Faculty of
Information Technology

Eduvos
Your Education. Your Future

Bachelor of Science in Information Technology (Security and Network Engineering)

SAQA ID 120690 NQF Level 7

Mode and duration

Contact

Full-Time (Campus)
- Minimum: 3 years
- Maximum: 5 years

Full-Time (Online)
- Minimum: 3 years
- Maximum: 5 years

Part-Time (Online)
- Minimum: 5 years
- Maximum: 7 years

Qualification description

Be on the cutting edge of digital innovation with the Bachelor of Science in Information Technology (BSc IT) with a Specialisation in Security and Network Engineering, a broad and rigorous undergraduate qualification designed to equip students with the knowledge and skills necessary to work in the field of information technology, with a specific focus on security and network engineering.

The BSc IT (Security and Network Engineering) is a specialised undergraduate degree programme that combines knowledge and skills in information technology, cybersecurity, and network engineering. It is structured to prepare students for careers in the rapidly evolving field of information technology, with a particular emphasis on the security and reliability of computer networks and systems.

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 IT (Security and Network Engineering), graduates are well-prepared to tackle the evolving challenges of securing digital information and managing complex network infrastructures in various industries. They may also pursue advanced degrees (e.g., BSc Honours in IT) for further specialisation and research opportunities.

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. A student with Mathematics Literacy (50% or more) or with Mathematics (less than 50%, but greater than or equal to 30%) is required to register for and complete Maths for Computing (ITMCA0) before attempting Mathematics 1A (ITMTA1).

Possible career options

Graduates of this program are well-prepared for a wide range of career opportunities, including but not limited to:
- Cybersecurity Analyst, Cybersecurity Consultant
- Entrepreneur/Startup Founder, Security Architect
- Information Security Specialist
- Network Security Engineer, Penetration Tester
- IT Project Manager, IT Consultant, Researcher/Academic
- Network Administrator/Engineer, Systems Administrator
- Systems Analyst, Database Administrator
- Technical Support Specialist, Cloud Computing Specialist

This qualification is offered at the following campuses:

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

Students are introduced to the fundamental principles of BSc IT (Security and Network Engineering).

- AI Ethics and Privacy
- Cloud Based Technologies
- Computer Network and Security*
- Computer Network Technologies**
- Computer Skills (Microsoft)
- Introduction to Information Systems
- Introduction to Programming
- Linux-based Operating System
- Mathematics 1A & 1B
- Non-Technical Skills for IT Professionals
- Procedural Programming

* Optional: A+ CompTIA Certification Voucher
** Optional : Network+ CompTIA Certification Voucher

Year 2

Students develop a high level of expertise and competence in the domain of BSc IT (Security and Network Engineering).

- Advanced Networking
- Database Systems
- Enterprise Network Management
- IoT Wireless Networks
- IT Project Management
- Mobile Computing
- Network Security
- Python Network Programming
- Security Analysis of IoT Networks and Platforms
- Web Server Management

Year 3

Students develop a high level of competence and specialised knowledge in the discipline of BSc IT (Security and Network Engineering).

- 4IR Technologies
- Business Management and Entrepreneurship
- Ethical Hacking and Penetration Testing
- Object Oriented Systems Analysis and Design
- Operating Systems
- Project: Cyber Security
- Research Design and Methodology
- Risk Analysis and Cyber Security Assessments

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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.

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.

Introduction to Information Systems
This module offers students a fundamental comprehension of information systems and their significance in contemporary organisations. In the current era of digitalization, information systems play a pivotal role in facilitating business processes, enhancing decision-making capabilities, and fostering competitiveness. In this module, students will engage in an exploration of fundamental concepts, advanced technologies, and practical applications pertaining to information systems.

Introduction to Programming
This module is designed to equip students with the necessary skills and nowledge to navigate the realm of programming. It aims to establish a solid understanding of fundamental programming concepts, enabling individuals to effectively utilise different platforms for the development of practical applications. This entails proficiency in programming languages such as C#, C++, and Java.

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.

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.

