# University of Pretoria Yearbook 2018

# BEng Chemical Engineering (12130002)

| | |
|---|---|
| **Minimum duration of study** | 4 years |
| **Total credits** | 608 |

## Programme information

All fields of study of the BEng degree have been accredited by the Engineering Council of South Africa (ECSA), and comply with the academic requirements for registration as a professional engineer. The programmes are designed in accordance with the outcomes-based model as required by the South African Qualifications Authority (SAQA). The learning outcomes and contents of the programmes have been compiled in accordance with the latest accreditation standards (PE-60 and PE-61) of ECSA, which also comply with the SAQA requirements, and which are summarised as follows:

**Learning outcomes of the BEng degree:**
A graduate in engineering should be able to apply the following skills on an advanced level:

a. Engineering problem solving.
b. Application of specialist and fundamental knowledge, with specific reference to mathematics, basic sciences and engineering sciences.
c. Engineering design and synthesis.
d. Investigation, experimentation and data analysis.
e. Engineering methods, skills, tools and information technology.
f. Professional and general communication.
g. Awareness and knowledge of the impact of engineering activity on society and the physical environment.
h. Work in teams and in multidisciplinary environments.
i. An awareness and ability for lifelong learning.
j. An awareness and knowledge of principles of professional ethics and practice.

**Learning contents of the BEng programmes:**
Six essential knowledge areas are included in the syllabi of the programmes. The typical representation of each knowledge area as a percentage of the total contents of an undergraduate programme is given in brackets ( ) in the list below. This percentage varies for the different study directions, but conforms in all instances to the minimum knowledge area content as stipulated by ECSA.
Knowledge areas:

a. Mathematics, including numerical methods and statistics (13%)
b. Basic sciences: the natural sciences essential to the programme (15%)
c. Engineering sciences (40%)
d. Engineering design and synthesis (16%)
e. Computing and information technology (5%)
f. Complementary studies: communication, economy, management, innovation, environmental impact, ethics,

engineering practice (11%).

# Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded when calculating the APS.
- Grade 11 results are used in the provisional admission of prospective students.
- A valid qualification with admission to degree studies is required.
- Minimum subject and achievement requirements, as set out below, are required. On first-year level a student has a choice between Afrikaans and English as language medium. In certain cases, tuition may be presented in English only, for example in electives, where the lecturer may not speak Afrikaans or in cases where it is not economically or practically viable.
- Provisional admission to the four-year programmes in the School of Engineering is only guaranteed if a prospective student complies with ALL the requirements below.
  **Note**: Candidates who do not comply with the minimum requirements, set out above, but who have obtained a minimum APS of 30, an achievement level of 5 for English or Afrikaans, 6 for Mathematics and 5 for Physical Science, will be considered for provisional admission to either the four-year programme or the ENGAGE programme based on the results of the NBT.
- Admission to ENGAGE in the School of Engineering will be determined by the results of the NBT, NSC results, an achievement level of 5 in Mathematics and 4 in Physical Science, as well as an achievement level of 4 in Afrikaans or English, together with an APS of 25. Students may apply directly to be considered for the ENGAGE programme.

| **Minimum requirements** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **Physical Science** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 5 | 3 | C | C | 6 | 2 | B | B* | 6 | 2 | B | B* | 35 |

* A-Level: C symbols for Mathematics Physics and Chemistry will be considered for admission providing the required APS has been obtained.

| **ENGAGE Programme: Minimum requirements** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Achievement level** | | | | | | | | | | | | |
| **Afrikaans or English** | | | | **Mathematics** | | | | **Physical Science** | | | | **APS** |
| NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | NSC/IEB | HIGCSE | AS-Level | A-Level | |
| 4 | 3 | D | D | 5 | 3 | C | C | 4 | 3 | D | D | 25 |

# Other programme-specific information

With a few exceptions, most modules offered at the School of Engineering are semester modules having credit values of either 8 or 16.
A student may be permitted by the Dean, on recommendation of the relevant head of the department, to register for an equivalent module in an alternate semester, although the module is normally offered to the student's

group in another semester, and providing that no timetable clashes occur.

**Please note**:

1. Students who did not pass SWK 122 Mechanics 122 in their first year of study can take the module in the first semester of the following year.
2. All students are required to successfully complete JCP 2013, Community-based project 203 as part of the requirements for the BEng degree. A student may register for the module during any of the years of study of the programme, but preferably not during the first or the final year of study.
3. Students registered for Chemical Engineering who have passed CBI 311, receive credit for CBI 410.
4. Mechanical Engineering: For the Aeronautical Option, the themes of both the Design and the Project must be aeronautical-related.
5. Offering of electives depends on the availability of resources and industry support.

