STADIO

HIGHER EDUCATION

SCHOOL OF INFORMATION TECHNOLOGY

HIGHER CERTIFICATE IN SOFTWARE DEVELOPMENT

NQF 5 | 120 CREDITS | SAQA ID: 119053 | MIN. 1 YEAR | MODE: CONTACT LEARNING

CAMPUS: BELLVILLE (CAPE TOWN), CENTURION (PRETORIA) & MUSGRAVE (DURBAN)

DESCRIPTION

A software developer's role involves more than just knowing how to code! The Higher Certificate in Software Development aims to equip anyone wishing to enter the software development field with sufficient skills to do so. The main objective of this programme is to provide the student with a broad knowledge of the most important aspects of software development, including understanding hardware and software interaction, software analysis and design (focusing on the object-oriented paradigm), database management and use, software implementation, testing and maintenance, as well as the security issues impacting the entire development cycle. The student will be equipped with problem solving and programming skills, ranging from algorithm development to the more advanced skills of programming using the Python scripting language. This programme will equip the student with the basic knowledge and skills needed to develop a reasonable-sized software application to automate the solution of a business problem of medium complexity, by participating in a 20-credit software development project. Moreover, students will be taught to consider legal, social and ethical implications in all aspects of the software engineering process, encompassing both existing and potential future technologies. This programme will equip learners with a sound theoretical foundation in respect of the software development discipline and develop the application skills required for entry into the IT job market.

ARTICULATION POSSIBILITIES

Students who have completed credits at another higher education institution may apply for the transfer of those credits in line with STADIO's CAT Policy. The recognition of credits for the purpose of transfer from one qualification to another is determined by the nature of the qualifications, the relationship between them, the nature, complexity, and extent of the curricula associated with the specific subjects to be recognised for credit and the nature of the assessment used. A maximum of 50% of credits of a completed qualification may be transferred via CAT, while all credits from an incomplete qualification may be transferred, provided that no more than 50% of the credits on the receiving qualification are awarded via CAT.

MODE OF DELIVERY - CONTACT LEARNING (BLENDED CONTACT)

The programme is offered in STADIO's **Blended Contact** mode of delivery. Contact learning is aimed at students who want to attend venue-based face-to-face classes at one of STADIO's campuses. The Blended Contact mode combines classroom and online learning and teaching in a manner that includes some flexibility, while optimising the time students spend on campus. Based on the nature of the module, each module utilises a unique combination of the following learning settings:

- **Classroom:** Classroom sessions involve learning by doing, debating, arguing, trying, experimenting, practising, analysing, and sharing — all the skills students will need when they enter the world of work. Students will have the opportunity to contribute to the learning process and at the same time they will learn from the contributions of their fellow students. Class attendance of venue-based sessions is compulsory.
- **Synchronous online:** These are live online teaching sessions facilitated by a range of lecturers from different campuses. STADIO believes in encouraging students to think and engage laterally and to consider different perspectives and this is what students will get from having different experts share their knowledge with them. Students will be advised of the date and time of the session at the start of the semester, and they may connect from the comfort of their home, or from any other venue. They may also come to campus to make use of the campus Wi-Fi to join these sessions. Some of the live online sessions may be recorded, while others will not. It depends on the nature of the session and the lecturer will advise students beforehand. The lecturer will also use these sessions for group work and for discussions. These sessions are also compulsory, as they are an integral part of the teaching programme.
- **Asynchronous online:** These are recorded lectures which students will watch in their own time, but within the timelines provided in the course environment. In these short sessions, the lecturers will explain the theoretical concepts and they will work through examples, etc. Students enjoy the benefit of watching these important sessions repeatedly during the semester, as they prepare for their assessments.

Students will find a detailed timetable indicating the combination of sessions on the learning management system (Canvas) at the start of the semester. This will enable them to plan their schedule ahead of time, and to optimise travelling arrangements to and from the campus.

Contact learning is suited to students who are able to attend and are interested in participating in face-to-face classes on a physical campus and who want to become part of a campus community with all the activities that go with being on the campus. It is important to realise that class attendance is compulsory and students must commit to regularly attend classes on campus if they want to be successful and derive the best benefits of contact learning.

