

# NATIONAL DIPLOMA: INFORMATION TECHNOLOGY: SOFTWARE DEVELOPMENT

(Extended curriculum programme with foundation provision)

Qualification code: NDISF1 - NQF Level 6

Campus where offered: Soshanguve South, eMalahleni and Polokwane campuses (day classes offered during the week and on Saturdays)

Last year of new intake: 2019

Teach-out (phase-out) date: 31 December 2024

Students registered for this qualification should complete their studies according to the teach-out date prescribed for the qualification, subject to the stipulations of Regulation 3.1.11 and 3.1.13 in the Students' Rules and Regulations.

Information on phased-out programmes can be obtained from the TUT website, [www.tut.ac.za](http://www.tut.ac.za).

## CURRICULUM

Consult the 2019 Faculty Prospectus for the full contents of the qualification.

**Please note that students will register for all first- and second-year subjects under qualification code NDITF1.**

### FIRST YEAR

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
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#### FIRST SEMESTER

FPALS01	Foundation Academic and Language Skills	(0,125)	
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FPITM01	Foundation ICT Mathematical Skills	(0,125)	
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TOTAL CREDITS FOR THE SEMESTER:		0,250	
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#### SECOND SEMESTER

FPIDS01	Foundation Information and Software Development Skills	(0,125)	
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FPPRS01	Foundation Presentation and Reporting Skills	(0,125)	
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TOTAL CREDITS FOR THE SEMESTER:		0,250	
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TOTAL CREDITS FOR THE FIRST YEAR:		<b>0,500</b>	
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### SECOND YEAR

After completion of all first-year subjects.

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
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#### FIRST SEMESTER

CFS10AT	Computing Fundamentals IA	(0,062)	
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CGS10AT	Computing Systems IA	(0,062)	
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CMK10AT	Computing Skills IA	(0,063)	
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DSO17AT	Development Software IA	(0,063)	
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TOTAL CREDITS FOR THE SEMESTER:		0,250	
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## SECOND SEMESTER

CFS10BT	Computing Fundamentals IB	(0,062)	
CGS10BT	Computing Systems IB	(0,062)	
CMK10BT	Computing Skills IB	(0,063)	
DSO17BT	Development Software IB	(0,063)	Development Software IA

TOTAL CREDITS FOR THE SEMESTER: 0,250

TOTAL CREDITS FOR THE SECOND YEAR: **0,500**

**As from the third year, a student will register for the specialisation field: Software Development (NDISF1).**

## THIRD YEAR

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
<b>FIRST SEMESTER</b>			
DSO23AT	Development Software IIA	(0,125)	Development Software IB
ISY23AT	Information Systems IIA	(0,125)	Computing Fundamentals IB
SSF24AT	System Software IIA	(0,125)	Computing Systems IB
TPG111T	Technical Programming I	(0,250)	Development Software IB

TOTAL CREDITS FOR THE SEMESTER: 0,625

## SECOND SEMESTER

DSO23BT	Development Software IIB	(0,125)	Development Software IIA
ISY23BT	Information Systems IIB	(0,125)	Information Systems IIA
SSF24BT	System Software IIB	(0,125)	Computing Systems IB
TPG201T	Technical Programming II	(0,250)	Technical Programming I

TOTAL CREDITS FOR THE SEMESTER: 0,625

TOTAL CREDITS FOR THE THIRD YEAR: **1,250**

## FOURTH YEAR

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
<b>FIRST SEMESTER</b>			
DSO34AT	Development Software IIIA	(0,125)	Development Software IIB
DSO34BT	Development Software IIIB	(0,125)	Development Software IIB
IDC30AT	Industry Exposure IIIA	(0,125)	
ISY34AT	Information Systems IIIA	(0,125)	Information Systems IIB
ISY34BT	Information Systems IIIB	(0,125)	Information Systems IIB

TOTAL CREDITS FOR THE SEMESTER: 0,625

## SECOND SEMESTER

**On completion of all the above subjects. Students with only one subject outstanding may be allowed to register for that subject and Industry Exposure IIIB with the approval of the Head of Department.**

IDC30BT	Industry Exposure IIIB	(0,125)	
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TOTAL CREDITS FOR THE SEMESTER: 0,125

TOTAL CREDITS FOR THE FOURTH YEAR: **0,750**

TOTAL CREDITS FOR THE QUALIFICATION: **3,000**



## SUBJECT 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 subject. At time of publication, the syllabus content was defined as follows:

### C

#### **COMPUTING FUNDAMENTALS IA (CFS10AT) 1 X 3-HOUR PAPER** **(Subject custodian: End User Computing Unit)**

The student is introduced to the fundamentals of computers and information systems, computer organisation and data processing. (Total tuition time: ± 90 hours)

