

# BACCALAUREUS TECHNOLOGIAE: INFORMATION TECHNOLOGY: SOFTWARE DEVELOPMENT

Qualification code: BTIS05 - NQF Level 7

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

Last year of new intake: 2019

Teach-out (phase-out) date: 30 June 2022

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.

### FIRST OR SECOND SEMESTER

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
ADH401T	Advanced Development Software IV (second-semester subject)	(0,100)	
DSO401T	Development Software IV (first-semester subject)	(0,100)	
ITA401T	Information and Technology Management IV	(0,100)	
PAJ411H	Principles of Research IV*	(0,100)	
PJT411B	Project IV	(0,200)	Principles of Research IV
PJT411R	Project IV (re-registration)	(0,000)	

**plus one of the following subjects (subjects are offered at the location determined by the Department):**

SRN401T	Software Requirements and Design IV* (first semester subject)	(0,100)	
TPG401T	Technical Programming IV (first-semester subject)	(0,100)	

**plus three of the following subjects (subjects are offered at the location determined by the Department):**

ADU401T	Advanced Technical Programming IV (second-semester subject)	(0,100)	Technical Programming IV
AIT401T	Artificial Intelligence IV (second-semester subject)	(0,100)	
ATE401T	Application Technology IV (second-semester subject)	(0,100)	
BAB401T	Business Fundamentals IV	(0,100)	
DBA401T	Database Administration IV* (second-semester subject)	(0,100)	
DBS401T	Database Systems IV (first-semester subject)	(0,100)	
DEG401T	Data Engineering IV* (first-semester subject)	(0,100)	
DPY401T	Decision Support Systems IV* (second-semester subject)	(0,100)	
HCI401T	Human Computer Interface Design IV	(0,100)	



ITU401T	Information Security IV (second-semester subject)	(0,100)
KNM401T	Knowledge Management IV	(0,100)
OSY431T	Operating Systems IV (first-semester subject)	(0,100)
PJG401C	Project Management IV	(0,100)

TOTAL CREDITS FOR THE QUALIFICATION: **1,000**

## 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:

### A

#### **ADVANCED DEVELOPMENT SOFTWARE IV (ADH401T) 1 X 4-HOUR COMPUTER-BASED** *(Subject custodian: Department of Computer Science)*

The primary purpose is on developing PL/SQL web applications using oracle 10g/11g as a tool and Oracle Application Server configurations. The contents include generating HTML output from PL/SQL, passing parameters to a PL/SQL web application, performing network operations within PL/SQL stored procedures and embedding PL/SQL code in web pages and the use of JavaScript in PL/SQL web applications. (Total tuition time: ± 40 hours)

#### **ADVANCED TECHNICAL PROGRAMMING IV (ADU401T) 1 X 4-HOUR COMPUTER-BASED** *(Subject custodian: Department of Computer Science)*

Aim: This subject focuses on introducing students to server-side component architecture using Enterprise Java Bean (EJB3.0). The students are exposed to EJB specifications to provide a standard way to implement the back-end "business" code typically found in enterprise applications. Objectives: Understanding EJB in relation to the J2EE architecture, annotation-based EJB programming model and persistence model for entity beans. Key Topics: Session bean, entity bean, message-driven bean, annotations, web services. (Total tuition time: ± 40 hours)

#### **APPLICATION TECHNOLOGY IV (ATE401T) 1 X 3-HOUR PAPER** *(Subject custodian: Department of Computer Science)*

The purpose of this subject is to equip students with skill and knowledge in the use of software design patterns. The subject exposes students to the commonly used creational, structural and behavioural design patterns. (Total tuition time: ± 40 hours)

#### **ARTIFICIAL INTELLIGENCE IV (AIT401T) 1 X 3-HOUR PAPER** *(Subject custodian: Department of Computer Systems Engineering)*

Aim/Purpose: To introduce the fundamentals of the art of creating machines that perform functions that require intelligence when performed by people. The field includes problem solving, communicating, perceiving and acting, learning, knowledge, reasoning and planning, uncertain knowledge and reasoning. (Total tuition time: ± 26 hours)

