

## Voorgraadse graadprogramme

### Elektriese Ingenieurswese

Elektriese Ingenieurswese fokus op die generering, verspreiding, omsetting en doeltreffende benutting van elektriese energie. Hierdie elemente is nie net op 'n elektriese rooster van toepassing nie, maar ook op die industriële, kommersiële, residensiële en mikro-skaal. Toepassings van Elektriese Ingenieurswese sluit die volgende in: kragstasies wat van steenkool gebruik maak; hidro- en kernkragstasies; kragdraadkommunikasies en bou- en spoorwegbedrading. Tans is daar ook besondere sterk fokus op vraagkantbestuur en energiedoeltreffendheid ten einde die doeltreffende en doelmatige gebruik van ons waardevolle energiehulpbronne — sowel hernubaar as nie-hernubaar — te verseker.

Die program vir die graad in Elektriese Ingenieurswese skenk oorwegend aandag aan die volgende onderwerpe:

- Digitale stelsels en mikroverwerkers
- Kragstelselkomponente en -analise
- Energiestelsels en optimalisering
- Hoëspanningsbeskerming
- Elektriese masjinerie
- Kragelektronika en elektriese aandrywing
- Beheerstelsels en outomatisasie

### Elektroniese Ingenieurswese

Elektroniese Ingenieurswese is 'n breë studieveld en behandel al die toepassings van elektronika. Die graadkursus in Elektroniese Ingenieurswese bied aan studente 'n geleentheid om meer te leer van mikroëlektronika, seinverwerking, kragelektronika, bioingenieurswese, beheerstelsels, optika en elektromagnetisme. Elektroniese ingenieurswese kan toegepas word op die gebied van telekommunikasie (televisie, radio, sellulêre kommunikasie, ensovoorts), in nywerhede (beheerstelsel en kragelektronika), op militêre gebied en in vervoer en bioingenieurswese. Onderwerpe waaraan veral aandag geskenk word in die graad in Elektroniese Ingenieurswese is die volgende:

- Elektroniese stroombaan
- Gevorderde elektronika
- Fotonika
- DSV-programmering
- Kommunikasiestelsels



### Rekenaaringenieurswese

Rekenaaringenieurswese fokus op sowel harde- as sagteware. Aan die hardeware kant sal u blootgestel word aan robotika, digitale seinverwerkers (DSV's), optiese netwerke en kommunikasiestelsels. Aan die sagtewarekant (wat dikwels met hardeware gekombineer word) sal u te doen kry met aspekte soos kunsmatige intelligensie, e-handel en netwerksekeriteitsstelsels, bedryfstelselontwerp, ingebedde stelsels en netwerksekeriteit. Rekenaaringenieurs is geneig om in 'n kombinasie van harde- en sagteware te spesialiseer ten einde optimale oplossings vir probleme te vind. Mense wonder dikwels wat die verskil tussen die graad in Rekenaarwetenskap en dié in Rekenaaringenieurswese is. Rekenaaringenieurswese fokus op 'n kombinasie van harde- en sagteware ten einde optimale oplossings vir werklike probleme te vind.

Die volgende is die belangrikste onderwerpe wat in die graadprogram vir Rekenaaringenieurswese gedek word:

- Mikroverwerkers
- Rekenaarnetwerke
- Rekenaargitektuur en -stelsels
- Sagteware-ingenieurswese
- Intelligente stelsels
- Netwerksekeriteit
- Kommunikasiestelsels
- Elektriese stroombane



### Fasiliteite

As 'n toonaangewende ingenieurswese departement is ons trots op ons fasiliteite wat goed met die beste ter wêreld vergelyk. Ons hipermoderne laboratoriums en lesingfasiliteite maak dit vir ons moontlik om uitsonderlike ingenieurs op te lei. Ons fasiliteite word voortdurend opgegradeer om seker te maak dat ons studente toegang tot die heel beste toerusting het.

Ons departement huisves die Agilent Sentrum vir Rekenaar-ondersteunende Onderwys-netwerklaboratoriums (CAEC) en elektroniese en elektriese laboratoriums. Al hierdie laboratoriums huisves toerusting ter waarde van miljoene rande en word deur die nywerheid geborg.

Die nuwe Ingenieursgebou, Ingenieurswese III, is opgerig om voorsiening te maak vir die verwagte voortgesette groei van die Skool vir Ingenieurswese, waartoe die Departement Elektriese, Elektroniese en Rekenaaringenieurswese behoort. Die konstruksie van Ingenieurswese III, teen 'n koste van R400 miljoen, het in 2009 begin en die gebou is op 25 Augustus 2011 amptelik geopen. Dit bevat ses lesingsale met altesaam 1 800 sitplekke, 'n saal met 450 sitplekke en twee vlakke laboratoriums en kantore met 'n gesamentlike vloeroppervlakte van byna 11 000 m<sup>2</sup>.

