Undergraduate Faculty Brochure

2024

The closing date for programmes in this Faculty is **30 June**.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie / Lefapha la Boetšenere, Tikologo ya Kago le Theknolotši ya Tshedimošo

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Message from the Dean

The Future of Work, the future of education and—ultimately—our survival, are being redefined by disruptive technologies such as artificial intelligence (AI), machine learning, robotics, smart cities and big data. Innovative technologies such as these are at the centre of a qualification from the University of Pretoria's Faculty of Engineering, Built Environment and Information Technology (EBIT).

Prof Wynand JvdM Steyn
Dean: Faculty of Engineering, Built Environment and Information Technology

Innovation is our business: innovative technologies that lead not only to real-world change on the outside, but also to innovation from within. The COVID-19 pandemic fast-tracked several technological innovations that changed the world as we knew it and propelled us into new and creative ways of navigating life and reconceptualising the Future of Work.

Our Faculty responded to these challenges by ensuring that we remain relevant and lead by example. The digital transformation process that is driven by technology extends beyond tools and processes. It impacts on individuals and organisations, and results in the improved well-being of both people and the planet. It also enhances globalisation by removing physical barriers, making it possible to work anywhere, at any time and on any device.

Future-focused and transdisciplinary research is imperative if we wish to make sense of this new digitalised world. Our state-of-the-art Engineering 4.0 complex is positioning the University of Pretoria as a centre of excellence in smart transportation. The research done here is testimony to our thought leadership and frontline position on the global stage. Other transdisciplinary projects include the Hatfield Digital Twin City, additive manufacturing for electronic systems and the development of smart avos and smart alternative platforms.

SmWoef, our four-legged robot, is our latest smart alternative platform to be used for research. This robot can transport sensors into high-risk environments that are not safe for, or accessible to humans, to collect useful data. This is an excellent example of how robots and humans can co-exist and work together to innovate our tomorrow. You can be part of this future!

EBIT has more than 30 research chairs and entities, which attract high-quality students and researchers. Our work relates to fields such as AI, big data science, robotics, machine learning, the planning and construction of green buildings, urban citizenship, information and communication technology (ICT), technology innovation, water and environmental engineering, green energy, minerals and materials beneficiation, smart cities and intelligent transportation. EBIT is one of the few academic faculties in Africa to feature among the top 550 in the world in FIVE subject areas in the 2022 QS World University Rankings by Subject in the field of engineering and technology, as well as in the subject area of Architecture and Built Environment, featuring in the top 200 in the world. Our School of Engineering is ranked 352nd out of more than 10 000 engineering schools. Our programmes in electrical and electronic engineering continue to feature at the top in South African universities, while the Department of Mechanical and Aeronautical Engineering was named the top Mechanical Engineering department in South Africa in the latest Shanghai Ranking. We are also particularly proud of the recognition received by our programmes in mineral and mining engineering, which have been ranked in the 33rd position worldwide.

Through our close ties with industry partners, we continuously search for collaboration opportunities to enhance the relevance of our academic programmes and enable our students to acquire scarce and highly specialised skills, which is why our graduates are in such high demand. Our students can also start their own businesses on Campus through the high-tech business incubator, TuksNovation.

By continuously improving our teaching and learning activities, we are able to help our students succeed in their studies. Our academic staff go to great lengths to bring the world of work to the lecture halls. EBIT offers 29 undergraduate degree programmes and our degrees are accredited by national and international statutory and professional bodies. We follow a hybrid teaching model and have superb laboratory facilities. Learning is facilitated by a motivated team of dedicated academics, supported by highly competent administrative staff and student advisors.

The Faculty strives to accommodate as many students as possible who meet the admission criteria. Since places are limited, we recommend that learners who excel in their studies apply early. Prospective students are also encouraged to visit our website for further information and to submit their online applications without delay.

We look forward to receiving your application to join one of our degree programmes for an enriching and rewarding experience at the University of Pretoria. I will be delighted to welcome you in 2024!

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Website www.up.ac.za/ebit

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Produced by the Department of Enrolment and Student Administration in December 2022.
Comments and queries may be directed to ssc@up.ac.za or tel: +27 (0)12 420 3111.

Online application process for studies in 2024

Please read through all the steps below to determine which actions are relevant for your application to study at the University of Pretoria in 2024. Citizens from countries other than South Africa* should also take note of the steps below with specific reference to the important information above the tables in the brochure: Undergraduate programme information for the National Senior Certificate (NSC) and Independent Examination Board (IEB) available at www.up.ac.za/programmes > Undergraduate > Admission information.

1 Choose a programme

Read about all undergraduate programmes offered at UP in the brochure:
Undergraduate programme information for National Senior Certificate (NSC) and Independent Examination Board (IEB) available at www.up.ac.za/programmes > Undergraduate > Admission information.

- It is important to indicate a first- as well as a second-choice programme on your Online Application. The Online Application Form only makes provision for two study choices. If you want to add a third choice, or if you want to change your study choice after you have already submitted your online application, please forward your request to ssc@up.ac.za.
- Your second-choice programme will automatically be considered should your application for your first-choice programme be unsuccessful or if your first choice is a selection programme.

More information is available at www.up.ac.za/programmes > Undergraduate > Admission information.

- Ensure that your first- and second-choice programmes meet the minimum admission requirements as well as the faculty's selection guidelines.
- Please note that certain programmes will not be considered if indicated as your second choice. Refer to the faculty tables in the abovementioned brochure available at www.up.ac.za/programmes > Undergraduate > Admission information.
- For study advice, make an appointment with a Student Advisor via Ms Carol Bosch at carol.bosch@up.ac.za.

2 Tuition and residence fees

For more information on tuition and residence fees, go to www.up.ac.za/article/2749200/fees-and-funding.

- **Fee quotation:** Please go to www.up.ac.za/student-fees to get an estimation of the study fees for the programme/s that you are interested in.
- **Family discount:** When two or more dependent children of the same family are registered simultaneously at the University of Pretoria, they may apply for a rebate on tuition fees.
- **The 2.5% discount:** If the student account is paid in full (ie 100%) by 30 April, a 2.5% discount is applicable.
- **Initial payment:** This payment is not an additional amount payable, but the first payment towards the tuition fees.
- **Residence reservation fee:** This fee will be payable within 30 days after placement in a UP residence. For residence room fees, go to www.up.ac.za/accommodation.
- **Fees paid by bursaries:** Students must submit written proof from the sponsor of the bursary awarded to them prior to registration, otherwise they are responsible for the initial payment. The final decision regarding the acceptance of a bursary letter rests with the University.
- **How and where to pay:** We encourage you to make EFT or Credit card payments. Please allow at least 5 working days for the payment to reflect on your student account.
- **UP banking details:** Refer to www.up.ac.za/student-fees/article/2735940/up-bank-details.

More information is available at www.up.ac.za/student-fees.

3 Apply to study at UP in 2024

Apply ONLINE at www.up.ac.za/apply from 1 April in the year preceding studies.

- Applications open on 1 April. All study programmes at the University of Pretoria are number-limited. You are encouraged to submit your application as soon as possible after 1 April.
- The closing date for applications for all UP study programmes is 30 June. This excludes the programmes in the Faculty of Veterinary Science which close on 31 May.
- Before you start to complete the Online Application, please watch an online application demonstration at www.up.ac.za/juniortukkie > Study at UP.
- Ensure that the email address that you indicate on your Online Application is correct as your temporary password and T-number will be sent to this email address.
- You will receive your student number within 10 working days after you have submitted your Online Application.
- On receipt of your student number, you will be able to track your application status on the UP Student Portal. Refer to Step 6 for instructions on how to gain access to your UP Student Portal.

4 Apply for residence placement

The Online Application has a section to be completed if you are interested in residence placement.

- The demand for accommodation by far exceeds the available spaces. Applications open on 1 April 2023. The earlier you apply the better your chances.

More information is available at www.up.ac.za/accommodation.

- A student who is admitted to a University of Pretoria residence for the first time, must pay a reservation levy within the prescribed period. This amount is communicated in the placement letter.

*Applicants who are not South African citizens.

Online application process for studies in 2024

5 Apply for bursaries and loans

Visit the relevant website for closing dates.

UP bursaries and loans
- Applications must be submitted via the UP Student Portal or www.up.ac.za/fees-and-funding. No late applications will be accepted.
- UP sports bursaries: www.up.ac.za/sport

National Student Financial Aid Scheme (NSFAS)
- For applications and comprehensive information, visit www.nsfas.org.za.

Fundi (previously known as Eduloan)

As a registered credit provider, Fundi covers a wide range of student-related necessities such as books, accessories, laptops, university and private accommodation, as well as study tuition with a fixed monthly instalment. Anyone can apply for a loan (students, parents or guardians), provided that the applicant is in full-time employment or has a registered business. For more information, visit www.fundi.co.za.

Other bursary options
- Bursaries according to field of study: www.gostudy.mobi
- The Bursary Register: Contact rlevin@mweb.co.za or +27 (0)11 672 6559

6 How to access the UP Student Portal

Go to www.up.ac.za and click on My UP Login.

Note: A T-number is a temporary number and NOT a student number. This T-number is issued to the applicant at the beginning of the Online Application process. An applicant will receive a UP student number within 10 working days after the application has been submitted successfully.

Applicants will only be able to access the UP Student Portal once they have received a UP student number, eg u23123456.

Please watch a video demonstration on: 'How to access the UP Student Portal' at https://youtu.be/Yd4pWr8IvNk.

Go to www1.up.ac.za and click on the "New user" link.
- Type in your Username (u followed by your student number) and your National ID or Passport number. Click the "Proceed" button.
- Set up your new password and confirm the password in the second block. Click the "Proceed" button.
- A message is displayed to inform the user that the password was set successfully. Click the "OK" button.
- A list of challenge questions appears. Select any three of these challenge questions and then click on the "Submit" button. Enter your answer on the three challenge questions you chose and click on the "Save" button.
- A message will be displayed to inform you that your challenge questions have been set up. Click the "OK" button.
- You are now ready to access the UP Student Portal.
- Sign in again with your username and password.

7 UP Student Contract

Before a student will be able to register, a contract needs to be concluded between the student and the University of Pretoria.

- Students must access the contract online on the UP Student Portal at www.up.ac.za > My UP Login.
- The contract should be completed online, and then printed and signed.
- Hand your original, signed UP Student Contract in at the Student Service Centre, Hatfield Campus.
  - You can also post your contract to the Student Service Centre, University of Pretoria, Private Bag X20, Hatfield, 0028.
  - Or you can courier your contract to University of Pretoria (Contracts), University Road entrance, Hatfield, Pretoria, 0083.
- The University of Pretoria does not accept faxed, scanned or emailed contracts.
- Before you start to complete the UP Student Contract, please watch a video demonstration on 'How to complete the UP Student Contract' at www.up.ac.za/juniortukkie > Study at UP.

8 Orientation and Registration for new first-year students

- The Orientation Programme will be available on www.up.ac.za/orientation by the end of December 2023.
- Online Registration information will be available on www.up.ac.za/online-registration by the end of December 2023.

9 Fly@UP Assist First-Year Awards

- First-year students who register for studies at UP directly after their final school-year (NSC Grade 12 or equivalent qualification), who meet the award criteria, will be considered.
- Students do not apply for these awards.
- Terms and Conditions apply.

More information is available at www.up.ac.za/student-funding > Fly@UP Assist 1st Year Awards.

Undergraduate programmes

General admission regulations that apply to all prospective students

1. The admission requirements and general information provided in this Faculty brochure are applicable to students who apply for admission to the University of Pretoria with a National Senior Certificate (NSC) or an Independent Examination Board (IEB) qualification.
2. The following persons will be considered for admission to a first bachelor's degree at the University of Pretoria:
   - Candidates who have a certificate that is deemed by the University to be equivalent to the required National Senior Certificate (NSC) with bachelor's degree endorsement;
   - Candidates who are graduates from another tertiary institution or have been granted the status of a graduate of such an institution; and
   - Candidates who are graduates of another faculty at the University of Pretoria.
3. Grade 11 results are used for the conditional admission of prospective students, but final admission will depend on the NSC (or equivalent) qualification and results.
4. Candidates must also comply with the specific subject and achievement level requirements and the minimum Admission Point Score (APS) for their chosen degree programmes.
5. The APS calculation is done by using the NSC 1 to 7 scale of achievement. It is based on a candidate's achievement in six recognised 20-credit subjects. The highest APS that can be achieved is 42. Life Orientation is a 10-credit subject and is excluded from the calculation when determining the APS. The following subject rating scores are used for calculating the APS for NSC/IEB:

Admission Point Score (APS) Conversion

Rating code	Rating	Marks %
7	Outstanding achievement	80–100%
6	Meritorious achievement	70–79%
5	Substantial achievement	60–69%
4	Adequate achievement	50–59%
3	Moderate achievement	40–49%
2	Elementary achievement	30–39%
1	Not achieved	0–29%

NSC – National Senior Certificate (completed Grade 12 in or after 2008)
IEB – Independent Examination Board

6. Except in cases where modules or programmes require the use of a language other than English, all modules will be presented in English, which is the University's official language of tuition, communication and correspondence.
7. Minimum requirements for admission to the relevant programmes are set out in the minimum admission requirements table in this brochure.
8. Meeting the minimum admission requirements does not guarantee admission into a programme.
9. Applicants with qualifications other than NSC and IEB should refer to the following publications:
   - The *Undergraduate Programme Information 2024: Qualifications other than the NSC/IEB brochure*, which is available at www.up.ac.za/programmes > Undergraduate > Admission information.
   - The *Newcomer's Guide: 2023 brochure of the International Cooperation Division*, which is available at www.up.ac.za/programmes > Undergraduate > Admission information.
10. **School of Tomorrow** (SOT) and **Accelerated Christian Education** (ACE): The University of Pretoria no longer accepts qualifications awarded by these institutions.
11. **General Education Development** (GED): South African GED graduates who graduated up to 2019 may be considered for admission, provided they qualify for an exemption certificate issued by USAf and comply with both University admission and Faculty subject requirements. South African GED graduates who graduated after 2019 cannot be considered for admission to UP as the diploma is not accredited by USAf and will not be considered for exemption. Applicants from the USA who completed the GED may apply for a Foreign Conditional Exemption Certificate issued by USAf and accompanied by their SAT/TOEFL/IELTS results.
12. **National Certificate (Vocational)** (NCV) Level 4: The University of Pretoria may consider NCV candidates, provided they meet the exemption for bachelor's status criteria and the programme requirements.

Note: Refer to the General Academic Regulations and Student Rules at www.up.ac.za/yearbooks/home, click on 'General Rules and Regulations'.

APPLICATION AND CLOSING DATES:
- Applications open on 1 April. All study programmes at the University of Pretoria are number-limited. You are encouraged to submit your application as soon as possible after 1 April.
- The closing date for applications for all UP study programmes is 30 June. This excludes the programmes in the Faculty of Veterinary Science which close on 31 May.

APPLICATION STATUS:
- Apply with your final Grade 11 (or equivalent) results.
- Please note that meeting the minimum academic requirements does not guarantee admission.
- Successful candidates will be notified once conditionally admitted.
- Unsuccessful candidates will be notified after 30 June.
- Please check your application status regularly on the UP Student Portal at www1.up.ac.za.
- Final admission will be based on the applicant's final school-year NSC or equivalent results.

Undergraduate programmes

Faculty-specific admission regulations

- Conditional admission to a four-year programme in the School of Engineering is considered only if a prospective student complies with ALL the requirements as indicated in the undergraduate minimum admission requirements table.
- Admission to ENGAGE in the School of Engineering will be determined by the NSC results, achievement level of 5 for English, 65% for Mathematics and 65% for Physical Sciences, and an APS of 33.
- Students may apply directly to be considered for the ENGAGE programme.
- **Second-choice programme:** Should the Admission Point Score (APS) of a prospective student meet the entrance requirements for a programme, and the prospective student is not accepted for the first-choice programme, then an alternative programme should be considered as a second-choice programme.
- **Accreditation:** The various programmes in the School of Engineering are accredited by the Engineering Council of South Africa (ECSA), and the degrees meet the requirements for professional engineers in South Africa. All the programmes in the School for the Built Environment are internationally recognised and accredited by their respective statutory councils, allowing students to register as members of their chosen professions. All the degree offerings in the School of Information Technology (SIT) are highly sought after in the IT industry with a focus on industry-related trends. The curriculum conforms to the highest international standards. We are very proud to be a member of the iSchools Organisation. We are the only IT School in South Africa with Accreditation Board for Engineering & Technology (ABET) rating.

University of Pretoria website www.up.ac.za/ebit

Minimum admission requirements

- The closing date for applications for programmes in this faculty is 30 June.
- Meeting the minimum admission requirements does not guarantee admission into a programme.

Programmes	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL OF ENGINEERING	English Home Language or English First Additional Language	Mathematics	Physical Sciences	
BEng (Industrial Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Industrial Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Industrial engineers design, test, implement and manage a wide range of man/machine systems for production and the delivery of services. Organisational matters that require optimisation include site selection and layout of facilities, manufacturing, inventory control, materials handling, supply chain management, quality management, cost control, financial services, maintenance, reliability, computer simulation, information systems, human resources and business law.				
BEng (Chemical Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Chemical Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Chemical engineers are involved in industrial processes that convert raw materials to products with a higher economic value. This is achieved using physical, thermal, chemical, biochemical and mechanical changes and processes. Chemical engineers apply their specialised knowledge in the petroleum, food, minerals processing, power generation and the paper and pulp industries, water and effluent treatment, and environmental engineering activities, including air pollution control. Like those in other engineering disciplines, chemical engineers are involved in research and development, techno-economic evaluation, equipment and plant design, process control and optimisation, construction, commissioning, operation and management, and the marketing and distribution of the final products.				
BEng (Civil Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Civil Engineering) are BSc (Chemistry), BSc (Mathematics), BSc (Physics), BSc (Construction Management) and BSc (Quantity Surveying) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Civil engineers design, build and maintain constructions such as tower blocks and skyscrapers, dams, canals and pipelines, roads, bridges, tunnels, railways, airports, power stations, towers, waterworks and outfall installations. They are involved in financial modelling, feasibility studies and the management and rehabilitation of large asset portfolios.				
BEng (Electrical Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Electrical Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Electrical engineers are active in the generation, storage, transmission, distribution and utilisation of electrical energy. There is a bright future in renewable energy. Electrical engineers design, supervise the construction, oversee the optimal operation and assure perfect and timely maintenance of all electrical installations for municipalities, residential areas, commercial buildings, factories, mines and industries. Rail transport, water pumping, electrical grids, telecommunications, energy management and smart lighting all fall within the scope of electrical engineering.				
BEng (Electronic Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Electronic Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Electronic engineers are active in various fields, such as telecommunications (fixed networks, wireless, satellite, television, radar and radio frequency networks), entertainment and medicine (magnetic resonance imaging, X-rays, cardiopulmonary resuscitation, infrared tomography, electroencephalograms (EEGs), electrocardiograms (ECGs), rehabilitation engineering and biokinetics), integrated circuit design, bioengineering, military equipment design (vehicle electronics, smart bombs, night vision, laser systems), transport (e-tags, speed measuring, railway signalling, global positioning system (GPS) and mapping), 'smart' dust, safety and security systems (face and speech recognition), banking (ATMs), commerce, robotics, education, environmental management, tourism and many more.				

