

# Engineering and the Built Environment



Our **Bachelor of Science in Engineering or BSc(Eng)** is fully accredited by the Engineering Council of South Africa (ECSA) and meets all academic requirements for you to register as an engineer in training. Further practical experience is necessary, however, before you can get professional recognition.

Under the 2000 Washington Accord, the BSc(Eng) has been officially recognised by professional engineering accrediting bodies in the US, Canada, Australia, New Zealand, the UK, Ireland, Japan, and Hong Kong.

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# Schools in Engineering



## School of Chemical and Metallurgical Engineering

The School of Chemical and Metallurgical Engineering offers expertise in various fields of engineering and is involved in cutting-edge research activities spanning chemical, metallurgical, and materials engineering.

The four-year BSc(Eng) degree in Chemical or Metallurgical and Materials Engineering is continually reviewed, modified, and re-aligned to reflect best practices within the industry and the wider profession.

## School of Civil and Environmental Engineering

The School of Civil and Environmental Engineering offers a four-year BSc(Eng) degree in Civil Engineering. In the first two years, you will develop your competency in mathematics, science, computing, communication, and engineering design and problem-solving.

In the third and fourth years, you will focus on geotechnical engineering,

hydrology, hydraulics, infrastructure planning and management, structural engineering, and construction materials.

## School of Electrical and Information Engineering

The School of Electrical and Information Engineering has extensive research laboratory facilities, including those for machines and drives, electronics, high voltage, lightning and EMC, telecommunications, information engineering, biomedical engineering, computational electromagnetics, and systems and

control. Bioinformatics has also been added as a competency.

The School is a partner of the Johannesburg Centre for Software Engineering and is involved in a renewable energy research initiative at Masters and PhD Level, with particular focus on wind, solar, and smart grids. The School has also incubated two high-tech companies and our staff are active academic research and industrial consultants.

## School of Mechanical, Industrial, and Aeronautical Engineering

The Departments within the School of Mechanical, Industrial, and Aeronautical Engineering have produced world-class engineers and have remained at the forefront of engineering in South Africa for over 100 years.

### Mechanical Engineering

Mechanical engineers design, develop, construct, and use the machines and systems found in all areas of industry.

### Industrial Engineering

Industrial engineers study complex systems, processes, and technology in order to devise efficient systems.

### Aeronautical Engineering

Aeronautical engineers design, develop, and modify aircraft components and systems.

In addition, there are two further options available:

### Nuclear Engineering

After completing a three-year BSc following a fixed curriculum (including courses from the first two years of Mechanical Engineering), you may enter the Mechanical Engineering stream in the third year. After five years, you will graduate with both a BSc and a BSc(Eng), specialising in Nuclear Engineering.

### Industrial Engineering

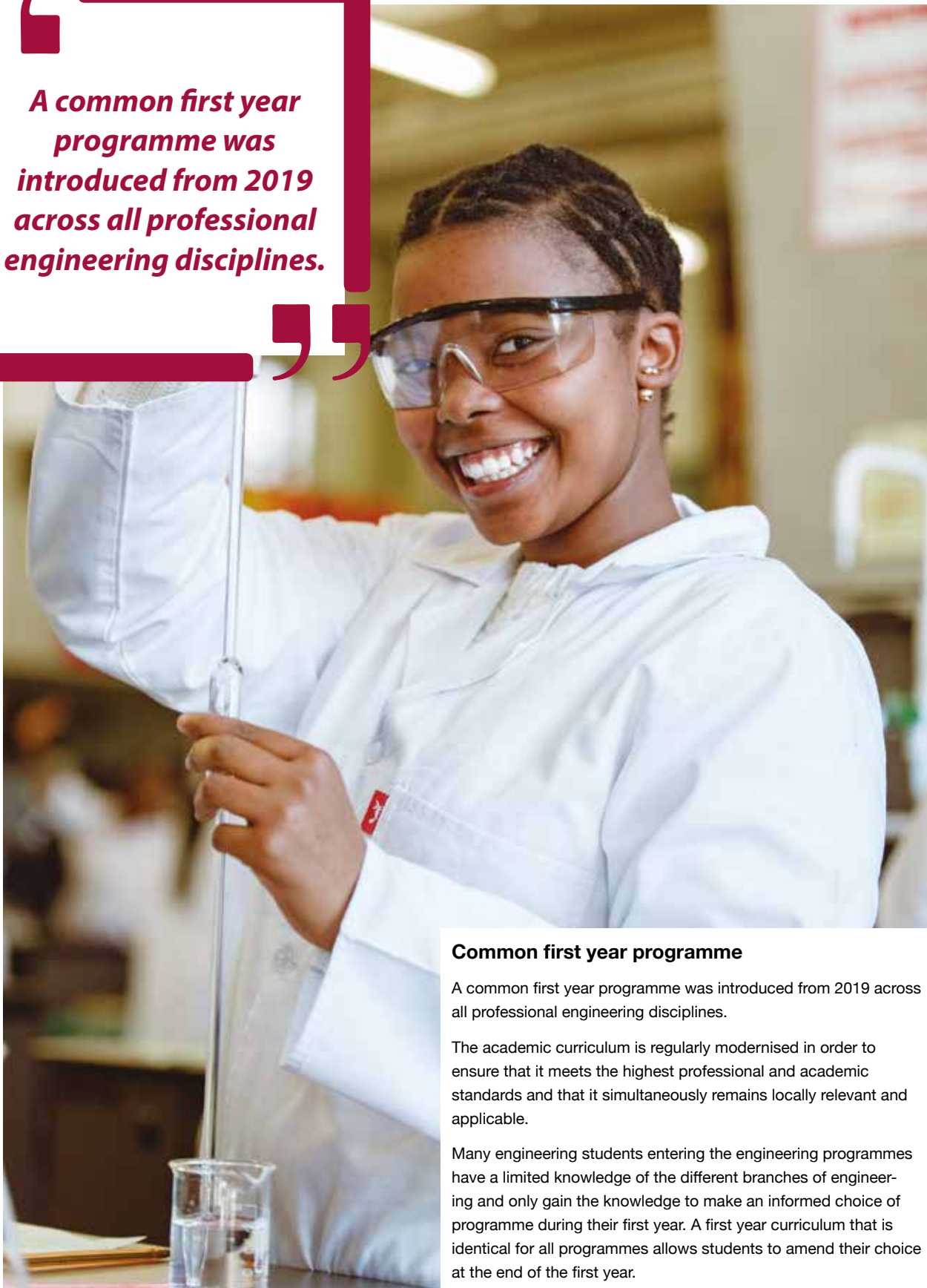
After you have completed two years of study in any engineering stream, you may enter the Industrial Engineering stream in third year. You will graduate as an industrial engineer, but with a background in another engineering discipline, such as chemical or electrical engineering.