Nadat die gebou voltooi is, het die Departement Elektriese, Elektroniese en Rekenaaringenieurswese daarheen verhuis. Die meerderheid van ons laboratoriums is dus splinternuut en is toegerus met die beste en mees moderne toerusting vir uitsluitlike gebruik deur ons studente.

### Toelatingsvereistes

| Vereistes   | Vierjaar-program | ENGAGE*     |
|---|------------------|-------------|
| Matriekvrystelling  | Ja               | Ja          |
| Wiskunde  | 6 (70%–79%)      | 5 (60%–69%) |
| Natuurwetenskap   | 6 (70%–79%)      | 4 (50%–59%) |
| Engels of Afrikaans eerste taal                           | 5 (60%–69%)      | 4 (50%–59%) |
| <b>Minimum TPT-telling (Lewensoriëntering uitgesluit)</b> | <b>35</b>        | <b>25</b>   |

Ons bied ook 'n uitgebreide ingenieurswese-graadprogram (ENGAGE) aan, wat 'n noukeurig gestruktureerde kurrikulum bied om studente te help om by die universiteitslewe aan te pas en die hoë eise van ingenieurstudie die hoof te bied. Toelating tot die ENGAGE-program is aan keuring deur die Fakulteit onderhewig en hang af van die uitslag van die National Benchmark Test. Verwys na die Departement se webblad vir die jongste inligting aangaande toelatingsvereistes.

### Akkreditasie

Al ons grade word deur die Suid-Afrikaanse Raad vir Ingenieurswese (ECSA) geakkrediteer en word erken as grade wat aan die akademiese programvereistes vir registrasie as 'n professionele ingenieur in Suid-Afrika voldoen.

Internasionale erkenning van ons akademiese programme word verskaf deur die Washington Accord-ooreenkomst, wat erkenning gee vir uitmuntendheid in die akkreditering van professionele ingenieurskwalifikasies.



## Beurse

### Prestasiebeurse

Prestasiebeurse word op grond van akademiese prestasie gedurende die voorafgaande studiejaar toegeken. Eerstejaar-studente kan ook op grond van hul punte in Graad 12 vir prestasiebeurse in aanmerking geneem word. Voornemende studente kan ons Departement vir meer inligting kontak. Verwys na <http://www.up.ac.za/fao>.

### Voorgraadse beurse

Alhoewel beurse beskikbaar is, kry die meerderheid studente eers na hul eerste of tweede studiejaar 'n beurs. Die rede hiervoor is dat skenkers verkies om beurse aan akademiese presteerders toe te ken wat hulself reeds op universiteit bewys het. Inligting oor beurse kan op die Departement se webblad verkry word.

## Nagraadse graadprogramme

Ons Departement bied ook nagraadse grade op honneurs-, meesters- en doktorsvlakke aan. Nagraadse studente kan hierdie nagraadse graadkursusse volg onder die leiding van dosente wat spesialiste op die volgende gebiede is:

- Gevorderde sensornetwerke
- Bioingenieurswese
- Beheerstelsels
- Elektromagnetisme
- Elektronika en mikroëlektronika
- Energiestelsels
- Intelligente stelsels
- Krag
- Telekommunikasie en seinverwerking

## Kontakbesonderhede

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## Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie

Faculty of Engineering, Built Environment and Information Technology / Lefapha la Boetšenera, Tikologo ya Kago le Theknolotši ya Tshedimošo

UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

## Departement Elektriese, Elektroniese en Rekenaar-Ingenieurswese

[www.ee.up.ac.za](http://www.ee.up.ac.za)



## Undergraduate degree programmes

### Electrical Engineering

Electrical Engineering focuses on the generation, distribution, conversion and the efficient utilisation of electrical energy. These elements not only apply to an electrical grid but also on an industrial, commercial, residential and micro scale. Applications of Electrical Engineering also extend to coal-fired, hydro and nuclear power stations; power line communications and building and railway wiring. There is now also an intense focus on demand side management and energy efficiency to ensure effective and efficient use of our valuable energy resources both renewable and non-renewable.