OUTCOMES

The qualifying student will be able to:

1. Demonstrate an understanding of what Information Technology in the broader sense entails and its use in diverse contexts (application domains).
2. Demonstrate an understanding of the terminology, tools and techniques applicable to software development, including the role of the software developer and some of the key characteristics thereof such as self-organisation and management.
3. Apply appropriate analysis and design methods and use a modern programming language and software development support environments and testing tools to implement software solutions to practical problems of medium complexity.
4. Demonstrate an understanding of the theoretical concepts of databases as well as the ability to design and extract information from both relational and semi-structured databases.
5. Demonstrate an understanding of the main issues in computer, network and information security and of mechanisms to implement different security services.
6. Apply technical expertise and teamwork skills, as a member of a software development team, to plan, design, programme and implement a software solution to a real-world business problem of medium complexity.

STADIO

STADIO is registered with the Department of Higher Education and Training as a private higher education institution under the Higher Education Act, 1997. Registration Number 2008/HE07/004.
DISCLAIMER: The content of this brochure is accurate at the time of publication. STADIO reserves the right to change the programme content due to changes in legislation, as well as for market requirements and other reasons. Notice of such changes will be published on our website.

06/09/24
Page 2 of 7

ADMISSION REQUIREMENTS

The admission criteria for the Higher Certificate in Software Development are:

- a National Senior Certificate (NSC) with a minimum of 30% in English Home Language or English First Additional Language; and a minimum of at least 40% for either Mathematics or Information Technology, or a minimum of at least 70% for Mathematical Literacy; or
- a National Senior Certificate (Vocational) (NC(V)) at Level 4, with a minimum of 30% in English Home Language or English First Additional Language; and a minimum of at least 40% for either Mathematics or Information Technology, or a minimum of at least 70% for Mathematical Literacy; or
- a Senior Certificate (SC) with a minimum of 30% (F) in English First Language(HG) or English Second Language (HG); and a minimum of at least 40%(E) for either Mathematics (HG) or Computer Studies (HG), or a minimum of at least 70%(B) for Mathematics (SG); and in addition
- a minimum of 50% for the compulsory non-credit bearing entry/access module Computational Thinking, which is offered at the start of the programme, and which includes a provision for students to write an early test in order to fulfil this requirement.

ADDITIONAL OR SPECIFIC ADMISSION REQUIREMENTS

Other access pathways

STADIO is committed to achieving inclusion and to overcome barriers to access and success in higher education. Applicants who do not meet the stated admission criteria, but who have relevant work experience and/or prior learning may apply for admission under the policy on Recognition of Prior Learning (RPL). STADIO admits a maximum of 10% per cohort via RPL.

The implementation of RPL is context-specific, in terms of discipline, programme and level. Further information may be obtained from your Student Recruitment Advisor.

SPECIFIC REQUIREMENTS

MINIMUM SYSTEM REQUIREMENTS:

- **Reliable broadband Internet Access (Wi-Fi available at all our campuses, but you may prefer access from home as well)**
- **Firefox/Chrome web browser**
- **Microsoft Word**
- **PDF Viewer**
- **Ability to scan and upload documents**
- **Email/cellphone for notification and communication**

ACCESS TO TECHNOLOGY:

STADIO provides students with materials, resources, assessments (including online tests and quizzes), as well as discussion opportunities and a number of administrative services via its student administration and learning environments. Having access to the above online facilities is essential for efficient communication, learning and success. You will need continuous access to study, using the resources mentioned above, and to access and submit some assessments.

STUDENT SUPPORT FOR CONTACT LEARNING STUDENTS

C4SS - CENTRE FOR STUDENT SUCCESS

The Centre for Student Success supports students with academic, psychological and financial wellness.

SSS - STUDENT SUPPORT SERVICES

Student Support Services is the first port of call for all student queries and requests, they can channel your requests to the right individuals.

CURRICULUM OUTLINE

SEMESTER 1	1st YEAR	CO/PREREQUISITES
Compulsory (All)	Computational Thinking for Problem Solving CTPS152 (0 credits)	
	Fundamentals of Information Technology FIT152 (10 credits)	
	Introduction to Databases IDB152 (10 credits)	
	Introduction to Programming and Program Development PPD152 (20 credits)	
	Software Engineering SEN152 (10 credits)	
	Technology and Society TAS152 (10 credits)	

SEMESTER 2	1st YEAR	CO/PREREQUISITES
Compulsory (All)	Fundamentals of Object-Oriented Analysis and Design FOAD152 (15 credits)	** *Introduction to Programming and Program Development (PPD152)* ** *Software Engineering (SEN152)* ** *Introduction to Databases (IDB152)*
	Introduction to Web Programming IWP152 (15 credits)	** *Introduction to Programming and Program Development (PPD152)*
	Information Security for IS Professionals ISP152 (10 credits)	
	Software Development Project SDP152 (20 credits)	* *Fundamentals of Object-Oriented Analysis and Design (FOAD152)* ** *Technology and Society (TAS152)* ** *Introduction to Programming and Program Development (PPD152)* ** *Software Engineering (SEN152)* ** *Introduction to Databases (IDB152)*
CREDITS P/YEAR	120	

* Corequisite modules must be taken concurrently with another partner module.