## School of Mining Engineering

The School of Mining Engineering is one of the world's leading mining engineering schools.

The School, in consultation with the South African mining industry, gives you the engineering knowledge that you will need as a practising mining engineer. This includes technical subjects for specialist skills in mining, mineral resource management and evaluation, and rock engineering, as well as management skills in evaluation techniques and fundamental mineral economic principles.

*A common first year programme was introduced from 2019 across all professional engineering disciplines.*



### **Common first year programme**

A common first year programme was introduced from 2019 across all professional engineering disciplines.

The academic curriculum is regularly modernised in order to ensure that it meets the highest professional and academic standards and that it simultaneously remains locally relevant and applicable.

Many engineering students entering the engineering programmes have a limited knowledge of the different branches of engineering and only gain the knowledge to make an informed choice of programme during their first year. A first year curriculum that is identical for all programmes allows students to amend their choice at the end of the first year.

## Chemical Engineering

### Bachelor of Science in Engineering in Chemical Engineering

EFA00

**Duration** 4 years

### NSC Requirements

**APS** 42+

**English Home Language OR First Additional Language**

Level 5

**Mathematics** Level 5

**Physical Sciences** Level 5

### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

**International Qualifications on page 29**

**Closing Date: 30 September**

### Careers

- Biochemical Engineer
- Environmental Engineer
- Food Processing Engineer
- Process Control Engineer
- Process Design Engineer
- Process Plant Manager
- Systems Engineer
- Technical Sales Engineer

### Programme Description

*Design, operate, and manage large-scale industrial conversion processes.*

Chemical Engineering involves large-scale industrial processes that convert raw materials – by physical or chemical change – into products with higher economic and social value. For example, coal, petroleum, natural gas, vegetation, and microorganisms are converted into fuels and chemicals. Chemical engineers are needed in fields such as plastics, oil refinery, explosives, fertilisers, detergents, and food and mineral processing.

Chemical engineering plays an important role in society by minimising and controlling the impact of modern industry on the environment, society, and businesses.

The curriculum therefore includes courses on environmental engineering, management principles, and professional practice and ethics.

Courses such as Chemical Engineering Thermodynamics, Chemical Reactor Theory, Process Control, Solid Fluid Systems, Transport Phenomena, Mass-Transfer Operations, and Chemical Plant Design are studied after first year. In final year, you will study elective subjects in advanced chemical engineering topics.

You need a thorough understanding of Mathematics, Physics and Chemistry, and must be computer literate.

### Curriculum

#### First year

Engineering Chemistry  
Introduction to the Engineering Profession  
Engineering Analysis and Design IA and IB

Engineering Mathematics IA and IB  
Engineering Physics IA and IB  
Applied Mechanics for Engineering  
Elective from Faculty of Humanities

#### Second year

Chemistry II  
Mathematics II  
Computing for Process Engineering  
Process Engineering Fundamentals A and B  
Energy Balances and Applications  
Electrical Engineering

#### Third year

Applied Thermodynamics  
Chemical Engineering Thermodynamics  
Chemical Engineering Laboratory  
Mass Transport and Operations  
Chemical Reaction Engineering A and B  
Process Design Principles A and B  
Numerical Methods  
Environmental Process Engineering  
Momentum and Heat Transport

#### Fourth year

Management for Process Engineers  
Solid Fluid Systems  
Chemical Engineering Design  
Process Control  
Chemical Engineering Research Project  
Biochemical Engineering  
**and three of the following:**  
Hydrometallurgy  
Fundamentals of Mineral Processing  
Advanced Chemical Reaction Engineering  
Waste Water Engineering  
Synthetic fuels ■

## Metallurgy and Materials Engineering

### Bachelor of Science in Engineering in Metallurgy and Materials Engineering

EFA08

Duration 4 years

#### NSC Requirements

APS 42+

English Home Language OR First Additional Language

Level 5

Mathematics Level 5

Physical Sciences Level 5

#### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

International Qualifications on page 29

Closing Date: 30 September

#### Careers

- Corrosion Engineer • Extractive Metallurgist
- Failure Analysis Consultant • Foundry Engineer
- Heat Treatment Engineer • Metallurgical Plant Design Engineer
- Process Control Engineer • Tribologist Materials Consultant

#### Programme Description

*Design, operate, and manage industrial plants that convert minerals and metals into valuable products.*

Metallurgy and Materials Engineering involves the engineering principles required to concentrate, extract, and refine metals, materials, and carbon (coal) materials, as well as to develop new alloys and materials, including ceramics and composites.

Core subjects in Materials Engineering focus on the structure and behaviour of materials and their conversion into usable forms (through heat treatment, welding and forming processes, and powder metallurgy). As in Chemical Engineering, the Materials Engineering curriculum also focuses on the issues of environmental engineering, management, and professional ethics.

