



Bachelor of Science in Computer Science

SAQA ID 120721 NQF Level 7

🕒 Mode and duration

Contact

Full-Time (Campus)

- Minimum: 3 years
- Maximum: 5 years

Part-Time (Online)

- Minimum: 5 years
- Maximum: 7 years

☰ Qualification description

Future-proof your IT expertise with the Bachelor of Science (BSc) in Computer Science, a broad, rigorous, and academically challenging programme designed to equip students with a strong foundation in the theory and practice of computer science.

Graduates of this qualification will have acquired a wide range of knowledge and skills in the field, enabling them to understand core computer science concepts, programming proficiency, problem-solving skills, mathematical and theoretical foundations, database management, operating systems and computer networks, the software development lifecycle, artificial intelligence techniques, cybersecurity, ethical and professional responsibilities, a capstone project, as well as business management and entrepreneurship.

The degree'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 fundamental information technology proficiencies.

Upon successful completion of the BSc in Computer Science, graduates are well-prepared for various career paths and research in the field of computer science. They may also pursue advanced degrees, such as a BSc Honours in IT, for further specialisation and research opportunities.

This qualification is offered at the following campuses:

- Midrand

✓ Entry requirements

1. South African National Senior Certificate (NSC) with Bachelor's degree endorsement.
2. Or a National Certificate (Vocational) level 4 issued by the Council of General and Further Education and Training with Bachelor's degree endorsement.
3. Or a letter or certificate confirming an exemption from Universities South Africa (USAf) for any other school-leaving results.
4. Or completion of a Bachelor's degree.
5. Or completion of a relevant Foundation Programme along with a letter or certificate of exemption from Universities South Africa (USAf).
6. Or completion of a relevant Higher Certificate.
7. Or completion of the BSc IT Access programme
8. And 32 Eduvos points or more.
9. And a minimum of 50% in English Language on Grade 12 or equivalent.
10. And points attained for the best two of the subjects of English, Mathematics and Computer Science/Information Technology must be doubled.
11. And a minimum of 50% in Mathematics on Grade 12 or equivalent.
 - A student with Mathematics (less than 50% but greater than or equal to 40%) is required to register for and complete Maths for Computing (ITMCA0) before attempting Mathematics 1A (ITMTA1).

📁 Possible career options

Are you enthusiastic about technology in the twenty-first century? The potential career paths available to individuals who have obtained a Bachelor of Science degree in Computer Science are diverse and encompass a wide range of options:

- Cloud Computing Specialist
- Cybersecurity Analyst/Engineer
- Embedded Systems Engineer
- Micro-controller Programmer
- Entrepreneur/Startup Founder
- IT Project Manager, IT Consultant, Researcher/Academic
- Machine Learning Engineer
- Network Administrator/Engineer
- Software Developer/Engineer
- Software Quality Assurance (QA) Engineer
- Systems Analyst, Database Administrator
- Technical Support Specialist
- Web Developer, Mobile App Developer

📄 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

The fundamental principles of computer science are introduced to students.

- AI Ethics and Privacy
- Cloud Based Technologies
- Computer Network and Security*
- Computer Network Technologies **
- Computer Skills (Microsoft)
- Generic Algorithm Design
- Introduction to Programming using C++
- Linux-based Operating System
- Mathematics 1A & 1B
- Non-Technical Skills for IT Professionals
- Object-Oriented Programming using C++

* Optional: A+ CompTIA Certification Voucher

** Optional : Network+ CompTIA Certification Voucher

Year 2

Students acquire a proficient level of knowledge and skills in the field of computer science.

- Advanced Networking
- Artificial Intelligence Techniques
- Computer Architecture Essentials
- Data Structures and Algorithms in C#
- Database Systems
- Digital Electronics and Microcontrollers
- IT Project Management
- Network Security
- Object-Oriented Programming in C#
- Software Design

Year 3

Students acquire an advanced level of proficiency and expertise in the field of computer science.

