



College of Agriculture, Engineering and Science | Annual Report 2017

by Professor Albert Modi



Professor Albert Modi
Deputy Vice-
Chancellor and Head
of College (Acting)

The College started 2017 with acting appointments in leadership positions. But this did not deter students and staff from ensuring that the college goals were achieved. The 2017 academic year was focused on teaching, learning, research and outreach with no disruptions to the activities. It was an opportunity to regroup and refocus after several disrupted years.

Awards and Achievements

In 2017, the College staff and students continued to excel through national and worldwide recognition of awards in a variety of activities.

Top undergraduate achievers across the five schools were acknowledged at two award ceremonies held in Durban and PMB. Increased support from the industry towards the prizes.

College of Agriculture, Engineering and Science won Gold and the trophy for the best individual stand at the 2017 Royal Show. Run in conjunction with the second Ukulinga Howard Davis Memorial Symposium, the stand showcased research done within the School of Agricultural, Earth and Environmental Sciences in the fields of climate change and food security.

Professor Albert Modi received the International Alumni Award from the College of Food, Agricultural and Environmental Sciences at the Ohio State University in the United States. This award is presented annually to outstanding international agriculture alumni representing, supporting and promoting the College and the Ohio State University around the globe.

Top Masters Physics student, Ms. Zahra Essack accepted to undertake PhD studies at the Massachusetts Institute of Technology.

Two UKZN representatives, [Dr Mark Williams-Wynn](#) (Postdoctoral Fellow, Thermodynamics Research Unit) and [Dr Nolwazi Nombona](#) (Lecturer, School of Chemistry and Physics), were selected by the Academy of Science of South Africa (ASSAf) and the African Academy of Science (AAS) respectively to attend the 67th Lindau Nobel Laureate Meeting in Germany.

Professor Rob Slotow [was awarded a UKZN Fellowship](#) in recognition of his distinguished academic achievement and contribution to his field of Ecology.

Professor Deresh Ramjugernath, [was awarded a Fellowship](#) of the University of KwaZulu-Natal in recognition of his distinguished academic achievements and contributions to the University both in his field of Chemical Engineering and more wide.

Five academics from the College of Agriculture, Engineering and Science (AES), [were recognised](#) for their passion and dedication towards educating and inspiring greatness in their students. The academics, one from each School within the College, walked away winners at the Distinguished Teacher Awards Ceremony held at UKZN's Pietermaritzburg campus. The awards recognise excellence in teaching and learning. The winners included Dr Lloyd Baiyegunhi, Dr Alan Matthews, Dr Mulemwa Akombelwa, Professor Dean Goldring and Dr Faraimunashe Chirove.

Professor Colleen Downs, [was named as a finalist](#) for three of the 13 highly acclaimed National Science and Technology Forum (NSTF)-South32 Awards, and was selected as second runner-up for the 2017 Distinguished Woman Researcher Award in the category of Natural (Life and Physical) and Engineering Sciences.



Professor Colleen Downs [received the Zoological Society of Southern Africa's Gold medal](#) in recognition of outstanding contributions to the Zoology over an individual's lifetime during its biennial congress.

Professor Ursula Scharler of the School of Life Sciences [was appointed Chairperson](#) of South Africa's new National Member Organisation (NMO) of the Austria-based International Institute of Applied Systems (IIASA).

Professor Onesimo Mutanga, Acting Dean and Head of the School of Agricultural, Earth and Environmental Sciences (SAEES) and Dr John Odindi, senior lecturer in Geography, [were recognised](#) as being among the best scientific contributors in Africa in a publication launched at a celebration of Africa Day, by the Minister of Science and Technology Naledi Pandor in Freedom Park in Pretoria.

Professor Albert Modi, the acting Deputy Vice-Chancellor of the College of Agriculture, Engineering and Science (CAES), was [elected Deputy Chairperson](#) of the National Agricultural Research Forum (NARF).

