

# ADVANCED DIPLOMA IN ELECTRICAL ENGINEERING

AdvDip (Electrical Engineering) - NQF Level 7 (120 credits)

**Qualification code: ADEE23**

SAQA ID: 117962, CHE NUMBER: H/H16/E209CAN

Campus where offered: Pretoria Campus

## REMARKS

*a. Admission requirement(s):*

A Diploma in Electrical Engineering, **or** a National Diploma: Engineering: Electrical from an accredited South African university. Preference will be given to an applicant with an average of 60%, or who is registered as a Professional Engineering Technician in Electrical Engineering or closely related field.

Holders of any other equivalent South African or international qualification may also be considered, see Chapter 1 of Students' Rules and Regulations.

*b. Selection criteria:*

Admission is subject to selection. All applications received by the published due date will be evaluated according to the marks obtained in the previous related qualification or according to the professional registration. The specific relevant documentation will be requested from applicants and each case will be handled on an individual basis.

Acceptance is subject to available capacity according to the Student Enrolment Plan (SEP). Applicants will be informed of their status per official letter from the Office of the Registrar, alternatively, they can check their application status on the TUT website, [www.tut.ac.za](http://www.tut.ac.za).

*c. Recognition of Prior Learning (RPL), equivalence and status:*

See Chapter 30 of Students' Rules and Regulations.

*d. Intake for the qualification:*

January only.

*e. Presentation:*

Block-mode classes offered in pre-determined blocks on Saturdays.

*f. Minimum duration:*

Two years.

*g. Exclusion and readmission:*

See Chapter 2 of Students' Rules and Regulations.

*h. Re-registration:*

A student may re-register for the module Industrial Project only with the permission of the Head of the Department. The purpose of the re-registration is to provide students with an opportunity to complete the final project only, and not to redo the whole module, should they fail the module.

## CURRICULUM

### FIRST YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
<b>FIRST SEMESTER</b>				
EGT117V	Engineering Management	(7)	(14)	



MAT117V Mathematics (7) (14)

TOTAL CREDITS FOR THE SEMESTER: 28

### SECOND SEMESTER

CNS117V Control Systems (7) (14)

EFW117V Electromagnetic Fields and Waves (7) (7)

MMF117V Man-Machine Interface (7) (7)

TOTAL CREDITS FOR THE SEMESTER: 28

TOTAL CREDITS FOR THE FIRST YEAR: 56

### SECOND YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
IEE107V	Industrial Project <i>(after completing at least 42 credits in the first year)</i>	(7)	(28)	
IEE117R	Industrial Project (re-registration) <i>(first-semester module, see paragraph h)</i>	(7)	(0)	

### FIRST SEMESTER

EBS117V Embedded Systems (7) (14)

SPR117V Signal Processing (7) (14)

### SECOND SEMESTER

CVS117V Conversion Systems (7) (14)

#### plus one of the following electives:

CLE117V Clinical Engineering (7) (14)

EAP117V Electronic Applications (7) (14)

ECM117V Electronic Communication (7) (14)

IAU117V Industrial Automation (7) (14)

PAS117V Probability and Statistics (7) (14)

PWE117V Power Electronics (7) (14)

PWS117V Power Systems (7) (14)

SFD117V Software Design (7) (14)

TOTAL CREDITS FOR THE SECOND YEAR: 84

TOTAL CREDITS FOR THE QUALIFICATION: 140

### MODULE INFORMATION (OVERVIEW OF SYLLABUS)

#### C

#### CLINICAL ENGINEERING (CLE117V)

1 X 3-HOUR PAPER

*(Module custodian: Department of Electrical Engineering)*

Advanced transducers and sensors; Environmental hazards management; sterilization and systems; Applications of computers and computer networks in the medical field; Advanced measurement and analysis techniques; Modern imaging systems; Advanced therapeutic equipment; Clinical Engineering Project. (Total notional time: 140 hours)



**CONTROL SYSTEMS (CNS117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Basics of Control Systems; Classical Modelling methods (in the frequency domain and time domain); Classical System Analysis methods (time domain and frequency domain, Transient Response and Steady State Errors); Classical Stability analysis methods (Root Locus Techniques and Frequency Response); Classical Controller Design (Root Locus Techniques and Frequency Response); Modern Control Theory; Modelling in State Space; System Analysis in State Space; Controller and Observer Design in State Space Practical and Project (Design, model and simulate a state space controller for physical systems with the provided criteria and specifications). (Total notional time: 140 hours)

**CONVERSION SYSTEMS (CVS117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Three-Phase Transformers; Three-Phase Induction Machines; Three-Phase Synchronous Machines Design; Power Converters. Group Project and an Individual Project. (Total notional time: 140 hours)

