EVERYTHING YOU NEED TO KNOW ABOUT PREPARING FOR A GREAT CAREER IN THE FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT
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The Faculty of Engineering & the Built Environment (EBE) at UCT enjoys an outstanding international reputation for its high quality graduates and for its groundbreaking research.

This brochure will provide you with information that will help you make an informed choice about which programme to study and the career options that will be available to you once you have graduated.

Our degrees are internationally accredited and enable graduates to compete on equal terms with their peers all over the world. We also ensure that these degree programmes are responsive to the exciting challenges facing our developing nation.

Should you require further information please contact our Faculty Office at email ebe-faculty@uct.ac.za, telephone (021) 650-2699 or visit www.ebe.uct.ac.za for more information.

THE BUILT ENVIRONMENT DISCIPLINES

**Architecture, Planning, and Geomatics**

*Undergraduate degree programmes:*
  - Architectural Studies (BAS)
  - Geomatics Streams (BSc Geomatics)
  - GeoInformatics
  - Surveying
  - Planning (BSc Geomatics after four years and MCRP after five years)

**Civil Engineering**

*Undergraduate degree programme:*
  - Civil Engineering (BSc(Eng))

**Construction Economics and Management**

*Undergraduate degree programmes:*
  - Construction Studies (BSc)
  - Property Studies (BSc)
Chemical Engineering
Undergraduate degree programme:
• Chemical Engineering (BSc(Eng))

Electrical Engineering
Undergraduate degree programmes:
• Electrical Engineering (BSc (Eng))
• Electrical and Computer Engineering (BSc(Eng))
• Mechatronics (BSc(Eng))

Mechanical Engineering
Undergraduate degree programmes:
• Electro-mechanical Engineering (BSc(Eng))
• Mechanical Engineering (BSc(Eng))

The School of Architecture, Planning, and Geomatics offers nationally and internationally accredited degree programmes that give graduates access to career opportunities in many built environment professions.

What does architecture entail?
The study and practice of architecture involves the design of buildings and their associated places, and incorporates aesthetic, theoretical, and practical concerns. Architects have to engage with an interconnected range of issues: social, cultural, developmental, contextual, and environmental. In order to graduate with a professional qualification in architecture, a student would need to complete a Bachelor of Architectural Studies and then the Bachelor of Architectural Studies (Honours) before doing a Master of Architecture (Prof).
What does geomatics entail?
Geomatics is a varied discipline in which geographical information systems, remote sensing, and surveying are the three broad areas of specialisation.

To excel in this field, you will need a mathematical, scientific, and technical aptitude combined with an interest in geography and the environment. It is also an ideal career for people who enjoy the idea of working outdoors. You will work with sophisticated electronic equipment and computers and be involved in the areas of land development, environmental management, and/or engineering projects.

Bachelor of Architectural Studies
A general, design-based first degree, the Bachelor of Architectural Studies (BAS) is a three-year undergraduate degree programme that focuses on the design of the built environment and architectural design. This programme equips students with the ability to solve design problems imaginatively, to think rationally, and to exercise appropriate judgement within the discipline of architecture. In particular, it aims to develop the capacity to design appropriately within the built and natural environment.

The BAS degree provides the necessary grounding for entry into the professional postgraduate degrees leading to careers in architecture, landscape architecture, urban and regional planning, urban design, transport engineering, and housing. Students should note the BAS degree is a necessary prerequisite for entry into the honours and master’s degrees.

Bachelor of Science in Geomatics
This is a four-year undergraduate degree that provides students with a foundation in surveying and spatial information science. They use this foundation in one of their chosen areas of specialisation that are reflected in the three streams of the degree programme:

- Geoinformatics, where a student majors in computer science, environmental and geographical science, or geology.
- Surveying, with specialisation in engineering surveying, geodesy, and cadastral surveying.
- Planning, whereby a graduate obtains a BSc (Geomatics) degree after four years and a master’s degree in City and Regional Planning (MCRP) after a further year of study in a combined programme.

Career opportunities
The BAS degree provides training for career openings as an architect’s assistant, interior designer, and urban designer or as an employee in housing agencies or local authorities in architectural, works, and housing administration sections. It does not allow you to practice as an architect, however you may do minor design work as an independent architectural designer. If you wish to become a professional architect, you must continue with the BAS (Hons) and master’s (Prof).

