BEng (Hons) Electrical and Electronic Engineering – E430

1. Introduction

The field of Electrical & Electronic Engineering encompasses a very wide area of knowledge. Electrical engineers perform a range of duties from automating industry processes, designing computers and software, regulating a nation's electric power distribution, to developing embedded and control systems in spacecraft. Expertise in electrical engineering is also sought in not so conventional areas such as operations research, finance, banking and bio-medicine. The need for better performing and more efficient technology in all aspects of our life continues to provide the impetus to push the limits of electrical engineering. Electrical engineers are trained to be problem solvers. They make things work better, more efficiently, faster and at a lesser cost.

The challenge for an educational institution is to keep the knowledge imparted to students in the field relevant and adequate. The objective of this engineering course is to provide an up to date and a very good foundation in the various major disciplines of electrical engineering. The students are equipped with the theoretical, analytical, design and practical problem-solving aptitudes necessary towards engineering practice. Innovation, scientific rigour, ethical attitude and a sense of purpose for the benefit of society form the core values associated with the delivery of the programme.

The aim of the Department is to achieve academic excellence by providing education such that graduates can assume key roles in engineering practice and applied research in industry, in the private sector and in public service. The programme has been designed to meet the competency standards prescribed by engineering bodies forming part of the Washington Accord for recognition of qualifications and international mobility of engineers.

The first three years of the programme cover the fundamentals of electrical engineering. The final year allows the student to specialise in selected areas of Electrical and Electronic Engineering.

2. General Entry Requirements

As per General Entry Requirements for admission to the University for Undergraduate Degrees.

3. Programme Requirements

2 GCE 'A' Level Passes in Mathematics and Physics or equivalent.

4. Minimum Requirements for Degree Award

For the award of the BEng (Hons) Degree in Electrical and Electronic Engineering, the student must

1. obtain at least 142 credits including 137 credits from all the core modules prescribed by the department and at least 5 credits from the elective modules.
2. complete all core modules prescribed by the department.
3. complete Industrial training satisfactorily.
4. demonstrate satisfactory completion of each of the ten(10) Exit Level Outcomes (ELOs) as specified by the Engineering Council of South Africa (ECSA).

MODULES	CREDITS
Humanities & Management	14
Basic Sciences & Mathematics	15
Engineering	101
Degree Project	12
TOTAL	**142**

5. Minimum Requirements for Diploma Award

A student may opt for a Diploma in Electrical and Electronic Engineering provided s/he satisfies the following minimum requirements. The Diploma project would normally be of 8 weeks duration for an input of at least 90 hours.

MODULES	CREDITS
Humanities & Management	4
Basic Sciences & Mathematics	10
Engineering	45
Diploma Project (ELEC 2000(3))	6
TOTAL	**65**

Moreover, students who have a CPA of less than 45.0 at the end of level 2 will be required to repeat the entire academic year or exit with a Diploma in Electrical and Electronic Engineering provided the above conditions are met.

6. Programme Duration

	Normal	**Maximum**
Degree:	4 years	7 years

7. Credits per Year

Minimum 5, Maximum 53 subject to Section 6.

8. Pre-Requisite Modules (PR)

A student will be allowed to register for module **y** of which module **x** is a pre-requisite(PR) provided s/he has registered and passed module **x**.

9. Assessment

Assessment will be based on a written examination of 2 to 3-hour duration and/or on continuous assessment.

The continuous assessment will count for 10-40% of the overall percentage mark of the module(s), except for a module where the structure makes for other specific provision(s). Continuous assessment may be based on laboratory work, seminars and/or assignments and class tests.

A minimum of at least 30% should be attained in each of continuous assessment and written examination, with an overall total of 40% for a candidate to pass a module.

10. Repeat and Termination of Registration

If the CPA of a student is <40.0% for an academic year, s/he will have to repeat the entire academic year, and retake modules as and when offered. However, s/he will not be required, if s/he wishes, to retake the modules for which Grade C or above have been obtained.

Students will be allowed to repeat **a year** only once over the entire duration of the Programme of Studies.

Registration of a student will be terminated if

(i) the CPA < 40.0% at the end of an academic year and the student has already repeated one year of study; or
(ii) the maximum duration allowed for completion of the Programme of Studies has been exceeded.
(iii) s/he is a year 1 student who has scored a CPA of < 25% at the end of an academic year. However the Board of Examiners might allow a repeat if there is evidence of compelling circumstances or valid medical grounds.

