Higher Certificate in Information Systems (Robotics and Intelligent Systems)

SAQA ID 120688 NQF Level 5

Mode and duration

Contact
Full-Time (Campus)
- Minimum: 1 year
- Maximum: 3 years

Part-Time (Campus)
- Minimum: 2 years
- Maximum: 5 years

Part-Time (Online)
- Minimum: 2 years
- Maximum: 5 years

Qualification description

Drive the innovation that will power the next industrial revolution. Robotics systems are a way of automating manufacturing applications while reducing the amount of labour and production costs and time associated with the process. An intelligent system is a computer-based system with an embedded, internet-connected computer that can learn about the structure of a data, analyse the data to extract patterns and meaning, derive new information, and identify strategies and behaviours to act on the results of its analysis.

The Higher Certificate in Information Systems (Robotics and Intelligent Systems) is a career-focused qualification that is intensive but also broad. It provides you with the fundamental and technical knowledge as well as the applicable skill set in Databases, Python Programming, Statistical Thinking in Python, Supervised Learning with scikit-learn and Deep Learning in Python. You will also cover topics such as Computer Literacy, Program Design, Mathematical Problem Solving and Reasoning. Throughout the qualification, you will complete technical projects and "challenging problems" that will make you well prepared and empowered for the world of work.

In addition, you will develop essential skills for the world of work, especially for the IT industry, such as analysing and solving real problems, logical thinking, being innovative and adaptable, working in teams and communicating effectively.

Entry requirements

1. South African National Senior Certificate (NSC) with Bachelor's degree, Diploma or Higher Certificate endorsement.
2. Or a National Certificate (Vocational) level 4 issued by the Council of General and Further Education and Training with Bachelor's degree, Diploma or Higher Certificate endorsement.
3. Or a Certificate of evaluation on a minimum NQF level 4 for foreign qualification confirmed by SAQA.
4. Or a letter or certificate confirming an exemption from Universities South Africa (USAf) for any other school-leaving results.
5. Or completion of a Bachelor's degree, Diploma, Higher Certificate or equivalent.

Possible career options

The career choices for you as a Higher Certificate in Information Systems (Robotics and Intelligent Systems) graduate include junior positions in:
- Database Administration
- Data Science
- Robotic and Intelligent Systems

This qualification is offered at the following campuses:

- Bedfordview
- Bloemfontein
- Claremont
- Durban
- East London
- Mbombela

- Nelson Mandela Bay
- Potchefstroom
- Pretoria
- Tyger Valley
- Vanderbijlpark

Qualification accreditation

- Accredited by the Higher Education Quality Committee (HEQC) of the Council on Higher Education (CHE)
- Registered with the South African Qualifications Authority (SAQA)

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Qualification structure

Year 1

- Computer Literacy (Microsoft)
- Database Design Concepts
- Linux Operating System
- Mathematical Problem Solving and Reasoning
- Personal Skills Development
- Program Design
- Python for Data Science
- Python Programming
- Python Robotics
- Software Engineering
- Elective - Choose 1
  - Database Management (MySQL)
  - Database Management (SQL Server)

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Module Descriptors

Year 1

Computer Literacy (Microsoft)
The module teaches students how to use Microsoft Office applications such as Word, Excel, PowerPoint, Access and Outlook. This is intended to strengthen students' computer application skills as students will use Microsoft Office and fundamental computer operations for documentation and data management throughout the qualification. These skills also assist students in the preparation of design documents, presentations, budgeting spreadsheets, and other administrative tasks.

Database Design Concepts
This module focuses on systems analysis, entity relationship diagrams, data normalisation and mapping a database's design to tables.

Database Management (MySQL)
Students will be introduced to core MySQL scripts used for creating a database and how to implement these. Students will use MySQL scripts to add tables to the database. These tables are created with certain constraints such as primary keys, foreign keys, etc.

Database Management (SQL Server)
The module starts with the fundamentals of database design concepts. These consist of creating a database, altering a database and creating tables, which have certain constraints, such as primary keys and foreign keys. The module then looks at how to practically populate and implement the functions of a database.

Linux Operating System
In this module students will examine the origins of the Linux operating system. They will look at the procedures necessary to install and configure Linux onto a computer, as well as logging in and out of Linux. In addition, students will be introduced to and become familiar with the GNOME desktop environment. They will develop skills and knowledge to enable them to use the powerful command line interface and explore files and directories. This module also deals with the role and function of the text editor, as well as working with directories and files using the Linux operating system terminal and commands. The final section of the module looks at developing skills to redirect input and output as well as controlling Linux operating system processes.

Mathematical Problem Solving and Reasoning
The aim of this module is to provide students with a strong foundation in essential mathematical concepts, techniques, and their applications, enabling them to effectively solve computational problems and enhance their problem-solving skills in computer science and related fields.

Personal Skills Development
Personal Skills Development implies professional and personal growth in knowledge and skills. Personal Skills Development embraces a range of practical and transferable skills that can be applied within higher education and in the workplace. By conducting case studies, role play and real-life activities, the student should be able to improve their own learning, be involved in team work and be more capable of solving problems. The rationale behind this module is to expose the student to softer skills that are critical in the workplace and in higher education. This module attempts to encapsulate a range of key and common skills and deliver this information in a dynamic learning environment.

Program Design
This module will introduce basic concepts of programming logic using control structures. More advanced topics, such as arrays, file handling and functions are covered later in the course. The knowledge that students will gain will initiate the students to master, at a basic level, the process to develop computer program algorithms using Python.

Python for Data Science
This module focuses on Python specifically for data science. You will master the basics of data analysis in Python and expand your skill set by learning scientific computing with NumPy. You will gain knowledge and skills about Python Basics, Python Lists, Functions and Packages and NumPy. Thus, you will learn about powerful ways to store and manipulate data as well as cool data science tools to start your own analyses.

Python Programming
This module is aimed at teaching the student how to create applications using the Python programming language. Students would gain an understanding of Python's interpreter. Variables and constants/literals are also discussed, and the differences between them.

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Python Robotics
This module aims to develop students who have an interest in the science and creation of robots. The students will be tasked with the development of battery-powered robots

Software Engineering
Students are then given a practical introduction to UML for use as a tool in the system development process. More specifically, students will familiarise themselves with use cases and scenarios, identify different actors that play a role in a system, and learn to draw using case diagrams. The unit also explores the use of state, sequence, collaboration, activity and deployment diagrams.