

Survival Guide

*For first-year students at the Faculty of Engineering
Stellenbosch University*

**What is Engineering, and how can I
make a success of my degree
programme?**



2011

*"An **engineer** has to know a lot about people, the ways they **organize and work together**, or against one another, the ways in which **business makes a profit** or fails to, especially about how **new things are conceived, analysed, developed, manufactured, and put into use**. "A **scientist** deals **primarily with things**, fascinating things it is true, but after all, only things. The **engineer**, by contrast, deals with both **things and men**; he covers the full gamut of experience; it is **his task to interrelate men and their ways with things** and their possibilities and limitations, to **produce** useful results. His satisfactions are concrete; he can witness the truck leaving the loading ramp with **new products** he has created, or the **communication link** that unites continents, or the **new alloy** that functions well in intense heat, or the **bridge that spans a river** or a chasm, or the edifice that **houses a thousand of his fellows**. He has the **satisfaction of seeing the product of his labours work**."*

- Vannevar Bush

Vannevar Bush was a well-known American engineer. He invented the analogue computer, and was head of the USA's military research during the Second World War.

The "he" referred to above in Bush's quotation of course also nowadays refers to "she", as engineering has become an attractive profession for women too!

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1 The Faculty of Engineering

1.1 History

Established in 1944, the Faculty of Engineering was the first Afrikaans Engineering Faculty in South Africa, and it produced its first graduates in 1945.

The three original Engineering Departments of Civil, Mechanical and Electrotechnical Engineering and the Department of Applied Mathematics were later augmented by the Departments of Chemical & Metallurgical Engineering in 1969. The Department of Industrial Engineering originated from the Department of Mechanical Engineering in 1983.

The first Dean was Prof HL Reitz who was also the head of the Department of Civil Engineering. He was assisted by Proffs RL Straszacker (Mechanical Engineering), A Heydorn (Electrotechnical Engineering) and JM le Roux (Applied Mathematics).

In the nineteen seventies the Faculty's own building complex was erected. This spacious complex with its well-equipped facilities provides in all the needs for training, education, postgraduate study and research in a wide variety of specialised engineering fields.

1.2 Mission

The Faculty's mission is to serve as a cost-effective source of excellent technical knowledge through education, research and service to the industry and the community.

1.3 Organisation

In addition to the five departments, the Faculty also has one service organisation, namely Central Mechanical Services.

The Dean is responsible for the management of the Faculty. Each department has a Chairperson who is responsible for the management of the department. Decision-making in the Faculty is decentralised as far as possible.

The Faculty Council, comprising all full-time lecturers, is the highest academic authority of the Faculty. The Engineering

Students' Council (ISR) appoints three students who are then full members of the Faculty Council. There are committees responsible for interdepartmental matters such as the class, test and examination timetables. The ISR also appoints representatives to serve on these committees.

2 Engineering

2.1 What is Engineering?

Engineering embraces a very wide spectrum of activities. The Oxford Dictionary says it involves the practical application of scientific knowledge in the control and use of energy. According to Funk & Wagnall it is the art to design, build and use engines, machines and public works.

The HAT (Verklarende Handwoordeboek van die Afrikaanse Taal) an Afrikaans explanatory dictionary, says it is the science through which the characteristics of matter and natural power sources are put to use in the form of machines, manufactured products, structures, etc.; it also includes the science of designing, building and maintaining these things.

The most important skill that young engineers have once they have qualified is the ability to model and solve technical problems. In order to achieve this, they are in possession of a sound mathematical background, a good knowledge of relevant natural phenomena, knowledge of the design process, and the ability to think independently.

In their profession they will soon gain experience in specific technical fields. As their careers progress, they will become more involved in the management of people.

Graduates should remain students their entire life. Technology changes rapidly, and if an engineer designs or manages people, he or she should keep abreast of technical or business developments. Therefore, almost half of all engineers do postgraduate studies in engineering or business management in order to broaden their knowledge.