** Prerequisite modules must be successfully completed before enrolling in a higher-level or more advanced module.

MODULE DESCRIPTIONS

COMPUTATIONAL THINKING FOR PROBLEM SOLVING

Efficient and effective problem solving is a skill that is of benefit to any individual in his/her everyday life. In the field of computing, problem solving is a vital skill that every computer programmer requires. This module introduces computational thinking as a systematic approach to problem solving with the solution expressed in such a way that it can be carried out by a computer.

This module covers the four pillars of computational thinking, namely, decomposition, data representation and abstraction, pattern recognition, and algorithms, as well as how computer scientists create and analyse algorithms. Students will be exposed to a variety of problem scenarios which will highlight the various ways of finding a solution to a problem. No computer programming skills are required as all examples will be approached in an "unplugged" way and solved by hand.

The module will be useful to students from diverse fields by offering a systematic way of approaching problem solving, but especially to those intending to study computer programming. Skills developed in this module, such as logic and decomposition, will certainly facilitate understanding of the "Introduction to Programming and Program Design" module for the Higher Certificate qualification.

FUNDAMENTALS OF INFORMATION TECHNOLOGY

The increased importance and global reach of computing technology in today's society was the basis for the emergence of the information technology discipline. Information Technology is the study of systemic approaches to select, develop, apply, integrate, and administer secure computing technologies to enable users to accomplish their personal, organizational and societal goals.

This module provides an overview of the discipline of IT, and how it relates to other computing disciplines. The goal is to help students understand the diverse contexts in which IT is used and the challenges inherent in the diffusion of innovative technology.

FUNDAMENTALS OF OBJECT-ORIENTED ANALYSIS AND DESIGN

This module provides students with a general understanding of the object-oriented approach to software analysis and design and develops their ability to apply object-oriented techniques that are commonly used for the analysis and specification of solution requirements. The analysis phase of systems development focuses on what the proposed system must be able to do. Students learn how to identify solution requirements based on 'objects', which are the real-world entities that the system will interact with. During object-oriented design, concepts identified in the analysis phase are mapped on to the implementing classes and interfaces, resulting in detailed models that describe how the system is to be built. The Unified Modelling Language (UML) is used to model the system requirements, supporting communication between designers, developers and other stakeholders.

INFORMATION SECURITY FOR IS PROFESSIONALS

The field of Information Security is becoming more important due to increased reliance on computer systems, the Internet and wireless network standards such as Bluetooth and WiFi, as well as the growth of "smart" devices, including smartphones, televisions, and the various devices that constitute the "Internet of Things".

The aim of this module is to equip students with a sound knowledge of the underlying principles of information security and to provide them with the skills needed to analyse and evaluate information security problems.

The student will also learn how to ensure that correct practices are incorporated regarding application security within the code. The student will be able to identify and deal with threats we face in the modern world and to apply various techniques to protect a network.

INTRODUCTION TO DATABASES

Information and raw data are the life blood of the various computing disciplines, either for their use in creating a solution to a given problem, or for storing after having been generated by information systems and other computational applications. As such algorithms for the efficient and effective collection, transformation, storage, access and updating of data, as well as for the representation, organization and presentation of the resulting information, constitute vital knowledge for computing professionals.

Relational databases, which rely on the use of structured tables to store data, have traditionally been used for data storage. However, with the ever-increasing volume of data needed to be processed and stored by information systems, non-traditional, unstructured alternatives have recently become more popular. The main aim of this module is to introduce students to the theoretical concepts of databases as well as provide practical experience in designing and extracting information from both relational and semi-structured databases.

This module introduces fundamental database concepts related to the design and creation of relational databases, as well as the extraction of information in the form of query building using SQL (structured query language). Also covered in the module are considerations of transactional processing and security of databases as well as an introduction to non-relational database models using XML to apply the theoretical concepts in semi-structured databases. Having completed this module, students will be able to manipulate a variety of databases, as well as design, implement and manage a database system.

INTRODUCTION TO PROGRAMMING AND PROGRAM DESIGN

Efficient and effective problem solving is a skill that is of benefit to any individual in his/her everyday life. In the field of computing, problem solving as well as familiarity with computer programming concepts, development of computer programs, and the syntax and semantics of programming languages are fundamental to successful software development.

