

# DIPLOMA IN COMPUTER SCIENCE (Extended curriculum programme with foundation provision)

Dip (Computer Science) - NQF Level 6 (360 credits)

Qualification code: DPRSF0

SAQA ID: 109017, CHE NUMBER: H/H16/E089CAN

Campus where offered: Soshanguve South, eMalahleni and Polokwane Campuses

## REMARKS

a. *Admission requirement(s) and selection criteria:*

Please take note that all completed applications received within the published due dates will be ranked. After consideration of the Departmental Student Enrolment Plan, only the top ranking applicants will be selected. Once a programme is full, a waiting list will be in place to provide an opportunity for applicants to fill places of those who did not register on time. 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).

• **FOR APPLICANTS WITH A SENIOR CERTIFICATE OBTAINED BEFORE 2008:**

**Admission requirement(s):**

A Senior Certificate or an equivalent qualification with an E symbol at Higher Grade or a D symbol at Standard Grade for English and Mathematics.

**Recommended subjects:**

Computer Science and Physical Science.

**Selection criteria:**

Swedish formula.

SYMBOL	HG VALUE	SG VALUE
A	5	4
B	4	3
C	3	2
D	2	1
E	1	

Applicants who score 9 or more points according to the formula for academic merit will be invited for an interview or a risk profile test.

Applicants will be notified to make an appointment with the departmental secretary for the interview or test. This rule applies to all applicants, as well as to applicants who are already registered at other institutions.

• **FOR APPLICANTS WITH A NATIONAL SENIOR CERTIFICATE OBTAINED IN OR AFTER 2008:**

**Admission requirement(s):**

A National Senior Certificate with a bachelor's degree or a diploma endorsement, or an equivalent qualification, with an achievement level of at least 3 for English (home language or first additional language) and 4 for Mathematics or Technical Mathematics or 6 for Mathematical Literacy.

**Recommended subjects:**

Information Technology.



**Selection criteria:**

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **23** (with Mathematics or Technical Mathematics) or **25** (with Mathematical Literacy). Life Orientation is excluded for APS calculation.

**Assessment procedure(s):**

Applicants who achieve the minimum APS of **23** will be considered. Applicants with a score of **21** (with Mathematics or Technical Mathematics) or **24** (with Mathematical Literacy) will be added to a waiting list.

- **FOR APPLICANTS WITH A NATIONAL CERTIFICATE (VOCATIONAL) AT NQF LEVEL 4:**

**Admission requirement(s):**

A National Certificate (Vocational) at NQF Level 4 with a bachelor's degree or a diploma endorsement, with at least 40% (APS of 3) for English (home language or first additional language) and 50% for Mathematics (APS of 4) or 70% for Mathematical Literacy (APS of 6) and 50% for Life Orientation (excluded for APS calculation) and 50% (APS of 4) for any other three compulsory vocational subjects.

**Selection criteria:**

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **23** (with Mathematics) or **25** (with Mathematical Literacy). Life Orientation is excluded for APS calculation.

**Assessment procedure(s):**

Applicants who achieve the minimum APS of **23** will be considered. Applicants with a score of **21** (with Mathematics) or **24** (with Mathematical Literacy) will be added to a waiting list.

- **FOR APPLICANTS WITH A NATIONAL N CERTIFICATE AS PUBLISHED IN NATED 191: (NQF LEVEL 4):**

**Admission requirement(s):**

A National Senior Certificate and a National N Certificate as published in Nated 191: N3 (NQF Level 4) issued by both the Department of Higher Education (DHET) and the Council for Quality Assurance in General and Further Education and Training (Umalusi), with at least 50% for English (APS of 4) and 60% for Mathematics N3 (APS of 5).