#### **COMPUTING FUNDAMENTALS IB (CFS10BT) 1 X 3-HOUR PAPER** **(Subject custodian: End User Computing Unit)**

The basic concepts of system development, data management, management information systems, ethics, privacy and security, purchasing and maintaining microcomputers, number systems and binary logic. (Total tuition time: ± 54 hours)

#### **COMPUTING SKILLS IA (CMK10AT) 1 X 3-HOUR PAPER** **(Subject custodian: Department of Informatics)**

This subject aims to equip the student with fundamentals of IT Soft skills for both the ICT industry and other working environments upon which a successful career can be built. In addition, it will also improve the student's relation and interaction abilities needed within the dynamic ICT industry. The student who successfully completes this subject must identify and implement various thinking skills and learning styles, state the legal and cultural sensitivity issues of IT, identify and explain the variety of soft skills including study skills and strategies, research, presentation as well as communication skills, and identify and explain interpersonal skills in relation to character, time management and team building dynamics and conflict resolution. (Total tuition time: ± 60 hours)

#### **COMPUTING SKILLS IB (CMK10BT) 1 X 3-HOUR PAPER** **(Subject custodian: Department of Informatics)**

The aim of this subject is to extend the skills in CMK10 AT so as to improve on student's relations and interaction capabilities that will be applicable within the dynamic ICT industry and the external environment. The student who successfully completes this subject must describe, distinguish and portray changes in terms of personality profiles, emotional intelligence, self-management, stress management and relationship management; identify and apply the notion of team dynamics; deal with conflict and understand the dynamics behind change; report on effective correspondence; produce meeting documents; conduct meetings; and demonstrate the required communication skills to develop interpersonal business relationships through by means of group work. (Total tuition time: ± 60 hours)

#### **COMPUTING SYSTEMS IA (CGS10AT) 1 X 3-HOUR PAPER** **(Subject custodian: Department of Computer Systems Engineering)**

Introduction to hardware, operating systems, motherboards, processors, memory, hard drives, installing and supporting I/O devices, multimedia devices and mass storage, PC maintenance and troubleshooting strategies, and installing and maintenance of Windows. (Total tuition time: ± 54 hours)

#### **COMPUTING SYSTEMS IB (CGS10BT) 1 X 3-HOUR PAPER** **(Subject custodian: Department of Information Technology)**

Provides the foundation of data communications and local area management, OSI model and/ or TCP/IP protocol stack model, data transmission principles, media, major protocols, topologies, routing methods, introduction to networking principles and network operating system fundamentals. (Total tuition time: ± 54 hours)

### D

#### **DEVELOPMENT SOFTWARE IA (DSO17AT) 1 X 4-HOUR COMPUTER-BASED** **(Subject custodian: Department of Computer Science)**

Aim: To learn to solve problems using the basic programming principles, and then practically apply that knowledge in C++. Objectives: To enable the student to understand problems and know how to solve them by using a computer; understand the general concepts and arithmetic used in programming, sequence, selection and iteration control structures and a variety of built-in data types, including strings. The students are exposed to the concept of event-driven programming in a visual programming environment focusing on the development of graphical user interfaces to solve real-life practical programming problems. (Total tuition time: ± 72 hours)



**DEVELOPMENT SOFTWARE IB (DSO17BT)****1 X 4-HOUR COMPUTER-BASED****(Subject custodian: Department of Computer Science)**

Aim: To expand on the already mastered knowledge obtained in Development Software IA. Objectives: To broaden the programming skills base of the student by adding the following topics: write an algorithm and applying it in VB.NET/C++ using functions and sub-procedures, and write an algorithm containing one-dimensional arrays. String manipulation will be continued as well as a brief introduction to text file processing. (Total tuition time: ± 72 hours)

**DEVELOPMENT SOFTWARE IIA (DSO23AT)****1 X 4-HOUR COMPUTER-BASED****(Subject custodian: Department of Computer Science)**

This subject introduces Oracle and SQL to students. The subject includes standard queries, joins, functions, sub-queries, report writing, creation of tables and views, data manipulation using the Oracle courseware and the Oracle software. Students also learn how to create and maintain database objects and how to store, retrieve and manipulate data. (Total tuition time: ± 59 hours)

**DEVELOPMENT SOFTWARE IIB (DSO23BT)****1 X 4-HOUR COMPUTER-BASED****(Subject custodian: Department of Computer Science)**

This subject introduces students to PL/SQL programming blocks or program units in the Oracle environment. This subject includes the Development of efficient PL/SQL programs to access Oracle databases, creation of stored procedures and functions for maximum reuse and easy code maintenance using the Oracle courseware and the Oracle software. Students would need the knowledge of Oracle and SQL for this subject. (Total tuition time: ± 59 hours)