### B

#### **BUSINESS FUNDAMENTALS IV (BAB401T) 1 X 3-HOUR PAPER** *(Subject custodian: Department of Informatics)*

Business analysis is critical in identifying the business needs of end users and other stakeholders to determine the appropriate solution to a business problem. Focus is primarily on business analysis, and discusses how to obtain success in business analysis. Six business analysis knowledge areas are discussed in detail. On successful completion of this subject, the student will be able to: specify and model requirements for an IT business solution, investigate business problem or opportunity within an organisation, analyse and document solution requirements for an IT organisation and support project manager throughout solution development, implementation and testing to ensure that requirements are met. (Total tuition time: ± 54 hours)



**D****DATA ENGINEERING IV (DEG401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

The aim of this subject is to address the issues of data representation for data mining. Objectives: On completion of this subject, students should be able to prepare and process data for meaningful interpretations. Key topics: data engineering models, data mining tool, normalisations and redistributing variables, introduction to Neural network. (Total tuition time: ± 40 hours)

**DATABASE ADMINISTRATION IV (DBA401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

An introduction to the management of database systems. Problems in current database administration, as well as possible solutions to those problems, are discussed. The subject focuses on the design of data structures and storage techniques, tuning, distributed systems, database administration and support tools. (Total tuition time: ± 40 hours)

**DATABASE SYSTEMS IV (DBS401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

This subject assumes knowledge of databases and builds on this existing database knowledge by presenting database design and technology concepts. Fundamental database concepts are covered as well as relational database models and normalisation; entity-relationship modelling; transaction management and concurrency control; distributed database management systems; object-orientated databases; client/server systems; data warehousing, data mining and also databases in electronic commerce. (Total tuition time: ± 40 hours)

**DECISION SUPPORT SYSTEMS IV (DPY401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

The subject focuses on decision support systems and business intelligence, human decision making processes, decision making, systems, modeling and support, decision support systems concepts, methodologies and technologies, modeling and analysis, data mining for business intelligence, artificial neural networks for data mining, text and web mining, data warehousing and the CART algorithm. (Total tuition time: ± 40 hours)

**DEVELOPMENT SOFTWARE IV (DSO401T)****1 X 4-HOUR COMPUTER-BASED****(Subject custodian: Department of Computer Science)**

The focus is on advanced PL/SQL programming using Oracle 10g/11G as a tool, the content includes PL/SQL tables, Nested blocks in PL/SQL, Dynamic SQL and Dynamic PL/SQL blocks, recompiling functions and procedures, package forward declarations, package dependency, package overloading, bulking in PL/SQL and creating database triggers. (Total tuition time: ± 40 hours)

**H****HUMAN COMPUTER INTERFACE DESIGN IV (HCI401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

Students gain knowledge and skills required for designing interactive products to support the way they communicate and interact in their everyday and working life. Students should know how to generate user requirement, design, evaluate and implement interactive computing systems for human use with other human factors and ergonomics. The subject's main topics include: the use of general HCI principles to design screens for Windows application and for the Web; understanding users and user-centered design; identifying needs and establishing requirements; doing conceptual design, prototyping and construction of human computer interfaces for different types of users. (Total tuition time: ± 40 hours)



**I****INFORMATION AND TECHNOLOGY MANAGEMENT IV (ITA401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Informatics)**

This subject provides concepts and frameworks for understanding the potential impact of Information Technology (IT) on business strategy and performance. The subject focuses on the implications of increased digitisation for defining business strategies and operating models, and explores the roles of both general managers and IT executives in using IT to achieve operational excellence and business agility. On successful completion of this subject, the student will be able to develop an IT Strategy for a digital enterprise; evaluate how IT will shape future businesses and the contribution of enterprise architecture; evaluate the risk and benefits of digitised processes and compare strategically whether to perform those processes internally or externally; assess the impact of globalisation; motivate why some firms are better able to convert their IT investments into business value; and implement steps to ensure effective IT decision making. (Total tuition time: ± 54 hours)

**INFORMATION SECURITY IV (ITU401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Information Technology)**

Encryption and decryption algorithms, protocols, operating systems, databases and network security. (Total tuition time: ± 40 hours)