There is a strong emphasis on design and project work, with the programme culminating in an extensive laboratory project and a large design project. The degree programme provides a sound foundation for future postgraduate study,

as well as a career in technical management.

#### Curriculum

##### First year

Engineering Chemistry  
Introduction to the Engineering Profession  
Engineering Analysis and Design IA and IB  
Engineering Mathematics IA and IB  
Engineering Physics IA and IB  
Applied Mechanics for Engineering  
Elective from Faculty of Humanities

##### Second year

Chemistry II (Metallurgy)  
Mathematics II  
Introductory Mineralogy and Earth Sciences  
Computing for Process Engineering  
Introduction to Extractive Metallurgy  
Practical Metallurgy  
Material Science and Engineering  
Process Engineering Fundamentals  
Electrical Engineering  
Economic Concepts IA

##### Third year

Numerical Methods (Metallurgy)  
Metallurgical Thermodynamics I and II  
Engineering Failure Analysis  
Kinetics and Transport Processes in Metallurgical Engineering  
Solidification, Heat Treatment and Microstructure  
Environmental Process Engineering  
Crystal Structure and Analysis  
Process and Materials Design I and II  
Corrosion and Wear  
Non-Ferrous Pyrometallurgy  
Engineering statistics

##### Fourth year

Physical Chemistry of Iron and Steel  
Manufacturing Metallurgical Design  
Research Project Management for Process Engineers  
Particulate Systems  
Process Control  
Welding and Forming Processes  
Structure and Properties of Engineering Materials  
Hydrometallurgical Processes ■

## Civil Engineering

### Bachelor of Science in Engineering in Civil Engineering

EFA01

Duration 4 years

#### NSC Requirements

APS 42+

**English Home Language OR First Additional Language**

Level 5

**Mathematics** Level 5

**Physical Sciences** Level 5

#### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

**International Qualifications on page 29**

**Closing Date: 30 September**

#### Careers

- Bridge Engineer
- Earthquake Design Engineer
- Consulting Engineer
- Construction Manager
- Environmental Engineer
- Geotechnical Engineer
- Hydrologist
- Structural Engineer
- Water Resource Manager

#### Programme Description

*Plan, design, and manage physical infrastructure.*

**Civil Engineering is the practice of improving and maintaining the built environment to enhance the quality of life for present and future generations.**

**Civil engineers primarily plan, design, construct, operate, and maintain physical infrastructure, including water and waste management facilities, transportation and communications infrastructure, and structures and public buildings. This all-important infrastructure supports people's basic needs, while enabling and driving economic development.**

**In the first two years of study, you will focus on developing competencies in mathematics, science, computing, communication, and engineering design/problem-solving. In third and fourth years, you will take courses in**

**Geotechnical Engineering, Hydrology, Hydraulics, Infrastructure Planning and Management, Structural Engineering, and Construction Materials.**

#### Curriculum

##### First year

Engineering Chemistry  
Introduction to the Engineering Profession  
Engineering Analysis and Design IA and IB  
Engineering Mathematics IA and IB  
Engineering Physics IA and IB  
Applied Mechanics for Engineering  
Elective from Faculty of Humanities

##### Second year

Mathematics II  
Geology for Civil Engineers  
Engineering Computing  
Introduction to Environmental Engineering  
Engineering Economics and Infrastructure Planning  
Materials and Structures I and II  
Numerical Methods  
Probability Theory and Mathematical Statistics for Engineers  
Engineering Surveying  
Practical Training  
Vacation Work I

##### Third year

Construction Materials I  
Geotechnical Engineering I  
Structural Steel Design  
Reinforced Concrete Design  
Hydrology  
Fluid Mechanics and Hydraulics  
Structural Analysis I and II  
Transport Engineering  
Systems Analysis and Optimisation  
Vacation Work II

##### Fourth year

Construction Materials II  
Structural Engineering  
Civil Engineering Design  
Geotechnical Engineering II  
Investigational Project  
Integrated Resource Management  
Hydraulic Engineering

# Electrical Engineering

## Bachelor of Science in Engineering in Electrical Engineering

EFA03

Duration 4 years

### NSC Requirements

APS 42+

English Home Language OR First Additional Language

Level 5

Mathematics Level 5

Physical Sciences Level 5

### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

International Qualifications on page 29

Closing Date: 30 September

### Careers

- Antennas Engineer
- Computer Engineer
- Control and Automation Engineer
- High Voltage Engineer
- Machines and Drives Engineer
- Power Engineer
- Power Systems Manager
- Telecommunications Engineer

### Programme Description

*Design, operate, and manage communications, IT, electric power, and automation technology.*

Electrical Engineering covers a broad range of activities involving the generation and use of electrical energy, including the planning and operation of large power-generating stations, computing and information transfer, and telecommunication systems.

An Information Engineering option is also offered within the programme.

In the first two years, all Electrical Engineering students focus on enhancing their capabilities in mathematics, physics, and chemistry.

In the third year, you will study Electrical Engineering Science subjects and take more advanced courses in mathematics, such as Electronics, Power Engineering, Electro-magnetic Engineering, and Mathematical Methods.

In the final year, you will study five complementary courses, including Engineering Design, Engineering Laboratory, and Systems Management. You will also choose three elective courses to specialise in either Electrical or Information Engineering. Engineering Design and Engineering Laboratory are project-based subjects in which you are required to submit a report for examination.