Undergraduate programmes

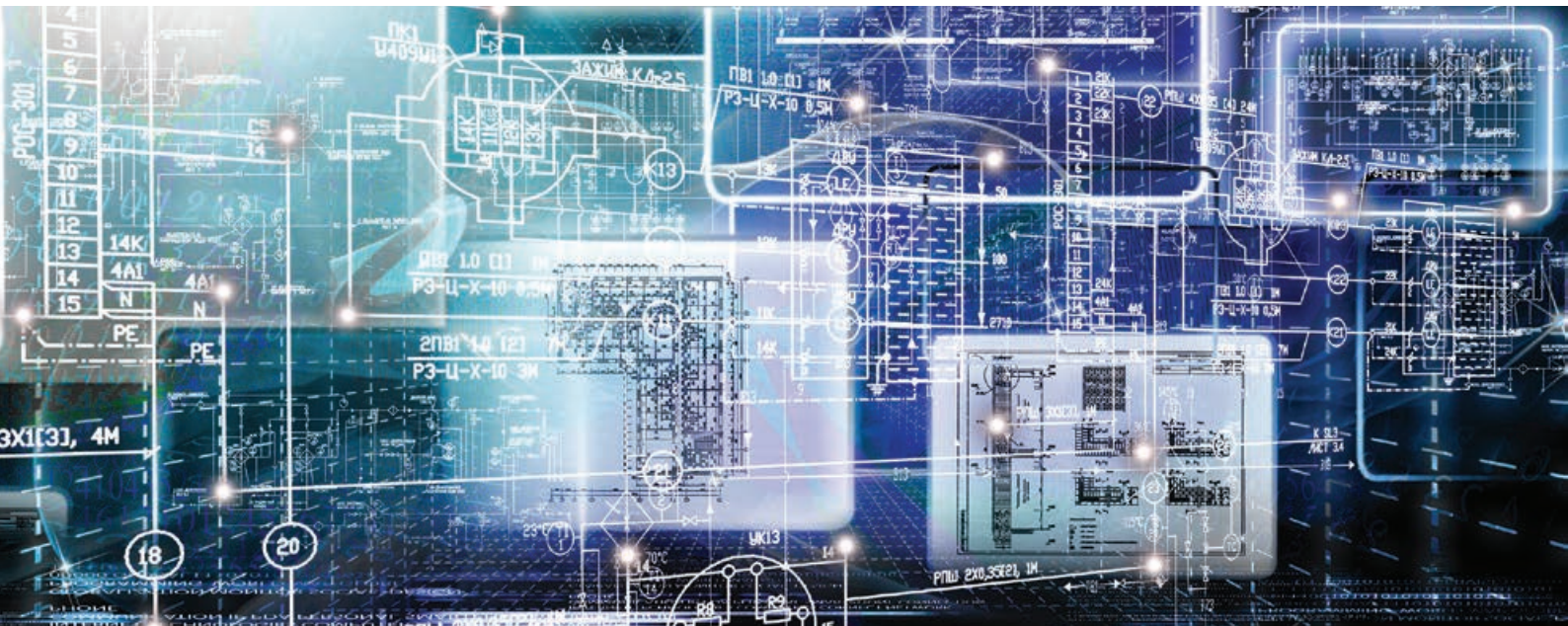
Programmes	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL OF ENGINEERING	**English Home Language or English First Additional Language**	**Mathematics**	**Physical Sciences**	
BEng (Mechanical Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Mechanical Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Mechanical and aeronautical engineers are concerned with power-generating machines and systems such as vehicles, ships, air-conditioners, pebble-bed nuclear reactors, aeroplanes, engines and turbines, robots and biomedical systems. Areas of specialisation include product design and manufacturing (such as the design, testing and improvement of mechanical, electrical, pneumatic and hydraulic systems), marine engineering and naval architecture, biomedical engineering, air-conditioning and refrigeration, aerospace systems and aircraft/missile engineering, vehicle engineering, maintenance engineering and energy management (gas and steam turbines, nuclear power reactors, petrol engines, cooling towers and renewable energy systems).				
BEng (Metallurgical Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Metallurgical Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Metallurgical engineers unlock the riches of deposits of metal ores and minerals and optimise the manufacture and performance of metallic components. You'll find metallurgical engineers where valuable minerals are recovered from ore, where metals are produced from the minerals and where the metals are converted into useful materials as well as into high-performance products. Areas of specialisation include minerals processing, extractive metallurgy, materials engineering and performance, advanced manufacturing processes, including laser-assisted additive manufacturing and welding, as well as failure analysis and forensic engineering.				
BEng (Mining Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Mining Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Mining engineers have a wide range of opportunities, namely mining (mine management, technical management of ventilation, rock mechanics, rock breaking, mineral resources), financial evaluation and management (mine design, financial evaluation of mines, mine feasibility studies, mine environmental impact studies), mining and drilling contracting (mining, tunnelling, shaft sinking, mine development, ore evaluation), mining research, mining equipment design and manufacture, mining marketing and mining administration at national, provincial and international levels.				
BEng (Computer Engineering) [4 years]	5	6	6	**35**
The suggested second-choice programmes for BEng (Computer Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.				
Careers: Computer engineers are active in all fields of the information superhighway and the information and communication technology (ICT) world, which include computer systems, software engineering, computer and communications networks, wireless sensor networks, embedded software, electronics, smart control systems and automation, data security, e-commerce, pattern recognition (face and speech recognition) and artificial intelligence. They specialise in combining hardware, software and communication technologies to optimise system performance.				
Engineering Augmented Degree Programme (ENGAGE) ENGAGE is an extended augmented degree programme for all Engineering disciplines [5 years]	5	65%	65%	**33**
For advice on a second-choice programme, please consult a Student Advisor. To make an appointment, send an email to carol.bosch@up.ac.za.				
Note: The admission requirements above are relevant to prospective students who will commence their studies in 2024. Admission to ENGAGE in the School of Engineering will be determined by the NSC results.				

Undergraduate programmes

Programmes	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL FOR THE BUILT ENVIRONMENT	**English Home Language or English First Additional Language**	**Mathematics**	**Physical Sciences**	
BSc (Architecture) [3 years]	5	4	4	**27**
For advice on a second-choice programme, please consult a Student Advisor. To make an appointment, send an email to carol.bosch@up.ac.za.				
Will only be considered as first study choice. Selection programme: Selection includes an interview. **Careers:** The BSc (Architecture) degree programme enables graduates to register with the South African Council for the Architectural Profession (SACAP) as candidate architectural technologists. The qualification is the first step to future registration as a candidate senior architectural technologist or a candidate architect.				
BSc (Construction Management) [3 years]	5	5	or Accounting 4	**30**
The suggested second-choice programme for BSc (Construction Management) is BSc (Real Estate).				
Careers: After completing the three-year undergraduate degree programme, graduates could enter careers in, among others, construction site management or subcontracting. On completion of the ensuing one-year honours programme, graduates can register as candidate professional construction managers or candidate professional construction project managers and opportunities become much wider, including property development, portfolio management, commercial marketing and managerial positions in the corporate environment.				
BSc (Real Estate) [3 years]	5	5	or Accounting 4	**30**
The suggested second-choice programme for BSc (Real Estate) is BCom (Investment Management).				
Careers: Apart from a future in areas such as property investment, property finance and facilities, and property management, further studies to obtain an honours degree in real estate can lead to registration as professional property valuers. Career opportunities encompass the entire spectrum of the property sector, whether as entrepreneurs in the private sector or as employees in the private, government or semi-government sectors.				
BSc (Quantity Surveying) [3 years]	5	5	or Accounting 4	**30**
The suggested second-choice programmes for BSc (Quantity Surveying) are BSc (Construction Management) and BSc (Real Estate).				
Careers: Quantity surveying is the science that delivers specialised financial and contractual services and advice to clients in the built environment, as well as related industries. The three-year undergraduate degree is the first step towards registration as quantity surveyors. The ensuing one-year honours programme leads to registration as candidate professional quantity surveyors. Career opportunities, apart from those in the private, government or semi-government sectors, also exist in the property, banking, insurance, mining and manufacturing industries.				
BTRP – Bachelor of Town and Regional Planning [4 years]	5	4	-	**27**
For advice on a second-choice programme, please consult a Student Advisor. To make an appointment, send an email to carol.bosch@up.ac.za.				
Careers: Town and regional planners, development practitioners, urban managers, real estate analysts and researchers. While many town and regional planners act as private consultants to the public and private sectors, the majority are employed by government, research agencies (such as the Council for Scientific and Industrial Research (CSIR) and the Human Sciences Research Council (HSRC)), non-governmental organisations, community-based organisations, major financial institutions and property development groups. The qualification will enable graduates to register as professional town and regional planners with the South African Council for Planners.				

Undergraduate programmes

Programmes	Minimum requirements for NSC/IEB for 2024		
	Achievement level		APS
SCHOOL OF INFORMATION TECHNOLOGY	**English Home Language or English First Additional Language**	**Mathematics**	
BIT (Information Systems) [3 years]	5	5	**30**
The suggested second-choice programme for BIT (Information Systems) is BIS (Information Science).			
Careers: Data scientist, IT auditor, IT entrepreneur, IT tax specialist, e-business consultant, programmer, business analyst, project manager, CIO, CTO and knowledge manager			
BSc (Computer Science) [3 years]	5	6	**30**
The suggested second-choice programmes for BSc (Computer Science) are BSc (Information and Knowledge Systems) and BCom (Informatics).			
Careers: Programmers, systems analysts, systems architects, consultants, database administrators, network analysts and researchers			
BIS (Multimedia) [3 years]	4	5	**30**
The suggested second-choice programmes for BIS (Multimedia) are BIS (Information Science), BIS (Publishing), BSc (Information and Knowledge Systems) and BCom (Informatics).			
Careers: Programmers, web designers, animation specialists, video editors and electronic artists. The programme prepares candidates for positions at any of the following content producers: paper publications, television, radio, phone technologies and the web. Graduates can become coders and work for programming companies. They can develop skills in their particular areas of interest, such as digital music or video programming, or graphic, games or web development.			
BSc (Information and Knowledge Systems) [3 years]	4	6	**30**
The suggested second-choice programme for BSc (Information and Knowledge Systems) is BSc (Computer Science).			
Careers: Graduates will differentiate themselves in an application environment by choosing one of the following options: data science, genetics, geographical information systems, IT and enterprises, IT and law, IT and music or software development.			
BIS (Information Science) [3 years]	4	-	**28**
The suggested second-choice programmes for BIS (Information Science) are BIS (Publishing), BCom (Informatics) and BA.			
If informatics is selected as a subject at the first-year level, an achievement level of 5 is required in Mathematics. **Careers:** Information and knowledge managers (manage information and knowledge resources), information or e-commerce specialists (organise, retrieve and add value to information), consultants on information products (services and systems), information brokers (act as infopreneurs and buy and sell information products and services), and system specialists/analysts/technologists (develop information systems).			
BIS (Publishing) [3 years]	5	-	**28**
The suggested second-choice programmes for BIS (Publishing) are BIS (Information Science), BA (Languages) and BA.			
Careers: Entry-level job opportunities include assisting specific role-players in the publishing value chain (such as MDs of publishing houses, commissioning editors, editors and production or marketing managers), market or picture research, copyright negotiations, copy-editing and proofreading, marketing and promotion, distribution and delivery.			
BCom (Informatics) Focus area: Information Systems [3 years]	5	5	**30**
This programme is administered by the Faculty of Economic and Management Sciences.			
Careers: Data scientist, IT auditor, IT entrepreneur, IT tax specialist, e-business consultant, programmer, business analyst, project manager, CIO, CTO and knowledge manager			



School of Engineering

School of Engineering: Highlights

The Engineering Council of South Africa has granted accreditation to all programmes offered by the School of Engineering at the University of Pretoria. The School, which offers programmes in all the engineering disciplines, is one of the largest of its kind in the country in terms of student numbers, graduates and research contributions. Many specialisations are also offered at both the undergraduate and postgraduate levels.

Through the innovative and relevant research undertaken in its seven departments—Chemical Engineering, Civil Engineering, Electrical, Electronic and Computer Engineering, Industrial and Systems Engineering, Materials Science and Metallurgical Engineering, Mechanical and Aeronautical Engineering and Mining Engineering—the School of Engineering provides students with the necessary training to enable them to make a considerable contribution to engineering in South Africa and abroad.

The School maintains close ties with industry through several research chairs in all its departments. These include chairs in Maintenance Engineering, Pyrometallurgy, Carbon Technology and Materials, Reaction Engineering, Water Utilisation and Environmental Engineering, Railway Safety Regulator, Industry Leadership 4.0 and Broadband Multimedia Communications. It also has a number of research centres and institutes, such as the Hub for Energy Efficiency and Demand-side Management, the Advanced Engineering Centre of Excellence, the Industrial Metals and Minerals Research Institute, the Centre for Telecommunications Engineering for the Information Society, the Centre for Asset Integrity Management, the SAIW Centre for Welding Engineering and the Carl and Emily Fuchs Institute for Microelectronics, to name but a few.

Each department excels in its own research, but the consolidation of research activities is encouraged and several sustainable research groups have been formed to make an impact worldwide.

School of Engineering

Department of Chemical Engineering

BEng (Chemical Engineering)

What does the programme entail?

What is chemical engineering?
A chemical engineer, **also known as a process engineer**, finds ways to convert cheap raw materials into more valuable products. Theoretical knowledge of chemistry is required, but the field mostly focuses on the application of intense mathematics to make processes as efficient as possible.

The programme provides students with the necessary foundation to ensure that once they have graduated, they will be able to make creative contributions to the world's ever-increasing needs by:

- converting natural resources into efficient and useable forms of energy;
- developing more durable, lighter and renewable materials;
- designing more efficient, environmentally friendly processing plants;
- applying biotechnology to convert raw materials into products in a sustainable way;
- designing processes to ensure that limited natural resources, such as water, can be reused; and
- leaving a clean and sustainable environment behind for future generations.

A solid foundation in chemistry, physics, mathematics and biology is combined with the principles of the conservation of mass, energy and momentum, followed by the application of the economic tenets when designing equipment so as to ensure lucrative processes that will contribute to economic and industrial growth. The programme is aimed at producing graduates who can develop new and innovative processes, ensuring continued growth to satisfy the abovementioned needs.

Watch this YouTube video:
https://youtube.com/watch?v=IYXw49AZ1Vo&feature=share

Who are the ideal candidates?

The ideal candidate should:

- have a passion for mathematics;
- enjoy problem solving;
- enjoy challenges;
- be hard-working;
- be creative and an independent thinker;
- have drive and ambition; and
- be a team player.

This discipline is exceptionally suited to women and the number of females in our student complement is continuously growing. In the past three years 40% of the Department's graduates were female.

Career opportunities

Chemical engineers are involved in industrial processes that convert raw materials to products with a higher economic value. This is achieved by using physical, thermal, chemical, biochemical and mechanical changes and processes.

Chemical engineers apply their specialised knowledge in the petroleum, food, mineral processing, power generation and paper and pulp industries, water and effluent treatment, and environmental engineering activities, which include air pollution control.

Like those in other engineering disciplines, chemical engineers are involved in research and development, techno-economic evaluation, equipment and plant design, process control and optimisation, construction, commissioning, operation and management, and the marketing and distribution of the final products.

Where are chemical engineers employed?

- Petroleum/ petrochemical industry
- Food and pharmaceutical industry
- Sustainable/ environmental engineering activities
- Mineral/ material processing
- Power generation
- Paper and pulp industries
- Water treatment and valorisation

School of Engineering

BEng (Chemical Engineering) *(continued)*

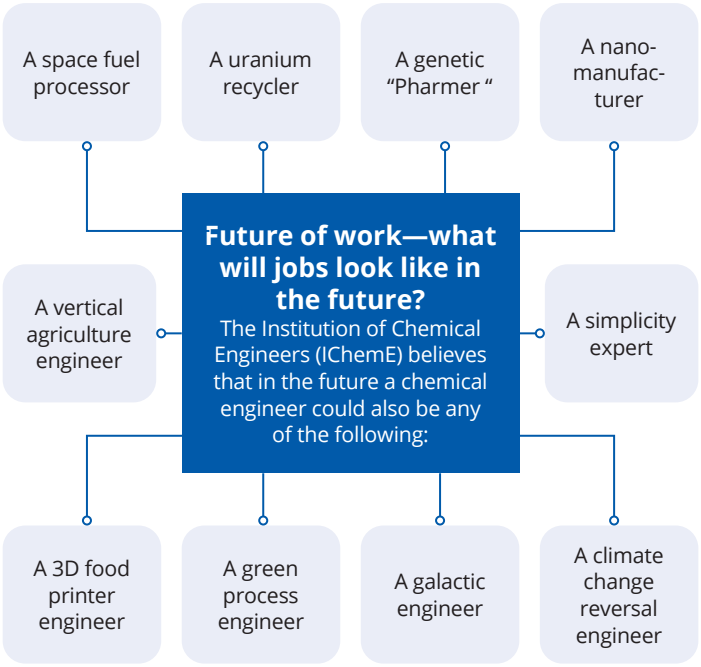
Which companies employ our graduates?

Companies where Chemical Engineers are employed in South Africa include:
Sasol, Golder and Associates, Veolia Water, APT, Hoechst SA, Afrox, Bayer, Sucrochem, Shell Chemicals, BASF, Engen Petroleum, Silicate & Chemical Industries, ICI, Rohm and Haas, Omnia, Chemserve, Fine Chemicals Corp (SA Druggists), Noriscel, Henkel, Revertex, CH Chemicals, Chempro, Carbon Trust, McKinsey and Co. and Kimberley Clark.

Postgraduate studies

At the postgraduate level, the Department of Chemical Engineering focuses on the following research themes:

- Sustainable environment and water utilisation processes
- Sustainable and efficient energy processes
- Advanced and applied materials
- Process modelling, control and optimisation (www.up.ac.za/ebit-postgraduate)



Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			
SCHOOL OF ENGINEERING	English Home Language or English First Additional Language	Mathematics	Physical Sciences	APS
BEng (Chemical Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Chemical Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.

Careers: Chemical engineers are involved in industrial processes that convert raw materials to products with a higher economic value. This is achieved using physical, thermal, chemical, biochemical and mechanical changes and processes. Chemical engineers apply their specialised knowledge in the petroleum, food, minerals processing, power generation and the paper and pulp industries, water and effluent treatment, and environmental engineering activities, including air pollution control. Like those in other engineering disciplines, chemical engineers are involved in research and development, techno-economic evaluation, equipment and plant design, process control and optimisation, construction, commissioning, operation and management, and the marketing and distribution of the final products.

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School of Engineering

Department of Civil Engineering

BEng (Civil Engineering)

What does the programme entail?

Civil engineers create facilities that improve the quality of people's lives and environments. This process entails research into the proposed facility, followed by the planning, design and construction of the facility and its continued maintenance. Civil engineers design, build and maintain constructions such as tower blocks and skyscrapers, dams, canals and pipelines, roads, bridges, tunnels, railway lines, airports, power stations, towers, waterworks and outfall installations.

Since these facilities have a long lifespan and a direct impact on the community and environment, civil engineers are trained to not only deal with the analytical aspects of design, but to also liaise and consult directly with communities and individuals to design, build and maintain such facilities cost-effectively and to the benefit of humankind.