Geomatics graduates have excellent employment prospects, as there is a shortage of professionals in surveying, geographic information science, and remote sensing in South Africa. Career opportunities exist for various categories of surveyors, planners, GIS specialists, GIS and GPS software developers, environmental scientists, geologists (who have a specific interest in GIS and spatial analysis), photogrammetry, and remote sensing specialists.
CIVIL ENGINEERING

Bachelor of Science (Eng) in Civil Engineering

As well as learning about the various civil engineering areas during lectures, you will also have practical sessions in the laboratories. These involve the investigation of the properties of various construction materials, soil behaviour, and foundation design, behaviour of structural members under different loads, water quality, and waste treatment. During vacations, students are expected to do practical training involving both site work and design office experience. The course also includes a survey camp covering basic survey operations and the preparation of a site plan.

Career opportunities

Civil engineers may work on site, such as in the construction of the Lesotho Highlands Water Project, or in a consulting office – undertaking the planning, designing, and analysis of civil engineering projects before they can be built on site.

After gaining experience in a variety of projects, many civil engineers end up in senior management roles in the engineering or business fields.

Some civil engineers prefer to work for national, provincial or local government or municipalities – finding and implementing practical solutions to problems faced in society in the areas of housing, provision of clean water, waste water treatment, roads, and public transportation.

What does civil engineering entail?

Civil engineering is a profession that plays a major role in research, planning, design, construction, development, and management of the infrastructure necessary for community life. This infrastructure includes: large buildings (such as office blocks and shopping centres); bridges; water drainage, storage, treatment and pipeline systems; and roads and public transport.

Civil engineering appeals to people who thrive on the challenges inherent in problem solving. This requires an aptitude for and skills in mathematics and science, and a desire to be involved in the planning, design, construction, development, and management of infrastructure necessary for civilisation. Civil engineering makes a positive difference to the world in which we live.

The Department of Civil Engineering offers an undergraduate programme at UCT that is fully accredited by the Engineering Council of South Africa. The undergraduate programmes in civil engineering offer the best that is available in South Africa and they are in line with the latest international developments in engineering curricula.
Students are challenged by aspects that deal with design, construction, and engineering technology, as well as subjects like economics, statistics, human resource management, commercial and contract law, costing, surveying, and professional communication. Practical exercises are a component in all three years’ curricula.

**Bachelor of Science in Property Studies**

This is also a three-year degree. The programme exposes students to a broad knowledge base including finance, economics, property law, and appropriate communication and computer skills. In addition, students develop particular skills in property valuation and development. These include evaluating and structuring finance for property investments, assessing feasibility and risk in property developments, valuing property assets, managing property portfolios, designing and implementing facilities management programmes, and managing the procurement of buildings.

**Career opportunities**

Graduates of the department play a vital role in the process of planning, designing, constructing, and managing all types of residential, commercial and industrial developments.

Graduates have an excellent understanding of the principles of management, economics, construction technology, and environmental engineering. They are good communicators, have well-developed planning and problem-solving skills, and are able to work positively in a team situation. Their unique skills assure them of excellent career prospects. Depending on their area of specialisation, they are in great demand by employers such as large building and construction contractors; property valuers, developers and managers; financial institutions; and professional quantity surveying practices. In addition, they are well prepared to enter self-employment as consultants in a wide range of vocations in the construction and property industries.

Graduates are in high demand by local and overseas employers. The construction management and quantity surveying degrees are fully accredited by the South African Council for the Quantity Surveying Profession and the Royal Institution of Chartered Surveyors. In addition, the construction management degree is accredited by the Chartered Institute of Building.

The BSc Property Studies and Bsc (Hons) in Property Studies are for those wishing to pursue professional qualifications in property valuation, property development, and property management. Graduates of both degrees will be ideally suited to vocations in property valuation, property broking, property development, and property management. Both degrees are accredited by the South African Council for the Valuation Profession and the Royal Institution of Chartered Surveyors.

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**CONSTRUCTION ECONOMICS AND MANAGEMENT**

Recognised as one of the leading academic departments of its kind in the country, UCT’s Department of Construction Economics and Management offers degrees that are accredited both locally and internationally by professional institutions.

**What does construction economics and management entail?**

Construction studies, quantity surveying, construction management, and property studies at UCT typically entail a combination of fields associated with the built environment, namely management, law, economics, science, and technology.

Construction projects require the expertise of specialists such as architects and engineers, but their successful physical execution depends on the expertise of those with the appropriate management skills. These include a command of cost planning and cost management techniques and a thorough understanding of the administrative and legal aspects of building developments.

**Undergraduate degree programmes**

**Bachelor of Science in Construction Studies**

This is a three-year degree that equips students with a wide range of skills and knowledge required of a managerial role in the construction industry.
Not only do chemical engineers have to design and operate cost-effective processes, they also have to ensure that these are accomplished in the most environmentally friendly way.

**Undergraduate degree programme**
**Bachelor of Science (Eng) in Chemical Engineering**

This is a four-year degree that prepares graduates for careers in the chemical, metallurgical, and process industries. There is a limited amount of specialisation in the areas of mineral processing, bioprocess engineering, catalytic processing, and environmental process engineering. The degree focuses on the development of technical expertise, problem-solving, teamwork, and communication skills. UCT’s chemical engineering degree tends to be generalist in nature, as well as being practical, as opposed to being highly theoretical or mathematical which some other South African universities are noted for.

**Chemical Engineering Conversion Programme for Science Graduates**

A two- or three-year conversion programme may be undertaken by BSc graduates. Students accepted into this programme are given credit and exemption for the science subjects they have completed in their BSc degree. While most BSc graduates will be considered for the three-year conversion programme (where the workload is similar to the last three years of the regular chemical engineering degree), some BSc graduates with an outstanding academic record may be accepted into a shorter conversion programme.

**Career opportunities**

UCT chemical engineering graduates are highly sought after in the workplace, and occupy key positions in top companies. The degree is accredited locally by the Engineering Council of South Africa, and internationally by the Institution of Chemical Engineers in the United Kingdom.

Chemical engineers work in many different and exciting workplaces – not only in the expected settings of the petrochemical and mining industries, but also in a wide variety of process-based disciplines, such as the food, beverage, paint, and pharmaceutical industries. As UCT-trained chemical engineers have excellent general problem-solving skills, they also end up in fields like banking, marketing, and IT.
Our aim is to equip all of our students with the capacity to tackle any of the myriad facets of electrical engineering. The Department of Electrical Engineering offers three four-year undergraduate programmes in:

• Electrical Engineering;
• Electrical and Computer Engineering; and
• Mechatronics.

Although all three programmes have slightly different first-year curricula – reflecting the overall direction of each – in some cases, it is possible to change programmes at the beginning of the second year. All programmes lead to the BSc (Eng) degree.

What does electrical engineering entail?
Electrical engineering is the branch of the engineering profession responsible for the planning and design of systems using electricity, either as a form of energy (so-called heavy-current or electrical engineering) or as a means of representing, storing, and transmitting information (light-current or electronic engineering).

Undergraduate degree programmes
Bachelor of Science (Eng) in Electrical Engineering
The mainstream electrical engineering programme covers both light-current and heavy-current engineering. The first three years are quite general, and cover the fundamentals of the electrical engineering disciplines. In the fourth year, students may choose any three major courses from the eight that are currently offered. This means that each student can opt for the mix that he or she wants (including any desired mix of light-current and heavy-current courses). This gives the new graduate considerable flexibility in the employment market.

Bachelor of Science (Eng) in Electrical and Computer Engineering
Electrical and computer engineering is an interdisciplinary branch of engineering that combines a fundamental study in electrical engineering with substantial parts of the three-year computer science programme. This equips graduates with an excellent basis on which to build valuable engineering roles in modern industry.

The advent of small, powerful processor chips has meant that not only has there been a proliferation of desk top computers (PCs), but almost every home appliance, motor vehicle, aircraft, and industrial machine has a small computer embedded into it. This has led to the term ‘Embedded Systems’ to describe this field of engineering, in which there are plenty of opportunities for good engineers.

Bachelor of Science (Eng) in Mechatronics
Mechatronics is an interdisciplinary branch of engineering that combines fundamental studies in mechanical engineering, electronics, and control systems engineering. Mechatronics offers an excellent foundation for graduates who wish to straddle the disciplines of electrical and mechanical engineering. In industries like motor manufacturing, there has been a huge increase in the amount of electronic control that is built into products (a modern light motor vehicle, for example, has more than 40 microprocessors in its circuits), and we aim to produce an engineer who can design and integrate these complex systems.

Electrical Engineering Conversion Programme for Science Graduates
A two- or three-year conversion programme may be undertaken by BSc graduates. Students accepted into the conversion programme are given credit and exemption for the science subjects that they have completed in their BSc degree.

Career opportunities
The electronic and electrical industry is one of the fastest growing industries at present. Electrical and electronic engineers work in many organisations and companies. These include private consultation firms and development laboratories, large and
small private enterprises involved with the design, development, production, and marketing of electronic systems, subsystems, and components of products, as well as government and semi-government organisations.

Graduates of the mechatronics programme can be found building underwater robots; designing artificial intelligence software to identify faulty machinery; designing new packaging systems for bottled beverages; and developing diagnostic systems for the next generation of motor vehicles.