### Curriculum

#### First year

- Engineering Chemistry
- Introduction to the Engineering Profession
- Engineering Analysis and Design IA and IB
- Engineering Mathematics IA and IB
- Engineering Physics IA and IB
- Applied Mechanics for Engineering
- Elective from Faculty of Humanities

#### Second year

- Mathematics II
- Physics II (Electrical)
- Data Structures and Algorithms
- Electric Circuits
- Electronics I
- Electrical and Magnetic Systems
- Software Development I
- Signals and Systems I
- Microprocessors
- Vacation Work I

#### Third year

- Mathematical Methods
- Electromagnetic Engineering
- Electronics II
- Power Engineering
- Probabilistic Systems Analysis
- Software Development II
- Signals and Systems IIA and IIB
- Control I
- Electrical Engineering Design
- Economics of Design
- Vacation Work II

#### Fourth year

- Electrical Engineering Design II
- Electrical Engineering Laboratory
- Measurement Systems
- Selected Topics in Sociology Systems Management and Integration

**AND, any three courses from the following:**

- High Frequency Techniques
- High Voltage Engineering
- Software Engineering
- Software Development III
- Electromechanical Conversion
- Control II
- Power Systems
- Data Intensive Computing in Data Science ■

# Information Engineering

## Bachelor of Science in Engineering in Information Engineering

EFA03

### Duration

4 years

### NSC Requirements

#### APS

42+

#### English Home Language OR First Additional Language

Level 5

#### Mathematics

Level 5

#### Physical Sciences

Level 5

#### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

#### International Qualifications on page 29

**Closing Date: 30 September**

### Careers

- Computer Engineer
- Information Engineer
- Software Developer
- Software Engineer
- Software Project Manager
- Software Systems Architect
- Network Engineer
- Telecommunications Engineer

- Information Technology Consultant

### Programme Description

*Plan, design, and manage complex software systems.*

**The Information Engineering degree focuses on Software Engineering, Telecommunications, and Computer Networking.**

**In the first two years, you will focus on enhancing your capabilities in mathematics, physics, and chemistry. At the beginning of the third year, you can choose to continue with the Electrical Engineering degree or register for the Information Engineering degree.**

**In the final year, you will study five complementary courses, including Engineering Design, Engineering Laboratory, and Systems Management. You will also choose three elective courses, to specialise in either Electrical or Information Engineering. Engineering Design and Engineering Laboratory are project-based subjects in which you are required to submit a report for examination.**

### Curriculum

#### First year

- Engineering Chemistry
- Introduction to the Engineering Profession
- Engineering Analysis and Design IA and IB
- Engineering Mathematics IA and IB
- Engineering Physics IA and IB
- Applied Mechanics for Engineering
- Elective from Faculty of Humanities

#### Second year

- Mathematics II
- Physics II (Electrical)
- Data Structures and Algorithms
- Electric Circuits
- Electronics I
- Electrical and Magnetic Systems
- Software Development I
- Signals and Systems I
- Microprocessors
- Vacation Work I

#### Third year

- Computational Mathematics
- Electronics II
- Probabilistic Systems Analysis
- Software Development II
- Signals and Systems IIA and IIB
- Data and Information Management
- Control I
- Electrical Engineering Design
- Economics of Design
- Communication Fundamentals
- Vacation Work II

#### Fourth year

- Measurement Systems
  - Information Engineering Design
  - Information Engineering Laboratory
  - Selected Topics in Sociology
  - Systems Management and Integration
- and, any three courses from the following:**
- Software Engineering
  - Software Development III
  - Control II
  - Network Fundamentals
  - Data Intensive Computing in Data Science



## Specialisation in Biomedical Engineering

### Bachelor of Engineering Science in Biomedical Engineering

EBA00

#### Duration

3 years

#### NSC Requirements

APS 42+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 5

Physical Sciences

Level 5

#### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

International Qualifications on page 29

Closing Date: 30 September

#### Careers

Physicist or Electrical Engineer or Medical Professional working in the development of:

- Artificial Organs
- Information Technology for Healthcare
- Medical Imaging System Design (e.g. ultrasound or CT scanning)
- Modelling and simulation of physiological states and disease
- Therapeutic Equipment Design

#### Programme Description

*Work at the cutting edge of research and development in healthcare systems.*

Biomedical Engineering, which falls within the School of Electrical and Information Engineering, applies engineering and other quantitative sciences to solving medical and biological problems, for example, developing sophisticated X-ray imaging systems, artificial organs, image recognition systems, and medical devices, and provides a quantitative understanding of disease processes.

The three-year Bachelor of Engineering Science in Biomedical Engineering BEngSc (BME) undergraduate degree combines subjects in science, engineering, medicine, and biology, as well as specific Biomedical Engineering courses.

Because this is a pre-professional qualification, you will not be eligible for professional registration with this degree alone. After you graduate, there are various routes you can take to obtain a professional qualification, such as Medicine (MBBCh), BSc(Eng) in Electrical or Information Engineering, and BSc(Hons) in Physics.

You can apply for admission into the third year of BSc(Eng) in Electrical / Information Engineering. However, the entry requirements for MBBCh and BSc(Hons) in Physics are competitive and may vary.

#### Curriculum

##### First year

Introductory Molecular and Cell Biology I  
Introductory Physiology and Environmental Sciences I  
Chemistry I  
Engineering Mathematics IA and IB  
Engineering Physics IA and IB  
Applied Mechanics for Engineering

##### Second year

Biomedical Statistics and Numerical Methods  
Electronics I  
Electric and Magnetic Systems  
Software Development I  
Signals and Systems I  
Microprocessors  
Electric Circuits  
Molecular and Cell Biology  
Mathematics II

##### Third year

Anatomy  
Biomedical Transport Phenomena  
Biomedical Measurement, Instrumentation and Imaging  
Signals and Systems IIA  
Biomedical Signals  
Systems and Control  
Physiology and Medical Biochemistry I

## Specialisation in Digital Arts



### Bachelor of Engineering Science in Digital Arts

EBA01

#### Duration

3 years

### NSC Requirements

#### APS

42+

#### English Home Language OR First Additional Language

Level 5

#### Mathematics

Level 5

#### Physical Sciences

Level 5

#### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

#### International Qualifications on page 29

**Closing Date: 30 September**

### Careers

- Animation
- Game Design
- Software Engineer
- Software Development

### Programme Description

*Work at the cutting edge of software development in gaming.*

Digital Arts is a specialised programme combining Electrical Engineering and Digital Arts courses to prepare you for a career in game design and development. The game design programme is a collaboration between the Wits School of Arts and the School of Electrical and Information Engineering.