The development of information technology and computer software that make continuous data collection, mathematical modelling and designs more effective has drastically changed the nature of civil engineering in that it enables civil engineers to concentrate on the more fundamental aspects of developmental work and design.

Information technology and environmental engineering and management increasingly form a greater part of the training, so that a civil engineer can still be provided with a broad-based qualification that offers challenging, fulfilling and highly adjustable career opportunities throughout a career lifespan of between 40 and 50 years.

In 2020, the Department inaugurated its new Engineering 4.0 facility, which includes state-of-the-art laboratories and training facilities to support the training and education of the engineers of the future.

Watch this video to learn more:
www.youtube.com/watch?v=V0YFU0ziEJg

What makes this programme unique?

Our programmes in the School of Engineering are accredited by the Engineering Council of South Africa (ECSA), and our degrees meet the requirements for professional engineers in South Africa.

Who are the ideal candidates?

The ideal candidate needs:
- a passion for continuous learning;
- people-management skills;
- good planning skills; and
- problem-solving skills.

Which companies employ our graduates?

Any company involved in development, design, construction and management of infrastructure and related services. For more information visit www.careerexplorer.com/careers/civil-engineer.

Where are civil engineers employed?

- Government departments, provincial administrations and municipalities
- Self-employment as a consultant, with the necessary experience and initiative
- Research institutions, state owned enterprises, and infrastructure developers
- Engineering or architectural firms
- Universities of technology and universities
- Construction companies

Future of work/careers in the future

In order to work towards smart cities, there is a need to develop researchers with advanced skills in robotics, artificial intelligence, the internet of things and satellite technology.

The civil engineer of the future will need to internalise the fundamentals of materials science, engineering mechanics and dynamics. This knowledge should be combined with an appreciation of the environment and its effects on materials, as well as a sound appreciation of the internet of things (IoT) and Big Data analysis. Another essential skill is the ability to integrate internalised knowledge with searchable information and data, combined with the development of models to describe the interaction between materials, traffic and the environment.

The expected effects of the 4IR on the life of the pavement engineer, for instance, may include changes in pavement structures due to the wandering patterns of autonomous vehicles, changes in materials due to developments in nanotechnology, changes in traffic loading due to vehicle technology developments, the availability of traditional materials such as bitumen, and the need to develop novel road pavement surfacing options.

For more information visit www.up.ac.za/eng4.

School of Engineering

BEng (Civil Engineering) *(continued)*

UP Engineering 4.0's 'smart avos' hold the key to determining the impact of transportation conditions on agricultural products.

Read more here:
www.up.ac.za/faculty-of-engineering-built-environment-it/news/post_2978576-up-engineering-4.0s-smart-avos-hold-the-key-to-determining-the-impact-of-transportation-conditions-on-agricultural-products

Home of the Smart Alternative Transport Platform
The research done at the Engineering 4.0 Complex is a testimony to EBIT's thought leadership and frontline position on the global stage. The Faculty's smart alternative transport platform puts future-focused development on centre stage.

One of its newest innovations is SmWoef, which can transport sensors into high-risk environments that are not safe for or accessible to humans, for the collection of useful data. This is an excellent example of how robots and humans can co-exist and work together to innovate our tomorrow. Researchers in the Faculty's Department of Civil Engineering are currently training SmWoef to assist with multiple research projects at Engineering 4.0.

Minimum admission requirements

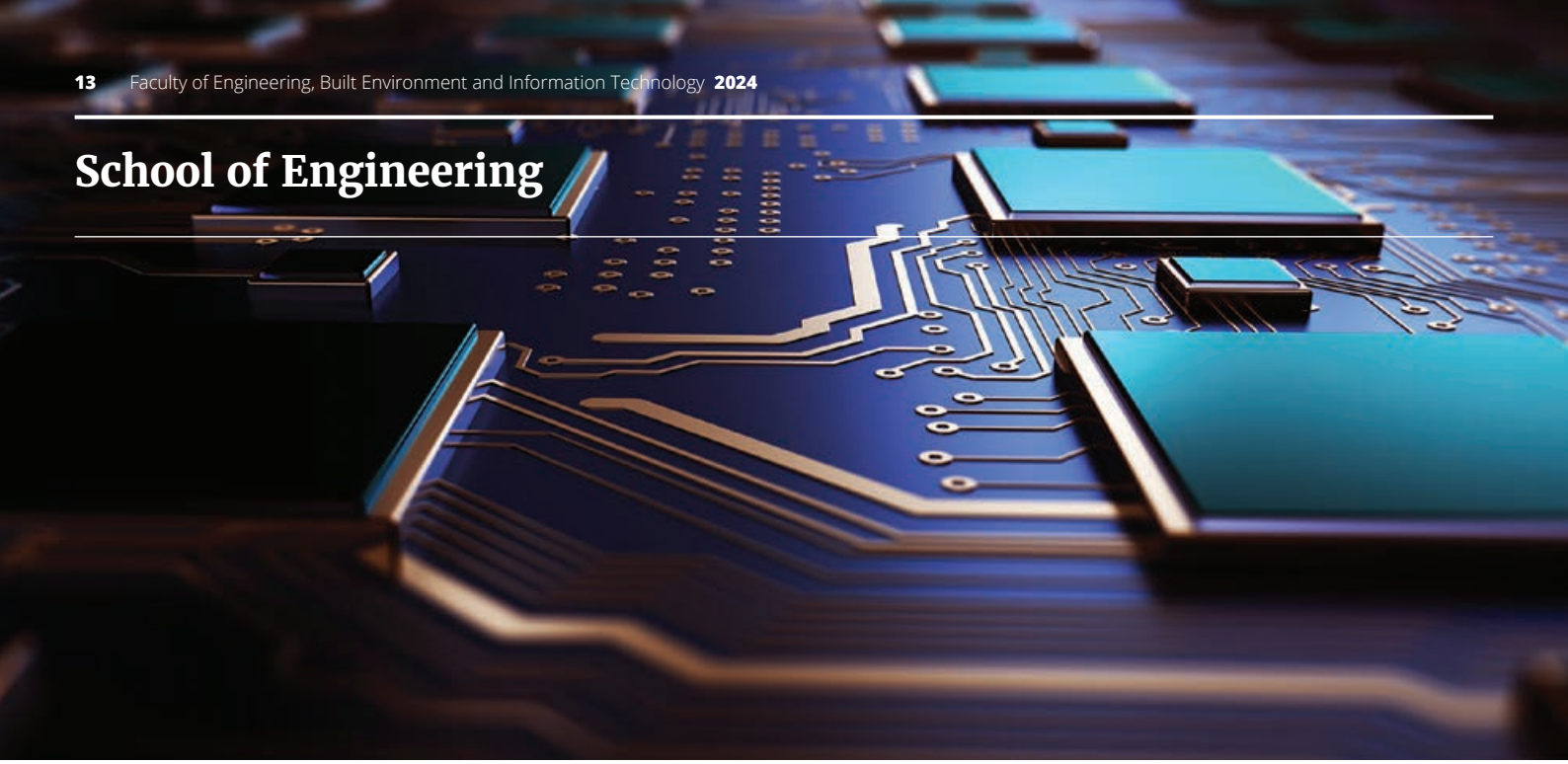
Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL OF ENGINEERING	**English Home Language or English First Additional Language**	**Mathematics**	**Physical Sciences**	
BEng (Civil Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Civil Engineering) are BSc (Chemistry), BSc (Mathematics), BSc (Physics), BSc (Construction Management) and BSc (Quantity Surveying) if your APS and subject requirements of your first-choice programme are not obtained.

Careers: Civil engineers design, build and maintain constructions such as tower blocks and skyscrapers, dams, canals and pipelines, roads, bridges, tunnels, railways, airports, power stations, towers, waterworks and outfall installations. They are involved in financial modelling, feasibility studies and the management and rehabilitation of large asset portfolios.

Contact information Prof Wynand JvdM Steyn (Head of Department) | **Tel** +27 (0)12 420 2171 | **Email** wynand.steyn@up.ac.za
Websites www.up.ac.za/civil-engineering | www.up.ac.za/school-of-engineering | www.up.ac.za/ebit-postgraduate

School of Engineering



Department of Electrical, Electronic and Computer Engineering

BEng (Electrical Engineering)

What does the programme entail?

Electrical engineering is one of the three internationally accepted and closely related subdisciplines in the traditional field of electrical engineering (electrical engineering, electronic engineering and computer engineering). This programme covers the vast and continuously expanding field of energy generation, distribution and utilisation. Practically all technological systems in the world rely on electrical power as a source of energy. An electrical engineer is someone with a talent for introducing alternative and renewable sources of electrical energy into everyday life.

Enormous challenges exist for utilising and storing electrical energy derived from such sources as the sun (solar energy), wind, biomass and water (hydro-energy), and even nuclear energy. In South Africa, pumped storage systems are extensively used, and new systems are being developed. The most cost-effective way of saving electrical energy is to spend a great deal of research and development time and money on sustainable energy-efficient equipment, from electrical machines to geysers and lighting.

There is a shortage of qualified electrical engineers all over the world. An electrical engineer has a thorough understanding of the basic sciences and a good education in the theoretical and practical aspects (including design, installation and maintenance methodology) of electrical engineering.

Who are the ideal candidates?

An electrical engineer needs to be innovative and has to keep abreast of new developments in the field of technology. Many electrical engineers move into management positions very quickly and use analytical, synthesis, managerial and leadership skills to reach the highest levels of corporate management.

What skills do I need?

- Critical thinking;
- complex problem-solving;
- innovative thinking;
- technological knowledge; and
- analytical skills.

Due to the current worldwide energy crisis, there is an urgent need for environmentally friendly ways to generate power and energy.

Watch this video to learn more:
https://www.youtube.com/watch?v=hOkcMmtVDas

What makes this programme unique?

Our programmes are internationally accredited by the Engineering Council of South Africa (ECSA).

Which companies employ our graduates?

Electrical engineering graduates have access to a wide range of job opportunities. The advances in electrical energy generation and distribution create tremendous opportunities for entrepreneurs in South Africa and in the rest of the world.

Research and development opportunities are available locally at institutions such as Denel, Eskom, the Council for Scientific and Industrial Research (CSIR) and Transnet.

Where are electrical engineers employed?

- Electricity utility companies
- Mining houses
- Municipalities
- Consulting engineers
- Transportation (rail and sea) companies
- Research organisations, locally and abroad

School of Engineering

BEng (Electrical Engineering) *(continued)*

Career opportunities

Electrical engineering is prevalent in almost all application fields and technologies where electrical energy is consumed. Every known piece of equipment requires a source of energy—powered by mains, batteries or photovoltaic (PV) cells—and needs the skill of an electrical engineer.

The transport and manufacturing industries are excellent examples of industries in which electrical engineers use their superior skills to design, develop and maintain electrical machines (motors and generators) with control systems for optimal performance. Most ships and trains are electrically powered.

Other applications of electrical engineering include power reticulation in cities, townships, shopping malls and factories. The lighting of indoor and outdoor areas forms the basis of our daily activities. It includes lighting at

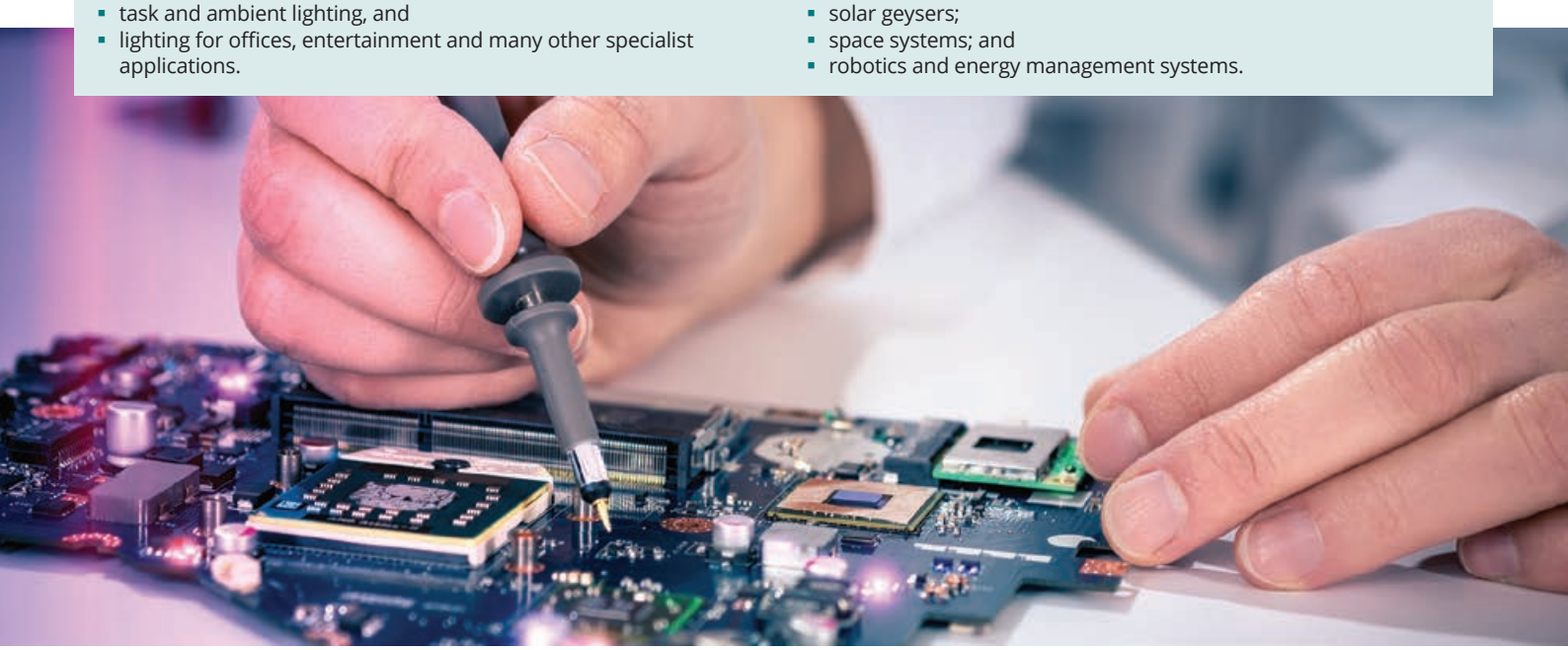
- sports stadiums,
- street lighting,
- safety and security lighting,
- task and ambient lighting, and
- lighting for offices, entertainment and many other specialist applications.

Regardless of whether it is medicine, the military, entertainment, sports, education or any other field of technology, electrical engineers will be there to provide the energy and control required.

Electrical engineering aims to change the world by discovering ways to generate, transmit, distribute and utilise electrical energy in an environmentally friendly and sustainable way.

Typical subsystems that may form part of larger electrical systems are:

- electrical machines of all sizes and shapes;
- power electronics;
- control systems;
- power system components;
- power quality and network stability;
- lamps and lighting;
- power supplies;
- photovoltaic (PV) cells;
- solar geysers;
- space systems; and
- robotics and energy management systems.



Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			
SCHOOL OF ENGINEERING	English Home Language or English First Additional Language	Mathematics	Physical Sciences	APS
BEng (Electrical Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Electrical Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.

Careers: Electrical engineers are active in the generation, storage, transmission, distribution and utilisation of electrical energy. There is a bright future in renewable energy. Electrical engineers design, supervise the construction, oversee the optimal operation and assure perfect and timely maintenance of all electrical installations for municipalities, residential areas, commercial buildings, factories, mines and industries. Rail transport, water pumping, electrical grids, telecommunications, energy management and smart lighting all fall within the scope of electrical engineering.

Contact information Prof Herman Myburgh (Function Head: Marketing) | **Tel** +27 (0)12 420 4540 | **Email** eerc@up.ac.za
Websites www.ee.up.ac.za | www.up.ac.za/school-of-engineering | www.up.ac.za/ebit-postgraduate

School of Engineering

Department of Electrical, Electronic and Computer Engineering

BEng (Electronic Engineering)

What does the programme entail?

Electronic engineering is one of the three internationally accepted and closely related subdisciplines in the traditional field of electrical engineering (electrical engineering, electronic engineering and computer engineering).

Electronic engineering entails the vast and continuously expanding field of the 'electronic world and era.' There is hardly a technological system in the world that does not rely on electronics and electronic engineering. An electronic engineer is someone with a talent for introducing new and upgrading old technologies.

An electronic engineer has a good understanding of the basic sciences and a sound education in the theoretical and practical aspects (including design methodology) of electronics and electronic engineering systems. The drastic increase in the development of new electronic systems globally makes it essential for electronic engineers to be well prepared for the workforce.

Watch this video to learn more:
https://www.youtube.com/watch?v=hOkcMmtVDas

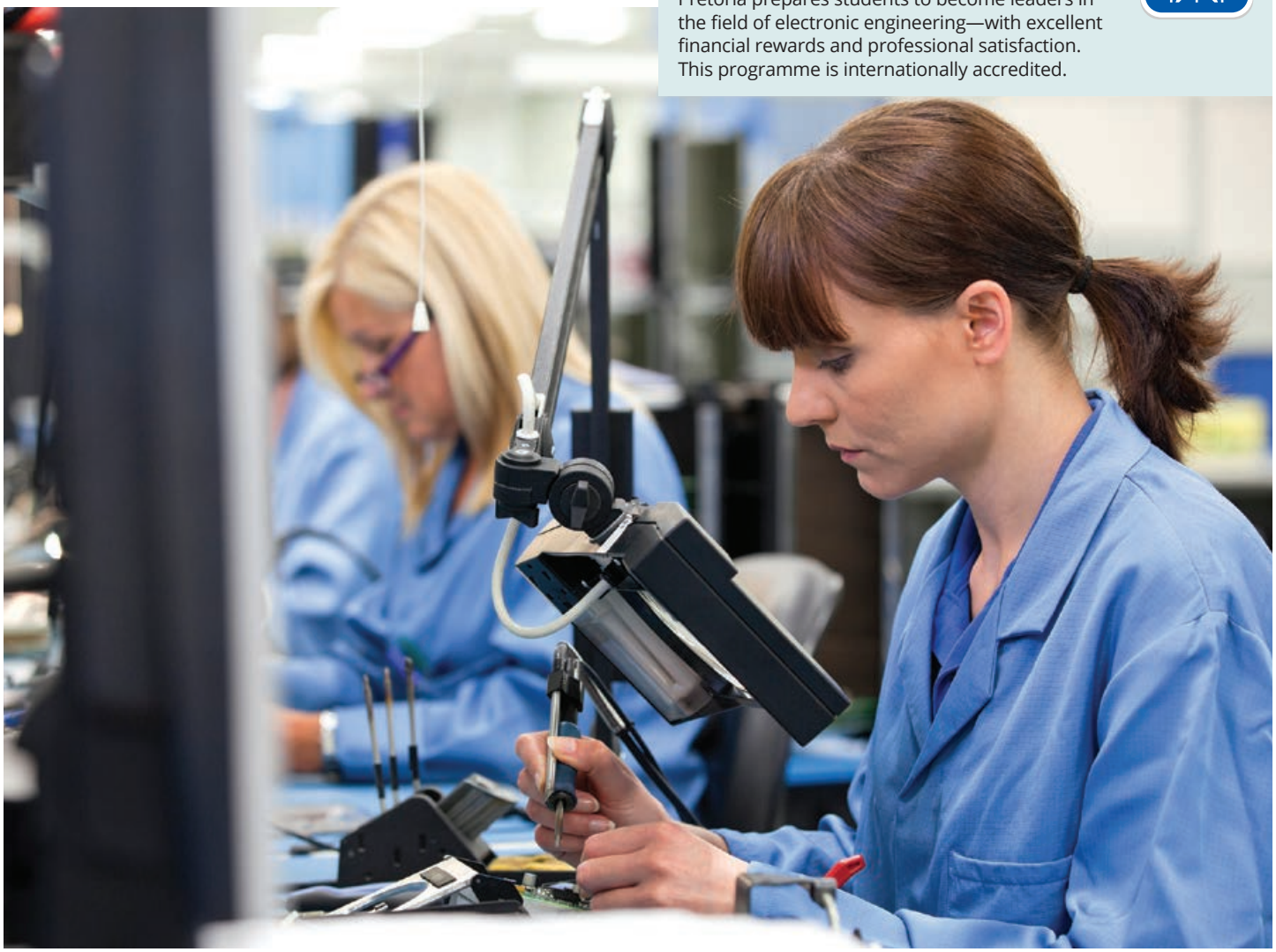
Our electronic engineering degree programme was developed over many years to provide exactly what the industry requires. This is an exciting world, and since the 'half-life' of microelectronics and photonics is only approximately two-and-a-half years, there are constant improvements and developments.