**DEVELOPMENT SOFTWARE IIIA (DSO34AT)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

This subject introduces students to the various database concepts, the design, implementation and management of a database system. The subject will prepare the student for practical applications in the design, implementation and management of database systems. The student should be competent in: the principles of developing and implementing small IT systems. On completion, the student should be able to create, maintain and administer databases according to the DBLC. Students should also be able to grasp how the database design fits into the Software Development Life Cycle. (Total tuition time: ± 59 hours)

**DEVELOPMENT SOFTWARE IIIB (DSO34BT)****CONTINUOUS ASSESSMENT****(Subject custodian: Department of Computer Science)**

The subject is project-based and integrates knowledge across all study fields of the qualification including: systems analysis and design; networking principles; project management; database design and implementation; and programming. On completion of the subject, the student should have the ability to: analyse and design software solutions to industry-related Information Technology problems and utilise the required technical skills to effectively implement the designed solutions in a distributed IT environment. (Total tuition time: ± 59 hours)

**F****FOUNDATION ACADEMIC AND LANGUAGE SKILLS (FPALS01)****1 X 3-HOUR PAPER****(Subject custodian: ICT First Years' and Foundation Unit)**

Aim/Purpose: To provide a sound foundation for, and to enhance basic language proficiency and academic skills necessary for reading, writing and studying in an ICT environment. Objectives: Analyse, adjust and improve study skills. Apply research skills in assignments. Interpret and reflect on all available and relevant resource material in proper English. Communicate in a comprehensible and clear manner in both a general and subject-specific manner showing cultural sensitivity. Demonstrate intermediate-level proficiency in oral and written English. Key topics: Managing adjustment problems: student life, coping with diversity and change, time management, setting goals and note taking, summarising techniques, English vocabulary and grammar, reading and writing skills. (Total tuition time: ± 84 hours)

**FOUNDATIONAL ICT MATHEMATICAL SKILLS (FPITM01)****1 X 3-HOUR PAPER****(Subject custodian: ICT First Years' and Foundation Unit)**

Aim/Purpose: The focus of the subject is to ensure students have the necessary mathematical and numeracy skills needed for ICT. Students will also be introduced to abstract logical reasoning and computational thinking skills. These skills are further developed through practical exercises relating to various day-to-day problem-solving activities. Objectives: To develop the problem solving skills as well as the computational thinking skills of the student and therefore prepare the student for the programming subjects to follow. Key topics: The number system and basic arithmetic; introduction to algebra: expressions and equations; fractions and decimals, algebraic fractions; percentages; ratio and rate; perimeter, area and volume; measuring systems and units; time,



distance and speed; Cartesian plane and coordinates; algebraic functions; matrices. (Total tuition time: ± 96 hours)

**FOUNDATION INFORMATION AND SOFTWARE DEVELOPMENT**

**1 X 3-HOUR PAPER**

**SKILLS (FPIDS01)**

**(Subject custodian: ICT First Years' and Foundation Unit)**

Aim/Purpose: To prepare students for computer programming by developing logical, critical and lateral thinking skills. Objectives: To develop the students' logical thinking and problem-solving skills as preparation for programming. Abstract logical reasoning and computational thinking skills will therefore be used to solve problems. Key topics: Brain teasers as introduction to problem-solving; analysis and solving of word problems; solving of various day-to-day problems; introduction to algorithmic problem solving - sequence, basic selection, basic repetition steps; statistics; financial matters. (Total tuition time: ± 96 hours)

**FOUNDATION PRESENTATION AND REPORTING SKILLS (FPPRS01)**

**1 X 3-HOUR PAPER**

**(Subject custodian: ICT First Years' and Foundation Unit)**

Aim/Purpose: To provide a sound foundation for, and to enhance basic language proficiency skills necessary for reading and writing in an ICT environment with specific reference to presentations and reports. Objectives: Preparation of effective and professional reports and PowerPoint presentations. Interpret, relate and reflect on all available and relevant resource material in proper English. Communicate orally in a comprehensible and clear manner specifically when presenting various IT topics, demonstrate intermediate-level proficiency in written English. Key topics: Conflict management; problem solving; interpersonal relationships; stress management; communication theory; listening skills; public speaking and presentation skills; and report writing. (Total tuition time: ± 84 hours)

**I**

**INDUSTRY EXPOSURE IIIA (IDC30AT)**

**1 X 3-HOUR PAPER**

**(Subject custodian: Department of Informatics)**

This subject enables students to gain insight to organisational characteristics and behaviour, personal and technological entrepreneurship; other issues include ethical and professional conduct in the workplace. The subject will also increase their knowledge of individual behavioural aspects, namely biographical characteristics, values attitudes, job satisfaction and personality and emotions, perceptions and individual decision making; broaden their understanding of the administrative structures of organisations, bureaucratic behaviour in global and diverse context; and develop interpersonal skills in applying and integrating contemporary theories of motivation. (Tuition time: ± 60 hours)

