POSTGRADUATE DIPLOMA IN COMPUTER SYSTEMS ENGINEERING

PGDip (Computer Systems Engineering) - NQF Level 8 (120 credits)

Qualification code: PDYE21

SAQA ID: 111238, CHE NUMBER: H/H16/E156CAN

Campus where offered: Soshanguve South Campus

REMARKS

a. *Admission requirement(s):*
An Advanced Diploma in Computer Systems Engineering or Electronics, **or** a relevant Baccalaureus Technologiae: Computer Systems or Electronics or Information Technology in the field of Intelligent Industrial Systems, **or** a relevant bachelor's degree, **or** an equivalent qualification at NQF Level 7 with a minimum of 120 credits. Preference will be given to candidates who obtained an average of 60% in the previous qualification.

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. Candidates are evaluated based on the previous qualification obtained and/or work experience.

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.

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:*
Day classes offered on Saturdays over a period of two years.

f. *Duration:*
A minimum of one or two years (depending on the programme offering).

g. *Exclusion and readmission:*
See Chapter 2 of Students' Rules and Regulations.

h. *Re-registration:*
A student may re-register for the module Industrial Research 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 project only, and not to redo it, should they fail the module.

i. *Personal equipment:*
Access to a laptop or desktop computer is essential to participate in multimodal learning experiences as well as to complete assignments and projects. NSFAS students receive an allowance to acquire a laptop, and using this allowance for this purpose is critical for academic success. Students are encouraged to consult the faculty website where the minimum requirements for specific programmes are published.

CURRICULUM

ATTENDANCE (FIRST OR SECOND YEAR)
Modules are offered as determined by the Head of the Department.

CODE	MODULE	NQF-L	CREDIT
IDD108G	Industrial Research Project	(8)	(30)
IDD118R	Industrial Research Project (re-registration) (first-semester module, see Paragraph h)	(8)	(0)
FIRST SEMESTER			
ESD118G	Advanced Embedded Systems Design	(8)	(15)
DSR118G	Advanced Digital Signal Processing	(8)	(15)
SECOND SEMESTER			
AIS118G	Advanced Artificial Intelligent Systems	(8)	(15)
	plus any three of the following modules (a student may only choose a maximum of two modules per semester):		
First semester			
CAO118G	Advanced Computer Architecture and Organisation	(8)	(15)
IES118G	Advanced Intelligent Electro-Mechanical Systems	(8)	(15)
IIS118G	Advanced Intelligent Industrial Systems	(8)	(15)
Second semester			
CES118G	Advanced Computer Emerging Technologies	(8)	(15)
CNE118G	Advanced Computer Networks	(8)	(15)
TOTAL CREDITS FOR THE QUALIFICATION:			**120**

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 ARTIFICIAL INTELLIGENT SYSTEMS (AIS118G) **1 X 3-HOUR PAPER**
(Module custodian: Department of Computer Systems Engineering)
This module covers applied supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks), applied unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning), and applied best practices in machine learning (bias/variance theory; innovation process in machine learning and AI). The student will be able to design supervised, unsupervised, and deep learning systems to solve diverse engineering problems. (Total notional time: 150 hours)

ADVANCED COMPUTER ARCHITECTURE AND ORGANISATION (CAO118G) **1 X 3-HOUR PAPER**

(Module custodian: Department of Computer Systems Engineering)

This elective module aims to provide an understanding of modern computer system architecture, computer subsystem hardware design, CPU control unit design, memory organisation, cache design, virtual memory, and algorithms. After successful completion of this module, the student must be able to design a prototype that consist of hardware and compiled algorithms. (Total notional time: 150 hours)

ADVANCED COMPUTER EMERGING TECHNOLOGIES (CES118G) **1 X 3-HOUR PAPER**

(Module custodian: Department of Computer Systems Engineering)

This elective module will explore current breakthrough technologies and disruptive innovations that have emerged over the past few years and the new inventions that have yet to emerge as viable technologies in the field of Computer Systems Engineering. After successful completion of this module, the student must be able to have an understanding of computer engineering trends in a global context. (Total notional time: 150 hours)

ADVANCED COMPUTER NETWORKS (CNE118G) **1 X 3-HOUR PAPER**

(Module custodian: Department of Computer Systems Engineering)

This elective module covers the theory and simulation of network nodes and network security. The mathematics of computer networks is implemented by using tools such as Python, GNS, Cisco VIRL and NS3. After successful completion of this module, the student must be able to design and simulate complex networks using modern and advanced network simulators. (Total notional time: 150 hours)

ADVANCED DIGITAL SIGNAL PROCESSING (DSR118G) **1 X 3-HOUR PAPER**

(Module custodian: Department of Computer Systems Engineering)

This module covers digital signal processing systems, time-domain signal processing, filter theory, frequency-domain transforms and processing, and various filters such as Kalman Filter, Gaussian filter. After successful completion of this module, the student must be able to apply the knowledge of module to a real industrial problems such as image processing, sound, computer vision, etc. (Total notional time: 150 hours)

ADVANCED EMBEDDED SYSTEMS DESIGN (ESD118G) **1 X 3-HOUR PAPER**

(Module custodian: Department of Computer Systems Engineering)

This module covers in-depth of recent and industry-inclined intelligent devices (microcontroller). The student will be able to use the most recent intelligent devices to solve real industrial problems. (Total notional time: 150 hours)

ADVANCED INTELLIGENT ELECTRO-MECHANICAL SYSTEMS (IES118G) **1 X 3-HOUR PAPER**

(Module custodian: Department of Computer Systems Engineering)

This elective module covers the Advanced Computer-based Instrumentation systems, Advanced Computer-Integrated Manufacturing Systems with PLC, Advanced Magnetic Circuits and Transformers, Design of Motors, Advanced DC Machines, Advanced AC Machines, Advanced Mechanical Systems and Intermediate Power Electronic Devices. After successful completion of this module, the student must be able to design a prototype that will consist of intelligent devices, electro-mechanical and API. (Total notional time: 150 hours)

ADVANCED INTELLIGENT INDUSTRIAL SYSTEMS (IIS118G) **1 X 3-HOUR PAPER**

(Module custodian: Department of Computer Systems Engineering)

This elective module covers Implementation of behaviour-based robotics, Mobile robot localisation, Mobile robot map building, Mobile robot SLAM and Implementation and applications using industry standard software/hardware. After successful completion of this module, the student must be able to design a complete mobile robot with a defined application. (Total notional time: 150 hours)

I

INDUSTRIAL RESEARCH PROJECT (IDD108G, IDD118R) **PROJECT ASSESSMENT**

(Module custodian: Department of Computer Systems Engineering)

This module is concerned with identifying a particular existing problem, researching the proposed solutions and solving it through the development and implementation of a novel software and hardware solution. The student will be expected to utilise knowledge from the various years of study, including project time management, system development and design lifecycle, circuit analysis and the use of modern tools available in hardware and software engineers. (Total notional time: 300 hours)