UKZN's Science Centre Co-ordinator, Dr Tanja Reinhardt (aka "Dr T") [scooped the prize](#) for the Best Workshop at the Grahamstown National Science Festival.

The Dean and Head of the School of Engineering at UKZN, Professor Cristina Trois, [received the Premio Navicella Sardegna](#) award from the Sardegna Oltre il Mare Association. The award is conferred on Sardinians living abroad who have, through their work, brought attention and recognition to the region of Sardinia and its culture.

Dr Joyce Chitja of the African Centre for Food Security (ACFS) in the School of Agricultural, Earth and Environmental Sciences (SAEES) [was appointed](#) Deputy Chairperson on the board of the Agricultural Research Council (ARC) for a three-year term.

Professor Emeritus Rob Hart of the School of Life Sciences (SLS) [was awarded a Gold Medal](#) from the Southern African Society of Aquatic Scientists (SASAqS) in recognition of his exceptionally high standard of research in the aquatic sciences and contributions to the field, specifically contributions to planktonic biota.

Masters candidate in Agrometeorology in SAEES, Mr Adesegun Quam Popoola, was one of 10 young professionals in South Africa [selected as a recipient](#) of a 2016/17 GreenMatter Fellowship Award.

Dr Yaseera Ismail, a postdoctoral researcher at UKZN's Centre for Quantum Technology, became the first South African [to be selected](#) as an Ambassador of the Optical Society of America (OSA).

Dr Kenda Knowles, a postdoctoral researcher from UKZN's Astrophysics and Cosmology Research Unit (ACRU,) [was awarded a Postdoctoral Fellowship](#) by the L'Oréal-UNESCO for Women in Science sub-Saharan Africa programme.

CAES honoured top female scientists from 5 schools at the Wonder Women in Science (WWIS) breakfast.

Research

The College continued to maintain its longstanding position as the leading College in research production in the University. The College support for research in 2017 included bursaries to the tune of R1.2 million, which supported a total of 51 postgraduate students (34 Masters and 17 PhD students). The College also spent R228 000 providing support to 21 postgraduate students and Postdoctoral Scholars, as well as 5 academic staff to attend both local and international conferences. The total amount spent to support Postdoctoral Scholars was R11.7 million.

The College of Agriculture, Engineering and Science (CAES) at UKZN hosted its seventh annual [Postgraduate Research and Innovation Day](#) on the Westville campus attracting more than 700 participants including presenters, exhibitors, judges,



academics, students and guests. Sixty-five percent of those in attendance were students - a new record for the CAES. The bumper programme included an Arts Meets Sciences exhibit, a competition featuring creations inspired by Science, and an InQubate-hosted Innovation Stream event to inspire students to aim for innovation beyond academia. CAES students delivered 60 platform presentations and 180 poster presentations during the day.

UKZN's College of Agriculture, Engineering and Science (CAES) once again made a significant contribution to South Africa's much-needed brain pool of highly-qualified Science, Technology and Engineering specialists, awarding an impressive 128 PhDs out of a university total of 350 during this year's Graduation ceremonies. The College's PhD total of 128 is a noteworthy increase over previous years with 117 PhDs being awarded in 2016, 106 in 2015, 98 in 2014, 76 in 2013, 77 in 2012 and 69 in 2011.

UKZN's African Centre for Crop Improvement (ACCI) produced a bumper crop of 14 doctoral candidates at the 2017 graduation ceremony.

The Durban Research Action Partnership (D'RAP), a joint initiative between the eThekweni Municipality and the University of KwaZulu-Natal, [was officially launched](#) at a workshop held at the Durban Botanical Gardens. The partnership is building capacity and increase limited knowledge in key areas related to the environment in the eThekweni Municipality region. More than 20 UKZN academics are involved; it has thus far helped graduate 29 students, with more than 16 postgraduate students currently undertaking research.

A team from the London School of Hygiene and Tropical Medicine (LSHTM) and the University of KwaZulu-Natal (UKZN) [hosted a launch workshop](#) for the Sustainable and Healthy Food Systems (SHEFS) programme, a new interdisciplinary research partnership being driven by nine international partners.

UKZN [hosted the second annual](#) Ukulinga Howard Davis Memorial Symposium at its Ukulinga Research Farm in Pietermaritzburg on the topic of Food Security, and welcomed more than 200 attendees from academia to government to industry, and were addressed by national and international leaders in the field.

Professor Colleen Downs [was awarded](#) a Trilateral Research Chair through an initiative jointly funded by Canada's International Development Research Centre (IDRC) and South Africa's National Research Foundation (NRF).

The University of KwaZulu-Natal [congratulated its top performing researchers](#) for 2016. Of the 30 researchers honoured, 16 are based in the College of Agriculture, Engineering and Science, where they are conducting important research in the Schools of Chemistry and Physics (SCP), Life Sciences (SLS), Mathematics, Statistics and Computer Science (SMSCS), Engineering, and Agricultural, Earth and Environmental Sciences (SAEES).

The University Ranking by Academic Performance (URAP) for 2016-17 ranked 16 South African universities amongst 2 500 Higher Education Institutions (HEI) across the world, and [placed the University of KwaZulu-Natal at the top](#) of the pile in the Physical Sciences, Chemical Sciences, Chemical Engineering and Engineering field rankings for South Africa. UKZN retained its same overall position based on previous rankings by URAP, and gained places in the field of Physical Sciences.

The Director General of the National Astronomical Observatory China (NAOC) Professor Jun Yan visited UKZN during which he [signed a Memorandum of Agreement](#) (MOA) with Vice-Chancellor and Principal, Professor Albert van Jaarsveld.

SAEES [hosted a launch workshop](#) on the Westville campus to commemorate the signing of Memoranda of Understanding (MoU) between UKZN and the South African Weather Service (SAWS), and SAWS and Umgeni Water (UW).

Professor Thomas Konrad from the School of Chemistry and Physics (SCP) and Centre for Quantum Technology [was part of an international team](#) of researchers that published research in Nature Communications detailing the first simultaneous teleportation of many pairs of light modes between two locations.

[Innovative research](#) on how white rhinoceroses utilise olfactory communication, transmitting key information via the odours of their dung, by PhD graduate Dr Courtney Marneweck, made international headlines in National Geographic news, Nature, the Canadian Broadcasting Corporation (CBC), the British Broadcasting Corporation (BBC), the Los Angeles Times, Spiegel Online, Live Science and Digital Journal.

UKZN researchers [were in action during World Water Day](#) events held at the Inkosi Albert Luthuli International Convention Centre (ICC) in Durban. Featured was the launch of the 2017 World Water Development Report, making this year an international occasion. The Centre for Water Resources Research (CWRR), the Pollution Research Group (PRG) and academics within the Schools of Agricultural, Earth and Environmental Sciences, Engineering, and Built Environment and Development Studies attended.

An article on quantum entanglement in the Journal of Optical Society of America B by post-doctoral Fellow at UKZN's Centre for Quantum Technology, Dr Yaseera Ismail, [was selected as the editor's pick](#).

The UMtate WamaBovu project of the UKZN Enactus team introduced an innovative App called Kandu which they believe is the solution to many problems faced by farmers in uMsinga in KwaZulu-Natal. This innovation [won the UKZN team](#) a place on the shortlist of eight finalists competing in the Barloworld Social Innovation Youth Awards (BSIYA).

The Pollution Research Group (PRG) in UKZN's School of Engineering [hosted a delegation](#) of Bill & Melinda Gates Foundation (BMGF) representatives and a select number of their grantees for a visit to kick-start a programme initiated in 2016, which involves the engineering field testing of "Reinvented Toilet" prototypes in Durban. They later hosted [field visits to their research sites](#) as part of two international workshops hosted by the International Organisation for Standardisation (ISO) and the South African Bureau of Standards (SABS).