- 4IR Technologies
- Business Management and Entrepreneurship
- Object Oriented and Distributed Programming in Java
- Object Oriented Systems Analysis and Design
- Operating Systems
- Project
- Social Practices and Security
- Web Development and e-Commerce



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Module Descriptors

Year 1

AI Ethics and Privacy

This module provides students with the necessary knowledge and skills to effectively address the ethical and privacy concerns that arise in the dynamic field of artificial intelligence. It aims to equip students with the ability to contribute responsibly to the development and implementation of AI in diverse professional settings.

Cloud Based Technologies

This module offers students a comprehensive examination of cloud concepts, AWS core services, pricing, security measures within the AWS environment, and a selection of AWS products and features that can be utilised to achieve security goals. Additionally, it covers architectural best practises for creating and managing dependable, secure, efficient, and cost-effective systems in the cloud, as well as the support available for these core services.

Computer Network and Security

The module teaches students how to build, support, and upgrade computer hardware, peripherals, primary networks, and provide customer support. Students will comprehend the functions and components of desktop and portable computers, recommend and build custom systems, disassemble and reassemble systems, set up printers, perform maintenance, practice safety, and interact professionally with customers. as well as explore fundamental networking and internet principles.

Computer Network Technologies

This module examines the broad topic of networking, building on the knowledge of computer networks and security. It looks at the different types of networks, their structure, how models explain how data travels over networks, the various media and devices used to move data, the underlying principles of protocols, addressing schemes, services, and standards, as well as the tools and techniques used to manage, monitor, troubleshoot, and secure networks.

Computer Skills (Microsoft)

This module provides students with practical computer skills, with an emphasis on Microsoft software applications. By the end of the module, students should have developed an understanding of information communications and technology (ICT) and be proficient in using Microsoft Word, Excel, PowerPoint, Access, and Outlook for a variety of academic and professional tasks.

Generic Algorithm Design

This module enhances students' comprehension of the intricate process of designing and implementing algorithms in the form of computer programs. It encompasses the foundational principles of basic data structures, parameters, control structures, arrays, records, functions, object-oriented programme design, and file concepts.

Introduction to Programming using C++

This module enhances students' comprehension of the intricate design and execution of algorithms in the form of programs. It encompasses the foundational aspects of basic data structures, parameters, control structures, and functions in the programming language C++.

Linux-based Operating System

Students will learn about Linux's origins in this module. They'll learn how to install, configure, and log out of Linux. GNOME will also be taught to students. They will learn to use the powerful command-line interface and explore files and directories. This module also covers text editor functions and Linux terminal and command usage for directories and files. The module concludes with skills to redirect input and output and control Linux processes.

Mathematics 1A

This module equips students with the solid mathematical foundation required for a variety of IT and computer science disciplines. The module covers the properties of graphs and functions, limits and their relationship to derivatives, calculating derivatives using various derivative rules, derivative application problems, and the concept of integration.



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Mathematics 1B

Building on the foundation of Mathematics 1A, this module introduces different techniques of integration and mathematical reasoning while providing knowledge of the fundamentals of calculus and its application. This module helps develop the students' ability to understand the concepts of calculus and to evaluate and apply derivatives and their integrals.

Non-Technical Skills for IT Professionals

Students will develop essential non-technical skills for IT professionals in this module. These skills, which are essential for success in IT roles, include effective communication, research and presentation skills, cultural sensitivity, personality profiles and emotional intelligence, self- and stress management, team dynamics, conflict negotiation and assertiveness, and time management.

Object-Oriented Programming using C++

Building on the foundation laid in Introduction to Programming with C++ and provides the student with the ability to program in an object-oriented programming environment using C++. Students will learn the fundamentals of C++, including coding, debugging, and error handling. They will learn how to use and design user-friendly programs, as well as how to manipulate data structures, variables, arrays, records, stacks, pointers, and classes.