Electronic engineering aims to do things faster, cheaper, in smaller sizes and with much more control. Typical subsystems that form part of larger electronic systems are:

- Amplifiers;
- transmitters and receivers;
- control and sensor systems,
- antennas;
- power supplies;
- radio frequency (RF) subsystems;
- micro and nanoelectronics and microprocessors; and
- digital signal processors (DSPs).

What makes this programme unique?

The academic programme at the University of Pretoria prepares students to become leaders in the field of electronic engineering—with excellent financial rewards and professional satisfaction. This programme is internationally accredited.

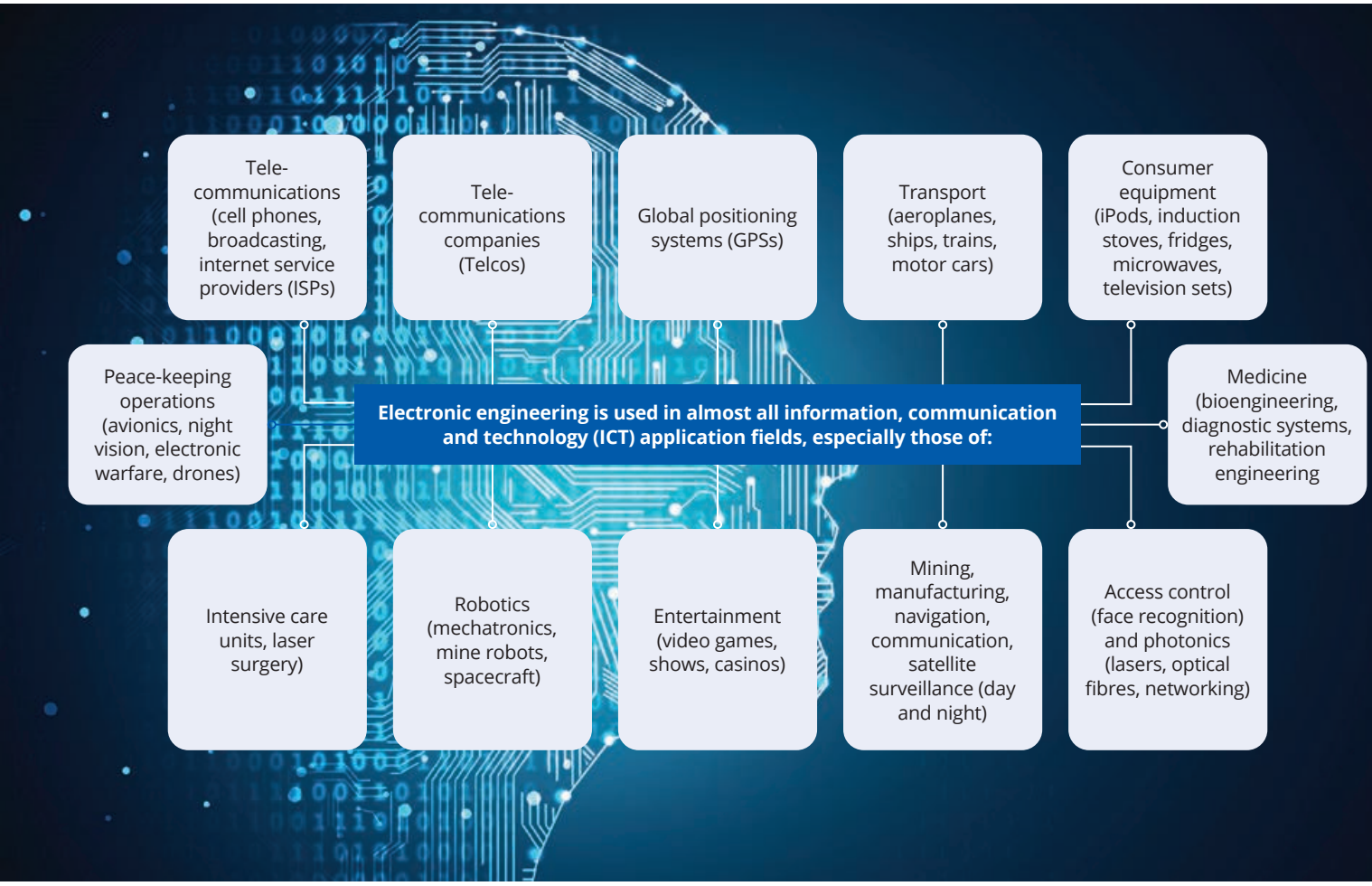


School of Engineering

BEng (Electronic Engineering) *(continued)*

Career opportunities

Electronic engineering graduates have access to a wide range of job opportunities, which include working for companies (large or small) anywhere in the world as employees, or being entrepreneurs or self-employed. Research and development opportunities are available at South African electronics and microelectronics companies and research institutes (such as the CSIR), and at universities all over the world. Graduates in electronic engineering have the opportunity to be innovative, ie to identify real-life problems and to come up with solutions, which they might be able to patent.



Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			
SCHOOL OF ENGINEERING	English Home Language or English First Additional Language	Mathematics	Physical Sciences	APS
BEng (Electronic Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Electronic Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.

Careers: Electronic engineers are active in various fields, such as telecommunications (fixed networks, wireless, satellite, television, radar and radio frequency networks), entertainment and medicine (magnetic resonance imaging, X-rays, cardiopulmonary resuscitation, infrared tomography, electroencephalograms (EEGs), electrocardiograms (ECGs), rehabilitation engineering and biokinetics), integrated circuit design, bioengineering, military equipment design (vehicle electronics, smart bombs, night vision, laser systems), transport (e-tags, speed measuring, railway signalling, global positioning system (GPS) and mapping), 'smart' dust, safety and security systems (face and speech recognition), banking (ATMs), commerce, robotics, education, environmental management, tourism and many more.

Contact information Prof Herman Myburgh (Function Head: Marketing) | **Tel** +27 (0)12 420 4540 | **Email** eerc@up.ac.za
Websites www.ee.up.ac.za | www.up.ac.za/school-of-engineering | www.up.ac.za/ebit-postgraduate

School of Engineering

Department of Electrical, Electronic and Computer Engineering

BEng (Computer Engineering)

What does the programme entail?

Computer engineering is one of the three internationally accepted and closely related subdisciplines of the traditional field of electrical engineering (electrical engineering, electronic engineering and computer engineering). Computer engineering is the most dynamic and rapidly growing engineering discipline in the vast and constantly expanding field of information and communication technology (ICT), and almost every technological system in the world relies on it. It involves a combination of electronics, computer systems (hardware and software) and communication systems. A computer engineer is someone with a talent for optimising electronic systems by introducing dedicated computing systems and control software. This includes computer and communication networks of all sizes—from a couple of microcontrollers to the worldwide web. It is essential to know what this career entails before enrolling for the programme.

A computer engineer has a thorough understanding of the basic sciences and a sound education in the theoretical and practical aspects (including design methodology) of electronics, digital systems, computer systems and control software. Due to the dramatic increase in computing and storage capabilities, as well as a decrease in size and cost, most technological systems include components of computer engineering.

The computer engineering degree offered by the University of Pretoria was developed in 1998 to deliver graduates who are able to deal with the most demanding challenges of the ICT world in all its forms. Examples of computer engineering include cell phone technology, car-control computers for engine management, entertainment systems, security systems, air-conditioning systems, active suspension and anti-lock braking systems (ABSs), which all use the principles of sensing, computing and actuation under optimised software control. This is the fastest-growing new discipline in engineering, and job opportunities for graduates exist all over the world.

Watch this video to learn more:
https://www.youtube.com/watch?v=hOkcMmtVDas

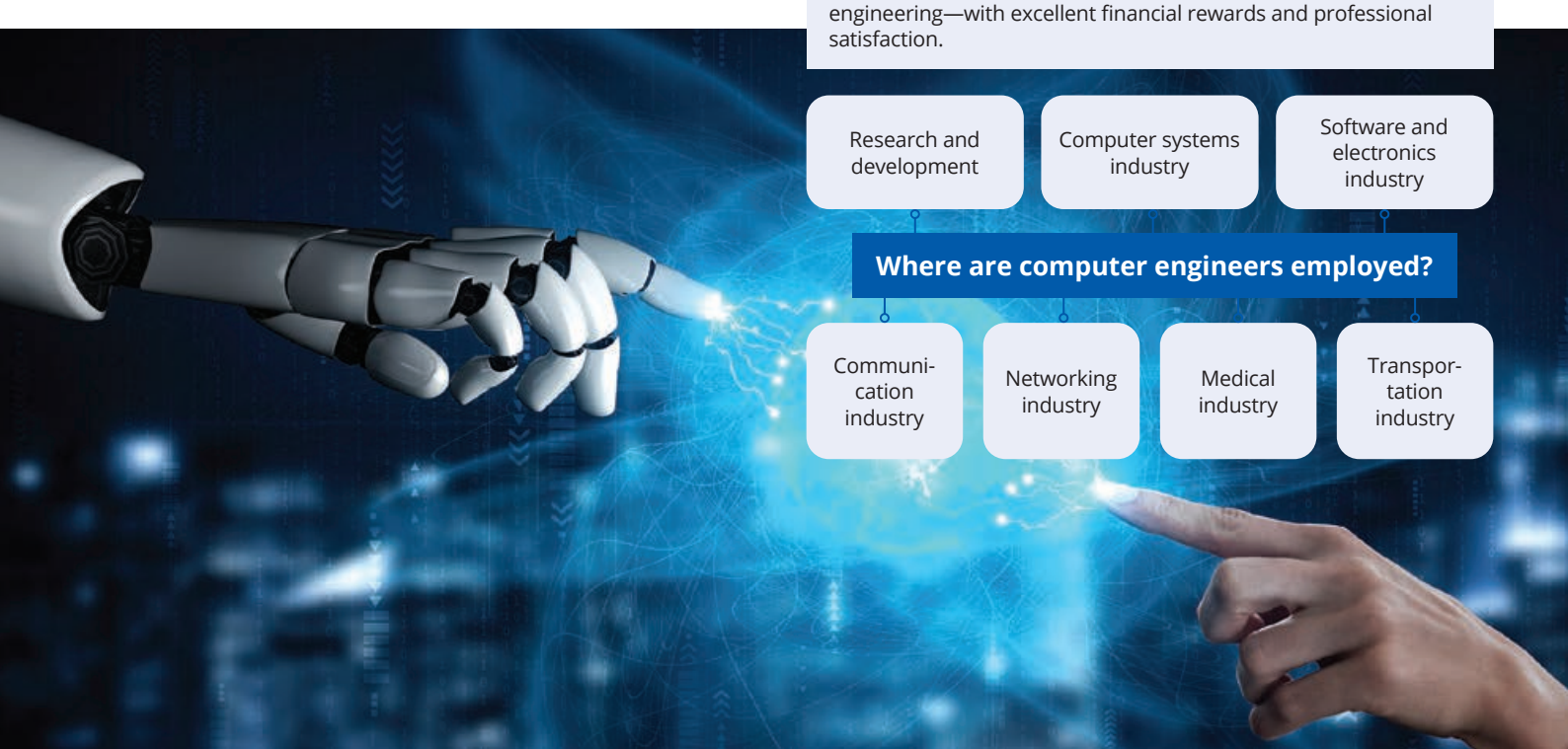
Career opportunities

Computer engineering is used in the following fields in particular:

- Telecommunications
- Computer networking
- Cell phone operations
- Computer system companies,
- military technologies (avionics, night vision, electronic warfare, drones)
- Transport technologies
- Internet banking
- Security systems
- Consumer equipment
- Modems, hand-held scanners
- Voting
- Medical systems (portable and remote diagnostic recorders)
- Robotics
- Entertainment equipment
- Global positioning system (GPS)
- Navigation
- Measurement and control software
- Fibre-optic (self-healing) networks

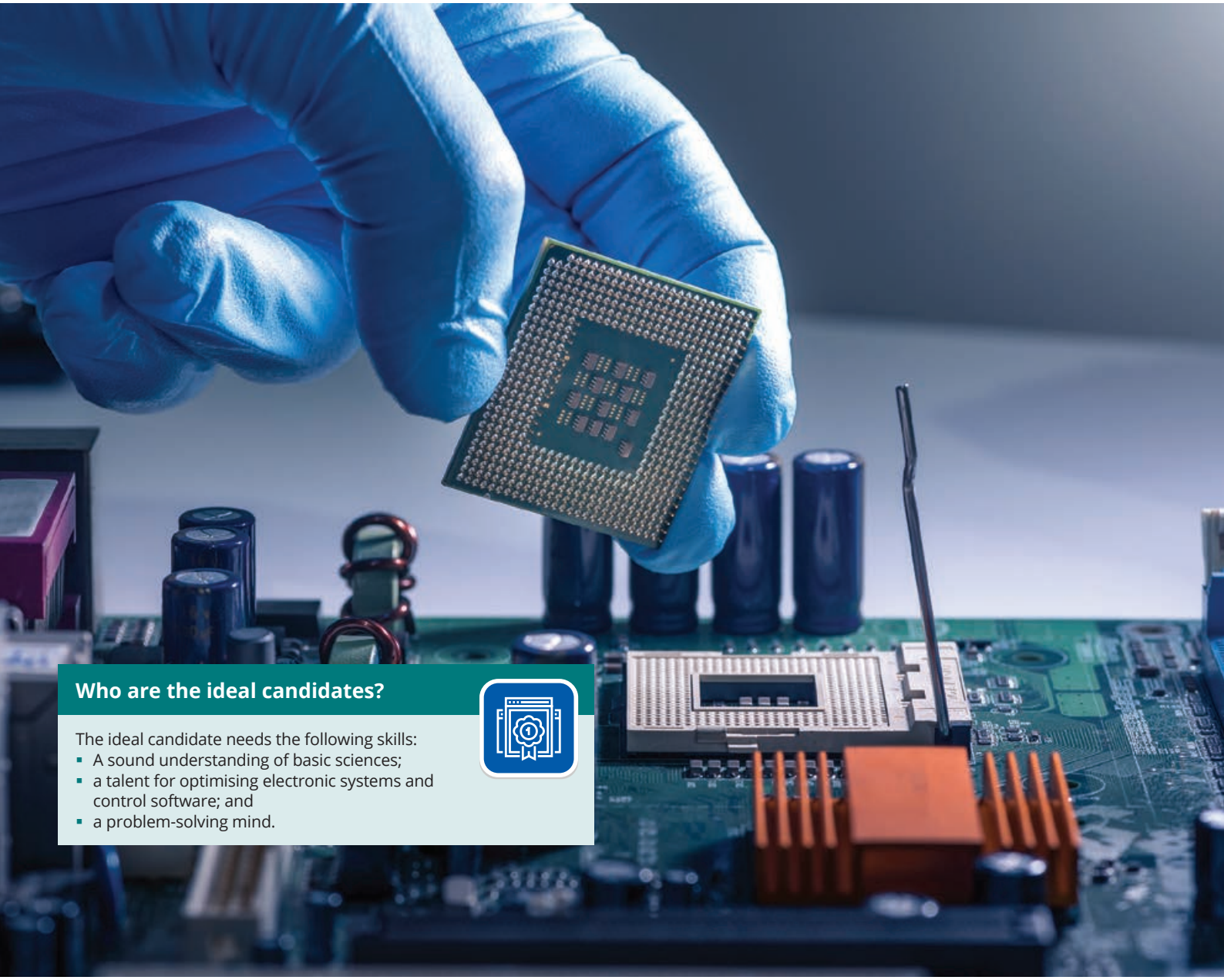
Computer engineering graduates have access to a wide range of job opportunities, which include working for a company (large or small) anywhere in the world as an employee, being an entrepreneur or being self-employed.

Research and development opportunities are available in the fields of communication, computer systems, networking and peace-keeping operations, and in medical, transportation, software and electronics companies in South Africa and all over the world. This provides opportunities for innovation: thinking of a problem to be solved and coming up with a solution and even possibly patenting the idea. The academic programme at the University of Pretoria prepares students to become leaders in the field of computer engineering—with excellent financial rewards and professional satisfaction.



School of Engineering

BEng (Computer Engineering) *(continued)*



Who are the ideal candidates?

The ideal candidate needs the following skills:
- A sound understanding of basic sciences;
- a talent for optimising electronic systems and control software; and
- a problem-solving mind.

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL OF ENGINEERING	English Home Language or English First Additional Language	Mathematics	Physical Sciences	
BEng (Computer Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Computer Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.

Careers: Computer engineers are active in all fields of the information superhighway and the information and communication technology (ICT) world, which include computer systems, software engineering, computer and communications networks, wireless sensor networks, embedded software, electronics, smart control systems and automation, data security, e-commerce, pattern recognition (face and speech recognition) and artificial intelligence. They specialise in combining hardware, software and communication technologies to optimise system performance.

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Websites www.ee.up.ac.za | www.up.ac.za/school-of-engineering | www.up.ac.za/ebit-postgraduate

School of Engineering

Championing the rights of under-represented groups in computational intelligence

The University of Pretoria's (UP) Professor Nelishia Pillay has been appointed to chair the Women in Computational Intelligence (WCI) subcommittee of the global Institute of Electrical and Electronics Engineers (IEEE) Computational Intelligence Society (CIS). Prof Pillay is a former Head of the Department of Computer Science in the Faculty of Engineering, Built Environment and Information Technology at UP and is Chairholder of the South African Research Chairs Initiative (SARChI) Chair in Machine Learning for Sustainable Development in the Faculty.

The commitment to gender diversity is an important feature of the activities of the IEEE CIS. As such, it pledges to work towards gender-diversified panels at all meetings, conferences and events of the CIS. It supports the inclusion of a diverse set of speakers, which could lead to more creative, interesting and representative panels. The WCI subcommittee develops, promotes, organises and runs activities directed at the achievement of gender diversity within the Institute.

Read the full article here: www.up.ac.za/faculty-of-engineering-built-environment-it/news/post_3083681-championing-the-rights-of-under-represented-groups-in-computational-intelligence

School of Information Technology

Data science research at UP gets international recognition as academic receives Google AI Research Scholar Award for 2022

Dr Vukosi Marivate, an associate professor in the University of Pretoria's Department of Computer Science and the Absa Chair of Data Science in the Faculty of Engineering, Built Environment and Information Technology, is a recipient of the Google AI Research Scholar Award for 2022.