2.2 Professional Engineers

As members of a profession, engineers are subject to a Code of Conduct. In South Africa the Engineering Council of South Africa (ECSA) has statutory powers to prescribe educational standards for education, and to register professional engineers. Registration as a Professional Engineer (Pr. Eng.) certifies that a person is competent to practise as an engineer.

2.3 Code of Conduct

Professional engineers undertake to:

- Accept responsibility to take engineering decisions that take into account the safety, health and welfare of the public, and without delay to make public any information on factors endangering the public or the environment;
- Avoid conflicts of interest where possible, and to declare their interest where conflict may arise;
- Be honest and realistic in claims or projections based on available information;
- Reject all forms of bribery;
- Promote knowledge and understanding of technology, the correct application, and potential consequences;
- Maintain and improve their technical competence, and to only undertake technological tasks if they are qualified for it through training or experience, and also only after disclosure of any deficiencies;
- Gather, accept and provide honest criticism on technical work, to acknowledge and improve mistakes, and to give recognition to contributions made by others;
- Treat all people justly irrespective of race, religion, sex, handicap, age or national origin;
- Avoid damage to others, their property, reputation or profession by false or malicious actions;
- Assist colleagues and co-workers in their professional development, and to help them abide by the Code of Conduct for professional engineers.

3 The BEng qualifications

3.1 Introduction

The BEng qualification is acquired when a student completes all the prescribed modules of the BEng programme successfully. The BEng programme equips students especially with the ability to work and

think independently, and to model and solve technical problems in their chosen field.

In the first two years of the programme a sound foundation is laid in mathematics, the language with which technical problems are described, and the *basic* and *engineering sciences*. With *engineering sciences* is meant those aspects of physics, chemistry and other basic sciences *relevant to engineering*. Mechanics, thermodynamics, strength of materials and electronics are examples of engineering science subjects.

Engineering students receive at least a semester's exposure to a second engineering language, namely engineering drawings. It is very seldom that a product as the result of an engineer's work sees the light without a drawing at some stage of the production. Drawings play an important role in modelling technical problems, in other words they help a person to puzzle out a problem. All engineering students learn a computer language.

Students also learn how to design. This *synthesis* component of the BEng course distinguishes it from the BSc course in the physical sciences, where the accent is on *analysis*.

Furthermore, the course exposes students to aspects of the economy and human behaviour, and develops their ability to communicate clearly and effectively with other people. Graduates also have the ability to be lifelong students, work in teams, and must be critically aware of the impact of engineering activities on people and the environment, as well as the necessity to act professionally and ethical at all times.

3.2 Accreditation

All the BEng degrees have been accredited by the Engineering Council of South Africa (ECSA) for registration of graduates as Professional Engineers after acquiring the relevant experience in practice. These degrees are also recognised in the overseas countries signatory to the Washington Accord, such as Australia, Canada, New Zealand, Singapore, the United Kingdom and the United States of America.

3.3 Achievement and progress

The qualification of Stellenbosch University has an excellent national and international reputation. This reputation was obtained over many years through the strict application of the University's quality control systems. Next to the high standard set in tests and examinations, there are also strict progress requirements. The most important of these is the HEMIS credit requirement (see the Calendar Part 11, Chapter 8).