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Year 2

Advanced Networking

This module is designed to equip students with the knowledge and skills necessary to install, configure, operate, and troubleshoot small to medium-sized enterprise networks. This module provides a comprehensive understanding of networking principles, Cisco networking technologies, and the ability to work with Cisco devices. Topics covered include introduction to networking, network fundamentals, Cisco router and switch configuration, internet protocol (IP) routing, switching technologies, network services, security fundamentals, WAN (wide area network) technologies, wireless networking, as well as network management and troubleshooting.

Artificial Intelligence Techniques

This module offers a comprehensive examination of different techniques and methodologies employed in the field of artificial intelligence (AI). Its objective is to equip students with the knowledge and skills necessary to comprehend, implement, and utilise AI solutions in practical scenarios. It encompasses various areas of AI, such as machine learning, natural language processing, computer vision, expert systems, robotics, knowledge representation and reasoning, and reinforcement learning.

Computer Architecture Essentials

This module introduces the student to computer architecture through the use of a Raspberry Pi. It will introduce students to assembly programming language for low-level development. It illustrates the use of low-level graphics programming. It will elaborate on how to manipulate sounds and use Raspberry Pi's GPIO pins to create drums. Students will integrate the Raspberry Pi with microcontrollers from third Parties, and will be required to create projects based on their acquired knowledge. Students will create miniature versions of real-world projects using microcontrollers, assembly, and Raspberry Pi.

Data Structures and Algorithms in C#

This module is intended to give students a solid foundation in data structures and algorithmic problem-solving techniques. It emphasises the importance of using the C# programming language to select and implement appropriate data structures and algorithms to optimise programme efficiency and solve real-world computational problems. The following topics are covered: introduction to data structures and algorithms, arrays and lists, stacks and queues, recursion and recursive algorithms, sorting and binary trees, graphs and graph algorithms, dynamic programming, and algorithm design paradigms.

Database Systems

This module introduces database development, database modelling with entity relationship diagrams and advanced concepts, database normalisation, database interaction via the web, database administration and security, transactions, and concurrency to students. It also focuses on SQL, distributed databases, and decision support databases. Introduction to databases, data modelling, relational databases, database design and implementation, data integrity and security, querying databases, transaction management, database administration, NoSQL and NewSQL databases, database applications, and database trends are some of the topics covered.

Digital Electronics and Microcontrollers

The primary objective of this module is to provide students with a thorough comprehension of essential principles in digital electronics and the practical implementation of systems based on microcontrollers. This comprehension will be accomplished by providing students with both theoretical and practical instruction. The scope of the material includes the fundamental principles of digital logic and electronic circuits, in addition to the more practical aspects of Arduino programming and the establishment of connections between microcontrollers for the purpose of developing embedded systems.



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IT Project Management

Students will gain an understanding of project management in an organisational context, including the project management knowledge areas and project management life cycle, as well as the project framework and fundamental principles and processes related to some of the project management knowledge areas. Included are project role players, project coordination and control, project management software, the change control procedure, project termination and closure. Students will apply a variety of project management skills, methods, and tools pertinent to specific knowledge domains.

Network Security

The primary objective of this module is to furnish students with an all-encompassing comprehension of the fundamental principles and practises pertaining to network security, specifically within the framework of Cisco networking technologies. This comprehensive study encompasses a range of network security elements, encompassing potential risks, weaknesses, and protective measures, with a specific emphasis on the execution and administration of security protocols within Cisco networks.

Object-Oriented Programming in C#

This module is designed to introduce students to the principles and practices of object-oriented programming using the C# programming language. Students will learn how to create, design, and implement object-oriented solutions to real-world problems, fostering software development skills that are essential in modern software engineering.

Software Design

This module is designed to equip students with the knowledge and skills needed to design high-quality software systems. It emphasises the importance of good design practices in creating efficient, maintainable, and scalable software applications. Topics covered include introduction to software design, software requirements analysis, architectural design, design patterns, object-oriented design, component-based design, user interface (UI) design, software design tools and notations, software design best practices, design for testing and debugging, and design documentation.