- b. *Recognition of Prior Learning (RPL), equivalence and status:*  
See Chapter 30 of Students' Rules and Regulations.
- c. *Intake for the qualification:*  
January only.
- d. *Presentation:*  
Day classes. Classes and assessments take place during the week and on Saturdays. Online classes are also offered in some instances, but assessments are on campus.
- e. *Minimum duration:*  
Four years.
- f. *Exclusion and readmission:*  
See Chapter 2 of Students' Rules and Regulations.
- g. *Work-Integrated Learning:*  
See Chapter 5 of Students' Rules and Regulations.



*h. 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

### FIRST YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
CAPF05X	Communication for Academic Purposes	(5)	(10)	
CFAF05D	Computing Fundamentals A	(5)	(15)	
COHF05D	Computational Mathematics	(5)	(15)	
INFF25D	Information Literacy (block module)	(5)	(3)	
LFSF25X	Life Skills (block module)	(5)	(2)	
PPAF05D	Principles of Programming A	(5)	(15)	
TOTAL CREDITS FOR THE FIRST YEAR:			<b>60</b>	

### SECOND YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
<b>FIRST SEMESTER</b>				
CFBF15D	Computing Fundamentals B	(5)	(15)	Computing Fundamentals A
WEBF15D	Web Computing	(5)	(15)	Principles of Programming A
TOTAL CREDITS FOR THE SEMESTER:			30	
<b>SECOND SEMESTER</b>				
DCTF15D	Discrete Structures	(5)	(15)	Computational Mathematics
PPBF15D	Principles of Programming B	(5)	(15)	Principles of Programming A
TOTAL CREDITS FOR THE SEMESTER:			30	
TOTAL CREDITS FOR THE SECOND YEAR:			<b>60</b>	

### THIRD YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
<b>FIRST SEMESTER</b>				
ADS216D	Advanced Discrete Structures	(6)	(15)	Discrete Structures
CAO216D	Computer Architecture and Organisation	(6)	(15)	
DTP216D	Database Principles	(6)	(15)	
OOP216D	Object-Oriented Programming	(6)	(15)	Principles of Programming B
TOTAL CREDITS FOR THE SEMESTER:			60	



## SECOND SEMESTER

AOP216D	Advanced Object-Oriented Programming	(6)	(15)	Object-Oriented Programming
ISC216D	Information Security	(6)	(15)	
ORS216D	Operating Systems	(6)	(15)	
SEF216D	Software Engineering Fundamentals	(6)	(15)	
TOTAL CREDITS FOR THE SEMESTER:			60	
TOTAL CREDITS FOR THE THIRD YEAR:			<b>120</b>	

## FOURTH YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
<b>FIRST SEMESTER</b>				
INT316D	Internet Programming	(6)	(15)	Advanced Object-Orientated Programming
MOB316D	Mobile Computing	(6)	(15)	Advanced Object-Orientated Programming
SWP316D	Software Project	(6)	(15)	Advanced Object-Orientated Programming
<b>plus one of the following electives:</b>				
DBP316D	Database Programming	(6)	(15)	Database Principles
DIS316D	Distributed Systems (module not currently offered)	(6)	(15)	
WEM316D	Web Server Management (module not currently offered)	(6)	(15)	
TOTAL CREDITS FOR THE SEMESTER:			60	
<b>SECOND SEMESTER</b>				
WOC316D	Work-Integrated Learning	(6)	(60)	Internet Programming Mobile Computing Software Project Database Programming <b>or</b> Distributed Systems <b>or</b> Web Server Management
TOTAL CREDITS FOR THE SEMESTER:			60	
TOTAL CREDITS FOR THE FOURTH YEAR:			<b>120</b>	
TOTAL CREDITS FOR THE QUALIFICATION:			<b>360</b>	



## 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 DISCRETE STRUCTURES (ADS216D) 1 X 3-HOUR PAPER** *(Module custodian: Department of Computer Science)*

This module is meant to help students develop their mathematical foundations necessary for more specialised modules in Computer Science, including data structures, algorithms, graphs and trees, and discrete probability. After completion of this module, students will have learnt the mathematical expertise required for an in-depth study of the science and technology of the computer age. (Total notional time: 150 hours)