Once you've completed the BEngSc in Digital Arts, you may continue into the third year of the BSc(Eng) (Electrical) or (Information Engineering) option, or into the Honours course in Digital Arts.

### Curriculum

#### First year

Engineering Analysis and Design IA and IB

Engineering Mathematics IA and IB

Engineering Physics IA and IB

Applied Physics

Key Concepts in Game Design IA and IB

#### Second year

Data structures and algorithms

Electronics I

Electric and magnetic systems

Software development I

Microprocessors

Electric Circuits

Mathematics II

Digital Art Design Project

Introduction to Game Creation IIA and IIB

#### Third year

Electrical and Magnetic Systems

Signals and Systems I

Professional Practice and Software Development

Introduction to the World Wide Web as Creative Medium III

Game Design IIIA

Game Design IIB

# Mechanical Engineering

Mechanical Engineering



## Bachelor of Science in Engineering in Mechanical Engineering

EFA05

### Duration

4 years

### NSC Requirements

#### APS

42+

#### English Home Language OR First Additional Language

Level 5

#### Mathematics

Level 5

#### Physical Sciences

Level 5

#### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

#### International Qualifications on page 29

Closing Date: 30 September

### Careers

- Energy Engineer
- Mechanical Design and Development Engineer
- Manufacturing Engineer
- Systems Engineer
- Production Engineer
- Technical Marketing Manager
- Transport Engineer

### Programme Description

*Design, develop, and manufacture aerospace vehicles and component systems.*

**Mechanical Engineering applies scientific principles to design, develop, construct, install, operate, and maintain engines, energy harnessing equipment, and machines in all industries.**

*Mechanical engineers work in the most important sectors of the economy, including manufacturing, mining, power generation, and transportation.*

### Curriculum

#### First year

- Engineering Chemistry
- Introduction to the Engineering Profession
- Engineering Analysis and Design IA and IB
- Engineering Mathematics IA and IB
- Engineering Physics IA and IB
- Applied Mechanics for Engineering Elective from Faculty of Humanities

#### Second year

- Mathematics II
- Electrical Engineering
- Fluid Mechanics I
- Mechanical Engineering Laboratory I
- Engineering Thermodynamics I
- Introduction to Materials Science and Engineering
- Applied Mechanics A and B
- Computer Skills and Software Development
- Mechanical Engineering Design I

#### Third year

- Mathematical Methods
- Incompressible Flows
- Mechanical Engineering Laboratory II
- Mechanics of Solids I
- Mechatronics I
- Business Management
- Fundamentals of Heat Transfer
- Mechanical Engineering Design and Production
- Mechanical Vibrations
- Engineering in its Social Context
- Numerical Methods and Statistics
- Vacation Work I

#### Fourth year

- Design Project
- Research Project
- Energy Conversion and Utilisation Systems
- Systems Management and Integration
- Compressible Flows
- Mechanics of Solids II
- Mechatronics II
- Engineering Professional Activity
- Vacation Work II

# Industrial Engineering

## Bachelor of Science in Engineering in Industrial Engineering

EFA07

### Duration

4 years

### NSC Requirements

#### APS

42+

#### English Home Language OR First Additional Language

Level 5

#### Mathematics

Level 5

#### Physical Sciences

Level 5

#### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

International Qualifications on page 29

Closing Date: 30 September

### Careers

- Enterprise Resource Planning Consultant
- Inventory Engineer
- IT Consultant
- Logistics Engineer
- Management Consultant
- Production and Operations Manager
- Process Engineer

- Quality Control Engineer
- Supply Chain Consultant
- Technical Manager

### Programme Description

*Improve and optimise productivity and quality in manufacturing and service companies.*

**Industrial Engineering studies the systems, processes, technology, and people that make up organisations. Industrial engineers are often involved 'behind the scenes', answering questions like:**

- **How do vehicle manufacturers economically produce hundreds of variations of the same vehicle?**
- **How can South Africa streamline its public healthcare delivery to ensure quality care for all?**
- **How can you safely and quickly send money to your family in another country, if they don't have a bank account?**

### Curriculum

#### First year

Engineering Chemistry  
Introduction to the Engineering Profession  
Engineering Analysis and Design IA and IB  
Engineering Mathematics IA and IB  
Engineering Physics IA and IB  
Applied Mechanics for Engineering  
Elective from Faculty of Humanities

#### Second year

Mathematics II

Electrical Engineering  
Fluid Mechanics I  
Mechanical Engineering Laboratory I  
Engineering Thermodynamics I  
Introduction to Materials Science and Engineering  
Applied Mechanics A and B  
Computer Skills and Software Development  
Mechanical Engineering Design I

#### Third year

Industrial Engineering Design  
Industrial Engineering Laboratory  
Mechatronics I  
Business Management  
Operations Management: Techniques  
Manufacturing Technology: Processes  
Principles of Organisational Behaviour  
Engineering in its Social Context  
Operations Research  
Mathematical Topics (Industrial)  
Mathematical Methods (Industrial)  
Vacation Work I

#### Fourth year

Design Project  
Research Project  
Manufacturing Technology: Systems  
Business Studies  
Systems Management and Integration  
Decision Support and Intelligence Systems  
Operations Management: Systems Integration  
Engineering Professional Activity  
Vacation Work II ■

# Aeronautical Engineering

## Bachelor of Science in Engineering in Aeronautical Engineering

EFA06

### Duration

4 years

### NSC Requirements

#### APS

42+

#### English Home Language OR First Additional Language

Level 5

#### Mathematics

Level 5

#### Physical Sciences

Level 5

#### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

#### International Qualifications on page 29

**Closing Date: 30 September**

### Careers

- Aircraft Design Engineer
- Aircraft Systems Design Engineer
- Airline Manager
- Automotive Aerodynamics Engineer