This award supports early-career researchers who are pursuing cutting-edge research in fields relevant to Google. This includes machine learning and data mining, and machine translation, among other computer science-related fields. It will provide financial support to the investigation of Dr Marivate's research team into consolidating learnings of language models and language tools for South African languages and beyond.

According to Dr Marivate, recent advances in natural language processing (NLP) have only benefitted well-represented languages, negating research into lesser-known global languages. This is, in part, due to the availability of curated data and research resources, as well as NLP algorithms that can exploit this abundance of data. Languages with fewer resources have the double challenge of small amounts of data and algorithms that do not cater for this paucity of data.

Read the full article here: www.up.ac.za/faculty-of-engineering-built-environment-it/news/post_3081119-data-science-research-at-up-gets-international-recognition-as-academic-receives-google-ai-research-scholar-award-for-2022

School of Engineering

Department of Industrial and Systems Engineering

BEng (Industrial Engineering)

What does the programme entail?

Industrial engineers are generally responsible for analysing, designing, planning, implementing, operating, managing and maintaining integrated systems. These systems consist of people, capital, materials, equipment, information and energy, and they aim to increase the productivity of organisations and to create wealth.

Typical activities of an industrial engineer are:
- Designing, implementing and managing production processes and equipment
- Designing and improving plant layout
- Designing and improving business processes
- Functional design and implementation of information systems
- Developing and implementing performance criteria and standards
- Providing support with decision-making
- Scheduling activities
- Analysing systems with the aid of mathematical and simulation models
- Undertaking economic evaluations of alternatives
- Integrating new systems in an existing environment

Watch this video to learn more:
www.youtube.com/watch?v=WoXkTyGaMbA

What makes this programme unique?

The programmes in the School of Engineering are accredited by the Engineering Council of South Africa (ECSA) and our degrees meet the requirements for professional engineers in South Africa.

Interesting facts

Academic staff are specialists in their respective fields. Alumni of the Department have made major contributions in several spheres of society and occupy important positions in organisations throughout South Africa, while many others are employed overseas.

The demand for industrial engineers currently exceeds the supply, and young graduates are virtually assured of employment.

Who are the ideal candidates?

The ideal candidate needs the following skills:
- Problem solving
- Communication
- Project planning
- Quality management
- Critical thinking

Which companies employ our graduates?

Graduates are employed in any of the service sectors, manufacturing, information technology, the finance sector, agriculture, government, logistics companies, consulting firms, education institutions, etc.

Where are industrial engineers employed?

- Mining sector
- Food and beverage industry
- Banking sector
- Electricity supply services
- Communi-cation industry
- Pharma-ceutical industry
- Financial sector
- Government

School of Engineering

BEng (Industrial Engineering) *(continued)*

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL OF ENGINEERING	**English Home Language or English First Additional Language**	**Mathematics**	**Physical Sciences**	
BEng (Industrial Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Industrial Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.

Careers: Industrial engineers design, test, implement and manage a wide range of man/machine systems for production and the delivery of services. Organisational matters that require optimisation include site selection and layout of facilities, manufacturing, inventory control, materials handling, supply chain management, quality management, cost control, financial services, maintenance, reliability, computer simulation, information systems, human resources and business law.

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Websites www.up.ac.za/industrial-and-systems-engineering | www.up.ac.za/school-of-engineering | www.up.ac.za/ebit-postgraduate

School of Engineering

Department of Materials Science and Metallurgical Engineering

BEng (Metallurgical Engineering)

What does the programme entail?

South Africa is not only blessed with the world's largest deposits of gold, chromium, platinum, vanadium and manganese but also has extensive reserves of iron, lead, zinc, copper, nickel, coal and diamonds. The minerals industry contributes 50% of South Africa's exports and is one of the largest employers in the country. Metallurgical engineers play a key role in the production of minerals and metals and help to process metals into final products with added value. In this way, the maximum income is generated in local and international markets. Components made from metals and other materials are designed to perform optimally in all aspects of modern life.

Watch this video to learn more:
www.youtube.com/watch?v=HGLqxpdXABY

Minerals processing
Processing the ore to release and concentrate the valuable minerals contained in it.

Extractive metallurgy
The processing of mineral concentrates to metals through pyrometallurgy (including smelting) or hydrometallurgy (including leaching) as refining steps.

The three main fields of specialisation in metallurgical engineering

Materials production, performance and integrity
This field entails the development of new alloys, the production of useful materials and products from raw metals, including forming through casting, 3D printing using lasers and joining through welding. The forensic investigation of failures is also of great importance.

Career opportunities

Metallurgical engineers unlock the riches of deposits of metal ores and minerals and optimise the manufacture and performance of metallic components. You'll find metallurgical engineers where valuable minerals are recovered from ore, where metals are produced from the minerals and where the metals are converted into useful materials as well as into high-performance products. Areas of specialisation include minerals processing, extractive metallurgy, materials engineering and performance, advanced manufacturing processes, including laser-assisted additive manufacturing and welding, as well as failure analysis and forensic engineering.

Careers include production engineers, plant managers, consultants, forensic engineers and researchers.

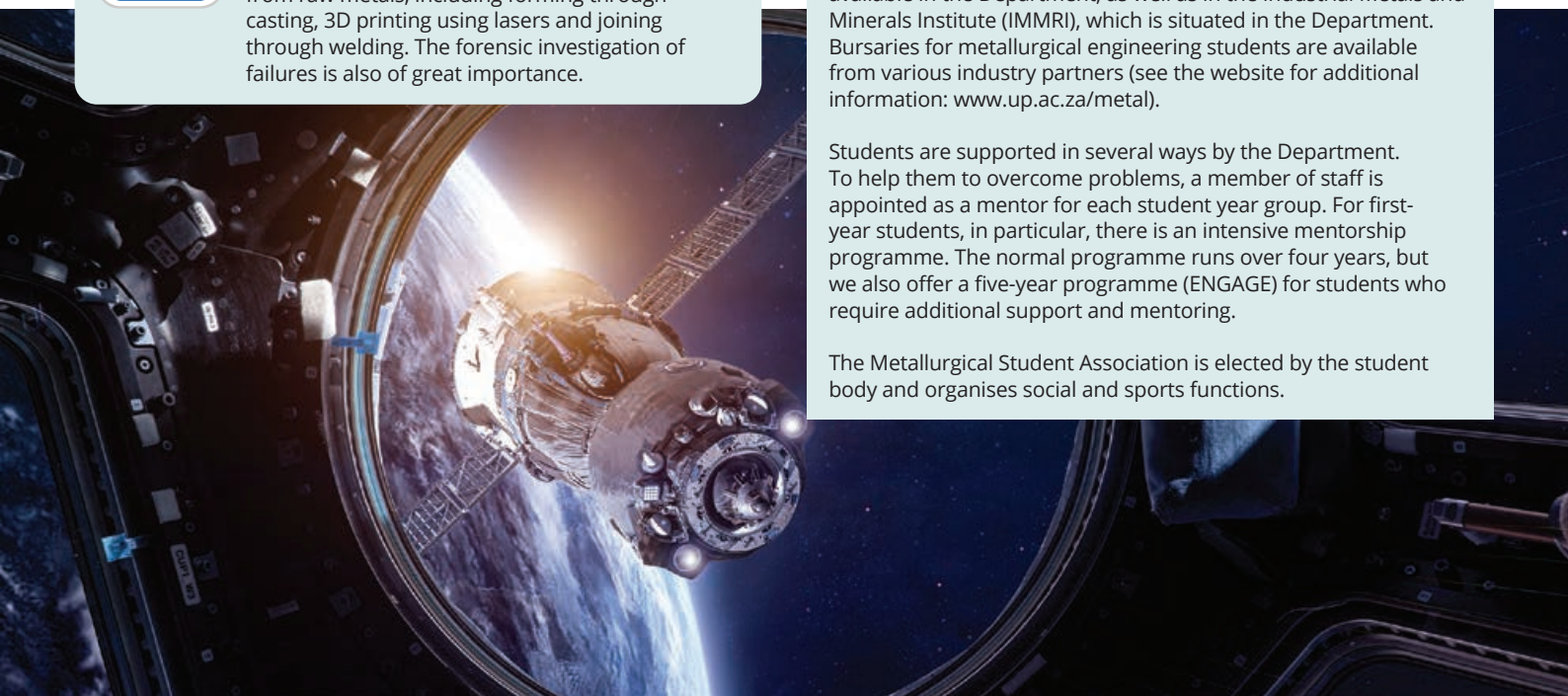
What makes this programme unique?

As the leading metallurgical engineering department in South Africa, the Department of Materials Science and Metallurgical Engineering currently plays a prominent role in the education of metallurgical engineers for the South African metallurgical and mining industries, and its graduate students are in high demand. Many graduate engineers from other disciplines take postgraduate programmes in the Department to enhance their skills in the rich minerals industry in South Africa and abroad.

Unconditional accreditation by the Engineering Council of South Africa (ECSA) is a confirmation of the quality of undergraduate teaching in the Department, and the degree currently enjoys international recognition. Staff members consult with and conduct research for industry and maintain close contact with local metallurgical industries to ensure that teaching and research are in line with industry needs. Sophisticated research equipment is available in the Department, as well as in the Industrial Metals and Minerals Institute (IMMRI), which is situated in the Department. Bursaries for metallurgical engineering students are available from various industry partners (see the website for additional information: www.up.ac.za/metal).

Students are supported in several ways by the Department. To help them to overcome problems, a member of staff is appointed as a mentor for each student year group. For first-year students, in particular, there is an intensive mentorship programme. The normal programme runs over four years, but we also offer a five-year programme (ENGAGE) for students who require additional support and mentoring.

The Metallurgical Student Association is elected by the student body and organises social and sports functions.



School of Engineering

BEng (Metallurgical Engineering) *(continued)*

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			
SCHOOL OF ENGINEERING	English Home Language or English First Additional Language	Mathematics	Physical Sciences	APS
BEng (Metallurgical Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Metallurgical Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.

Careers: Metallurgical engineers unlock the riches of deposits of metal ores and minerals and optimise the manufacture and performance of metallic components. You'll find metallurgical engineers where valuable minerals are recovered from ore, where metals are produced from the minerals and where the metals are converted into useful materials as well as into high-performance products. Areas of specialisation include minerals processing, extractive metallurgy, materials engineering and performance, advanced manufacturing processes, including laser-assisted additive manufacturing and welding, as well as failure analysis and forensic engineering.

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Websites www.up.ac.za/materials-science-and-metallurgical-engineering | www.up.ac.za/school-of-engineering | www.up.ac.za/ebit-postgraduate

School of Engineering

EBIT is one of the few academic faculties in Africa to feature among the top 550 in the world...

in FIVE subject areas in the 2022 QS World University Rankings by Subject in the field of engineering and technology; as well as in the subject area of Architecture and Built Environment, featuring in the top 200 in the world.

Mechanical and Aeronautical Engineering

Chemical Engineering

Computer Science and Information Systems

Electrical and Electronic Engineering

Mineral and Mining Engineering

Architecture and Built Environment

UP academic wins NSTF-Water Research Commission Award at 'Science Oscars'

University of Pretoria (UP) academic Professor Evans Chirwa walked away with the NSTF-Water Research Commission (WRC) Award during the 24th National Science and Technology Forum in partnership with South32 (NSTF-South32) Awards on Thursday evening (21 July 2022).

Prof Chirwa, a professor and the Rand Water Research Chair: Water Utilisation in the Department of Chemical Engineering at UP, was awarded for his work on 'the introduction into South Africa of the use of biological analogues in advanced water treatment and water recovery with applications in metal-halide heterogeneous photocatalysis'.

The finalists and awardees were honoured, announced, and celebrated at the Awards gala dinners held in Johannesburg and Cape Town simultaneously, and via live broadcast on the NSTF YouTube channel. It is an honour to be nominated, an achievement to reach the finals and an exceptional milestone of excellence to be a winner. The awards' theme for this year was 'Basic Sciences for Sustainable Development', in line with the international theme for 2022 proclaimed by the United Nations: International Year of Basic Sciences for Sustainable Development.

Read the full article here: www.up.ac.za/faculty-of-engineering-built-environment-it/news/post_3089773-up-academic-wins-nstf-water-research-commission-award-at-science-oscars

School of Engineering

UP's Mechanical Engineering comes out tops in South Africa in latest Shangai Rankings

The University of Pretoria's Department of Mechanical and Aeronautical Engineering has come out as the top Mechanical Engineering department in South Africa in the latest Shanghai Ranking, as well as ranking in the top 200 Mechanical Engineering departments worldwide. It was the only South African Mechanical Engineering department to be placed high enough to be ranked by the Shanghai Ranking system.

The Shangai Rankings use a ranking system that is particularly focused on objective research based metrics, and thus this results highlights the research excellence within the Department of Mechanical and Aeronautical Engineering at the University of Pretoria.

Read the full article here: www.up.ac.za/faculty-of-engineering-built-environment-it/news/post_3092276-ups-mechanical-engineering-comes-out-tops-in-south-africa-in-latest-shangai-rankings

UP engineer develops a new off-road ABS algorithm

Considering the high impact that vehicle accidents have on human health, the recent progress within the Department of Mechanical and Aeronautical Engineering at the University of Pretoria into developing a new Antilock Braking System (ABS) algorithm that is particularly suited to bad roads and can assist cars in braking more safely and more quickly is encouraging for future drivers.

Vehicle safety has a significant impact on the health of humans globally. According to the World Health Organization (WHO) report on road accidents, more than 3 700 people die on the world's roads every day and tens of millions of people are injured or disabled every year. Road traffic injuries are the eighth leading cause of death for all age groups and more people die because of road traffic injuries than from HIV/AIDS, tuberculosis, or diarrheal diseases.

Read the full article here: www.up.ac.za/faculty-of-engineering-built-environment-it/news/post_3093702-up-engineer-develops-a-new-off-road-abs-algorithm

School of Engineering

Department of Mechanical and Aeronautical Engineering

BEng (Mechanical Engineering)

What does the programme entail?

Mechanical engineering is concerned with the design, manufacture and operation of components, devices or systems such as:

- Heat exchangers, refrigerators, ventilation systems
- Manufacturing technologies that include the use of lasers, precision machinery
- Automobiles, aeroplanes and other vehicles
- Robotics, mechatronics and electronic control of machinery
- Digitization of physical assets through sensing, computing and data science

The undergraduate programme focuses on the establishment of a broad knowledge of engineering and includes topics such as dynamics, strength of materials, thermodynamics, fluid mechanics and design. Mechanical and aeronautical expertise is required for designing and manufacturing products and services, such as the provision of electricity and water, transport (road, rail and air), mining activities, mechatronics and air conditioning.

Watch this video for more information:
www.youtube.com/watch?v=n9oMl2mAp4o

What makes this programme unique?

The programmes in the School of Engineering are accredited by the Engineering Council of South Africa (ECSA) and our degrees meet the requirements for professional engineers in South Africa.

The University of Pretoria is always looking for opportunities to collaborate with other innovative institutions around the world and established an exchange programme with the Massachusetts Institute of Technology (MIT) in the USA 2010. The exchange programme makes it possible for students from the Department of Mechanical and Aeronautical Engineering to study at MIT for a year, and for MIT students to study at the University of Pretoria for a year.

Usually between two and four students spend their third year of study at MIT. A new five-year term for the exchange programme was approved in 2022.

Who are the ideal candidates?

The ideal candidate should have:

- the ability to work under pressure;
- creativity;
- problem-solving skills;
- effective technical skills;
- verbal and written communication skills; and
- the ability to work as part of a team.

Career opportunities

Mechanical engineers are employed in almost all sectors of the economy, for example in the chemical industry, mining, manufacturing, processing, vehicle/aircraft manufacturing and design, defence and in the aeronautics industry. Possible careers are:

- Aerospace engineer
- Automotive engineer
- Maintenance engineer
- Design engineer
- Mathematical and computational modeling engineer
- Data science engineer

Non-traditional employment is also an option, such as banking, finance and health insurance.

Where are mechanical engineers employed?

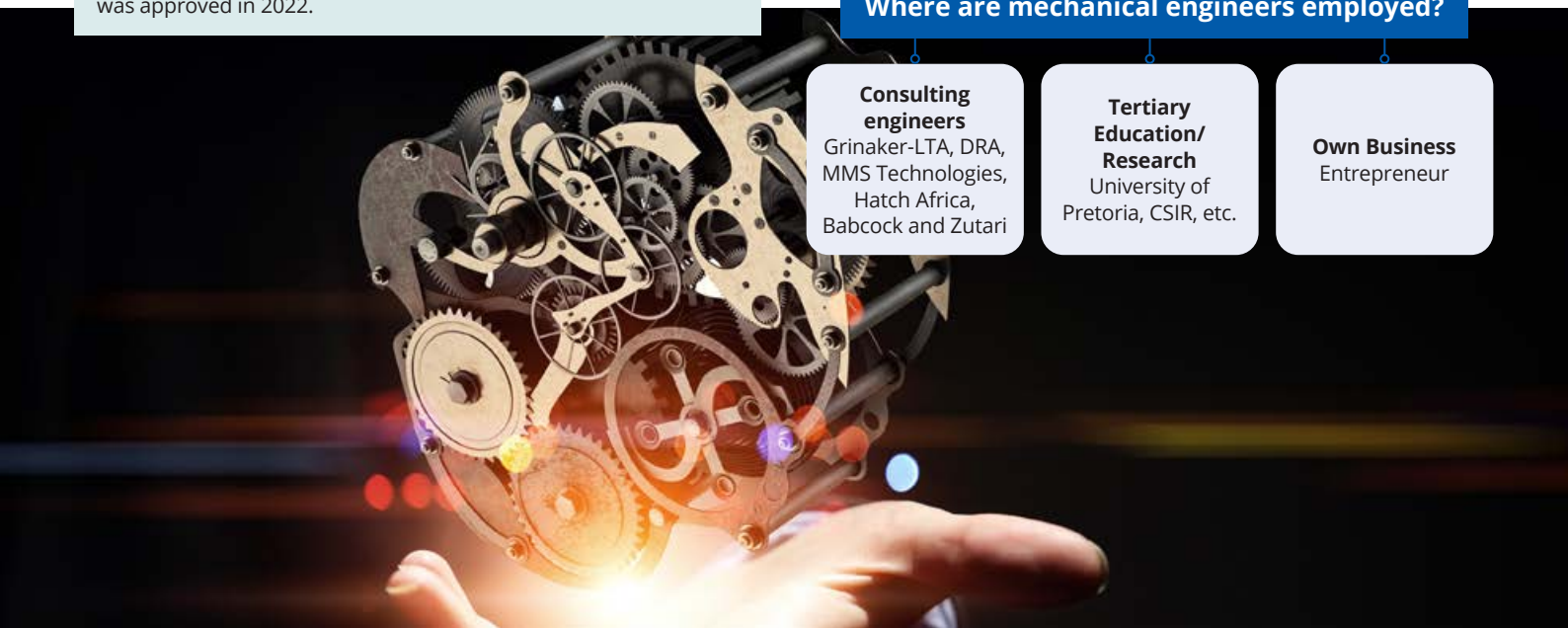
Private Industry
Anglo American Platinum, Afrit, BMW, Panasonic, Aerosud, Boeing, Toyota, Bosch, Kumba, ArcelorMittal, Columbus Stainless, iST, Carrier, Siemens, GEA, Bell Equipment, BHP Billiton, Ansys Fluent, Oracle, Vodacom, Steinmuller, AMT Composites, Tenneco, Toyota, Ford and Volkswagen

Semi-government services and corporations
Denel, Eskom, Rand water, SAAF, Telkom, Sasol, CSIR, NECSA and SAA

Consulting engineers
Grinaker-LTA, DRA, MMS Technologies, Hatch Africa, Babcock and Zutari

Tertiary Education/ Research
University of Pretoria, CSIR, etc.