#### **ADVANCED OBJECT-ORIENTED PROGRAMMING (AOP216D) 1 X 4-HOUR COMPUTER-BASED** *(Module custodian: Department of Computer Science)*

This Advanced Object-oriented Programming module covers advanced concepts of object-orientated programming using the Java language. The module builds upon the knowledge and skills obtained in the "Object-oriented Programming" module offered in the first semester of the second year. The focus of this module is to introduce students to advanced object oriented programming concepts in Java such as data structures (lists and queues), multithreading, database connectivity and client-server applications. The student will be able to apply his/her knowledge of these advanced programming concepts to the problems arising in the software industry. (Total notional time: 150 hours)

### C

#### **COMMUNICATION FOR ACADEMIC PURPOSES (CAPF05X) 1 X 3-HOUR PAPER** *(Module custodian: ICT First Years' and Foundation Unit)*

This module applies a variety of listening and note taking skills for academic and professional purposes, different reading strategies appropriate to the purpose for reading in both an academic and professional environment, composes a selection of written texts related to a specific field of study. Plan, draft, revise and edit written work for clarity, coherence, style and appropriateness. (Total notional time: 100 hours)

#### **COMPUTATIONAL MATHEMATICS (COHF05D) 1 X 3-HOUR PAPER** *(Module custodian: Department of Computer Science)*

The focus of this module is to teach students mathematical reasoning which will be necessary to solve complex programming problems in other modules. The theoretical knowledge obtained from this module is expected to develop students to solve real world computer systems challenges by applying logic from a mathematical perspective relating to computer applications. (Total notional time: 150 hours)

#### **COMPUTER ARCHITECTURE AND ORGANISATION (CAO216D) 1 X 3-HOUR COMPUTER-BASED** *(Module custodian: Department of Computer Systems Engineering)*

The focus of this module is to introduce students to microcontroller principles and their applications. The module covers the design, development, and construction of microcontroller applications. After completion, the student must be able to design circuitry and develop software to complete a functioning microcontroller application. (Total notional time: 150 hours)

#### **COMPUTING FUNDAMENTALS A (CFAF05D) 1 X 3-HOUR PAPER** *(Module custodian: End User Computing Unit)*

This module provides the fundamentals of computers; Key applications; Evolution of computer networks and the Internet. The purpose of this module is to identify legal, ethical and security issues related to information technology. (Total notional time: 150 hours)



**COMPUTING FUNDAMENTALS B (CFBF15D)****1 X 3-HOUR PAPER****(Module custodians: End User Computing Unit and Department of Information Technology)**

This module provides the foundation for the design and implementation of computer programming solutions on different platforms. The focus of this module is to lay the foundation for the design and implementation of computer programming solutions on different platforms, including the web and mobile devices. The student will be able to apply his/her knowledge of concepts and principles relating to information systems, databases, systems analysis, system's requirements, and IT project management. (Total notional time: 150 hours)

**D****DATABASE PRINCIPLES (DTP216D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

The focus of this module is to lay the foundation for the design and implementation of database programming solutions on different platforms, including the web and mobile devices. The student will be able to apply his/her knowledge of database concepts such as data insertion and data selection (data retrieval), database normalisation to solve database related problems arising in the software industry. (Total notional time: 150 hours)

**DATABASE PROGRAMMING (DBP316D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

This module is aimed at preparing students to design and implement databases on different platforms using PL/SQL programming techniques in order to provide solution to a range of business problems in the IT industry. The module builds upon theoretical knowledge and skills obtained in "Database Systems" module offered in second year, first semester. The student will be able to apply his/her knowledge of design and implementation of database programming solutions based on PL/SQL programming techniques. (Total notional time: 150 hours)