**INDUSTRY EXPOSURE IIIB (IDC30BT)**

**CONTINUOUS ASSESSMENT**

**(Subject custodian: Department of Computer Science)**

Industry Exposure IIIB is career-orientated and is aimed at integrating academic training with practical skills, as demanded by industry. Students work in industry for six months. (No formal tuition)

**INFORMATION SYSTEMS IIA (ISY23AT)**

**1 X 3-HOUR PAPER**

**(Subject custodian: Department of Computer Science)**

Understanding Systems Analysis fundamentals and the role of information technology in today's dynamic business environment; How to analyse a business case in the systems planning phase and the importance of understanding business operations and requirements and how IT projects support a company's overall strategic plan as well as the importance of conducting a preliminary investigation and a feasibility study; Learn about project management and how to plan, schedule, monitor and report on IT projects; Understand how to gather facts about a systems project, prepare documentation, and how to develop or create graphical models that show how the system transforms data into useful information and these models are used to design and develop systems. (Total tuition time: ± 72 hours)

**INFORMATION SYSTEMS IIB (ISY23BT)**

**1 X 3-HOUR PAPER**

**(Subject custodian: Department of Computer Science)**

The subject accommodates students from a broad spectrum of disciplines and interest. It includes a theoretical as well as a practical component. Theoretical component covers the systems design, systems implementation and systems support and security phases. Students choose different programming languages and integrate them to design commercial system. This subject provides the knowledge and practical skills needed to complete the development and design phases of a commercial system. (Total tuition time: ± 72 hours)



**INFORMATION SYSTEMS IIIA (ISY34AT)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

The purpose of this subject is: to provide the knowledge and practical skills needed to develop and present a computerised design of the system that students plan and analyse, using a system design and development methodology. This subject covers system analysis and design following the object oriented approach. A model driven approach is adopted starting with use cases and scenarios followed by defining problems domains classes through to detailed design models. The students will gain in-depth knowledge of OO software design and design patterns compliant with UML 2.0 modeling standards supported by the Unified Process as a systems development methodology covering the entire Unified Process Life Cycle (UPLC). (Total tuition time: ± 60 hours)

**INFORMATION SYSTEMS IIIB (ISY34BT)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

Students are introduced to concepts of project management within an ICT environment. Topics that are covered include: project life cycle, project process groups, project management knowledge areas which include risk, time, cost, and scope management. A student is expected to have knowledge of systems analysis and design in the IT field. On completion, students are expected to be competent in project selection, project scheduling using Gantt/PERT charts, project cost estimation and project risk analysis. (Total tuition time: ± 59 hours)

**S****SYSTEM SOFTWARE IIA (SSF24AT)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Systems Engineering)**

Students are introduced to the basic system administration knowledge of Red Hat Linux, as well as to network administration in the Linux environment. (Total tuition time: ± 78 hours)

**SYSTEM SOFTWARE IIB (SSF24BT)****1 X 3-HOUR PAPER****(Subject custodian: Department of Information Technology)**

Network concepts defined in System Software I will be further explored. The emphasis is on the TCP/IP protocol suite and services, and building a TCP/IP network. LAN and WAN infrastructures, remote networking, network security and disaster recovery form an integral part of this subject. (Total tuition time: ± 78 hours)

**T****TECHNICAL PROGRAMMING I (TPG111T)****1 X 4-HOUR COMPUTER-BASED****(Subject custodian: Department of Computer Science)**

**Aim:** To introduce students to object-orientated concepts and principles using the C++ programming language. **Objectives:** Students must be able to create programs that are in accordance with Object-Orientated Programming (OOP) principles, use their own and pre-defined classes in programs, use structures such as control and interactive, use iterative statements in a program, manipulate strings and characters in a program, use arrays in a program, use inheritance, polymorphism and exception handling mechanisms, and understand graphical user interface design. **Key topics:** Classes, methods, objects, selection structures, loops, strings, arrays, file manipulations, inheritance, polymorphism, exception handling. (Total tuition time: ± 140 hours)

**TECHNICAL PROGRAMMING II (TPG201T)****1 X 4-HOUR COMPUTER-BASED****(Subject custodian: Department of Computer Science)**

**Aim/Purpose:** The student is introduced to a modern rapid application development tool for Win32. with the purpose of solving every day programming challenges. **Analyse and design.** **Objectives:** Analyse and design software solutions to industry related information technology problems, utilise the required technical skills to effectively implement the designed solutions in a distributed IT environment. **Key topics:** Advanced OOP, C#, dynamic object instantiation, event-driven programming, back-end classes, strategic solution planning, systematic programme design, flat file data handling. **Relational database application development, defensive programming, SQL implementation, triggers, events, implementation of data structures, advanced methods in data aware application development.** (Total tuition time: ± 80 hours)