This module first introduces computational thinking as a systematic approach to understanding and solving a problem in such a way that the solution can be carried out by a computer. Thereafter, all aspects of software development are covered, including, creating an algorithm, coding this algorithm to develop a program, debugging and executing the program, and finally, testing the program. The main focus of the module is on the programming aspect, where students will be exposed to the Python programming language, from the basic programming constructs (sequencing, decisions and looping) and data structures (such as simple types and lists) to more advanced constructs (such as the use of functions) and more complex data structures (such as dictionaries).

The module will be useful to students from diverse fields in that it offers a systematic way of approaching problem solving and then creating a solution that can be executed by a computer. No prior programming experience is required to complete this module. Students will be taken from first principles to being able to develop a non-trivial Python program.

INTRODUCTION TO WEB PROGRAMMING

With the ever-growing demand for availability of application programmes on the Web, the inclusion of a module on the development of these applications is essential in an IT programme.

The aim of this module is to lay a solid foundation in the discipline of developing application software for the web. The student will gain a breadth of knowledge about the development platforms and underlying technology, as well as the range of methods, tools, and techniques utilized in developing web applications. The student will also gain practical experience in developing applications for the web.

The first part of the module focuses on important client-side and limited server-side interaction aspects of the Web. The aim is to provide practical training in the design and creation of usable Web pages. Although only introductory client-side programming is covered, students will be given meaningful exposure to more advanced topics such as HTML hand-coding, Cascading Style Sheets (CSS), JavaScript programming, designing Web pages and sites with good usability, and graphics file formats, their manipulation and preparation.

The second part of the module covers the development of more dynamic Web-based applications centered around the manipulation of data stored in online databases.

SOFTWARE DEVELOPMENT PROJECT

This module makes use of a software development project to integrate the practical and theoretical knowledge that students have acquired in the corequisite modules listed above. Student teams will be expected to prepare, maintain and follow a basic project management plan; maintain relevant documentation relating to the analysis, design, development, and coding and testing phases of the project; and present their final software product for assessment. Each team member will assume each of the roles of project manager, analyst, designer, developer, and tester at least once during the project. The final group projects will include an appendix documenting the students' experience of each stage of the project, and discussing any issues relating to e.g. privacy, data security, ethics, or social impact that could affect users of the system.

SOFTWARE ENGINEERING

Software engineering is the use of an organized and regulated approach for the design, development, testing, documentation and maintenance of software by applying principles from engineering, project management, computer science, programming, cost management and other areas.

The Software Engineering module specifically aims to lay a solid foundation in the discipline of developing and maintaining software systems that behave reliably and efficiently, are affordable to develop and maintain, and satisfy all the requirements that customers have defined for them. The student will acquire broad knowledge about the Software Engineering process and the range of methods, tools, and techniques utilised, illustrated by means of a variety of case studies.

Skills in the practical application of methods and techniques and the use of software development platforms and tools, will mostly be acquired through the 20 credit Software Development Project module. In particular, students will obtain practical guidance on elicitation and feedback techniques within a project environment.

TECHNOLOGY AND SOCIETY

The cyber world is a world with countless interactions in different forms. Online interaction has become part of our daily routine and it presents a number of challenges to both developers, owners and users. Given the different types of personal and corporate data that can be generated, it is important to establish awareness of possible ethical contraventions in which we can unintentionally participate. The development of new technologies also potentially poses threats to the livelihoods of many. Ethical behaviour by all stakeholders is crucial in sustaining the fair development and implementation of technologies. It is also important to ensure fair online interaction and the sharing of information. This module aims to establish an initial awareness of ethical issues in students as they start their studies in technology. It will assist with understanding the rights of people in the world of technology.

STADIO

HIGHER EDUCATION

SCHOOL OF INFORMATION TECHNOLOGY

HIGHER CERTIFICATE IN SOFTWARE DEVELOPMENT

NQF 5 | 120 CREDITS | SAQA ID: 119053 | MIN. 1 YEAR | MODE: CONTACT LEARNING

CAMPUS: BELLVILLE (CAPE TOWN), CENTURION (PRETORIA) & MUSGRAVE (DURBAN)

FEES & PAYMENT
OPTIONS

PRESCRIBED
TEXTBOOKS

VISIT OUR WEBSITE
www.stadio.ac.za

I'M READY!
APPLY ONLINE NOW

EMAIL US
hello@stadio.ac.za

CALL US
+27 87 158 5000

DON'T BE SHY BE SOCIAL: