Faculty is positioned to meet the challenges of a knowledge economy

The Faculty of Engineering, Built Environment and Information Technology is a leading source of locally relevant and internationally competitive programmes at both undergraduate and postgraduate levels. Its School of Engineering is ranked among the top 1% of engineering schools in the world and it will be celebrating 60 years of world-class tuition in 2016.

The Faculty attracts high-quality students and staff, and offers extended programmes to facilitate inclusiveness. It is well resourced in terms of teaching and research facilities, and houses several research chairs, centres and institutes. It maintains close links with industry, which supports both teaching and research programmes. The Faculty's multidisciplinary nature facilitates interaction across disciplines in both teaching and research activities.

Over the past 15 years, the Faculty has witnessed a remarkable growth in stature, both in terms of student numbers and the diversity profile of its student corps. From about 6 000 students in 2010, the Faculty now has close to 12 000 students (of which almost 30% comprises postgraduate students), effectively doubling its student population over the past five years. In the process, it can make a direct contribution to human capital development in the scarce skills that are so desperately needed in this country. The composition of the Faculty has also changed over the years to be more representative of the country's population. More than half the students in the Faculty are from designated groups, and the Faculty's gender profile is also improving.

The Faculty's engineering programme is ranked in the top 1% in the world according to the Thomson Reuters ISI Web of Science.

Its positioning as a faculty of choice among learners, postgraduate students, parents and industry is enhanced by the ranking of its engineering programme in the top 1% in the world according to the Thomson Reuters ISI Web of Science. It has also been the highest ranked among all South African engineering schools for the past five years.

Academic programmes

The Faculty comprises four schools: the School of Engineering, the School for the Built Environment, the School of Information Technology and the Graduate School of Technology Management.

The School of Engineering offers both undergraduate and postgraduate programmes in chemical engineering, civil and biosystems engineering, electrical, electronic and computer engineering, industrial and systems


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engineering, materials science and metallurgical engineering, mechanical and aeronautical engineering, and mining engineering. Its undergraduate programmes are all accredited by the Engineering Council of South Africa (ECSA).

The School for the Built Environment is the largest of its kind in the country. Undergraduate and postgraduate degrees are offered in architecture, landscape architecture, interior architecture, quantity surveying, construction management, and town and regional planning. At postgraduate level, the School offers both honours and master's degrees in architecture, interior architecture and landscape architecture, as well as a master's degree in town and regional planning. Doctoral degrees are also offered.

The School of Information Technology is a unique institution for tertiary education in the field of information technology. Established in April 1998, it consists of the departments of Computer Science, Informatics and Information Science. Close links also exist with the Faculty's Department of Electrical, Electronic and Computer Engineering. The integration of the three academic departments in one school has brought considerable advantages for the programmes offered.

The Graduate School of Technology Management (GSTM) presents post-graduate programmes in the Department of Engineering and Technology Management. These internationally recognised development programmes are offered at honours, master's and doctoral level, and address different needs in the fields of technology management, project management, engineering management and asset management. The increasing complexity of engineering systems and activities, the scope and sophistication of resources, as well as advances in technology, have all been driving forces in the evolution of engineering and technology management as a globally evolving new discipline.

The Faculty's commitment to academic and research excellence is supported by facilities and equipment of the highest quality.

Research focus

Research and postgraduate studies are regarded as core activities of the Faculty. The research outputs of its postgraduate students and research staff have increased steadily over the past few years, making it the second-highest producer of journal article units in the University.

Almost 22% of its academics have been rated by the National Research Foundation (NRF), and it boasts three A-rated researchers: Prof Brian Rand, Chairholder of the South African Research Chairs Initiative (SARChI) Chair in Carbon Technology and Materials, Prof Xiaohua Xia, Director of the Centre of New Energy Systems and of the National Hub for Postgraduate Programme in Energy Efficiency and Demand-side Management, and Prof Andries Engelbrecht, Chairholder of the SARChI Chair in Artificial Intelligence and Head of the Department of Computer Science.

The Faculty's research activities have seen significant growth over the past few years with the establishment of several new research institutes, as well as SARChI and industry-sponsored research chairs. These include the Sasol Mining Resilience Research Institute, the SARChI Chair in Advanced Sensor Networks and the Council for Scientific and Industrial Research (CSIR) Chair in Aeronautics. Some of the Faculty's existing chairs are proud to receive ongoing support from industry. The sponsorship by Transnet of the Transnet Chair in Railway Engineering, for example, celebrated 23 years of collaborative training and research in 2015, while the Sentech Chair in Broadband Wireless Multimedia Communications (BWMC), which was launched in 2006, has received funding from its sponsor for a further four years. (See article on page 34.)

Key research clusters in the Faculty that provide multidisciplinary research opportunities and are focused on addressing national, regional and global challenges include digital opportunities and data science, energy, intelligent transportation, water resource management, and mining and minerals beneficiation.

World-class facilities

The Faculty's commitment to academic and research excellence is supported by facilities and equipment of the highest quality. Developments over the past five years that have contributed to enhancing the University's ability to train an increasing number of engineers to meet the critical national shortage of these important skills have included the Engineering 3 Building on the Hatfield Campus and the Mining Industry Study Centre at the entrance to the Engineering 1 Building.

An innovative new development is the Kumba Virtual Reality Centre for Mine Design, which was launched on 4 August 2015.

This centre in the Department of Mining Engineering will provide students with a realistic and immersive experience of the possibilities, limitations and challenges

→ *The Faculty attracts high-quality students and staff, and offers extended programmes to facilitate inclusiveness.*

of mine design; not only from a research perspective, but also in industry. It enables high-risk scenarios to be simulated in a safe and controlled environment where the consequences of any unsafe act can be powerfully demonstrated without causing any actual loss of life or damage to property.

A number of state-of-the-art laboratories and other research and training facilities are housed in the Engineering 1, 2 and 3 buildings and at other locations in close proximity to the lecture halls of the Faculty's programmes in engineering, built environment and information technology.

These include the Centre for Electromagnetism, the Institute of Applied Materials, the Carl and Emily Fuchs Institute for Microelectronics, and the Geotechnical Centrifuge Laboratory in the Department of Civil Engineering.

Meeting the challenges of a knowledge economy

According to Prof Sunil Maharaj, Dean of the Faculty of Engineering, Built Environment and Information Technology, the Faculty is in a strong position nationally, and is making a distinct impact in the country, not just in terms of human capital development, but also in the type of projects in which it is involved.

For example, researchers in the Department of Chemical Engineering are developing a fast pyrolysis unit that will be able to produce fuel from agriculture and forestry waste (see article on page 9), while in a project initiated in the Department of Civil Engineering, the Faculty was instrumental in launching South Africa's first small conduit hydropower facility in Bloemfontein (see article on page 59).

Industry partnerships

The Faculty's research agenda must continuously address the country's challenges and opportunities by strengthening partnerships with business and government.

This is illustrated by the signing of memoranda of understanding (MoUs) with various industry partners in support of training and research. Examples include an agreement signed with the CSIR for the establishment of a Chair in Aeronautics at the University of Pretoria in January 2015 (see article on page 27), a collaboration agreement signed with the Australian Institute of Building in April 2015 (see article on page 160), the establishment of the SARChI Chair in Advanced Sensor Networks in January 2015 (see article on page 33) and the launch of the South African Chapter of the Construction Industry Institute (CII) in May 2015 (see article on page 136).

As part of his vision for the Faculty, Prof Maharaj has identified the need to continuously attract and retain the top performers in our schooling system from across the country, as well as to attract and encourage more students to pursue postgraduate studies. This is vital if we are to take South Africa further into the knowledge economy.