**E****ELECTROMAGNETIC FIELDS AND WAVES (EFW117V)****1 X 2-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Introduction; Electric and Magnetic Fields; Transmission Lines, Wave Propagation; Project – electromagnetic systems. (Total notional time: 70 hours)

**ELECTRONIC APPLICATIONS (EAP117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Models for integrated-circuit active devices; BJT, MOS and BiCMOS integrated technology; Single and multiple-transistor amplifiers; Current mirrors, active loads and references; Output stages; Fully differential amplifiers and differential amplifiers with single ended outputs; Noise in integrated circuits; Non-linear analogue circuits. (Total notional time: 140 hours)

**ELECTRONIC COMMUNICATION (ECM117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Source and Channel Coding in Digital Communication; Error Detection and Correction in Digital communication; Multiplexing and Media Access Techniques in Wireless Communication; Mobile and Fixed IP Networks; Telecommunication Applications and Services. (Total notional time: 140 hours)

**ENGINEERING MANAGEMENT (EGT117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Engineering Contract And Law; Operations Management; Maintenance Management; Marketing And Diffusion Of Innovation; The Engineer, User Of Information And Communication Systems; Principles Of Project Management; Introduction to Accounting, Economics, Financial Management And Budgeting; Cost Estimating, Cost Engineering And Cost Management; Time Value Of Money And Project Selection; Business And Technology Strategy; Managing Technology And Innovation; The Overview Of Environmental Management And Sustainable Developmental Concepts For Management Practices. (Total notional time: 140 hours)

**EMBEDDED SYSTEMS (EBS117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

16 bit Micro controllers; Digital Communication Protocol's and standards; Wireless communication; Serial-Interface electrical standard; Peripherals. (Total notional time: 140 hours)

**I****INDUSTRIAL AUTOMATION (IAU117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Data Communication; Networking; Networks in Automated Systems; Fieldbuses in Automated Systems; Wireless Fieldbuses in Industrial Automation; Intrinsically Safe Fieldbus Systems; Commissioning and Installation Practices on Automated Fieldbus Systems. (Total notional time: 140 hours)



**INDUSTRIAL PROJECT (IEE107V, IEE117R)****PROJECT ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

The module covers the fundamentals of project management, planning and control techniques. Students will acquire the competency and knowledge needed to calculate and process all project management planning and control. The module is an introduction to project management that covers standards and project processes, feasibility study, execution, monitor and control, communications and the managing of small projects. The module also includes a project aiming to solve a real world industrial problem by the design, test and implementation of the project. (Total notional time: 280 hours)

**M****MAN-MACHINE INTERFACE (MMF117V)****1 X 2-HOUR PAPER**

*(Module custodian: Department of Electrical Engineering)*

Introduction; Arduino Studio IDE; HTML, CSS, XML, Java-script; Analog and Digital interfacing; Digital control; Data representation; User interface design (UID). (Total notional time: 70 hours)

**MATHEMATICS (MAT117V)****1 X 3-HOUR PAPER**

*(Module custodian: Department of Mathematics and Statistics)*

Bridging mathematics; Matrix analysis; Z transforms; Fourier analysis; Second-order partial differential equations. (Total notional time: 140 hours)

**P****POWER ELECTRONICS (PWE117V)****1 X 3-HOUR PAPER**

*(Module custodian: Department of Electrical Engineering)*

Review of Power Semiconductor devices; Review of Electronic circuits used in Power Electronics control circuits; Gate drive and snubber circuits; Single-phase controlled rectifier design; DC converter design; Single-phase inverter design. (Total notional time: 140 hours)

**POWER SYSTEMS (PWS117A)****1 X 3-HOUR PAPER**

*(Module custodian: Department of Electrical Engineering)*

Transmission line parameters; Transmission lines: Steady State; Power Flows; Transient Stability; Power System Control. (Total notional time: 140 hours)

**PROBABILITY AND STATISTICS (PAS117V)****1 X 3-HOUR PAPER**

*(Module custodian: Department of Electrical Engineering)*

Data Handling; Combinatorics; Probability and Probability Models; Normal Distribution and Sampling; Statistical Inference. (Total notional time: 140 hours)

**S****SIGNAL PROCESSING (SPR117V)****1 X 3-HOUR PAPER**

*(Module custodian: Department of Electrical Engineering)*

Introduction to signals and systems; Time-domain analysis of continuous-time systems; Signal representation by Fourier series; Continuous-time system analysis using Fourier transform; Continuous-time system analysis using Laplace transform; Frequency response and analogue filters; Project. (Total notional time: 140 hours)

**SOFTWARE DESIGN (SFD117V)****1 X 3-HOUR PAPER**

*(Module custodian: Department of Electrical Engineering)*

Variables and I/O; Loops (for / while); Program Flow (if - else); Functions; Structures; Pointers; GUI's; Dynamic Data Types; Classes and Objects; Networking. (Total notional time: 140 hours)