The mechanical engineering department has a dynamic staff led by professionals who are experienced academics and practitioners and some of the staff are recognised as world leaders in their research fields.

As a person studying mechanical/electro-mechanical engineering, you should be interested in how things work. The aim of the undergraduate programme is to educate and train professional engineers to enable them to think independently and to approach problems in a logical and confident manner.

What does mechanical engineering entail?
The mechanical engineering degree provides students with a solid understanding and appreciation of the materials and forces of nature. The undergraduate programme is structured around the study of mathematics, physics, chemistry, materials, basic electrical engineering, the design process, and management studies.

What does electro-mechanical engineering entail?
In today’s world of computer control, industry welcomes our graduates, who understand the basics of both the mechanical and electrical engineering disciplines.
and can design, build, control, and maintain a wide range of engineering products and processes. Examples of some products are: motor vehicles and aeroplanes, where computers control the engines and ensure the engines are working efficiently; production machine tools, such as lathes and milling machines that have been automated by means of computer control; artificial hearts, and many other products used in the world of medicine; robots that are used more and more in industry and medicine; and even the humble washing machine is now computer controlled.

Electro-mechanical engineering entails the study of mathematics, physics, chemistry, materials, basic electrical engineering, basic mechanical engineering, and the integration of these subjects in carefully structured design courses.

Undergraduate degree programmes
The two undergraduate BSc (Eng) degree programmes, namely mechanical and electro-mechanical engineering, have a common first and second year curriculum and students make their choice of which of the programmes to pursue prior to the beginning of their third year of study.

Bachelor of Science (Eng) in Mechanical Engineering
This programme concentrates on instruction in the areas of solid mechanics, dynamics, and thermofluids, accompanied by experimental verification. Communication skills are addressed through expert instruction and application in reports of experimentation and design. Design is made central to the curriculum, where team skills and, finally, individual skills are developed. Curriculum flexibility in the final year of study allows students the selection of courses that can provide an introduction to a career in mechanical engineering.

Bachelor of Science (Eng) in Electro-mechanical Engineering
The programme aims to provide an educational approach where emphasis is placed on integrated studies and on the production of graduates who are generalists, rather than specialists. It aims to meet the increasing demand for engineers with cross-disciplinary skills, particularly in the fields of robotics, flexible manufacturing, and electro-mechanical power systems. The programme comprises mainly courses selected from the electrical engineering and mechanical engineering curricula. These courses include: microprocessors, digital electronics, mechatronics design, electro-mechanical design, computer integrated manufacture and robotics, project management, maintenance management and reliability in systems, industrial engineering, industrial law, and new venture planning. Some flexibility is allowed in the selection of courses to ensure that students can tailor the degree to suit their interests and needs.

Career opportunities
Graduates find employment opportunities in a wide spectrum of exciting careers, requiring the talents of mechanical engineers for the design, development and manufacture of technologies, products and processes; including automotive, aircraft and space industries, marine engineering and naval architecture, air conditioning and refrigeration, food and packaging industry, bio-mechanical research and development, energy and power utilisation, robotics, computer-aided manufacturing and design, general manufacturing and production, and the environmental industry, to name a few. Many of our graduates have followed successful career paths to become captains of industry.
ACADEMIC DEVELOPMENT IN EBE

The Academic Support Programme for Engineering in Cape Town (ASPECT) is designed for students who obtained the National Senior Certificate endorsed for degree studies or a Senior Certificate with matriculation exemption from schools that have not prepared them adequately for tertiary study. The programme provides a supportive environment that is sensitive to students’ academic, social and emotional needs.

The curriculum is planned so that the degree should take five years to complete. In the first year, students register for three full credit-bearing courses, all counting towards the degree. These are: Mathematics I, Physics I; or Chemistry I, Engineering I. These are the same courses that are taken by students registered for the four-year degree. The mathematics course is taught by staff in ASPECT; the physics lectures are conducted by ASPECT staff, while the laboratory sessions are offered by the physics department.

Chemistry is taught in the chemistry department, with an extra afternoon workshop run by an ASPECT staff member. Students also take an Introduction to Communication course, run by ASPECT staff.

Students who continue with engineering at UCT will complete, in their second year, the remaining first year courses, one major second year course, namely the Mathematics Course for Engineers, and up to two courses from the second-year engineering curriculum. ASPECT will provide additional tutorial and non-academic support during this year. In the third year, students complete the remaining second year courses, together with appropriate courses from the third-year curriculum, while ASPECT continues to provide non-academic support and counselling. ASPECT staff will monitor and advise students as they complete the remaining degree requirements.
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