Own Business
Entrepreneur



School of Engineering

BEng (Mechanical Engineering) *(continued)*

Statistics of graduates over the past three years

We are the largest producer of mechanical graduates in the country and have produced at least 200 graduates per year since 2017. Our student body is diverse and approximately 18% of the final year research project students are female. Alumni of the Department have made valuable contributions in several spheres of society and occupy important positions in organisations throughout South Africa. Others are employed overseas.

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL OF ENGINEERING	**English Home Language or English First Additional Language**	**Mathematics**	**Physical Sciences**	
BEng (Mechanical Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Mechanical Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics) if your APS and subject requirements of your first-choice programme are not obtained.

Careers: Mechanical and aeronautical engineers are concerned with power-generating machines and systems such as vehicles, ships, air-conditioners, pebble-bed nuclear reactors, aeroplanes, engines and turbines, robots and biomedical systems. Areas of specialisation include product design and manufacturing (such as the design, testing and improvement of mechanical, electrical, pneumatic and hydraulic systems), marine engineering and naval architecture, biomedical engineering, air-conditioning and refrigeration, aerospace systems and aircraft/missile engineering, vehicle engineering, maintenance engineering and energy management (gas and steam turbines, nuclear power reactors, petrol engines, cooling towers and renewable energy systems).

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School of Engineering

Department of Mining Engineering

BEng (Mining Engineering)

What does the programme entail?

As a profession, mining engineering encompasses a broad spectrum of engineering work—from mine evaluation to industrial control. For instance, mining engineers may assess a new mining project as soon as the geological confirmation of a newly discovered mineral deposit has been completed. If such a mineral deposit is found to be viable, mining engineers will design the mine to exploit the mineral deposit. Where the mineral deposit is close to the surface, an opencast mine is preferred, but for deeper deposits, an underground mine will be planned. Mining engineers will coordinate the construction of such a mine and bring it to the stage where it starts producing.

A typical mine has a lifespan of 15 to perhaps 100 years. The design of the mining excavations, with their equipment and services, the planning of all the activities and the management of the operation at all levels is the responsibility of the mining engineer. This professional will also provide expert advice on rock breaking, blasting, materials transport systems, mine planning and scheduling, mechanical tunnel development, mine climate control, rock mechanics, support of excavations, devising mining methods, as well as the design and development of equipment.

Who are the ideal candidates?

The aptitudes and skills of successful engineers include the following:

- Be able to visualise objects in three dimensions
- Have good health and stamina
- Have mathematical and scientific ability
- Be curious
- Be disciplined
- Be passionate about mining
- Have creativity and initiative
- Be responsible
- Have self-confidence
- Have organisational skills
- Command respect
- Maintain a cool head and take charge of a situation
- Have listening, speech and writing skills

Career opportunities

The mining industry is one of the largest industries in South Africa, producing more than **60 different minerals in over 1 000 mines and quarries**. Mining amounts to one eighth of the gross national product.

Mining engineers are employed at a wide range of companies, both locally and internationally. They are responsible for the effective, safe and profitable operation of mining undertakings.

Mining engineering careers include that of rock engineer; mine ventilation engineer; explosives engineer; rock breaking engineer; drill and blast engineer; project engineer; mine planner and environmental engineer to mention but a few.

- Mining engineers are mining experts and they are engineers, who have a background in geology as well as in civil, mechanical and electrical engineering.
- Mining engineers research mining-related topics in order to improve safety and find better ways to extract minerals.
- Mining engineers also work in the banking sector and at the Stock Exchange, where they specialise in risk analysis and investment.
- Mining engineers are also needed for sales and marketing as well as business development of mining companies or supporting industries.

There is a shift in mining as it progresses towards mechanisation and automation through robotics. Mechanisation requires in-depth engineering skills to support and operate mobile mechanised equipment.

What makes this programme unique?

The Mining Engineering Leadership Academy
Our students have a sound academic foundation. To that, we add skills such as self-awareness, communication skills and the ability to work in multi-disciplinary settings and groups. The philosophy of the Leadership Academy programme is to expose final-year students to experiential situations, which teaches them intrapersonal and interpersonal skills. Psychometric assessments and real-life case studies hone well-rounded leadership habits.

The University of Pretoria provides excellent facilities to our Mining Engineering students and these include access to the:

- Kumba Mine Design Laboratory;
- Kumba Virtual Reality 3D360 cylinder;
- Kumba Virtual Reality 3D theatre;
- ARM Laboratory;
- Virtual Blasting Wall; and
- The Metallurgical, civil and mechanical engineering laboratories on the Hatfield Campus.

School of Engineering

BEng (Mining Engineering) *(continued)*

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			
SCHOOL OF ENGINEERING	**English Home Language or English First Additional Language**	**Mathematics**	**Physical Sciences**	**APS**
BEng (Mining Engineering) [4 years]	5	6	6	**35**

The suggested second-choice programmes for BEng (Mining Engineering) are BSc (Chemistry), BSc (Mathematics) and BSc (Physics).

Careers: Mining engineers have a wide range of opportunities, namely mining (mine management, technical management of ventilation, rock mechanics, rock breaking, mineral resources), financial evaluation and management (mine design, financial evaluation of mines, mine feasibility studies, mine environmental impact studies), mining and drilling contracting (mining, tunnelling, shaft sinking, mine development, ore evaluation), mining research, mining equipment design and manufacture, mining marketing and mining administration at national, provincial and international levels.

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Departmental administrator **Tel** +27 (0)12 420 3763 | **Email** abea.kgatshe@up.ac.za
Websites www.up.ac.za/mining-engineering | www.up.ac.za/school-of-engineering | www.up.ac.za/ebit-postgraduate

School of Engineering

The Engineering Augmented Degree Programme (ENGAGE)

What does the programme entail?

An engineering degree is very demanding. The workload is high, the pace is fast and the modules are academically challenging. Many students also face challenges regarding background knowledge in mathematics and physical sciences, academic literacy and information technology. They may not have the study skills to cope with the mainstream four-year programme.

Furthermore, many students—even some of those who attended high-performing schools—struggle with the transition to university life due to the very large first-year classes, freedom from strict discipline and many social activities.

For this reason, the School of Engineering offers a five-year programme called the Engineering Augmented Degree Programme (ENGAGE). ENGAGE is available in all the engineering disciplines. It provides a carefully structured curriculum that helps students to adjust to university life and cope with the academic demands of engineering studies.

In ENGAGE, the volume of work is gradually increased while the support provided is decreased over a period of three years. However, the workload—the time students must spend on their studies—is high from the very beginning, therefore ENGAGE is not for students who do not want to work!

Who are the ideal candidates?

Students may apply for ENGAGE if:

- their marks in the National Senior Certificate meet the minimum admission requirements for the ENGAGE programme; or
- their marks in the National Senior Certificate meet the minimum admission requirements for the four-year programme, but they would like more support.

Structure of programme

In ENGAGE, students take the same first-year modules and attend the same classes as the four-year degree programme students, but the modules are spread out over two years.

In addition, for every 16-credit 100-level (first-year) module, students also take an 8-credit augmented additional module. For example, in the first year students take the same mathematics modules (16 credits) as the four-year degree programme students, as well as some additional mathematics modules (8 credits).

In the additional modules students are divided into groups of approximately 50 members to work on strengthening their problem-solving and other cognitive skills, developing conceptual understanding and acquiring the background knowledge needed for both the additional module and the corresponding four-year module.

In the first year of study, ENGAGE students take the basic sciences modules that form the foundation of engineering, namely chemistry, physics and mathematics. However, computer engineering students take mechanics instead of chemistry. ENGAGE students also take Professional Orientation, which provides an introduction to information technology skills and practice and develops their academic and communication skills. Furthermore, first-year engineering students are required to take a module in humanities and social sciences—the HAS module.

In the second year, ENGAGE students take all the introductory (100-level) engineering modules, as well as a compulsory additional module for each. They also take one 200-level mathematics module per semester. In the third year, they take the remaining 200-level modules, but since they have already completed two 200-level mathematics modules, their workload is slightly lighter than that of the four-year degree programme students.

For the last two years of their studies, ENGAGE students follow exactly the same programme as the four-year degree programme students. All the prescribed components of ENGAGE are compulsory, as is attendance of all lectures and discussion classes in the modules.

What makes this programme unique?

The parallel support offered through additional modules in the first and second years of the ENGAGE programme.

School of Engineering

The Engineering Augmented Degree Programme (ENGAGE) *(continued)*

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL OF ENGINEERING	**English Home Language or English First Additional Language**	**Mathematics**	**Physical Sciences**	
Engineering Augmented Degree Programme (ENGAGE) ENGAGE is an extended augmented degree programme for all Engineering disciplines [5 years]	5	65%	65%	**33**
For advice on a second-choice programme, please consult a Student Advisor. To make an appointment, send an email to carol.bosch@up.ac.za.				
Note: The admission requirements above are relevant to prospective students who will commence their studies in 2024. Admission to ENGAGE in the School of Engineering will be determined by the NSC results.				

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School for the Built Environment

School for the Built Environment: Highlights

The School for the Built Environment offers professional degree programmes in architecture, quantity surveying, construction management, real estate and town and regional planning. All these programmes are internationally recognised and accredited by their respective statutory councils, allowing students to register as members of their chosen professions.

As a School, we pursue the equitable and sustainable development of people through:

- accredited undergraduate and postgraduate programmes as professional qualifications;
- active and constructive involvement of students and lecturers in community development and service;
- academically rigorous and socially relevant research conducted by students and lecturers;
- contracted service provision to the local, provincial and national government as well as the private sector; and
- accredited continued professional development (CPD) opportunities for professionals.

Close relationships with industry and government expose students to regular engagements with practitioners and real-life projects and ensure curricula that are relevant to current and future challenges. These relationships also open doors to exciting research opportunities at the honours, master's and doctoral levels in fields such as environment behaviour studies; climate change adaptation; urban resilience; urban citizenship; green building; regenerative design and development; heritage and cultural landscapes; safe and sustainable housing and urban spaces; strategic development planning; construction cost databases, escalation and indices; well-being in the built environment; and contracts and property law.

School for the Built Environment

Department of Architecture

The Department of Architecture presents an undergraduate programme in architecture that explores the design of meaningful environments across varying scales, from intimate interior spaces to more significant interventions in landscapes. Specialised programmes in architecture, interior architecture and landscape architecture are introduced at the postgraduate level.

Our vision is to provide a learning environment that fosters critical and independent thinking, encourages social-ecological accountability and inspires responsive and responsible problem-solving that contributes to the improvement of society and its environment. We engage with spatial design with academic rigour that is theoretically grounded and technologically informed, and our academic programmes are locally and internationally accredited.

BSc (Architecture)

What does the programme entail?

The curriculum for the BSc (Architecture) programme integrates knowledge from the humanities and the natural sciences to develop students' spatial design skills, and aims to instil a culture of lifelong learning in graduates.

Design and Applied Theory

Architecture students attain half of the credits for every year of study in the significant module of design, which is presented in tandem with architectural theory to equip students with a pertinent vocabulary and theoretical underpinning.

Design is a studio-based module in which projects over a range of scales and complexities are undertaken to encourage students to develop critical and independent design thinking, the ability to evaluate design within a social, cultural and ecological framework, and to explore imaginative and appropriate solutions.

In the studio, design discernment is fostered through ongoing discussion, peer learning, and formal and informal assessment. The Department promotes design that is generative rather than stylistically or iconically driven, and students are encouraged to appreciate the universal (global) while engaging with the particular (local).

History of the Environment

History of the environment prepares students to define their role in society and find meaning in history through the study of the self and the cultures of others. It investigates the context and meaning of cultural artefacts, including space and place, to relate form and order to the environmental, political and philosophical conditions that influenced their making. It culminates in a reading of southern Africa in the third year of study.

Earth Studies

Earth studies introduce students to ecosystemic accountability and systems thinking to guide them towards designing for well-being in the built environment from social, cultural and environmental points of view. It includes ecological themes that extend to approaches that underpin and inform inclusive, ecological, passive and responsive design.

Students attend classes in the following subject streams:

Community and Practice

Students participate in collaborative community projects that are directed by our research and initiatives in urban citizenship, as well as the Faculty's community engagement module. In the third year of study, the focus turns to the management of a professional practice and the legal context of construction contract law.

Construction

The study of construction theory, materials and methods is presented as an extension of design to enable the designer to give tangible expression to built form and realisation of an architectural concept.

Design Communication

Design communication offers students the opportunity to develop skills in harnessing especially the digital tools that are essential to designers in the twenty-first century. It deals with visual communication, digital visualisation and representation, and the management of document and building information.

Theory of Structures

The theory of structures equips students with the theoretical knowledge and practical understanding required to analyse, plan and design critical structural components such as beams, columns and trusses from a structural engineering perspective, using timber, steel, concrete and other materials.

School for the Built Environment

BSc (Architecture) *(continued)*

Career opportunities

The BSc (Architecture) degree is accredited by the South African Council for the Architectural Professions and allows graduates to enter professional practice as technologists. To be able to register as a candidate architect, landscape architect or interior architect, they need to complete two additional professional postgraduate programmes. Note that the Department recommends at least one year of work or travel before postgraduate studies are undertaken.Through a commitment to innovation and internationally recognised programmes, the Department maintains professional qualifications of a high standard. The graduates of the Department are highly regarded both locally and abroad, in academia as well as in practice.

Architects design spaces and buildings to satisfy our daily needs and improve the environment in which we live. They need abilities and skills that range from the practical to the artistic, and from the technical to the theoretical. As professionals, they conceptualise, design and document building projects and oversee quality control during construction. Architects are ethically and legally bound through institutes and a government-controlled council, which protects the interests of the public. Architects may manage their own practices or work for other—often multidisciplinary—firms, or can make contributions to the government sector and education.

The majority of our graduates work in professional practice, often in multidisciplinary firms. Still, there is a wide range of other possibilities that branch out from the spatial design disciplines: from furniture to urban design, ecological planning to entrepreneurship, as well as in research and advisory positions in the public and private sector.

Admission by selection

A limited number of students are admitted to the Department annually. Admission is determined by a three-part selection process explicitly developed to level the playing field between students coming from different educational and cultural backgrounds. Please refer to www.up.ac/architecture for information on the selection requirements and process.

Important dates

Applications open on 1 April and close on 30 June.

Undergraduate	Minimum duration	Outcome (registration with SACAP)
BSc (Architecture)	Three years (full-time, studio-based)	Candidate Architectural Technologist
At least one year of work or travel recommended before postgraduate studies are undertaken.		
Professional Postgraduate	**Minimum duration**	**Outcome**
Bachelor of Architecture Honours	One year (full-time, studio-based)	Candidate Senior Architectural Technologist
Bachelor of Landscape Architecture Honours	One year (full-time, studio-based)	Candidate Senior Landscape Architectural Technologist
Bachelor of Interior Architecture Honours	One year (full-time, studio-based)	Candidate Senior Interior Designer
Master of Architecture	One year (full-time, studio-based)	Candidate Architect
Master of Landscape Architecture	One year (full-time, studio-based)	Candidate Landscape Architect
Master of Interior Architecture	One year (full-time, studio-based)	Candidate Interior Architect

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL FOR THE BUILT ENVIRONMENT	English Home Language or English First Additional Language	Mathematics	Physical Sciences	
BSc (Architecture) [3 years]	5	4	4	**27**

For advice on a second-choice programme, please consult a Student Advisor. To make an appointment, send an email to carol.bosch@up.ac.za.

Will only be considered as first study choice.
Selection programme: Selection includes an interview.
Careers: The BSc (Architecture) degree programme enables graduates to register with the South African Council for the Architectural Profession (SACAP) as candidate architectural technologists. The qualification is the first step to future registration as a candidate senior architectural technologist or a candidate architect.

Contact information Dr Nico Botes (Coordinator: Undergraduate Programme in Architecture) | **Tel** +27 (0)12 420 4600 | **Email** arch@up.ac.za
Websites www.up.ac.za/architecture | www.up.ac.za/school-for-the-built-environment | www.up.ac.za/ebit-postgraduate
Academic enquiries: Prospective students | **Email** arch@up.ac.za | **Website** www.up.ac.za/architecture

School for the Built Environment

Department of Construction Economics

BSc (Construction Management)

What does the programme entail?

Construction management is the management of the physical construction process within the built environment and includes the coordination, administration and management of resources. The construction manager takes full responsibility in this process and can work either as a construction manager or a construction project manager.

Watch this video to learn more:
www.youtube.com/watch?v=zlH-64qkCCM

Who are the ideal candidates?

The ideal candidate should have the following skills:

- Communication;
- Risk management;
- Financial management;
- Organisation; and
- Openness to feedback.

Duration of the programme

BSc (Construction Management)
The three-year programme will qualify BSc (Construction Management) graduates to support professionals in the construction industry with all types of construction work.

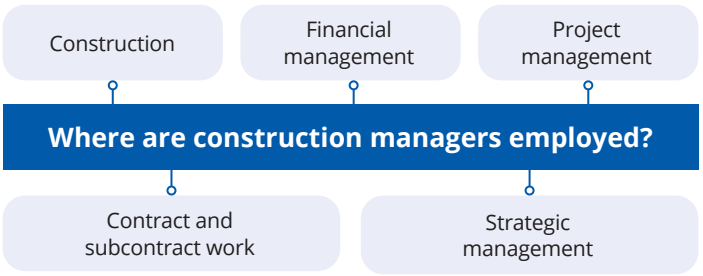
BScHons (Construction Management)
The one-year BScHons (Construction Management) programme qualifies graduates to start a professional construction management career or professional construction project management career and related industries. After submitting proof of prescribed professional practical experience and the successful completion of an assessment of professional competence, graduates may register with the South African Council for the Project and Construction Management Profession (SACPCMP).

The honours degree requires students to work part-time at construction companies/firms or other relevant establishments for at least 240 hours to supplement their theoretical studies with hands-on practical experience. Students will be required to keep and submit a logbook on the prescribed template.

Career opportunities

Various job opportunities exist in the construction industry. On successful completion of the three-year programme, students can enter a career in construction management, or undertake subcontract and main contract work. On successful completion of the one-year honours degree, opportunities become far wider. The one-year honours degree focuses on further training in aspects such as financial, project and strategic management.

After registration with the South African Council for the Project and Construction Management Professions (SACPCMP), students will be able to become professional construction managers and construction project managers.



School for the Built Environment

BSc (Construction Management) *(continued)*

What makes this programme unique?

The BSc (Construction Management) and BScHons (Construction Management) programmes are accredited nationally by the SACPCMP and internationally by the Chartered Institute of Building (CIOB) in the UK. The CIOB has a worldwide footprint and provides our degrees in construction management with international recognition.

The Department also offers master's and doctoral degrees, which can be obtained by submitting a thesis and passing an oral examination.