**DISCRETE STRUCTURES (DCTF15D)****1 X 3-HOUR PAPER****(Module custodian: Department of Computer Science)**

The focus of this module is to teach students notations used in Discrete Structures related to Computer Science. The module will teach the rudiments of elementary mathematical reasoning which will be necessary to solve complex programming problems in later courses. The student will be able to apply his/her knowledge of discrete structures principles, algorithms, number theory and cryptography to the problems arising in the software industry. (Total notional time: 150 hours)

**DISTRIBUTED SYSTEMS (DIS316D)****1 X 3-HOUR PAPER****(Module custodian: Department of Computer Science)**

This module prepares the student to apply the concepts and applications of any computer networks. The student will be able to apply his/her knowledge of basic network concepts such as LAN design, WAN design, troubleshooting, implement networks and network connectivity. The technical knowledge obtained in this module together with the communication skills and presentation skill will prepare the students for the work place. Graduates should have the ability to make effective presentations to a range of audiences about technical problems and their solutions. (Total notional time: 150 hours)

**I****INFORMATION LITERACY (INFF25D)****CONTINUOUS ASSESSMENT****(Module custodian: Directorate of Library and Information Services)**

Introduction of information literacy. Development of a search strategy and application of a search string to search engines and academic databases. Evaluation of information sources. Ethical and legal use of information. Organisation and management of information. (Total notional time: 20 hours)

**INFORMATION SECURITY (ISC216D)****1 X 3-HOUR PAPER****(Module custodian: Department of Information Technology)**

This module prepares the student to apply the concepts and applications of basic computer security. The module will contribute to knowledge of CIA (Confidentiality, Integrity, Availability), concepts of risk, threats, vulnerabilities, and attack vectors, authentication and authorisation, access control (mandatory vs. discretionary), concept of trust and trustworthiness, ethics (responsible disclosure), and skills such as fundamentals of authentication servers configuration, configuration of firewalls and basic security tools testing. The technical knowledge obtained in this module together with the communication skills and presentation skill will prepare the students for the work place. (Total notional time: 150 hours)



**INTERNET PROGRAMMING (INT316D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

This module prepares the student to apply programming and software engineering principles to provide solutions to a range of problems emanating from the IT industry. The focus of this module is to lay the foundation for the design and implementation of internet applications using JEE components for a web container. The student will be able to apply his/her knowledge of advanced programming concepts such as MVC design pattern, Servlets, Java Server Pages, Expression Language and Java Standard Tag Library (JSTL) to the problems arising in the software industry. (Total notional time: 150 hours)

**L****LIFE SKILLS (LFSF25X)****CONTINUOUS ASSESSMENT****(Module custodian: Directorate of Student Development and Support)**

Personal, socio-emotional and academic skills development for students in higher education. This module includes: 1. Intra- and interpersonal skills (e.g. emotional intelligence, relationships, and conflict management); 2. General study skills (e.g. time management, goal setting, learning styles); 3. Health and wellness (e.g. HIV/AIDS, GBV issues, substance abuse); 4. Student life and adjustment (e.g. identity development, adjusting to a higher education environment); and 5. Financial management. (Total notional time: 20 hours)

**M****MOBILE COMPUTING (MOB316D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

This module prepares the student to apply mobile computing principles to provide solutions to a range of problems emanating from the IT industry. The focus of this module is to lay the foundation for the design and implementation of mobile applications on Google Android Operating System. The student will be able to apply his/her knowledge of basic programming concepts such as Android development platform, Android user interface design and programming; Multi-threading in Android, Android storage techniques; and Location-Based Services and notifications to the problems arising in the software industry. (Total notional time: 150 hours)

**O****OBJECT-ORIENTED PROGRAMMING (OOP216D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

This Object-oriented Programming module covers intermediate concepts of object-orientated programming using the Java language. The module builds upon the knowledge and skills obtained in the "Principles of Programming B" module offered in the second semester of the first year. Furthermore, it introduces students to intermediate object oriented programming concepts in Java such as arrays of objects, inheritance, polymorphism, exception handling, files and graphical user interface components. The student will be able to apply his/her knowledge of these advanced programming concepts to the problems arising in the software industry. (Total notional time: 150 hours)