- Research
- Production Manager
- Propulsion Engineer
- Technical Director

### Programme Description

*Design, develop, and manufacture vehicles and component systems.*

**Aeronautical Engineering is concerned with the design, development, and modification of the components and systems of all types of flight vehicles, including fixed wing aircraft, helicopters, sailplanes, missiles, and non-flying aerodynamic devices.**

### Curriculum

#### First year

- Engineering Chemistry
- Introduction to the Engineering Profession
- Engineering Analysis and Design IA and IB
- Engineering Mathematics IA and IB
- Engineering Physics IA and IB
- Applied Mechanics for Engineering
- Elective from Faculty of Humanities

#### Second year

- Electrical Engineering
- Fluid Mechanics I
- Mechanical Engineering Laboratory I
- Engineering Thermodynamics
- Introduction to Materials Science and Engineering

- Applied Mechanics A
- Computer Skills and Software Development
- Applied Mechanics B
- Mechanical Engineering I

#### Third year

- Mathematical Methods
- Incompressible Flows
- Aeronautical Engineering Laboratory
- Aircraft Design
- Introduction to Aeronautics
- Mechatronics I
- Business Management
- Numerical Methods and Statistics
- Mechanical Vibrations
- Engineering in its Social Context
- Vacation Work I

#### Fourth year

- Design Project
- Research Project
- Systems Management and Integration
- Gas Dynamics and Propulsion
- Aerodynamics
- Flight Dynamics
- Aircraft Structures II
- Mechatronics II
- Engineering Professional Activity
- Vacation Work II

# Mining Engineering

## Bachelor of Science in Engineering in Mining Engineering

EFA09

### Duration

4 years

## NSC Requirements

### APS

42+

### English Home Language OR First Additional Language

Level 5

### Mathematics

Level 5

### Physical Sciences

Level 5

### Wait-listing

Students with English, Mathematics and Physics at Level 5 will be wait-listed, subject to place availability.

Generally, applicants who achieve 70% in English, Maths and Physical Science stand a greater chance of being accepted.

International Qualifications on page 29

Closing Date: 30 September

## Careers

- Blasting Engineer
- Consulting Mining Engineer
- Environmental, Safety and Health Manager
- Financial Analyst
- Mine Manager
- Mine Design Engineer
- Mineral Resources Manager
- Project Manager
- Rock Engineer

## Programme Description

*Plan, organise, and manage safe and efficient ways to extract raw materials from the earth.*

**Mining engineers play a key role in the planning, exploitation, and excavation of mineral resources.**

**In the first two years, you will learn the skills, technology, and basic sciences common to all areas of engineering, including courses in civil, electrical, and mechanical engineering, geology and surveying. In the third and fourth years, you will study mining engineering subjects, including courses in technical valuation, ventilation, environmental engineering, mine transportation, and rock mechanics. In the final stage of the undergraduate programme, you'll complete a mine design exercise in which you'll apply your knowledge to designing a mine and assessing its economic feasibility and profit potential.**

**The programme will provide you with the engineering expertise you'll need as a mining engineer or mine manager.**

## Curriculum

### First year

Engineering Chemistry  
Introduction to the Engineering Profession  
Engineering Analysis and Design IA and IB  
Engineering Mathematics IA and IB  
Engineering Physics IA and IB  
Applied Mechanics for Engineering  
Elective from Faculty of Humanities

### Second year

Mathematics II  
Applied Mathematics IIA  
Engineering Services for Mining  
Introduction to Underground and Surface Mining Methods  
Geology IA and IB  
Computer Applications in Mining  
Explosives Engineering  
Mechanical Excavation of Rock  
Digital Technologies and Mine Data Analytics  
Computer Programming for Mining  
Engineering Surveying  
Computer Programming Bootcamp  
Practical Workshop Training (Mining)

### Third year

Ore Dressing and Extractive Metallurgy  
Ore Body Modelling  
Mine Transportation, Automation and Robotics  
Mineral Resources Evaluation  
Computerised Mine Design  
Rock Mechanics  
Mine Ventilation and Climate Control  
Water, Energy and the Environment  
Mine Surveying and Geospatial Techniques  
Underground Mining Systems  
Surface Mining Systems

### Fourth year

Mine Management Principles  
Financial Valuation  
Mine Design  
Project Report  
Rock Engineering  
Mining Optimisation Techniques and Systems Engineering  
Health, Safety and Mining Law  
Mine Technical Visits  
Vacation Work I  
Vacation Work II ■

# The Built Environment



- Bachelor of Science in Urban and Regional Planning into BSc(URP) (Honours) in Urban and Regional Planning. The BSc(URP) Honours programme is accredited by the South African Council of Planners (SACPLAN).
- Bachelor of Science in Construction Studies into Honours in Quantity Surveying and Construction Management. The BSc(Hons) (Construction Management) and the BSc(Hons) (Quantity Surveying) are both internationally accredited.
- Bachelor of Science in Property Studies. Provisional conditional accreditation status by the South African Council for Property Valuers Profession (SACPVP).

Each of the Built Environment degrees deals with a different aspect of our physical environment. Wits Built Environment qualifications address the social, spatial, cultural, and infrastructural needs of a transforming South Africa.

The delivery of affordable housing, the development of rural and urban environments, and solving other social and physical challenges form the basis of the degrees offered.

Working in the built environment requires a keen environmental and social awareness, as well as mathematical, analytical, and organisational ability.

When designing a building, architects need to consider many factors. These include the building's intended purpose; how to place the building in harmony with its surroundings; site restrictions; and creative expression.

**Urban and regional planners** help to shape better places for people to live, work, and relax. Good planning considers population changes, community life, economic development, environmental questions, and design.

The **Property Studies** specialist requires a combination of legal, financial,

and engineering skills to implement property solutions in line with corporate or government strategy.

As such, s/he must be up-to-date with the latest thinking in property investment and development.

**Construction managers** are experts in effective and efficient construction and property development. As such, they oversee projects that include planning the layout of sites, overseeing contractors, and ensuring that building regulations are adhered to.

**Quantity surveyors** are the financial specialists of the building industry. They contribute their skills and knowledge of costs and revenues to the planning of all building and engineering projects to ensure they are cost-effective.

Built Environment programmes provide an entry qualification into professional degrees, such as:

- Bachelor of Architecture Studies into BAS(Honours), which leads to the MArch (Prof) in Architecture. The Bachelor of Architectural Studies degree is internationally validated.

## School of Architecture and Planning

The School of Architecture and Planning provides an excellent learning environment towards accredited professional degrees in:

- Architecture
- Planning
- Postgraduate qualifications in related fields such as housing, urban design, sustainable and energy efficient cities, and wider urban studies.

Many of our graduates have become esteemed professionals and leading academics at universities across the globe.

## School of Construction Economics and Management

The School of Construction Economics and Management comprises a vibrant community of approximately 700 students and 32 academic and administrative staff. We strive to attract the best students, who will contribute to the development of the national economy and the real estate and construction industry.

The School currently produces South Africa's highest number of graduates in the field of construction economics and management. ■

## Architectural Studies

### Bachelor of Architectural Studies

FBA00

#### Duration

3 years

### NSC Requirements

#### APS

34+

#### English Home Language OR First Additional Language

Level 4

#### Mathematics

Level 4

#### Wait-listing

Acceptance depends on departmental selection. Applicants must complete a written and graphic exercise, and may be required to attend an interview. Applicants with a Wits APS of 29-33 may be accepted on the basis of exceptional scores, following an interview.

The BAS selection process is conducted by a panel of senior academics from the School of Architecture and Planning, which is monitored by the Assistant Dean. Selection is based predominantly on performance in the selection exercise, interview, and academics.

Demographic balance is taken into consideration where a choice needs to be made between applicants scoring within the same range.

#### International Qualifications on page 29

**Closing Date: 30 June**

### Careers

- Architect
- Architectural Technologist
- Draughtsperson
- Landscape Designer
- Interior Designer
- Lecturer
- Researcher
- Urban Planner/studies

### Programme Description

*Enhance human lives and experiences through space and structure design.*

Architects design buildings and spaces that enhance human lives and experiences, and leave culturally and socially rich environments for future generations.

The Bachelor of Architecture Studies (BAS) curriculum extends over three years. Once you have completed the BAS programme, you will be required to work in an architectural practice for one year. You can then apply for the one-year, full-time BAS(Hons) qualification, and then the one-year, full-time MArch (Professional) qualification. If you meet the minimum BAS qualification requirements, you will be granted automatic admission to the BAS(Hons) programme, while remaining places are subject to additional selection criteria.

With a BAS qualification, you can register with the South African Council for the Architectural Professions as an architectural technologist. With a Master of Architecture (Professional) qualification, you can register as a candidate professional architect. After two years working as a registered candidate professional architect, you may qualify to register as an architect.

Wits architecture degrees are accredited by the South African Council of Architects and validated by the Commonwealth Association of Architects.

### Curriculum

#### First year

Architectural Design and Theory I  
Theory and Practice of Construction I  
Histories and Theories of Architecture I  
Architectural Representation I  
Introduction to Structures  
Applied Mathematics

#### Second year

Architectural Design and Theory II  
Theory and Practice of Construction II  
Architectural Representation II  
Histories and Theories of Architecture  
Civil Engineering Theory I

#### Third year

Architectural Design and Theory III  
Theory and Practice of Construction III  
Histories and Theories of Architecture III  
Civil Engineering Theory II  
Small Office Practice ■



# Urban and Regional Planning

## Bachelor of Science in Urban and Regional Planning

FBA05

Duration 3 years

### NSC Requirements

APS 36+

English Home Language OR First Additional Language

Level 5

Mathematics Level 5

### Wait-listing

Students with English and Mathematics at Level 5 will be wait-listed, subject to place availability.

International Qualifications on page 29

Closing Date: 30 September

### Careers

- Built Environment Analyst
- Consulting
- Damage Assessor
- Development and Corporate Real Estate
- Local, Provincial or National Government Planner
- Policy Analyst
- Property Management

### Programme Description

*Sustain the environment and develop economic and social wellbeing.*

The Bachelor of Science Urban and Regional Planning BSc(URP) programme, offered by the School of Architecture and Planning, is concerned with sustaining the environment and developing economic

and social wellbeing. In a context of increased technological change, rapid urbanisation, social transformation, and a changing natural environment, planning is about efficient and effective space management and creating places with meaning and quality.

The programme covers a range of fields, including geography, economics, sociology, and mathematics.

Core planning subjects range from the design of urban spaces and principles of place-making in a culturally diverse context, to policies for the planning and management of entire spatial regions. The classes involve mostly small group teaching, and expose you to real-life issues during practical field trips.

Planners often work in local, provincial, or national government, as well as in large companies with property portfolios, like insurance firms, and in communities, NGOs, and independent consultancies.

If you achieve the minimum requirements at the end of the three-year BSc(URP) programme, you may register for the professional BSc(URP) Honours programme, which enables you to register with the South African Council of Planners (SACPLAN) after you have gained necessary practical experience.