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL FOR THE BUILT ENVIRONMENT	English Home Language or English First Additional Language	Mathematics	Physical Sciences	
BSc (Construction Management) [3 years]	5	5	or Accounting 4	30

The suggested second-choice programme for BSc (Construction Management) is BSc (Real Estate).

Careers: After completing the three-year undergraduate degree programme, graduates could enter careers in, among others, construction site management or subcontracting. On completion of the ensuing one-year honours programme, graduates can register as candidate professional construction managers or candidate professional construction project managers and opportunities become much wider, including property development, portfolio management, commercial marketing and managerial positions in the corporate environment.

Contact information Mr Derick Booyens | **Tel** +27 (0)12 420 4433 | **Email** derick.booyens@up.ac.za
Websites www.up.ac.za/construction-economics | www.up.ac.za/school-for-the-built-environment | www.up.ac.za/ebit-postgraduate

School for the Built Environment

Department of Construction Economics

BSc (Quantity Surveying)

What does the programme entail?

Quantity surveyors are independent, professional consultants who are responsible for the financial management of construction projects. They provide specialised financial and contractual services, as well as advice to clients in the construction industry. They act in collaboration with, among others, architects, consulting engineers and contractors to promote the interests of the building client.

What will I do?

- Quantify construction drawings to prepare budgets and tender documents
- Protect the interests of the client and contractors
- Consult with developers, architects, engineers, and building contractors

Watch this video to learn more:
www.youtube.com/watch?v=zlH-64qkCCM

Who are the ideal candidates?

The ideal candidate should have:
- strong numeracy skills;
- attention to detail;
- negotiation skills;
- organisational skills;
- discipline; and
- interpersonal skills.

Career opportunities

Various job opportunities exist in the construction industry. The majority of quantity surveyors are employed in quantity surveying practices in the private sector.

After registration with the South African Council for the Quantity Surveying Profession (SACQSP), quantity surveyors may become partners or directors, or they could start their own professional practices. Quantity surveyors also act as project managers and valuers, provided that they are registered with the relevant councils.

Where are quantity surveyors employed?

Various government departments employ quantity surveyors, who are also employed by the property sector, banking, insurance industry, engineering and manufacturing industries, which offer further career options.

Quantity surveyors also work for construction firms or establish their own building enterprises and construction companies.

Duration of the programme

BSc (Quantity Surveying)
This three-year programme qualifies BSc (Quantity Surveying) graduates to support professional quantity surveyors with all types of construction work, particularly buildings and infrastructure.

BScHons (Quantity Surveying)
The one-year BScHons (Quantity Surveying) programme qualifies graduates to start a professional quantity surveying career in construction and related industries. After submitting proof of the prescribed professional practical experience and the successful completion of an assessment of professional competence, graduates may register with the South African Council for the Quantity Surveying Profession (SACQSP).

The honours degree requires students to work part-time at quantity surveying firms, or other relevant establishments for at least 240 hours to supplement their theoretical studies with hands-on practical experience. Students will be expected to keep and submit a logbook on the prescribed template.

School for the Built Environment

BSc (Quantity Surveying) *(continued)*

What makes this programme unique?

The three-year BSc (Quantity Surveying) and BScHons (Quantity Surveying) programmes are accredited nationally by the SACQSP and internationally by the Royal Institution of Chartered Surveyors (RICS).

The RICS has a worldwide footprint, which provides our degrees in quantity surveying with international recognition. The Department also offers master's and doctoral degrees, which can be obtained by submitting a thesis and passing an oral examination.

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL FOR THE BUILT ENVIRONMENT	**English Home Language or English First Additional Language**	**Mathematics**	**Physical Sciences**	
BSc (Quantity Surveying) [3 years]	5	5	or Accounting 4	**30**

The suggested second-choice programmes for BSc (Quantity Surveying) are BSc (Construction Management) and BSc (Real Estate).

Careers: Quantity surveying is the science that delivers specialised financial and contractual services and advice to clients in the built environment, as well as related industries. The three-year undergraduate degree is the first step towards registration as quantity surveyors. The ensuing one-year honours programme leads to registration as candidate professional quantity surveyors. Career opportunities, apart from those in the private, government or semi-government sectors, also exist in the property, banking, insurance, mining and manufacturing industries.

Contact information Mr Danie Hoffman (Programme Leader: Quantity Surveying) | **Tel** +27 (0)12 420 2551 | **Email** danie.hoffman@up.ac.za
Websites www.up.ac.za/construction-economics | www.up.ac.za/school-for-the-built-environment | www.up.ac.za/ebit-postgraduate

School for the Built Environment

Department of Construction Economics

BSc (Real Estate)

What does the programme entail?

The study of real estate covers all aspects relating to land and buildings, including the development of land, the management of buildings (including shopping centres), the valuation of land and buildings and decision making regarding the financing of, and investment in land and buildings. Real estate/Property practitioners are professional people who work in all spheres of the property industry—also as professional property valuers.

Watch this video to learn more:
www.youtube.com/watch?v=zlH-64qkCCM

Who are the ideal candidates?

The ideal candidate should have:
- networking skills;
- marketing skills;
- communication skills; and
- management skills.

Duration of the programme

BSc (Real Estate)
This is a three-year programme that will qualify graduates to work in the various spheres of the property industry, including management, development and marketing.

BScHons (Real Estate)
Students who complete this one-year programme will be qualified to start a professional career in the property industry. After submitting proof of having gained the prescribed professional practical experience, and the successful completion of a professional examination, graduates may register with the South African Council for the Property Valuers Profession (SACPVP).

The honours degree requires students to work part-time at approved property companies or related businesses for at least 240 hours to supplement their theoretical studies with hands-on practical experience. They will be expected to keep and submit a logbook on the prescribed template.

Career opportunities

Real estate (or property) studies has developed into a specialised field requiring unique expertise in areas where the property sector represents a significant part of the South African economy. Property/real estate comprises between 40% and 50% of the world's total assets.

Apart from a future in areas such as property investment, property finance and facilities management, further studies to obtain an honours degree in real estate can lead to registration as a professional property valuer.

Career opportunities exist in the entire spectrum of the property sector, and individuals with a qualification in real estate can work as entrepreneurs in the private sector, or as employees in the private, government or semi-governmental sectors.

Where are real estate graduates employed?

- Investec
- Atterbury
- DDP Valuers
- Growthpoint
- Resilient
- Redefine
- Abland

School for the Built Environment

BSc (Real Estate) *(continued)*

What makes this programme unique?

The BSc (Real Estate) and BScHons (Real Estate) programmes are accredited nationally by the SACPVP and, apart from qualifying students to work in all spheres of the property industry, enable them to become professional property valuers.

The Department also offers an MSc (Real Estate) coursework degree, as well as master's and doctoral degrees, which can be obtained by submitting a thesis and passing an oral examination.

Internationally, the MSc RE coursework degree is accredited by the Royal Institution of Chartered Surveyors (RICS). The worldwide footprint of the RICS provides our real estate degrees with international recognition.

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL FOR THE BUILT ENVIRONMENT	English Home Language or English First Additional Language	Mathematics	Physical Sciences	
BSc (Real Estate) [3 years]	5	5	or Accounting 4	30
The suggested second-choice programme for BSc (Real Estate) is BCom (Investment Management).				
Careers: Apart from a future in areas such as property investment, property finance and facilities, and property management, further studies to obtain an honours degree in real estate can lead to registration as professional property valuers. Career opportunities encompass the entire spectrum of the property sector, whether as entrepreneurs in the private sector or as employees in the private, government or semi-government sectors.				

Contact information Ms Vita Wilkens (Programme Leader: Real Estate) | **Tel** +27 (0)12 420 3599 | **Email** vita.wilkens@up.ac.za
Websites www.up.ac.za/construction-economics | www.up.ac.za/school-for-the-built-environment | www.up.ac.za/ebit-postgraduate

School for the Built Environment

Department of Town and Regional Planning

BTRP – Bachelor of Town and Regional Planning

What does the programme entail?

This programme prepares students for a profession in which they will promote and manage societal transformation and progressive change through the planning, design, implementation and management of interventions in the development and use of land.

These interventions, which range from site level to supranational level, are aimed at widening choice, promoting equity, ensuring sustainable human settlements and improving people's quality of life.

The guiding motive of the profession is the pursuit of innovative, inclusive, sustainable and affordable alternatives to existing settlement types. At the current juncture in South Africa's history, town and regional planning as a profession plays a crucial role in the correction of the many spatial and other imbalances in both urban and rural areas, as well as the improvement of inefficient, unjust and underperforming human settlements.

The challenge for planning is the fact that stakeholders, role players and participants have different interests and different expectations for the future, which are often contradictory and conflict ridden.

Watch this video to learn more:
www.youtube.com/watch?v=qLA_R6Q0voA

Who are the ideal candidates?

A professional approach that combines sensitivity, empathy and care, and strong analytical and strategic skills are required to manage the various political, social, environmental and economic issues at stake. The ideal town and regional planners are creative, can suggest innovative solutions to complex problems and, as mediators, can reconcile diverse points of view. They are strategic thinkers and good managers, and are passionate about working with people.

Given the enormous backlogs in the areas of housing and social services and the deep levels of poverty, marginalisation and despair in the country, planners also need a strongly developed sense of social and environmental justice. They should be committed to human and community development.

Career opportunities

While most town and regional planners are employed in the three spheres of government, or act as private consultants to the public and private sectors, they are also employed by research agencies such as the Council for Scientific and Industrial Research (CSIR) and the Human Sciences Research Council (HSRC), non-governmental and development organisations, community-based organisations, major financial institutions and property development groups.

What makes this programme unique?

One of the characteristics of the Department is its desire to take on new challenges and develop innovative ways of contributing to the reconstruction and development of the country. We are actively immersed and involved in, and committed to inclusive and transformative community development in South Africa, mainly through research and contract work for a range of clients in all three spheres of government.

The professional four-year BTRP qualification enables graduates to register as professional town and regional planners with the South African Council for Planners (SACPLAN), which is an official body established in terms of an act of Parliament. The degree is internationally recognised.

School for the Built Environment

BTRP – Bachelor of Town and Regional Planning *(continued)*

Structure of programme

- The minimum period of study is four years' full-time study.
- Only a limited number of candidates can be accommodated and admission is subject to selection.

Practice and theory are integrated into the programme. Lectures, practical projects and studio work focus on stimulating critical thinking, engaging students in discussion and using practical problem-solving exercises by applying theory to real-world situations. Instruction is student centred and the progress of each student is carefully monitored.

The Town and Regional Planning programme equips planners with the knowledge and skills needed to present interventions to deal with many problems on properties and in settlements and regions by focusing on the following themes: planning theory and history; land-use management and land development; settlement planning and design; strategic and integrated development planning; urban and rural regeneration; public policy preparation and review; and planning methods and techniques.

Several modules in related fields are also prescribed to ensure that students acquire a multidisciplinary perspective and the knowledge base that is necessary to provide innovative, inclusive, affordable and appropriate solutions to complex urban and rural problems.

For a list of all modules, visit: www.up.ac.za/en/town-and-regional-planning/article/50045/undergraduate

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024			
	Achievement level			APS
SCHOOL FOR THE BUILT ENVIRONMENT	English Home Language or English First Additional Language	Mathematics	Physical Sciences	
BTRP – Bachelor of Town and Regional Planning [4 years]	5	4	-	**27**

For advice on a second-choice programme, please consult a Student Advisor. To make an appointment, send an email to carol.bosch@up.ac.za.

Careers: Town and regional planners, development practitioners, urban managers, real estate analysts and researchers. While many town and regional planners act as private consultants to the public and private sectors, the majority are employed by government, research agencies (such as the Council for Scientific and Industrial Research (CSIR) and the Human Sciences Research Council (HSRC)), non-governmental organisations, community-based organisations, major financial institutions and property development groups. The qualification will enable graduates to register as professional town and regional planners with the South African Council for Planners.

Contact information Prof Mark Oranje (Head of Department) | **Tel** +27 (0)12 420 3531 | **Email** mark.oranje@up.ac.za
Websites www.up.ac.za/townplanning | www.up.ac.za/school-for-the-built-environment | www.up.ac.za/ebit-postgraduate

School of Information Technology

School of Information Technology: Highlights

The School of Information Technology (SIT) is unique and the first of its kind in South Africa. With modern laboratories and programmes in computer science, informatics and information science it offers students the advantage of an integrated approach to IT. The School, offers cross-disciplinary degrees such as MIT and PhD (IT), and each of the departments also has its own selection of undergraduate and postgraduate degrees. Staff members collaborate with industry and academic partners from the African continent and the rest of the world on a variety of research projects.

The research focus areas of the Department of Informatics are data science, IS and education, IS and organisations, ICT for sustainable development and human-computer interaction. The Department of Informatics has a fully-equipped User Experience (UX) Lab with sophisticated eye-tracking equipment and software. A coursework master's degree in ICT management, as well as research master's and doctoral degrees, are offered.

The Department of Information Science offers a two-year coursework master's degree in information technology (MIT), as well as research master's and doctoral degrees in information science, library science, publishing studies and multimedia. It hosts the African Centre of Excellence for Information Ethics (ACEIE), which produces research on information ethics and presents awareness-raising workshops across Africa. The Department also hosts the Virtual Reality and Interaction Lab, which provides students with access to cutting-edge virtual reality equipment and is used for interaction and user experience research in virtual reality. The lab concentrates on using XR (extended reality) technology to create interactive user experiences for various applications. The main aim is to use commercial XR technologies to create user-centred solutions for complex problems from both academic and industry perspectives (http://vri.up.ac.za). The Department of Information Technology and Mining Engineering shares the EXXARO Chair in Extended Reality (XR).

The Department of Computer Science is internationally recognised for its research in the fields of artificial intelligence, data science and digital forensics and computer and information security, and hosts the South African Initiative Chair in Artificial Intelligence, the DRS Chair in Cybersecurity, the ABSA Chair in Data Science and the Multichoice Joint Chair in Machine Learning. The Department offers a two-year coursework master's degree in big data science (MIT), as well as research master's and doctoral degrees.

School of Information Technology

Department of Informatics

BIT (Information Systems)

What does the programme entail?

Students who enrol for this programme study the application and use of computer and information systems in organisations. The use of information technology by organisations is growing exponentially and new, more complex and challenging applications are being explored and developed all the time.

Informatics specialists are trained to analyse business problems experienced by organisations and to improve the efficiency, effectiveness and control of business processes for commercial organisations, government, government departments, non-profit organisations or any other organisation where information is crucial. They therefore not only analyse the business needs, but also address them by designing and implementing information systems.

Nowadays the term information systems is used to refer to computer-based systems (including mobile applications) that store and manipulate data so that people can understand and interpret information and use it for decision-making.

Who are the ideal candidates?

The ideal candidate should have:
- analytical skills;
- excellent research skills;
- problem-solving skills;
- communication skills; and
- the ability to work in a team.

What makes this programme unique?

What makes the Informatics degree at the University of Pretoria unique is the Capstone Project, which is a working software solution for a real-life client. Implementing this software solution exposes students to the industry's need for graduates with both soft skills and technical skills.

Career opportunities

The work environment of the informatics specialist is particularly interesting and well-qualified informatics specialists can choose between many excellent job opportunities, for example:
- Business analyst
- System analyst
- Quality assurance tester
- User experience designer
- Project manager
- Developer (front end, back end or full stack)

Where are informatics specialists employed?

Epi Use, Epi Use Labs, Investec, KPMG, BMW ZA Hub

Moyo, Intecon, Standard Bank, FNB, ABSA

Structure of programme

The BIT (Information Systems) programme takes a minimum of three years to complete.

Core modules
- Critical thinking and problem solving
- Programming
- Systems analysis and design
- Database design and development
- Team skills development

Elective modules are dependent on the chosen stream.

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024		
	Achievement level		
SCHOOL OF INFORMATION TECHNOLOGY	English Home Language or English First Additional Language	Mathematics	APS
BIT (Information Systems) [3 years]	5	5	**30**
The suggested second-choice programme for BIT (Information Systems) is BIS (Information Science).			
This programme is administered by the Faculty of Engineering, Built Environment and Information Technology. **Careers:** Data scientist, IT auditor, IT entrepreneur, IT tax specialist, e-business consultant, programmer, business analyst, project manager, CIO, CTO and knowledge manager			

Contact information Prof Marié Hattingh (Programme Coordinator) | **Tel** +27 (0)12 420 3798 | **Email** informatics@up.ac.za
Websites www.up.ac.za/informatics | www.up.ac.za/school-of-information-technology | www.up.ac.za/ebit-postgraduate

School of Information Technology

Department of Informatics

BCom (Informatics) Focus area: Information Systems

What does the programme entail?

The BCom (Informatics) focus area is Information Systems, which is the study of the application and use of computer and information systems in organisations. The superiority of students in this field lies in their broad background in the field of economic and management sciences, which implies familiarity with the world of business.

The use of information technology by organisations is growing exponentially, and new, more complex and challenging applications are being continuously explored and developed. In addition to the fact that their work environment is particularly interesting, many job opportunities are available to well-qualified informatics specialists.

Informatics specialists are trained to analyse the information needs of businesses, government departments, non-profit organisations or any other organisation where information is crucial. They not only analyse the needs but also address those needs by designing and implementing information systems. The term information systems is used nowadays to refer to computer-based systems (including mobile applications) that store and manipulate data so that people can understand, interpret information and use it for decision making.

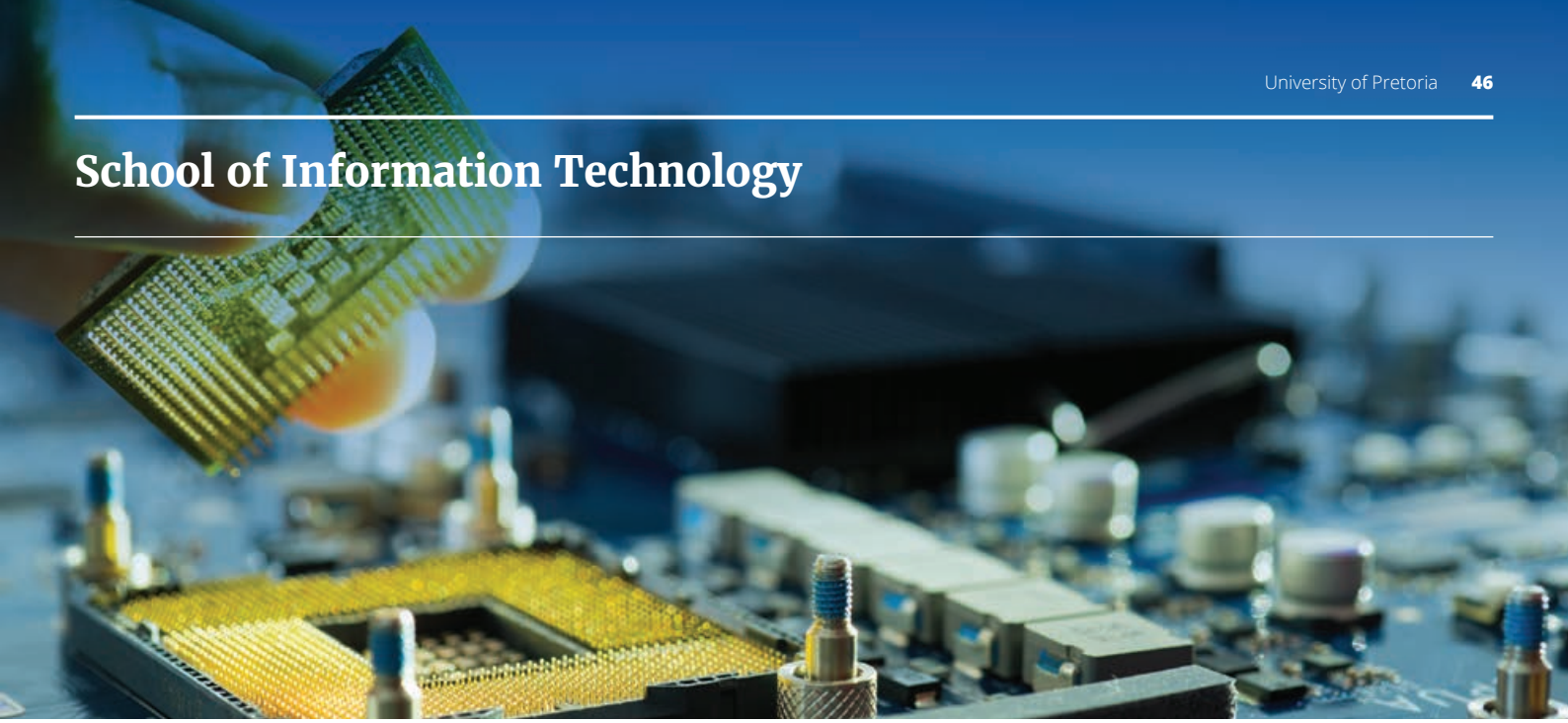
The BCom (Informatics) focus area: Information Systems degree offered by the University of Pretoria is the only degree in Africa that is internationally accredited by the Accreditation Board for Engineering and Technology (ABET) of the USA.