**OPERATING SYSTEMS (ORS216D)****1 X 3-HOUR PAPER****(Module custodian: Department of Computer Systems Engineering)**

This module prepares the student to apply operating systems principles to a range of problems emanating from the IT industry. The focus of this module is to introduce students to operating systems principles and their applications. The module covers process management, inter-process communication and synchronisation, memory management, virtual memory, file system management, device management and security. After successful completion of this module, the student must be able to demonstrate a sound knowledge of operating systems aiding them in developing operating systems specific applications and even operating systems themselves. (Total notional time: 150 hours)

**P****PRINCIPLES OF PROGRAMMING A (PPAF05D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

The focus of this module is to introduce students to the basic object oriented programming (OOP) concepts in VB.NET such as the importance of OOP in the software industry, identification of objects from problem statements, relationship between objects and classes, usage of predefined classes in programs, arithmetic operators, data types and their conversion. (Total notional time: 150 hours)



**PRINCIPLES OF PROGRAMMING B (PPBF15D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

This module introduces students to intermediate object oriented programming concepts in VB.NET such as selection control structures, iteration control structures; and manipulation of strings, characters and primitive arrays. (Total notional time: 150 hours)

**S****SOFTWARE ENGINEERING FUNDAMENTALS (SEF216D)****1 X 3-HOUR PAPER****(Module custodian: Department of Computer Science)**

The purpose of the module is to prepare students to apply programming and software engineering principles to provide solutions to a range of problems emanating from the IT industry. The focus of this module is to teach students principles of software engineering with regard to systems analysis, design of software solutions within the context of industry-based problems. Upon completion of this module, a student will be able to develop fault-free software that satisfies user requirements, delivered on time and within budget. (Total notional time: 150 hours)

**SOFTWARE PROJECT (SWP316D)****PROJECT ASSESSMENT****(Module custodian: Department of Computer Science)**

This module presents students with the opportunity to apply and extend their practical knowledge acquired in other modules completed prior to this one by completing an industry-related Information Technology software project similar to projects found in a workplace environment. It will not only enable students to apply but also appreciate the usefulness of their skills and knowledge acquired thus far in this qualification. The final product of the project should be a three-tier system, with each tier residing/hosted in a separate machine. (Total notional time: 150 hours)

**W****WEB COMPUTING (WEBF15D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

This module prepares the student to apply programming and software engineering principles to provide solutions to a range of problems emanating from the IT industry. The focus of this module is to lay the foundation for the design and implementation of computer programming solutions on different platforms, including the web and mobile devices. The student will be able to apply his/her knowledge of basic programming concepts such as planning, designing, scripting and developing effective Web applications using client-side Web technologies to the problems arising in the software industry. (Total notional time: 150 hours)

**WEB SERVER MANAGEMENT (WEM316D)****1 X 4-HOUR COMPUTER-BASED****(Module custodian: Department of Computer Science)**

This module focuses on introducing students to the understanding of installation, administering, updating and securing a web server. This module combines the concepts of Web server management with plenty of opportunities for hands-on practice to apply the concepts. Each lecture will introduce a networking or Web server topic, discuss it in the context of either Windows and/or Linux, and then provide steps for each operating system. (Total notional time: 150 hours)

**WORK-INTEGRATED LEARNING (WOC316D)****WORK-INTEGRATED LEARNING****(Module custodian: Department of Computer Science)**

This module prepares the student to integrate the application of the concepts and principles learned through the theoretical learning of all the modules in the qualification. The student will be able to apply his/her knowledge of theory acquired in the qualification. Upon completion of the module, the student will be able to analyse and behave professionally in the working environment. (Total notional time: 600 hours)