Students are strongly advised to set their aim higher than the progress requirement. **Students whose progress is too slow, are not allowed to complete the programme.**

4 Successful study

4.1 The keys to success - in a nutshell

If you want to be successful in your studies, you must:

- Work regularly and sufficiently. Do not allow your work to pile up.
- Work for the right reason - to qualify as a **good** engineer or engineering scientist.
- Only your best is good enough. Your academic work must be your highest priority.
- Open doors for your future by doing as well as possible.
- Tackle **many new problems**. Do a good cross-section of the different types of problems in your text book. Use **examples that have been worked out** carefully by tackling them **before** looking at the solutions.
- Remain up to date with **all** your work. **Work each evening on all the subjects you are going to encounter the following day in lectures, practicals or tutorials**. It is not a good idea to only work on one subject per evening, because you will fall behind in your other subjects. **Attend all lectures and pay attention in class**.
- Do not take shortcuts. Ensure that you **learn all the work in a particular course**. If you leave out a portion of the work it will cost you dearly. A person does not have time in the third year to look up work done in the first year.
- **Read the University Calendar and make sure that you are familiar with the University's rules.**

4.2 Study philosophy

There are **many activities on campus** in which a student would like to participate. Be sensible about your participation. If you do **not set about it smartly, you will get stuck** and be unable to manage your studies and you will be kicked out. If this happens, you will be in deep trouble. People will be angry at you for wasting time and money. **Nobody will be angrier than you.**

You must work on your studies full out for five evenings per week. Where weekends are concerned, you should have an optimisation plan:

Maximise your free time during weekends, subject to the condition that you do well in your academic work.

Here are a few tips to master the problem:

4.2.1 Study strategy

- **Maximise your study efficiency.**
- Maximise your ability to study. Ensure that you are:
 - **fit and healthy,**
 - **not tired,** and
 - **in the mood to learn.**
- Be in control of your studies.
 - **Keep up** with the work.
 - **Plan your study programme,** and
 - **Stick to your plan.** Work first and play later.
 - **Use all available time.**
 - **Do not work on one subject only the whole evening.** If you do this, **you will definitely fall behind with your other subjects.**
- Utilise your time effectively.
 - Use the **best study methods.**
 - **Draw maximum advantage** from **lectures, tutorials and practicals.** Read the work that is going to be dealt with the next day before the time and **concentrate** in class.
 - **Work fast and effectively** by setting specific goals for yourself.
 - Utilise the **lecturers' availability.** Ask your lecturer to explain if you do not understand

something. He/she would gladly help you and this may save you hours' work.

- Formulate your questions around a specific aspect - vague questions will produce the wrong answers.

4.2.2 Tests and examination

- Maximise your marks.
- Write tests and exams in the correct manner.
 - **Make it easy for the person marking** your paper. You will be rewarded with marks.
 - Tackle the questions logically. First read the paper through briefly to get an overview of what is going to be asked. Answer those questions you find easier first in order to boost your confidence.
 - Describe in a few words what you want to do **before** you do it.
 - Write neatly and always **with a pen**.
 - Be consequent with the units you use in your calculations and write all units down in your calculations.

4.2.3 Study methods

- Maximise your **study efficacy**.
- Familiarise yourself with the **subject's goals**. Are you stuffing your head with facts, while the lecturer expects you to understand the technique?
- With most subjects you must **do as many problems as possible**. **You must learn how to analyse a problem and to divide it into smaller tasks**.
- **Some aspects of a subject are more important than others**. Find out which ones are more important and give more attention to those, without neglecting the rest.
- **Prepare for the next day's lectures by revising the previous lecture on each subject you will encounter the next day. If time allows, read the next day's work** even if you do not understand much of it.
- When you learn a new concept, be certain that you
 - **understand** it,
 - can **remember** it,
 - are able to interpret it in your **own words**,
 - **convert it symbolically** in terms of mathematical

- expressions or graphical representations,
 - know the **results** arising from this and be able to interpret it,
 - use it to **predict new results** by doing estimations or calculations of new problems you have not encountered before.
- **Prepare thoroughly for a tutorial or practical** by understanding all the work to date and by doing all assignments regarding the practical/tutorial completely. Spend about half of the previous evening's time on this subject.
 - Learn from your mistakes. **Ensure that you know why you lost points when a test paper is handed back.**
 - **Use the study guides** that are handed out by lecturers at the beginning of a module. The knowledge and skills expected of you in the module are stipulated clearly in the study guide.

4.3 When you struggle...

- **Ask questions in class** if you do not understand something.
- **Speak** to your lecturers, the Dean, the Faculty Officer responsible for student support, your Departmental Chairperson, or people at the Centre for Student Counselling and Development (CSCD) **without delay** if you experience any problems.

4.4 Do your own work

- Any item that a student has to **hand in for marking, and which can contribute towards the final mark**, must be his/her **own work**. No part thereof may have been done by another person.
- The only exception to the rule is when the particular **lecturer gives written instruction to the student(s) to work in groups.**

5. Tests and Examinations

5.1 Modules

There are four types of modules:

- **Attendance modules:** The particular lecturer must certify that the student has attended the classes satisfactorily and that all tasks and tests have been satisfactorily completed. **All prescribed attendance modules must be completed satisfactorily before the BEng degree can be awarded.**

Vacation work and Practical Workshop Training are examples of attendance modules.

- **Project modules:** In these modules only a single final mark is awarded which is determined on the grounds of the tasks done and handed in by the student. Examples are the **final-year thesis** and certain **design modules**.
- **Modules that are evaluated continuously:** The final mark is compiled from marks awarded for tests and tasks. No single evaluation may contribute more than 25% towards the final mark.
- **Examination modules:** In these modules the student must write an examination and must obtain a **final mark of at least 50** in order to pass the module. **A class mark of 40** must be obtained during the semester in order to gain admission to the examination. The class mark is compiled from marks the student received for tests and tasks.

5.2 Class tests

5.2.1 First year and second year

The Faculty introduced a test week to enable the lecturer to do additional evaluation of the student's work in order to award a **CLASS MARK at the end of the semester**. Test timetables are arranged by the Timetable Committee.

The Faculty Council determines a particular week for conducting class tests. During the test week there will be no lectures or practicals, except for students who have to attend lectures for modules at the Faculty of Science. Tests are conducted during the weeks before the April and September holidays. The following arrangements apply to tests in the first two years:

- **One class test per module is written during the test week.** The **first test week** is **compulsory for all students**.
- A **second, announced class test** (the so-called second opportunity) for each module is written in **specific weeks** later on in the semester. This is an **optional test** for students. It can be **utilised to ensure access to the examination, or merely to improve the class mark**. Students who cannot write the first test due to illness or some other acceptable reason, are eligible to write the second test. **Classes and practicals continue normally during these weeks when the second announced tests are written in the evenings.**

- Tests commence strictly according to the times indicated by the test timetable.
- To avoid clashes in venue, the duration of tests may not be more than 2,25 hours (135 minutes).
- Where more than one venue has been allocated to a subject (e.g. A203, A503B), the venues are filled up in their order of appearance on the timetable, that means A203 is filled firstly, then A503B, etc.
- **At the beginning of the semester the test timetable will appear on the Faculty's Web page at <http://www.firga.sun.ac.za/roosters.htm>.**
- **No other tests** besides the two above-mentioned tests **may be announced**.

5.2.2 Illness during the test week

The following arrangement applies to first- and second-year students who become ill during the test weeks:

- **No special tests are written.** Students who miss the test during the test week due to illness, can write the announced test that is written later in the semester.
- A **medical certificate**, on which a doctor must indicate that the student was not able to write the test due to a specific illness, must be submitted within 7 days after the test opportunity if the test was not written during the test week.
- Students who miss both test opportunities (even due to illness) cannot obtain a class mark, and therefore cannot write exam in the specific module.

5.2.3 Tests for third- and final-year students

Departments draw up their own policy regarding the testing of third- and final-year students. This will be set out in the module guides.

5.3 Examinations

5.3.1 General

For each examination module, two, and only two, examinations are written. A student must obtain a class mark of at least 40 to be admitted to the examination(s). Students have the choice to write the second examination only. However, students must bear in mind that if they write the second examination only, they **do not have the opportunity to write a re-examination**. If students choose to write the second examination only and something

prevents them from writing it, such as illness, they will then fail that module as there will be no further examination opportunities.