The following topics are the most prevalent ones covered in the Electrical Engineering degree:

- Digital systems and microprocessors
- Power system components and analysis
- Energy systems and optimisation
- High voltage protection
- Electrical machines
- Power electronics and electrical drives
- Control systems and automation

### Electronic Engineering

Electronic Engineering is a very broad field and deals with all applications of electronics. In the Electronic Engineering degree, you will have the opportunity to learn about microelectronics, signal processing, power electronics, bioengineering, control systems, optics and electromagnetism. Electronic engineering can be applied to telecommunications (television, radio, cellular communications, optical communication and more), industry (control systems and power electronics), military, transport and bioengineering. The following topics are the most prevalent ones covered in the Electronic Engineering degree:

- Electronic circuit
- Advanced electronics
- Photonics
- DSP programming
- Communication systems



### Computer Engineering

Computer Engineering has its focus in both hardware and software. On the hardware side, you will be exposed to robotics, digital signal processors (DSPs), optical networks and communication systems. On the software side (which is often combined with hardware), you will be exposed to such aspects as artificial intelligence, e-commerce systems, operating system design, embedded systems and network security. Computer engineers tend to specialise in combining hardware and software to produce optimal solutions to problems. People often wonder what the difference is between the Computer Science and Computer Engineering degrees. Computer Engineering focuses on the combination of hardware with software to provide optimal solutions to real-world problems.

The following topics are the most prevalent ones covered in the Computer Engineering degree:

- Microprocessors
- Computer networks
- Computer architecture and systems
- Software engineering
- Intelligent systems
- Network security
- Communication systems
- Electrical circuits



### Facilities

As a leading engineering department we pride ourselves through our world-class facilities. Our state-of-the-art laboratories and lecturing facilities enable us to train exceptional engineers. We continuously upgrade our facilities to ensure that we offer our students the very best equipment.

In our department we house the Agilent Computer-Aided Education Centre (CAEC) laboratory, networking laboratories and electronic and electrical laboratories. All of these laboratories house equipment worth millions of rand and are sponsored by industry.

The new Engineering building, Engineering III, was built in response to and in expectation of the ever-expanding nature of the School of Engineering, of which the Department of Electrical, Electronic and Computer Engineering is part. Engineering III was officially opened on 25 August 2011 after construction began in 2009, at a cost of R400 million. It houses six lecture halls with a total of 1 800 seats, a drawing hall with 450 seats, and two levels of laboratories and offices with a combined floor space of almost 11 000 m<sup>2</sup>.

The Department of Electrical, Electronic and Computer Engineering has relocated to Engineering III after completion. Most of our laboratories are therefore brand new and contain the best and latest equipment for our students' exclusive use.

### Minimum admission requirements

| Requirements  | Four-year Programme | ENGAGE*     |
|---|---------------------|-------------|
| Matriculation exemption                               | Yes                 | Yes         |
| Mathematics   | 6 (70%–79%)         | 5 (60%–69%) |
| Physical Science                                      | 6 (70%–79%)         | 4 (50%–59%) |
| English or Afrikaans first language                   | 5 (60%–69%)         | 4 (50%–59%) |
| <b>Minimum APS score (Excluding Life Orientation)</b> | <b>35</b>           | <b>25</b>   |

We also offer an extended programme, called the Engineering Augmented Degree programme (ENGAGE), which provides a carefully structured curriculum that helps students adjust to university life and cope with the high demands of engineering studies. Admission to the ENGAGE programme is subject to faculty selection based on the results of the National Benchmark Test. Refer to the department website for the latest information regarding admission requirements.

### Accreditation

All our degrees are accredited by the Engineering Council of South Africa and are recognised as meeting the academic programme requirements for registration as a Professional Engineer in South Africa.

International recognition of our academic programmes is provided through the Washington Accord agreement. The agreement recognises substantial equivalence in the accreditation of qualifications in professional engineering.



## Bursaries

### Achievement bursaries

Achievement bursaries are awarded based on academic achievement in the previous year of studies. First-year students also qualify for achievement bursary based on their Gr. 12 marks. Prospective students can contact our department for more information. Refer to <http://www.up.ac.za/fao>.

### Undergraduate bursaries

Although bursaries are available, it is only after the first or second year that most students get a bursary. This is due to the fact that bursars like to award bursaries to academic achievers after the student has proven himself at university. Also see the departmental website for information regarding bursaries.

## Postgraduate degree programmes

Our department also offers postgraduate degrees on honour's, master's and doctorate level. Postgraduate students can study towards these postgraduate degrees under the leadership of lecturers who are specialists in the following areas:

- Advances sensor networks
- Bioengineering
- Control systems
- Electromagnetism
- Electronics and Microelectronics
- Energy systems
- Intelligent systems
- Power
- Telecommunications and signal processing

## Contact details

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