# Promotion to next study year

**Promotion to the second semester of the first year and to the second year of study (Eng. 14)**

a. A new first-year student who has failed in all the prescribed modules of the programme at the end of the first semester, is excluded from studies in the School of Engineering. A student who is registered for the Engineering Augmented Degree Programme and has passed only 8 credits will also be excluded.
b. A student who complies with all the requirements of the first year of study, is promoted to the second year of study.
c. A student who has not passed at least 70% of the credits of the first year of study after the November examinations, must reapply for admission should he/she intend to proceed with his/her studies. Application on the prescribed form must be submitted to the Student Administration of the School of Engineering not later than 11 January. Late applications will be accepted only in exceptional circumstances after approval by the Dean. Should first-year students be readmitted, conditions of readmission will be determined by the Admissions Committee.
d. Students who have not passed all the prescribed modules at first year level (level 100), as well as students who are readmitted in terms of Faculty Regulations must register for the outstanding first-year level (level-100) modules.
e. A student who is repeating his or her first year, may, on recommendation of the relevant heads of department and with the approval of the Dean, be permitted to enroll for modules of the second-year of study in addition to the first-year modules which he or she failed, providing that he or she complies with the prerequisites for the second-year modules and no timetable clashes occur. Students on the ENGAGE programme may, following the same procedure, be permitted to enrol for level-200 modules in addition to the level-100 modules which he/she failed providing that he/she complies with the prerequisites for the modules at 200-level and no timetable clashes occur. On recommendation of the relevant head of department and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
f. Students in Computer, Electrical and Electronic Engineering, who fail a first-year module for the second time, forfeit the privilege of registering for any modules of an advanced year of study.

**Please note:**

i. From the second year of study each student should be in possession of an approved calculator. It is assumed

that each student will have easy access to a personal computer.

ii. Students who intend transferring to Mining Engineering, must familiarise themselves with the stipulations set out in the syllabi of PWP 121 Workshop practice 121.

**Promotion to the third year of study of the Four-year Programme, as well as to the third and the fourth years of study of the ENGAGE Programme. In case of the fourth year of study of the ENGAGE Programme, the words "first", "second" and "third" must be substituted with the words "second", "third" and "fourth" respectively. (Eng. 15)**

a. A student who complies with all the requirements of the second year of study, is promoted to the third year of study.
b. A student must pass all the prescribed modules at first year level (level 100) before he or she is admitted to any module at third year level (level 300).
c. A student who is repeating his or her second year must register for all the second-year modules still outstanding. Such a student may, on recommendation of the relevant head of department and with the approval of the Dean, be permitted to enroll for modules of the third year of study in addition to the second-year modules which he or she failed, providing that he or she complies with the prerequisites for the third-year modules and no timetable clashes occur. On recommendation of the relevant head of department, and with special permission from the Dean, permission may be granted to exceed the prescribed number of credits. The total number of credits which may be approved may not exceed the normal number of credits per semester by more than 16 credits.
d. Students in Computer, Electrical and Electronic Engineering who fail a second-year module for the second time forfeit the privilege of registering for any modules of the third year of study.
e. Students who intend transferring to Mining Engineering must familiarise themselves with the stipulations set out in the syllabi of PWP 120 Workshop practice 120, as well as PPY 317 Practical training 317.

**Promotion to the fourth year of study of the Four-year Programme, as well as to the fifth year of study of the ENGAGE Programme. In case of the fifth year of study of the ENGAGE Programme, the words "second", "third" and "fourth" must be substituted with the words "third", "fourth" and "fifth" respectively. (Eng. 16)**

a. A student who complies with all the requirements of the third year of study is promoted to the fourth year of study. A student who does not comply with all the requirements but who is able to register for all outstanding modules in order to complete the degree programme, may at registration be promoted to the fourth year of study.
b. A student must pass all the prescribed modules of the second year of study, before he or she is admitted to any module of the fourth year of study.
c. A student who has not passed all the prescribed modules of the third year of study, must register for the outstanding modules. A student may be admitted by the Dean, on the recommendation of the head of department concerned, to modules of the fourth year of study, in addition to the outstanding third-year modules, provided that he or she complies with the prerequisites of the fourth-year modules and no timetable clashes occur. The total number of credits per semester for which a student registers may not exceed the normal number of credits per semester by more than 16 credits. In exceptional cases, the Dean may, on recommendation of the relevant head of department, permit a student to exceed the above limit.
d. Students in Computer, Electrical and Electronic Engineering who fail a third-year module for the second time, forfeit the privilege of registering for any modules of the fourth year of study.