**K****KNOWLEDGE MANAGEMENT IV (KNM401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Informatics)**

This subject is aimed at extending the skills of the students by introducing students to the various Knowledge Management concepts, design, implementation and management of KNM systems, as well as an overview of challenges that organisations face during the implementation of KNM initiatives. As the economy increasingly moves towards a knowledge-based economy, the ability to manage knowledge becomes a matter of competitive survival for organisations. Principles and practice of knowledge management in organisations, therefore, become the focal point of this subject. On completion of the subject, students will be able to identify and apply the theoretical and practical knowledge management principles to address management pitfalls, manage these knowledge management challenges; and implement the relevant knowledge management steps to ensure success within the context of the organisation. (Total tuition time: ± 54 hours)

**O****OPERATING SYSTEMS IV (OSY431T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Systems Engineering)**

The main objective of this subject is to design and program a simple operating system (using layered technology), programmed in Assembler, C or C++ programming languages. The simple operating system will have a programmed boot process (written in Assembler only), a kernel (can be written in Assembler, C or C++ combination), file system (can be written in Assembler, C or C++ combination), and command interpreter or shell (can be written in Assembler, C or C++). Students should have prior (and solid) knowledge of operating systems and C or C++ programming language before embarking on this subject. The subject starts off with a revision of Assembler programming only. No revision of C or C++ is done, as this is required from students. When time permits, advanced concepts (in theory only), such as memory management, process management and process scheduling, as well as types of operating systems, such as distributed, parallel, embedded and/or real-time operating systems, are evaluated theoretically. (Total tuition time: ± 26 hours)

**P****PRINCIPLES OF RESEARCH IV (PAJ411H)****CONTINUOUS ASSESSMENT****(Subject custodian: Department of Computer Science)**

This subject prepares students to obtain the necessary skills in doing proper research to deliver a proper researched report. The subject also looks at the basics of paradigms, methodologies, and techniques of research in the behavioural sciences, and their application in information technology. On completion of the subject, students will be able to apply the basic paradigms, methodologies and techniques; apply different methodologies in different scenarios; recommend which data collection technique is necessary; apply correct research methods in the ICT environment, and apply the appropriate tools for collecting data in the ICT environment. Project topics and research questions in line with the Department niche area. (Total tuition time: ± 54 hours)



**PROJECT IV (PJT411B/R)****CONTINUOUS ASSESSMENT****(Subject custodian: Department of Computer Science)**

This subject is an IT project that includes IT research and writing a research report. On completion of the subject, students will be able to apply the research and presentation skills obtained in Principles of Research, apply the correct Harvard reference method, demonstrate writing skills, and demonstrate research skills according to the project topics and research questions in line with the Department niche area. (Total tuition time: ± 26 hours)

**PROJECT MANAGEMENT IV (PJG401C)****1 X 3-HOUR PAPER****(Subject custodian: Department of Informatics)**

This subject aims to enhance students' knowledge of Project Management. The student who successfully completes this subject must be able to apply project management skills to any IT related project. On completion of the subject, students will be able to define, facilitate, document, and manage the project requirements for information technology project, construct the relevant template based on industry-accepted standards, apply the appropriate techniques that are geared to significantly improve requirements, collection and documentation; and explore the roles of various players (project leaders, business analysts, client advocates, and customers) in determining the success of the requirements definition for IT projects. (Total tuition time: ± 54 hours)

**S****SOFTWARE REQUIREMENTS AND DESIGN IV (SRN401T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Computer Science)**

Software engineering subject that concentrate on software requirements, software design, software construction and software testing knowledge area in addition to software project management. (Total tuition time: ± 40 hours)

**T****TECHNICAL PROGRAMMING IV (TPG401T)****1 X 4-HOUR COMPUTER-BASED****(Subject custodian: Department of Computer Science)**

Aim/Purpose: To introduce the students to the creation and design of software systems to support interoperable machine-to-machine interactions over a network. Objectives: To introduce students to Web services architecture, anatomy of WSDL document, SOAP-RPC, SOAP format, SOAP fault and extensions, overview of UDDI. Key topics: SOA, WSDL, SOAP, Restful Web services, UDDI. (Total tuition time: ± 40 hours)

