away from the comfort of the office and the classroom, staff have been compelled to be innovative in the way they teach, do research and provide administrative and technical support. The College has succeeded together as a team of colleagues and continues to contribute positively to the success of the University. Such a great performance would not be possible without the support of our stakeholders, including funders, external partners and collaborators.

I thank all staff for being my inspiration. The future belongs to the brave. Our hopes and dreams will continue.

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