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4IR Technologies

This module is designed to explore the transformative technologies that are shaping the Fourth Industrial Revolution (4IR). It provides an in-depth understanding of various 4IR technologies and their potential impact on industries, businesses, and society as a whole. Students will gain insights into the principles, applications, and challenges associated with these technologies. Topics covered include introduction to the Fourth Industrial Revolution, artificial intelligence (AI), Internet of Things (IoT), blockchain technology, robotics and automation, quantum computing, cybersecurity in the 4IR, digital transformation and industry 4.0, as well as ethical and societal implications.

Business Management and Entrepreneurship

This module is designed to provide students with a comprehensive understanding of essential concepts, skills, and strategies related to business management and the advancement of entrepreneurship. Students will explore the core principles of effective business management and the entrepreneurial mindset required for the successful establishment and sustained profitability of ventures. Upon completion of this module, students will have acquired practical skills, developed critical thinking capabilities, and cultivated an entrepreneurial mindset that can be effectively utilised in diverse business environments, including both entrepreneurial endeavours and established organisations.

Object Oriented and Distributed Programming in Java

This module is designed to provide students with a comprehensive understanding of object-oriented programming concepts and techniques and their application to the development of distributed systems using the Java programming language. Topics covered include introduction to Java programming, Java basics, object-oriented programming (OOP), exception handling, collections and generics, file I/O and serialization, concurrency and multithreading, Java networking, distributed systems concepts, remote method invocation (RMI), JavaFX basics, and Java database programming.

Object Oriented Systems Analysis and Design

The purpose of this module is to equip students with the critical knowledge and skills to effectively analyse, design, and model software systems by employing object-oriented principles and methodologies. Topics covered include introduction to systems analysis and design, requirements engineering, object-oriented concepts, unified modelling language (UML), use case modelling, system modelling, object interaction, modelling design patterns, object-relational mapping (ORM), architectural design, system testing and validation, agile and iterative development.

Operating Systems

This module provides students with a comprehensive understanding of computer operating systems, their design, components, and management. It covers the core concepts and functions of operating systems, with an emphasis on their role in managing hardware resources and providing a stable platform for software applications. By the end of this module, students will be able to evaluate an operating system (OS) with regards to different management systems by applying different policies and algorithms to given data, model the business and other non-software systems, explore alternative designs, and validate the architectural design of software.

Project

Students will acquire essential skills in the design and administration of a software project, including the initial phase, development of functional prototypes, and production of user documentation. Upon successful completion of the module, students will acquire the capacity to comprehend the process entailed in formulating a project proposal. They will also possess the skill to construct design models with accuracy and coherence, along with the necessary knowledge and expertise to develop comprehensive design and testing specifications. Furthermore, students will demonstrate proficiency in conceptualising, planning, and executing website and mobile application design and development. Lastly, they will attain a comprehensive understanding of the process involved in compiling project documentation.



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Social Practices and Security

Students will learn how to make informed managerial and technical information security decisions in this module. They will examine security risk management and reduction methods, as well as understand business security needs and security principles, evaluate legal and ethical issues, apply risk management, understand risk control strategies, learn security blueprints and security technology, implement new IT security technologies, learn how to use cryptography, and apply hacker methods.

Web Development and e-Commerce

This module is designed to equip students with the practical skills and critical knowledge required to develop interactive and dynamic websites and e-commerce platforms. It covers web development technologies, programming languages, design principles, and best practices necessary for building effective web applications and online stores. Topics covered include: introduction to Web development, HTML (Hypertext Markup Language), CSS (Cascading Style Sheets), JavaScript programming, Web development frameworks, database integration, server-side scripting, content management systems (CMS), security in Web development, Web performance optimization, Web accessibility and usability, e-Commerce fundamentals, creating an e-commerce Website, search engine optimization (SEO), and Web hosting and deployment.