UKZN's Centre for Water Resources Research (CWRR) and its collaborators [hosted two delegations](#) of North Sudanese water resources managers and decision makers as part of a United Nations Environment Programme (UNEP) small project agreement. The visits were aimed at contributing to the strengthened capacity of North Darfur institutions to support, scale up and replicate successful approaches to catchment management. The gatherings benefitted from UKZN's expertise and experience in Integrated Water Resources Management (IWRM), as well as its ability to facilitate training in this field.

The SAIEE-EECE [Research day was held](#) at the Smart Grid Centre at the Westville campus. The event was a joint initiative between the South African Institute of Electrical Engineers (SAIEE) and the Discipline of Electrical, Electronic Engineering and Computer Engineering (EECE) from the School of Engineering at UKZN.

At the [Electrical, Electronic and Computer Engineering \(EECE\) Open Day](#), around 100 individual final-year projects were on display, and students were on hand to explain and demonstrate their innovative designs to parents, fellow students and members of the general public. The projects form the pinnacle of the design activities in the EECE four-year degree programmes and also serve as a test of each student's ability to survive as a design engineer.

Fountainhill Estate (FHE) [hosted its annual two-day research symposium](#) to disseminate the findings and purpose behind research being conducted at the estate. The estate avails its facilities to the University of KwaZulu-Natal (UKZN) for the facilitation of research.

The Institute of Natural Resources (INR) and the University of KwaZulu-Natal (UKZN) celebrated [the signing of a Memorandum of Understanding](#) (MOU) between the two institutions, formalising a relationship that has stretched back almost thirty years.



[Mechanical Engineering Open Day](#) showcasing 21 student designs a resounding success. Projects included the Smart House project designed to operate cost-effectively and entirely off the grid by utilising solar energy for heat, light and electricity.

UKZN's Mr Trevor Lorimer from Electrical Engineering and former UKZN Professor, Edward Boje, were [invited to Japan](#) by the Tokyo Electric Power Services Company (TEPSCO), a subsidiary of the Tokyo Electric Power Company (TEPCO), to showcase their cable line inspection robot technology.

Postgraduate student Mr Sulaiman Patel won a Best Paper Award at the annual Southern Africa Telecommunication Network Application Conference (SATNAC) 2017. SATNAC is among the leading annual information and communication technology conferences in Africa.

The UKZN node of the National Astrophysics and Space Science Programme (NASSP) organised a four day tour for Honours and Masters students of the research facilities in the Western and Northern Cape provinces.

Teaching and Learning

Teaching and learning in the College continued to take centre stage in the daily activities of the Teaching and Learning Committees of the different Schools. In 2017 the College exceeded its overall enrolment target, both in undergraduate and postgraduate numbers. The total number was 7987 for undergraduate and 2429 for postgraduates, against targets of 7540 and 2269 respectively. The total number of Postdoctoral Scholars was 186.

The College held five ceremonies, three in Westville and two in Pietermaritzburg, graduating a total of 2042 students which was a significant increase from 2016. This comprised 128 PhDs, 299 Masters, 333 Honours and 1240 Bachelors' degrees, as well as 42 Postgraduate diplomas.

Among the high achievers to enrol at CAES was Mr [Ndumiso Ndamane](#), who matriculated from Umlazi Comtech in 2016 achieving full marks in Mathematics and Physical Science; he joined the Discipline of Electrical Engineering at UKZN's School of Engineering.

UKZN's School of Engineering [has established the AfriHub](#) to act as a trans-disciplinary centre for research into smart and sustainable cities. AfriHub aims to pursue projects which are entrepreneurial, innovative and growth oriented.

UKZN lecturer Dr Alaika Kassim, who graduated with a PhD in Agricultural Engineering, was the first female agricultural engineer to be appointed a lecturer in the Discipline of Bioresources Engineering at UKZN.

Dr. Nontobeko Mvubu who holds a PhD in Microbiology became the first Talent Excellence and Equity Acceleration Scholarship candidate to be appointed as a lecturer at the University.

