



Bachelor of Science Honours in Information Technology (Robotics)

SAQA ID 120723 NQF Level 8

🕒 Mode and duration

Contact

Full-Time (Online)

- Minimum: 1 years
- Maximum: 2 years

Classes are mainly offered on Saturdays and some consultations may run during the week.

☰ Qualification description

Stay at the forefront of digital advancement with the Bachelor of Science Honours in Information Technology, specialising in Robotics, a broad and rigorous postgraduate qualification designed to prepare students to design, develop, and implement robotic systems.

The BSc Honours IT (Robotics) is designed to provide a well-rounded education that includes both specialised knowledge and practical hands-on experience in robotics. The programme equips students with the expertise needed to work with robotic systems, from their design and development to their deployment in various practical applications, making them valuable contributors to the rapidly advancing field of robotics and automation.

The qualification's notable achievements can be largely attributed to its unique instructional methodology, characterised by a blended approach that encompasses interactive lecture-based instruction, smaller class sizes, and the integration of technology. In addition, our institution boasts a faculty of exceptionally committed educators who possess esteemed professional accreditations. Moreover, our curriculum remains both pertinent and progressive, consistently staying ahead of emerging trends in the field. The primary emphasis lies in the practical implementation of concepts, encompassing project completion, workshop participation, and the cultivation of critical information technology proficiencies.

Upon successful completion of the BSc Honours IT (Robotics), graduates are well-prepared to contribute effectively to the rapidly advancing field of robotics and automation. They may also pursue advanced degrees, such as an MSc in Computing, for further specialisation and research opportunities.

☑ Entry requirements

1. A recognised undergraduate degree or equivalent for the specific honours degree.
2. Or an equivalent foreign undergraduate qualification on NQF level 7 approved by SAQA.
3. And the specific undergraduate qualification should preferentially include, but not limited to, these modules or their equivalence:
 - Python for Data Science
 - Machine Learning Algorithms
 - Database Systems Design, Implementation, and Management
4. And a minimum of 60% average during the exit year of the applicable undergraduate qualification.
5. Relevancy in - line with the stream being applied for at the discretionary approval of the faculty where applicable.
6. Submission of the module outlines of the completed subjects might be required.

📁 Possible career options

Graduates of a BSc Honours IT (Data Science) programme are well-prepared for a variety of roles in the data science and analytics field, such as:

- Automation Engineer
- Data Miner, Robotic Process Automation Developer
- DevOps Engineer,
- Entrepreneur/Startup Founder
- Industrial Automation Specialist
- IT Consultant, Researcher/Academic
- Machine Learning Robotics Engineer
- Microservices Developer, Microservices Architect
- Research Scientist in Robotics, Robotics Software Developer
- Robotics Engineer, Control Systems Engineer

📄 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)

**This qualification is offered
at the following campuses:**

- Midrand



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Qualification structure

Year 1

Students develop a high level of competence and specialised knowledge in the discipline of BSc Honours IT (Robotics).

- Applied Robotics
- Data Mining and Data Administration
- Digital Image Processing
- Multi-agent Systems
- Pattern Recognition in Robotics
- Research Methodologies in IT Research
- Research Project
- Service-oriented and Microservices Architectures



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Module Descriptors

Applied Robotics

The aim of this module is to furnish students with an in-depth understanding of applied robotics, encompassing the fundamental principles of kinematics, dynamics, and control. The purpose of this module is to provide engineering students with the essential knowledge and skills required to analyse and create computer programmes for robotic systems. It focuses on kinematics, encompassing concepts such as rotation, orientation, motion, forward kinematics, and inverse kinematics. Additionally, it explores velocity kinematics and acceleration kinematics, offering valuable insights into the motion properties of robotic systems. The module further delves into dynamics, with a particular focus on applied dynamics and robot dynamics. Lastly, it addresses control aspects, including path planning and time-optimal contingencies.

Data Mining and Data Administration

The aim of this module is to showcase an in-depth understanding and utilisation of databases within decision support systems while also acquiring knowledge in databases and data mining techniques, along with practical aspects of databases. This module aims to enhance your understanding of data mining techniques using Python, specifically focusing on the extraction, cleansing, and transportation of data in a format that is more conducive to decision-making and data administration. The acquisition of knowledge in the module on data administration and data mining enables students to make well-informed decisions pertaining to the data within a given system. This module aims to equip students with the skills necessary to discern and analyse trends and patterns within datasets, thereby facilitating informed decision-making.

Digital Image Processing

This module's aim is to provide students with an understanding of how image processing is used in the digital world and the ability to use a digital computer to process digital images using an algorithm. Beginning with an explanation of digital image processing techniques, the module enables students to acquire the knowledge necessary for enhancing images through processing. In addition, students will be empowered to demonstrate the ability to extract useful information from an image in order to make decisions based on it, choose an appropriate digital image processing technique, and effectively defend their choice. Finally, students will research and evaluate the use of commercial applications that incorporate digital image processing. Upon completion of the module, students should be able to design and implement a variety of digital image processing techniques and evaluate algorithms that implement these techniques.

Multi-agent Systems

This module's aim is to provide an in-depth understanding of multiagent systems (MAS), with a particular emphasis on their introduction, coordination, and control. It includes consensus, distributed intelligence in power systems, secure control, advanced consensus algorithms, cooperative control in networked power systems, and dynamic graphical games, as well as fundamental concepts, mathematical models, and practical applications related to MAS. This module explores multiagent systems, focusing on their theoretical foundations and practical applications. It covers a variety of topics, including graph theory and mathematical models for agent dynamics, advanced consensus algorithms, secure control, and cooperative control in networked power systems. Students will investigate a variety of MAS applications, including power systems, distributed energy resources, and microgrids. Students will gain a comprehensive understanding of MAS and their role in modern technology through theoretical discussions and simulation studies.



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Module Descriptors

Pattern Recognition in Robotics

This module shows how robotics can solve real-world problems using pattern recognition. This module covers pattern recognition basics and robotics applications. We emphasise data pattern and regularity identification methods in the face of increasing heterogeneous data structures across domains. This module uses real-world examples of pattern recognition for goal achievement to explain the convergence of AI and robotics. It balances theory and practice to boost your confidence in solving real-world problems. This module should familiarise you with robotic pattern recognition tools and methods. Simulations using hands-on approaches to real-life robotic solutions should demonstrate your understanding and application of advanced robotic topics like autonomous control, machine learning, and applied artificial intelligence.

Research Methodologies in IT Research

This module is designed to equip students with the essential research skills required in the field of Information Technology (IT). Students will learn about various research methodologies, including quantitative and qualitative approaches, experimental design, survey methods, and case studies. They will develop critical thinking and analytical skills necessary for designing, conducting, and evaluating IT research projects. This module will also cover ethical considerations in IT research.

Research Project

The research project is the capstone of the programme, allowing students to conduct in-depth research on a chosen robotics topic. Under the guidance of faculty and industry experts, students will define research objectives, conduct experiments, collect and analyse data, and present their findings. This module will challenge students to push the boundaries of robotics knowledge and innovation, preparing them for careers in cutting-edge research or industry leadership.

Service-oriented and Microservices Architectures

In today's IT landscape, service-oriented and microservices architectures have become central to the development of scalable and maintainable software systems. This module will provide an in-depth understanding of these architectural paradigms. Students will explore the principles of designing and implementing services, containerization, and orchestration. Practical aspects such as RESTful APIs, service discovery, and scaling microservices will also be covered. Students will gain hands-on experience in building and deploying microservices-based applications.