# Pass with distinction

a. A student graduates with distinction if:

i. no module of the third or fourth year of study of the four year programme or of the fourth or fifth year of the ENGAGE programme was repeated and a weighted average of at least 75% was obtained in one year in all the modules of the final year of study; and
ii. the degree programme was completed within the prescribed four years for the four year programme and within the prescribed five years of the ENGAGE programme.

b. Exceptional cases to the above will be considered by the Dean.

# Curriculum: Year 1

**Minimum credits: 160**

## Fundamental modules

Academic orientation 112 (UPO 112) - Credits: 0.00

## Core modules

General chemistry 171 (CHM 171) - Credits: 16.00
General chemistry 181 (CHM 181) - Credits: 16.00
Chemical engineering 113 (CIR 113) - Credits: 8.00
Chemical engineering 123 (CIR 123) - Credits: 8.00
Electricity and electronics 122 (EBN 122) - Credits: 16.00
Physics 116 (FSK 116) - Credits: 16.00
Humanities and social sciences 110 (HAS 110) - Credits: 8.00
Humanities and social sciences 120 (HAS 120) - Credits: 8.00
Graphical communication 110 (MGC 110) - Credits: 16.00
Mechanics 122 (SWK 122) - Credits: 16.00
Calculus 158 (WTW 158) - Credits: 16.00
Mathematics 164 (WTW 164) - Credits: 16.00
Workshop practice 121 (WWP 121) - Credits: 6.00

# Curriculum: Year 2

**Minimum credits: 162**

## Core modules

Engineering statistics 220 (BES 220) - Credits: 8.00
Chemistry 215 (CHM 215) - Credits: 12.00
Chemistry 226 (CHM 226) - Credits: 8.00
Chemical engineering materials 210 (CIM 210) - Credits: 8.00
Chemical engineering 211 (CIR 211) - Credits: 12.00
Thermodynamics 223 (CTD 223) - Credits: 16.00
Electrical engineering 221 (EIR 221) - Credits: 16.00
Community-based project 203 (JCP 203) - Credits: 8.00
Programming and information technology 213 (MPR 213) - Credits: 16.00
Strength of materials 210 (SWK 210) - Credits: 16.00
Mathematics 238 (WTW 238) - Credits: 16.00
Differential equations 256 (WTW 256) - Credits: 8.00
Calculus 258 (WTW 258) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00

# Curriculum: Year 3

**Minimum credits: 144**

## Core modules

Engineering management 310 (BSS 310) - Credits: 8.00
Biochemical engineering 310 (CBI 310) - Credits: 16.00
Chemical engineering design 320 (CIO 320) - Credits: 16.00
Chemical engineering 310 (CIR 310) - Credits: 8.00
Professional and technical communication 310 (CJJ 310) - Credits: 8.00
Kinetics 321 (CKN 321) - Credits: 16.00
Laboratory 321 (CLB 321) - Credits: 16.00
Mass transfer 310 (CMO 310) - Credits: 16.00
Transfer processes 311 (COP 311) - Credits: 16.00
Process dynamics 321 (CPN 321) - Credits: 16.00
Practical training 311 (CPY 311) - Credits: 16.00
Engineering activity and group work 320 (MIA 320) - Credits: 8.00

# Curriculum: Final year

**Minimum credits: 144**

## Core modules

Particle technology 410 (CPA 410) - Credits: 16.00
Process control 410 (CPB 410) - Credits: 16.00
Design project 421 (CPJ 421) - Credits: 24.00
Chemical engineering practice 420 (CPR 420) - Credits: 8.00
Process synthesis 410 (CPS 410) - Credits: 8.00
Process analysis 420 (CPS 420) - Credits: 8.00
Practical training 411 (CPY 411) - Credits: 16.00
Reactor design 410 (CRO 410) - Credits: 16.00
Research project 411 (CSC 411) - Credits: 16.00
Research project 421 (CSC 421) - Credits: 16.00
Specialisation 420 (CSS 420) - Credits: 16.00

The information published here is subject to change and may be amended after the publication of this information. The General Regulations (G Regulations) apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the General Rules section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.