

# MSc (ELECTRONIC AND ELECTRICAL SYSTEMS)

Qualification code: PGEE04

Campus where offered:

Pretoria Campus

## REMARKS

- a. *Admission requirement(s):*  
This qualification is offered in partnership with the ESIEE (France) and is managed by F'SATI at the Tshwane University of Technology. The degree is conferred by the ESIEE (France). The rules of the ESIEE thus apply to this qualification.
- b. *Recommended subject(s):*  
Software Engineering IV and at least two specialisation subjects.
- c. *Selection criteria:*  
Prospective students may be requested to pass an admission test. Acceptance is subject to available capacity according to the Student Enrolment Plan (SEP) as well as supervisory capacity. 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).
- d. *Recognition of Prior Learning (RPL), equivalence and status:*  
See Chapter 30 of Students' Rules and Regulations.
- e. *Intake for the qualification:*  
January and July.
- f. *Presentation:*  
Block-mode classes. Students are required to accumulate 90 ECTS (European Credit Transfer System) credits.  
  
The programme may be completed in one of four possible specialisations at TUT: Control and Image Processing, Energy Efficiency, Power Engineering or Telecommunication Technology. The MSc programme is accredited by the Conférence des Grandes Écoles (CGE), a French national institution responsible for the accreditation of MSc programmes in France.
- g. *Minimum duration:*  
Two years.

## CURRICULUM

### ATTENDANCE

CODE	MODULE	ECTS CREDIT
ESI5001	Digital Communication V	(6)
ESI5002	Digital Electronics V	(6)
ESI5003	Digital Control V	(6)
ESI5004	Embedded Systems V	(6)
ESI5005	High-Frequency Systems V	(6)
ESI5006	Management V	(6)
ESI5007	French Language Skills	(3)
ESI5008	Telecommunication Networks V	(6)
ESI5009	RF Design V	(6)
ESI5010	Advanced Control Systems V	(6)
ESI5011	Advanced Embedded Systems V	(6)
ESI5012	Image Analysis V	(6)
ESI5013	Machine Intelligence V	(7)
ESI5014	Real-Time Signal Processing V	(7)
ESI5021	Signal Theory V	(6)



ESI5022	Software Engineering V	(6)
ESI5023	Special Topics I	(6)
ESI5024	Special Topics II	(6)
ESI5025	Special Topics III	(6)
ESI5026	Scientific Computing V	(6)
ESI5027	Conversion Systems V	(7)

## MODULE INFORMATION (OVERVIEW OF SYLLABUS)

The syllabus content is subject to change to accommodate industry changes. Please note that a more detailed syllabus is available at the Department or in the study guide that is applicable to a particular module. At time of publication, the syllabus content was defined as follows:

### A

#### **ADVANCED CONTROL SYSTEMS V (ESI5010) CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

A selection of advanced control system topics, such as fuzzy control, optimal and multivariable control, robust and non-linear control. (Total tuition time: ± 90 hours)

#### **ADVANCED EMBEDDED SYSTEMS V (ESI5011) CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

A selection of advanced embedded system topics, such as multi and co-processor design, real-time and high-speed design. (Total tuition time: ± 90 hours)

### C

#### **CONVERSION SYSTEMS V (ESI5027) 1 X 3-HOUR PAPER**

*(Module custodian: Department of Electrical Engineering)*

Converter theory, electromechanical systems, electric materials, EM field calculation, distribution (non-linear and transient problems, numerical methods, applications), transmission, planning and design. (Total tuition time: ± 90 hours)

### D

#### **DIGITAL COMMUNICATION V (ESI5001) CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

Fourier analysis and filtering, probability and stochastic processes, information theory and entropy, advanced modulation techniques, block and convolutional coding, performance analysis, networking fundamentals, and system modelling. (Total tuition time: ± 90 hours)

#### **DIGITAL CONTROL V (ESI5003) CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

System modelling, discrete-time analysis and digital controller design. (Total tuition time: ± 90 hours)

#### **DIGITAL ELECTRONICS V (ESI5002) CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

Analysis of advanced digital electronic circuits, best practice design and prototyping principles. (Total tuition time: ± 90 hours)

### E

#### **EMBEDDED SYSTEMS V (EDD501T, ESI5004) CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

VHDL and FPGA design and real-time DSP implementation. (Total tuition time: ± 90 hours)



**F****FRENCH LANGUAGE SKILLS (ESI5007)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Conversational French for beginners. (Total tuition time: ± 80 hours)

**H****HIGH-FREQUENCY SYSTEMS V (ESI5005)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

HF system fundamentals and analysis, measurement principles and propagation models. (Total tuition time: ± 90 hours)

**I****IMAGE ANALYSIS V (ESI5012)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Image formation, frequency domain analysis, neighbourhood processing, texture, segmentation, shape, feature extraction, transformation and classification. (Total tuition time: ± 90 hours)

**M****MACHINE INTELLIGENCE V (ESI5013)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Supervised learning (Bayesian classification, linear classifiers, non-linear classifiers, including neural networks and support vector machines), unsupervised learning and special topics, such as genetic algorithms and swarms and ants optimisation. (Total tuition time: ± 90 hours)

**MANAGEMENT V (ESI5006)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Project management, marketing, business strategies, financial planning, new product development and engineering research methodology. (Total tuition time: ± 90 hours)

**R****REAL-TIME SIGNAL PROCESSING V (ESI5014)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Advanced signal processing concepts (adaptive filtering, multirate processing and wavelets, filter banks etc.) with the emphasis on real-time DSP implementation. (Total tuition time: ± 90 hours)

**RF DESIGN V (ESI5009)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

RF component design principles and analysis. (Total tuition time: ± 90 hours)

**S****SCIENTIFIC COMPUTING V (ESI5026)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Scientific computing fundamentals, simulation, C++, Matlab, Simulink and Scilab. (Total tuition time: not available)

**SIGNAL THEORY V (ESI5021)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Signal spaces, mappings, deterministic signal theory and stochastic signal theory. (Total tuition time: ± 90 hours)

**SOFTWARE ENGINEERING V (ESI5022)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Software engineering fundamentals, UML design principles and operating system basics. (Total tuition time: ± 90 hours)



**SPECIAL TOPICS I (ESI5023)**  
**SPECIAL TOPICS II (ESI5024)**  
**SPECIAL TOPICS III (ESI5025)**

*(Module custodian: Department of Electrical Engineering)*

Special topics based on a selection of seminal research papers from a chosen field. (Total tuition time: ± 90 hours)

**CONTINUOUS ASSESSMENT**  
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**T**

**TELECOMMUNICATION NETWORKS V (ESI5008)**

*(Module custodian: Department of Electrical Engineering)*

Fixed networks, mobile networks, RF and optical networks. (Total tuition time: ± 90 hours)

**CONTINUOUS ASSESSMENT**