### Curriculum

#### First year

- Mathematical Technique for Planners
- Settlements through History
- Introduction to Environmental Interpretation
- Introduction to Settlement Form and Design

Geography for Planners  
Identity and Society I

#### Second year

- Two and three Dimensional Computer Aided Design
- GIS Planning
- Housing Services
- Infrastructure and Transport
- Introduction to Land Management
- Contemporary Design and Environmental Issues in South Africa Histories, Theories and Futures of Planning
- Introduction to Environmental Planning
- Introduction to Civil Engineering Infrastructure
- Economic Concepts IA and IB

#### Third year

- Quantitative Methods for Planners
- Comparative African Cities
- Integrated Development Planning
- Regional Planning and Local Economic Development
- Development Policy and Processes in South Africa
- Applications in Graphic and Spatial Communication in Planning
- Urban Economics

**AND, one of the following specialisations in Urban Environmental Design or Housing:**

- Comparative Approaches to Urban Design
- Spatial and Design Principles
- Housing Theory, Law and Policy

**AND, one of the following specialisations in Urban Politics and Governance:**

- Politics, Governance and the City
- Liberty, Justice and the Politics of Difference ■

## Construction Studies

### Bachelor of Science in Construction Studies

FBA04

#### Duration

3 years

### NSC Requirements

#### APS

36+

#### English Home Language OR First Additional Language

Level 5

#### Mathematics

Level 5

#### Wait-listing

Students with English and Mathematics at Level 5 will be wait-listed, subject to place availability.

#### International Qualifications on page 29

**Closing Date: 30 September**

### Careers

- Careers within Local Authorities and Government
- Commercial Trading as a Materials or Equipment Supplier
- Construction Management
- Project Management
- Quantity Surveying Practice
- Subcontractor in the Construction Industry

### Programme Description

*Plan, organise, and control construction projects.*

The School of Construction Economics and Management offers professionally recognised qualifications in construction management, property studies, and quantity surveying.

The three-year Bachelor of Science (BSc) in Construction Studies forms the foundation of these professional fields and gives you insights into how they interact. This will help you decide which professional field to pursue at Honours level.

Construction managers plan, organise, and control all aspects of large and complex construction projects. They have highly developed managerial skills and advanced technical knowledge of construction processes. They work in construction companies, insurance organisations, manufacturing organisations, and government departments, as property developers and project management consultants.

The BSc Construction Studies is accredited by the South African Institute of Building; the Chartered Institute of Building, UK (CIOB); the Royal Institution of Chartered Surveyors, UK (RICS); the South African Council of Quantity Surveying Profession; and the South African Council for Project and Construction Management Professions.

### Curriculum

#### First year

Introductory Statistics for Construction  
 Construction Drawings  
 Construction Materials and Environment  
 Construction Technology I  
 Communication Skills  
 Quantities and Specifications I  
 Commercial Law I  
 Mathematics  
 Physics  
 Practical Experience I

#### Second year

Building Science I  
 Construction Technology II  
 Quantities and Specifications II  
 Site Management  
 Accounting Principles in Construction  
 Civil Engineering Theory I  
 Economics IA - Microeconomics  
 Economics IB - Macroeconomics  
 Engineering Surveying  
 Practical Experience II

#### Third year

Professional and Research Skills  
 Quantities and Specifications III  
 Construction Technology III  
 Estimating and Analysis of Prices  
 Management Principles in Construction  
 Building Science II  
 Introduction to Construction Management  
 Property Studies  
 Civil Engineering II  
 Business Enterprise Law  
 Practical Experience III ■

## Property Studies

### Bachelor of Science in Property Studies

FF004

#### Duration

4 years

### NSC Requirements

#### APS

36+

#### English Home Language OR First Additional Language

Level 5

#### Mathematics

Level 5

#### Wait-listing

Students with English and Mathematics at Level 5 will be wait-listed, subject to place availability.

#### International Qualifications on page 29

Closing Date: 30 September

### Careers

- Banking, Investment and Finance
- Built Environment Analyst
- Consulting
- Damage Assessor
- Development and Corporate Real Estate
- Policy Analyst
- Property Management
- Property Valuation

### Programme Description

*Provide spaces that sufficiently meet organisational requirements.*

**Property is a high-demand finite resource that supports economic**

activity and influences the cost of goods and services. It forms the major asset value in corporate balance sheets, with most corporate debt secured against it. The challenge for the property practitioner is to provide spaces that efficiently meet organisational requirements. This requires a combination of legal, financial, and engineering skills.

The four-year Bachelor of Science (BSc) in Property Studies programme provides comprehensive training in most aspects of the property business, including finance, investment, development, and valuation. You can also specialise in corporate real estate and facilities management.

You will get a strong understanding of the fundamentals, including introduction to property, business and property, applications of mathematics, statistics, law, and planning. You will also receive training in finance, market analysis, investment finance, and property valuation, as well as professional skills training, including oral and written communication, the ability to work in teams, financial statement analysis, valuation, and financial modelling. In the fourth year, you will get additional training in entrepreneurship and leadership.

This gives you the practical experience you need to start working in finance, property asset management, letting and leasing, banking, property development, and valuations, in the public and private sectors.

### Curriculum

#### First year

- Planning for Property Developers
- Communication Skills

- Real Estate Principles
- Economics IA - Microeconomics
- Economics IB - Macroeconomics
- Commercial Law
- Mathematics for Property Studies
- Business Statistics

#### Second year

- Construction Technology
- Accounting Principles for Construction
- Econometrics for Property Studies
- Real Estate Market Analysis
- Real Estate Law
- Urban Economics
- Real Estate Corporate Finance
- Building Technology I

#### Third year

- Building Science I
- Construction Technology II
- Real Estate Valuation
- Professional and Research Skills
- Real Estate Finance
- Real Estate Management
- Environmental Impact Assessment
- Building Services
- Building Technology II

#### Fourth year

- Entrepreneurship and Innovation
- Advanced Real Estate Evaluation
- Management and Leadership in the Property Sector
- Commercial Real Estate Investments
- Corporate Real Estate
- Real Estate Development
- Facilities Management
- Advanced Real Estate
- Market Analysis
- Research Report ■