The Discipline of [Statistics](#) in the [School of Mathematics, Statistics and Computer Science](#) (SMSCS) hosted the first three-day Advanced Multilevel Modelling in Biostatistics workshop on the Pietermaritzburg campus. This workshop formed part of the [Wellcome Trust's Developing Excellence in Leadership, Training and Science](#) (DELTA) [sub-Saharan Africa Consortium for Advanced Biostatistics](#) (SSACAB).

The Marine Biology, Aquaculture, Conservation Education and Ecophysiology (MACE) laboratory at the [School of Life Sciences](#) featured strongly in a session devoted to microplastics and the danger they pose to marine life at the [Symposium for Contemporary Conservation Practice](#) (SCCP). The SCCP explored the practice, science and value of nature conservation, and charted a renewed path towards addressing conservation challenges of the current era. SCCP aims to develop synergies between conservation implementation and research.



Community Outreach

The UKZN chapter of the Siyanqoba Maths Training Programme, coordinated by Professor Emeritus Poobhalan Pillay [ran a selection](#) with 153 learners from 27 schools from Grades 7 through 11. The programme to train up to 100 learners for the SA Maths Olympiad forms part of the Department of Science and Technology (DST)-funded initiative in collaboration with the South African Mathematics Foundation (SAMF), which enriches learners' experience of mathematics and enhances South Africa's international competitiveness in STEM.

The KwaZulu-Natal Chapter of the Young Water Professionals (YWP) [embarked on a career roadshow](#) aimed at raising awareness on potential careers in the water sector. The roadshow coincided with National Water Week which was celebrated from 20 to 26 March.

UKZN's School of Life Sciences [celebrated World Oceans Day](#) with an event arranged by Marine Biology PhD candidate and founder of the Refilwe Matlotlo environmental organisation, Ms Refilwe Mofokeng.

Masters candidate in SAEES, Mr Kusasaletu Sithole, [established](#) the International Association for Impact Assessment South Africa (IAIASa) Student Mentorship Programme (ISMP) aimed at assisting Environmental Science graduates.

CAES staff member Dr Hsin "Cynthia" Chiang and student Ms Joan Akob speak at the [first TEDx Talk](#) held in Pietermaritzburg.

The AgriGroomers student group based at the Cedara College of Agriculture [hosted a Business Connect event](#) at the College's Centenary Complex to celebrate Student Entrepreneurship Week. More than 150 students, lecturers, businesspeople and farmers attended the event, aimed at encouraging students to pursue entrepreneurship as a career option.

[A visit by students](#) in UKZN's Discipline of Construction Studies to the Lakehaven Child and Youth Care Centre in Durban elicited smiles, gratitude and hope for 60 children living there.

The Umjikelezo We-Science collaboration recently held a roadshow in the Hammarsdale, Tongaat and Umbumbulu areas to further its mission of taking Science to rural Kwazulu-Natal. The three hour daily roadshow programme, held from 5 to 7 September, reached up to 2 100 learners.

Leading KwaZulu-Natal scientists and academics, drawn from a range of scientific disciplines, [came together with civil societies and citizens in a March for Science](#). The march was held in Durban's city centre on Saturday 22 April. UKZN Science Centre's Dr Tanja Reinhardt (aka Dr T) was on hand to woo both the young and old with her popular science show highlighting the wonders of science.

More 4000 grade 11 and 12 learners from mainly quintile 1, 2 and 3 schools in the eThekweni attended Science, Technology, Engineering and Mathematics Careers Symposium. The symposium was organised by the Human Settlements, Engineering and eThekweni Transport Authority and Trading Cluster with CAES.

Discipline of Chemistry hosted 74 young learners and their teachers from Msinga's Mawele High School as part of an initiative to promote the study of Chemistry.



Campus Development

A successful bid by Professor Annegret Stark led to UKZN being awarded equipment to advance scientific research and teaching through Seedling Labs 2017 Instrumental Access programme. Stark holds the Sugar Milling Research Institute Chair in Biorefinery. The equipment will be used by Stark's Bioeconomy Research Group, in the Department of Chemical Engineering.

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