Students who obtain a final mark of 40 or 45 in the first examination, may also write the second examination of the module.

The first and second examinations for **first-semester modules** are written in **May and June**. The first and second examinations for **second-semester modules, as well as year modules**, are written in **November and December**.

When you report for an examination, that examination counts. You are not allowed to write an examination and then decide that you want to give up and not hand in your paper.

5.3.2 Examination tips

Ensure a good mark with a **positive disposition** and a **balanced work programme** that allow room for **enough sleep** and a **bit of relaxation**.

Study the following tips carefully. Who knows, maybe one will result in you obtaining that extra five percent that you need to pass or to get a distinction.

- **See that you are fresh. Do not study all night long** for an examination. Leave the stay awake tablets and other "aids" alone.
- **Get your strategy right.** What would you like to achieve with your examination? You must **convince the lecturer** marking your paper **that you know your work**. A good examination strategy is to **make it easy for the lecturer to mark your paper**.
- **Work neatly and write clearly** with a pen (and not a pencil).
- Explain now and again in a few words **what you are trying to do** when you are doing a long calculation or deduction.
- **Read the paper through before you start writing.** Then do the questions you are the most sure of first.
- **Do not be dishonest.** Several students' study careers came to an abrupt end, because they had "crib notes" with them. Their conviction led to them forfeiting their bursaries.

5.3.3 Oh dear!

If you do not turn up at an examination due to one or the other oversight, you have lost your chance to write the examination.

- **Make sure of your examination timetable.**
- **Work with safe time margins** - do not wait until the last minute before going to the examination venue.
- If you missed the first examination, you can write the second examination if you obtained admission to write the examination.

5.3.4 Pocket calculators

Consult your lecturer in order to ascertain which calculator you are allowed to use during the examination. A lecturer may decide that students may:

- not use any calculator,
- use the first-year calculator, or
- use the pocket calculator for senior students in tests and examinations.

5.3.5 Re-evaluation of a paper

A student who fails an examination, and who feels that his/her exam paper had not been marked correctly, can apply for re-evaluation of the paper. See the applicable section in Part 1 of the Calendar for the correct procedure to be followed in such a case. This is only applicable to modules not subjected to external examining.

5.3.6 Final marks

Results can be obtained from the **University's internet web page <http://www.mymaties.com>**. However, if you experience any problems with the web page, you can contact the University's administration at 083 123 7777 for telephonic results.

Final marks are displayed on the Faculty's notice boards as soon as they are available after completion of the re-evaluation examinations. The Dean's office and departmental offices do not supply ANY final marks over the telephone.

6. The SU Writing Laboratory

The Writing Laboratory, a unit in the Language Centre, provides a supportive environment to Stellenbosch University lecturers, students and staff who need to write. Here writing assignments can be discussed with trained consultants, stimulating writers to think strategically about the writing task and process and to find solutions to writing problems.

6.1 Services of the Writing Laboratory

- Consultations for students/staff in groups or on a one-on-one basis.
- Workshops and shorter courses.
- The development of aids on the web page of the Writing Centre.

6.2 Individual consultations

- Consultations are approximately an hour long.
- An appointment must be made at least one day before the time to ensure a consultant is available.
- Students can bring their writing or can even come to discuss their assignment before they start writing.
- Students are encouraged to come more than once.
- This service is **FREE!**

For more information please contact Ms Anne-Mari Lackay. You are also welcome to visit the website.

Telephone: 021 808 2989

E-mail: amlackay@sun.ac.za

Website: <http://www.sun.ac.za/taalsentrum>

7. The Engineering and Forestry Library

The Engineering and Forestry Library is one of five branch libraries of the US Library Service and is situated on the third floor of the Civil Engineering Building. All registered students and staff of Stellenbosch University are automatically members of all libraries of the Library Service. Students are encouraged to make use of this well-equipped library from their first year.

8. Where to look for information

The following shows where you can find more information on the University's policies.

Absence from classes:

Inform your lecturer in advance. Apply for leave at the Registrar. *Calendar Part 1.*

Answering of papers: Papers must be written in ink.

Appeals: A student who queries a test mark or a class mark, may approach his/her departmental Chairperson. In all cases a deadline of 7 calendar days after the announcement of the test or class mark applies. No representations will be considered after this deadline. *Calendar Part 11 (8.6.5).*

Black list: If you progress too slowly. *Calendar Part 1.*

Change in field of study: Send your application to the Faculty Secretary. *Calendar Part 11 (3.2).*

Class fees: Take note of the dates when class fees are payable. *Calendar Part 2.*

Code of conduct: For professional engineers. *Calendar Part 11 (1.2.3).*

Discipline and penalties: Become familiar with the University's rules and regulations for students. See what happens to you when you break these rules. *Calendar Part 1.*

Discussion of examination answer papers: Examination papers may be discussed after final marks have been handed in. Take note of the deadlines. *Calendar Part 1.*

Examination regulations: Ensure that you know the rules. *Calendar Part 1.*

Examination timetable: Ensure well in advance that there are no clashes between your subjects.

HEMIS credit: 1 HEMIS credit = One year's prescribed subject course passed. *Calendar Part 11 (8).*

Language used in tests and examinations: Test and examination papers are set in Afrikaans and English, and students are allowed to answer in any one of these languages.

Letters of reference: The Faculty does not issue letters of reference.

Marks: Class and Final: A class mark of at least 40 is required for admission to the examination. A final mark of 50 is required to pass a subject course. *Calendar Part 1.*

Merit bursaries: Students who perform well, automatically come into consideration for bursaries.

Motor vehicles: Motor vehicles and motor cycles must be registered. *Calendar Part 1.*

Papers: At the Faculty of Engineering the names of examiners must appear on test and examination papers. At least two examiners are responsible for class tests and examinations on each subject.

Practical Workshop Training: For students in Chemical, Industrial Mechanical and Mechatronic Engineering. *Calendar Part 11 (5.4).*

Prizes: Students who perform well, are rewarded with several prizes. *Calendar Part 11 (7).*

Professional engineer: Registration with ECSA. *Calendar Part 11 (1.3).*

Psychological services: The Centre for Student Counselling Development (CSCD) and offers a wide spectrum support services to students with stress, emotional or adaptation problems. *Calendar Part 1.*

Re-admission: Students who progress too slowly, are in danger of not being re-admitted. With good reasons (such as death in the family or serious illness) a student may be re-admitted. *Calendar Part 11 (8.2, 8.3).*

Recommendations for bursaries: A recommendation can be done confidentially by a lecturer. Consult the Departmental Chairperson or the Dean.

Re-evaluation of examination papers: A student may request the re-evaluation of an examination paper. Take note of the deadlines. *Calendar Part 1.*

Renewal of registration: Prerequisite subjects, maximum classes and timetable clashes. *Calendar Part 11 (8.2).*

Required modules: Pass, prerequisite and corequisite: Students must meet certain requirements before they are allowed to register for a particular course. *Calendar Part 1; Calendar Part 11 (5.2; 5.5).*

Student Health Services: There are doctors who can be consulted. Special arrangements can be made for needy students. *Calendar Part 1.*

Study methods: The Centre for Student Counselling and Development (CSCD) can give advice. *Calendar Part 1; this Guide section 4.*

Study records: A study record is sent to the parental home at the end of each semester. *Calendar Part 1.*

Syllabi: Our degree programmes. *Calendar Part 11 (3).*

Unsatisfactory work: Parents may be informed. *Calendar Part 1.*

Notes:



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