11. List of Modules

CORE MODULES		Hrs/Wk L+P/T	Credits
BASIC SCIENCES & MATHEMATICS			
ELEC 1016Y(1)	Mathematics for Electrical Engineers 1	2+1	5
ELEC 1019Y(1)	Physics for Electrical Engineers	2+1	5
ELEC 2017Y(3)	Mathematics for Electrical Engineers 2	2+1	5
ENGINEERING			
ELEC 1011Y(1)	Electronics 1	2+1	5
ELEC 1013Y(1)	Electrical Engineering	2+1	5
ELEC 1015Y(1)	Measurement Systems	2+1	5
ELEC 1018Y(1)	Computational Techniques for Electrical Engineers	1.5+2	5
ELEC 1210	Laboratory Skills	6L + 48P	2
ELEC 2012Y(3)	Electronics 2	2+1	5
ELEC 2013Y(3)	Electromagnetics & Analog Communications	2+1	5
ELEC 2014Y(3)	Circuits, Signals and Systems	2+1	5
ELEC 2015Y(3)	Microprocessors and Microcontrollers	2+1	5
ELEC 2016Y(3)	Electrical Machines	2+1	5
ELEC 3011Y(5)	Power Systems 1	2+1	5
ELEC 3012Y(5)	Control Systems 1	2+1	5
ELEC 3013Y(5)	Power Electronics 1	2+1	5
ELEC 3014Y(5)	Digital Communications 1	2+1	5
ELEC 3015Y(5)	Digital Systems Design	2+1	5
ELEC 3016Y(5)	Engineering Design	1+2	4
ELEC 3200	Industrial Training	12 weeks	0
ELEC 4000Y(5)	Degree Project		12
ELEC 4041Y(5)	Power Systems 2	2+1	5
ELEC 4042Y(5)	Power Electronics 2	2+1	5
ELEC 4043Y(5)	Control Systems 2	2+1	5
ELEC 4044Y(5)	Renewable Energy Technologies and Management	2+1	5
HUMANITIES & MANAGEMENT			
ELEC 1020Y(1)	Engineering Communication 1	1+2	4
ELEC 2018(3)	Engineering Management 1	2+2	3
ELEC 3018Y(5)	Engineering Management 2	2+1	5
ENGG 4101(5)	Engineers in Society	2+0	2

ELECTIVES

ENGINEERING

ELEC 4051Y(5)	Data Communications and Networking	2+1	5
ELEC 4052Y(5)	Mobile Communications	2+1	5
ELEC 4053Y(5)	Digital Control	2+1	5
ELEC 4054Y(5)	Optoelectronics	2+1	5
ELEC 4055Y(5)	RF and Microwave Engineering	2+1	5
ELEC 4056Y(5)	Digital Signal Processing	2+1	5

NOTE 1: Engineering Electives
Students are required to take a minimum of **5 credits** from Year 4 elective modules in the engineering elective category.

NOTE 2:
For a student to clear the module ELEC 3200, s/he must achieve Grade S (Satisfactory) in the module.

NOTE 3: Core module for Diploma
ELEC 2000(3): Diploma Project (6 credits)

12. Programme Plan – BEng(Hons) Electrical and Electronic Engineering

LEVEL 1

Semester 1 & 2

Code	Module	Hrs/Wk L+P/T	Credits
CORE			
ELEC 1011Y(1)	Electronics 1	2+1	5
ELEC 1013Y(1)	Electrical Engineering	2+1	5
ELEC 1015Y(1)	Measurement Systems	2+1	5
ELEC 1016Y(1)	Mathematics for Electrical Engineers 1	2+1	5
ELEC 1018Y(1)	Computational Techniques for Electrical Engineers	1.5+2	5
ELEC 1019Y(1)	Physics for Electrical Engineers	2+1	5
ELEC 1210	Laboratory Skills	6L + 48P	2
ELEC 1020Y(1)	Engineering Communication 1	1+2	4

LEVEL 2

Semester 1 & 2

Code	Module	Hrs/Wk L+P/T	Credits
CORE			
ELEC 2012Y(3)	Electronics 2	2+1	5
ELEC 2013Y(3)	Electromagnetics & Analog Communications	2+1	5
ELEC 2014Y(3)	Circuits, Signals and Systems	2+1	5
ELEC 2015Y(3)	Microprocessors and Microcontrollers	2+1	5
ELEC 2016Y(3)	Electrical Machines	2+1	5
ELEC 2017Y(3)	Mathematics for Electrical Engineers 2	2+1	5
ELEC 2018(3)	Engineering Management 1	2+2	3

LEVEL 3

Semester 1 & 2

Code	Module	Hrs/Wk L+P/T	Credits
CORE			
ELEC 3011Y(5)	Power Systems 1	2+1	5
ELEC 3012Y(5)	Control Systems 1	2+1	5
ELEC 3013Y(5)	Power Electronics 1	2+1	5
ELEC 3014Y(5)	Digital Communications 1	2+1	5
ELEC 3015Y(5)	Digital Systems Design	2+1	5
ELEC 3016Y(5)	Engineering Design	1+2	4
ELEC 3200	Industrial Training	12 weeks	0
ELEC 3018Y(5)	Engineering Management 2	2+1	5

LEVEL 4

Semester 1 & 2

Code	Module	Hrs/Wk L+P/T	Credits
CORE			
ELEC 4000Y(5)	Degree Project		12
ELEC 4041Y(5)	Power Systems 2	2+1	5
ELEC 4042Y(5)	Power Electronics 2	2+1	5
ELEC 4043Y(5)	Control Systems 2	2+1	5
ELEC 4044Y(5)	Renewable Energy Technologies and Management	2+1	5
ENGG 4101(5)	Engineers in Society	2+0	2
ELECTIVES*			
ELEC 4051Y(5)	Data Communications and Networking	2+1	5
ELEC 4052Y(5)	Mobile Communications	2+1	5
ELEC 4053Y(5)	Digital Control	2+1	5
ELEC 4054Y(5)	Optoelectronics	2+1	5
ELEC 4055Y(5)	RF and Microwave Engineering	2+1	5
ELEC 4056Y(5)	Digital Signal Processing	2+1	5