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024		
	Achievement level		APS
SCHOOL OF INFORMATION TECHNOLOGY	English Home Language or English First Additional Language	Mathematics	
BCom (Informatics) Focus area: Information Systems [3 years]	5	5	**30**
This programme is administered by the Faculty of Economic and Management Sciences.			
Careers: Data scientist, IT auditor, IT entrepreneur, IT tax specialist, e-business consultant, programmer, business analyst, project manager, CIO, CTO and knowledge manager			

Contact information Dr Riana Steyn (Programme Coordinator) | **Tel** +27 (0)12 420 3798 | **Email** informatics@up.ac.za
Websites www.up.ac.za/informatics | www.up.ac.za/school-of-information-technology | www.up.ac.za/ebit-postgraduate

School of Information Technology



Department of Computer Science

BSc (Computer Science)

What does the programme entail?

A BSc (Computer Science) degree from the University of Pretoria provides breadth and depth in computing skills. It equips students with problem-solving abilities and ensures that they have a solid foundation for continued learning and producing high-quality software in an IT career.

Career opportunities

Graduates follow careers in programming, system analysis, system architecture, consulting, database administration and network analysis. They can also be employed as researchers.

Structure of programme

The minimum time required for completing a BSc (Computer Science) degree is three years. This programme includes a significant number of mathematics and natural sciences modules to strengthen the kind of thinking needed for the development of software and the enhancement of problem-solving abilities. It also provides a basis for research in computer science, which often relies on a certain level of mathematical skill and maturity.

Who are the ideal candidates?

BSc (Computer Science) is the ideal programme for students who are curious about how computers work, enjoy building things carefully and systematically, have logical minds, are good at step-by-step reasoning, enjoy designing things that others can use, can pay attention to detail, can recognise good style and are able to keep working at a task until they succeed.

The ideal candidate should have:
- attention to detail;
- the ability to work with others in a team;
- analytical skills;
- creativity; and
- a logical mind.

What makes this programme unique?

The curriculum conforms to the highest international standards and will give students a foundation in all the important areas of computer science. Students will study a wide variety of computer science modules that emphasise the most up-to-date ways of developing software for use in the IT industry.

Watch this video to learn more:
www.youtube.com/watch?v=9bH0K_hluc0

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024		
	Achievement level		APS
SCHOOL OF INFORMATION TECHNOLOGY	English Home Language or English First Additional Language	Mathematics	
BSc (Computer Science) [3 years]	5	6	**30**
The suggested second-choice programmes for BSc (Computer Science) are BSc (Information and Knowledge Systems) and BCom (Informatics).			
Careers: Programmers, systems analysts, systems architects, consultants, database administrators, network analysts and researchers			

Contact information Dr Linda Marshall (Programme Coordinator) | **Tel** +27 (0)12 420 2361 | **Email** compsci@up.ac.za
Websites www.cs.up.ac.za | www.up.ac.za/school-of-information-technology | www.up.ac.za/ebit-postgraduate

School of Information Technology

Department of Computer Science

BSc (Information and Knowledge Systems)

What does the programme entail?

BSc (Information and Knowledge Systems) is the ideal programme for students who are interested in computer science, and specifically in one of the following areas of specialisation:

- Data science
- Genetics
- Geographical information systems
- IT and enterprises
- Law
- Music
- Software development

The minimum period for the completion of the BSc (Information and Knowledge Systems) programme, which aims to prepare students for careers in the IT industry, is three years.

What makes this programme unique?

Computer science has a multidisciplinary application domain and the purpose of the programme is reflected in the composition of the curriculum, which combines computer science with other fields of study. The possibility of taking a second major other than computer science broadens the scope of the curriculum for students.

Who are the ideal candidates?

The ideal candidate should have:

- attention to detail;
- the ability to work with others in a team;
- analytical skills; and
- creativity.

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024		
	Achievement level		APS
SCHOOL OF INFORMATION TECHNOLOGY	English Home Language or English First Additional Language	Mathematics	
BSc (Information and Knowledge Systems) [3 years]	4	6	**30**
The suggested second-choice programme for BSc (Information and Knowledge Systems) is BSc (Computer Science).			
Careers: Graduates will differentiate themselves in an application environment by choosing one of the following options: data science, genetics, geographical information systems, IT and enterprises, IT and law, IT and music or software development.			

Contact information Dr Linda Marshall (Programme Coordinator) | **Tel** +27 (0)12 420 2361 | **Email** compsci@up.ac.za
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School of Information Technology

Department of Information Science

BIS (Multimedia)

What does the programme entail?

Modern information technology offers the possibility of information products being designed and created comprising various types of media over and above the traditional text medium. Information technology, therefore, results in the convergence of various previously separate traditional media. There is not a single discipline that handles the combination of information products.

The Multimedia qualification in the Department of Information Science addresses this shortcoming. Institutions in any economic sphere, including government, may profit from a multimedia approach to information design, organisation and retrieval.

Multimedia documents include text, graphics, sound, video and animation. This qualification aims to enable students to understand the necessary concepts to build multimedia products and maintain the products.

This programme is, therefore, a combination of theory and practice. The explosion of the web and the exponential growth and power of information technology require the introduction of this degree following international trends.

Watch this video to learn more:
www.youtube.com/watch?v=soywpXrChzY

Who are the ideal candidates?

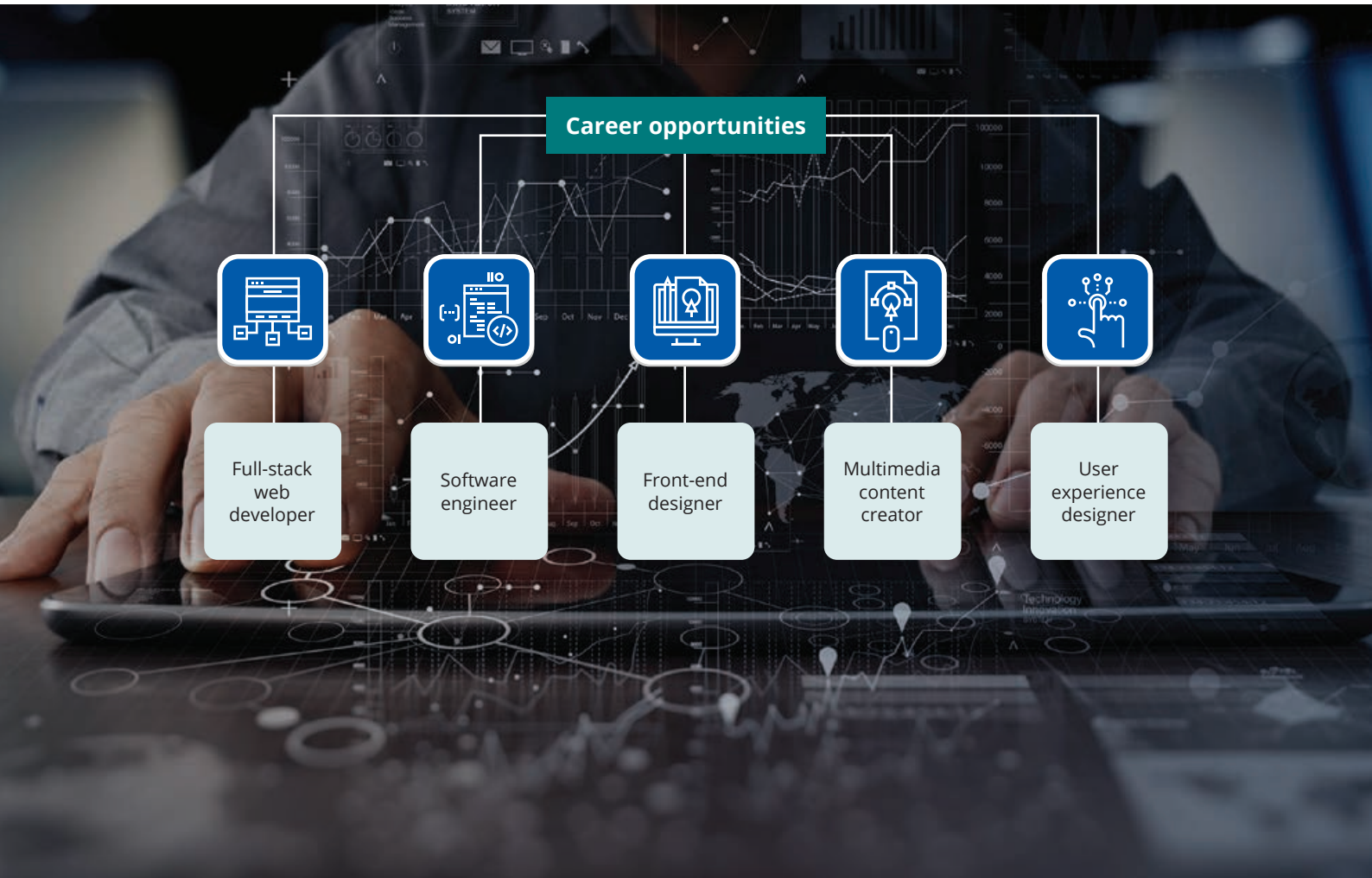
The ideal candidate should be:

- passionate about computing and technological advancements;
- happy to spend many hours in front of a computer.
- interested in creating and maintaining websites (both front- and back-end);
- interested in learning about animation, image, sound and video editing;
- interested in the intersection between technical aspects (programming) and design aspects (user experience, visual design); and
- interested in understanding how people interact with computing systems and how to design them based on this knowledge (user experience and interaction design).

What makes this programme unique?

A student with this degree will work in a team of developers and designers and communicate easily with both groups. They will also have the skills to move between these two types of roles within a company.

They will also be able to further their understanding of design, animation, and game design and development and then work in those fields.



School of Information Technology

Structure of the programme

Core modules
- Theory of information science
- Mark-up languages
- Multimedia theory and trends
- Multimedia authoring tools
- Human-computer interaction
- Programming and program design
- Computer science theory
- Visual design

Elective modules (3rd year computer science only)
- Software engineering
- Artificial intelligence
- Computer networks
- Programming languages
- Compiler construction
- Computer security
- Database systems
- Computer graphics

Which companies employ our graduates?

- RetroRabbit
- Gendac
- EPI-USE Labs
- Derivco
- bizAR Reality
- 5DT

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024		
	Achievement level		APS
SCHOOL OF INFORMATION TECHNOLOGY	English Home Language or English First Additional Language	Mathematics	
BIS (Multimedia) [3 years]	4	5	**30**

The suggested second-choice programmes for BIS (Multimedia) are BIS (Information Science), BIS (Publishing), BSc (Information and Knowledge Systems) and BCom (Informatics).

Careers: Programmers, web designers, animation specialists, video editors and electronic artists. The programme prepares candidates for positions at any of the following content producers: paper publications, television, radio, phone technologies and the web. Graduates can become coders and work for programming companies. They can develop skills in their particular areas of interest, such as digital music or video programming, or graphic, games or web development.

Contact information Ms Annique Smith | **Email** annique.smith@up.ac.za | **Website** www.up.ac.za/information-science > multimedia
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School of Information Technology

BIS (Information Science)

What does the programme entail?

The high prevalence of information and technology in the modern world implies that graduates are needed with specific competencies and skills related to the interaction between humans and information technologies. This is especially relevant concerning the technologies associated with the Fourth Industrial Revolution (and any further similar innovations).

This programme focuses on the use of information technology and the processing of information products. It is designed to train students in the management, retrieval and organisation of information and teach them to package, distribute and add value to information.

Students will also have the opportunity to develop their knowledge and skills in managing information and knowledge, which are the most critical resources of enterprises—information and knowledge. This will include knowledge management, competitive intelligence and also digitisation and digital repositories.

Who are the ideal candidates?

The type of student for whom this qualification is ideal is interested in engaging with information and creating and sharing new knowledge across platforms, primarily digitally and in analogue formats.

This qualification will enable graduates to discover, organise, manage and utilise information, practice knowledge management and competitive intelligence in an ethical manner.

Graduates with skills in this field are highly sought after to help information-intensive industries to meet their visions and missions and become globally competitive.

Which companies employ our graduates?

Banks, telecommunication companies, consultancy agencies and information-intensive industries.

Career opportunities

Knowledge managers (manage information and knowledge resources)

Information specialists (organise, retrieve and add value to information)

Information consultants (consult on information products, services and systems)

Information brokers (become an infopreneur and buy and sell information products and services)

Systems specialists (analyse and develop information systems)

Minimum admission requirements

Programme	Minimum requirements for NSC/IEB for 2024		
	Achievement level		APS
SCHOOL OF INFORMATION TECHNOLOGY	English Home Language or English First Additional Language	Mathematics	
BIS (Information Science) [3 years]	4	-	28

The suggested second-choice programmes for BIS (Information Science) are BIS (Publishing), BCom (Informatics) and BA.

If informatics is selected as a subject at the first-year level, an achievement level of 4 is required in Mathematics.
Careers: Information and knowledge managers (manage information and knowledge resources), information or e-commerce specialists (organise, retrieve and add value to information), consultants on information products (services and systems), information brokers (act as infopreneurs and buy and sell information products and services), and system specialists/analysts/technologists (develop information systems).

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School of Information Technology

BIS (Publishing)

What does the programme entail?

The BIS (Publishing) programmes teaches publishing theory and skills by selecting and developing content based on the needs of the user and appropriately packaging this content through a process of adding value. Publishing can happen in both paper-based and electronic format and includes a range of products, such as books for the trade market and publications for educational, academic and corporate readers. Publishing processes are also used in the production of mass media products, such as newspapers and magazines.

This programme aims to:
- provide students with knowledge of the publishing process and role-players, as well as trends and initiatives in the local and international publishing industry;
- provide students with relevant and current skills, including editing, design and production;
- enable students to work with a variety of information formats, from print to digital; and
- make students aware of the social, ethical and legal responsibilities involved in the publishing process.

Watch this video and learn more:
www.youtube.com/watch?v=gvG56EuMx4M

Who are the ideal candidates?

The ideal candidate should have:
- excellent language and communication skills, both written and verbal;
- project management and the ability to work towards goals and deadlines;
- computer skills and an aptitude for learning new skills;
- critical reading and reasoning; and
- good business sense.

What makes this programme unique?

This programme is unique in South Africa and offers students access to the full publishing value chain. It is benchmarked against international programmes and students can continue with their studies in other countries.

Career opportunities

Graduates can work in a wide variety of publishing, communication and media functions. Various career opportunities are available in the publishing industry, book retail and corporate communications. Content production for media houses, magazines and other content creators is also possible.

Some career opportunities include the following:
- Editorial functions
- Layout, design and typesetting
- Digital production
- Copyright permissions and negotiations
- Marketing and promotion
- Self-publishing and consultancy

Where are publishers employed?

- Local and international publishing houses
- Bookshops and e-commerce vendors
- Journals, newspapers or magazines
- The media and publicity industries
- National and local government departments
- The corporate and business environment
- Community-based publication initiatives
- Self-publishing and consultancy enterprises

Which companies employ our graduates?

Our graduates can be found at all the major local publishers (Pan Macmillan, Jonathan Ball, NB, Oxford University Press, Van Schaik and Juta), as well as at companies as diverse as legal firms, medical aid schemes and car manufacturers. Some are also entrepreneurs and start new businesses, for example BK Publishing and Blackbird Books.

Minimum admission requirements

Programmes	Minimum requirements for NSC/IEB for 2024		
	Achievement level		APS
SCHOOL OF INFORMATION TECHNOLOGY	English Home Language or English First Additional Language	Mathematics	
BIS (Publishing) [3 years]	5	-	28
The suggested second-choice programmes for BIS (Publishing) are BIS (Information Science), BA (Languages) and BA.			
Careers: Entry-level job opportunities include assisting specific role-players in the publishing value chain (such as MDs of publishing houses, commissioning editors, editors and production or marketing managers), market or picture research, copyright negotiations, copy-editing and proofreading, marketing and promotion, distribution and delivery.			

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EBIT WEEK

The EBIT week is a four-day programme presented by the Faculty of Engineering, Built Environment and Information Technology (EBIT) biannually for learners in Grades 9,10 and 11.

Prospective students are offered this hands-on opportunity to obtain information regarding all the disciplines offered in the School of Engineering, Built Environment and the School of Information Technology. During this event, learners are introduced to the practical as well as the theoretical aspects in order to help them make sound career choices. As part of the programme, learners also obtain industry exposure on-site or off-campus.

Programmes presented by the School of Engineering during the first and second EBIT week are listed below:

- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Electronic Engineering
- Industrial Engineering
- Mechanical Engineering
- Metallurgical Engineering
- Mining Engineering

Programmes presented by the School for the Built Environment during the first EBIT week are listed below:

- Architecture
- Construction Management
- Real Estate
- Quantity Surveying
- Town and Regional Planning

Programmes presented by the School of IT during the second EBIT week are listed below:

- Computer Science
- Publishing
- Information and Knowledge Systems
- Information Science
- Information Systems
- Informatics
- Multimedia

EBIT Open Day on campus: Saturday, 29 April 2023

Prospective students are invited to come and visit the Faculty of Engineering, Built Environment, and Information Technology on 29 April 2023. The programme and the registration form will be advertised on our website at this link: www.up.ac.za/ebitweek

The Faculty of Engineering, Built Environment and IT (EBIT) is home to a generation of leaders and innovators who are dedicated to improving their lives, the lives of their families, their country, and the world.

Our slogan ***'Innovating our Tomorrow'*** keeps us on the path of pursuing innovation. We are committed to remaining relevant and addressing the challenges of the Future of Work.

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Faculty of Engineering, Built Environment and Information Technology

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