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Module Descriptors

Procedural Programming
The purpose of this module is to provide students with an in-depth understanding of the fundamental principles that form the basis of procedural programming. Additionally, it aims to enable students to create and implement procedural programming solutions. Upon completion of this module, students will possess the ability to create, execute, and evaluate procedural programming solutions.

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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.

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.

Enterprise Network Management
Students will learn the principles, practises, and tools needed to efficiently design, deploy, secure, monitor, and manage complex enterprise networks in this module. It emphasises network management basics like scalability, reliability, security, and performance. Students will practise network management tools and best practises while learning about enterprise network protocols, devices, and technologies. Through practical exercises and projects, students will use network simulation tools, configure network devices, and develop network management strategies. Students will also be able to design, implement, and manage enterprise networks that meet modern organisations' diverse needs while ensuring security and reliability.

IoT Wireless Networks
This module introduces students to the principles, protocols, and technologies of wireless communication systems on the Internet of Things (IoT). This module explains how IoT devices wirelessly communicate to enable data exchange and remote control across applications. Students will learn IoT wireless network fundamentals, protocols, security, and trends. Hands-on exercises, simulations, and projects will help students configure, deploy, and troubleshoot IoT wireless networks throughout the module. Students will also learn to design, implement, and manage wireless communication solutions for various IoT applications.

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.

Mobile Computing
This module gives students a deep understanding of mobile computing principles, technologies, and challenges. In today's interconnected world, smartphones and tablets are essential to personal and professional life. This module covers mobile computing's fundamental concepts, protocols, and applications. It also emphasises design and security for robust mobile systems. By the end of this module, students will understand mobile computing's fundamentals, technologies, and security issues and be able to design and develop mobile apps. This knowledge is invaluable in today's interconnected world.

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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.

Python Network Programming

Recently, large and small computer networks have become more software-driven. This module is built on Python to help network engineers automate. Students will be introduced to Python before networking. Thus, students can network with Python. After this module, students will be proficient in Python network engineering. Student experience with sockets, IPv4, and simple client/server programming will come from Python network creation and automation. Students will get hands-on experience with multiplexing socket I/O, IPv6, domain sockets, and network interfaces. HTTP, email protocols, FTP, CGI programming, screen-scraping, machine boundaries, XML, Web services, and network monitoring/security will also be covered.

Security Analysis of IoT Networks and Platforms

Students will learn about the unique security challenges and vulnerabilities of IoT networks and platforms in this module. To ensure data and service confidentiality, integrity, and availability, this module assesses and mitigates IoT security risks. Hands-on exercises and real-world case studies will teach students about IoT architecture, protocols, and devices and help them identify and address security threats. Students will participate in labs, simulations, and projects that simulate IoT network security scenarios throughout the module. Students will also be able to critically assess IoT networks and platforms' security, apply best practises to mitigate vulnerabilities, and design and deploy secure and resilient IoT systems.

Web Server Management

Students will gain the knowledge and skills necessary to effectively plan, deploy, configure, and manage web servers through the completion of this module. It covers a wide range of topics pertaining to web server technology, such as the various types of web servers, server operating systems, security, performance optimisation, and troubleshooting. Students will acquire hands-on experience in the installation and maintenance of web server environments.

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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.

Ethical Hacking and Penetration Testing
Students will learn the principles, tools, and techniques ethical hackers and penetration testers use to assess and improve computer system and network security in this module. This module emphasises security testing to identify and fix vulnerabilities and discusses hacking ethics and law. Students will learn to think like attackers to defend against cyberattacks. Students will practise ethical hacking in controlled environments, perform penetration tests, and secure systems and networks throughout the course. Students will also know how to identify and fix security vulnerabilities, making the internet safer.

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: Cyber Security
This module teaches students to analyse and defend medium-to-large information systems against vulnerabilities and create cyber security documentation. This module has two parts: First, students will learn penetration testing and cyber security analysis using various security technologies. After an approved proposal, students will analyse, design, develop, and implement a secured information system to meet user needs and submit a mini-dissertation.

Research Design and Methodology
The purpose of this module is to equip students with the knowledge and skills necessary to effectively plan, conduct, and evaluate research. It provides students with a comprehensive understanding of various research paradigms, methodologies, and techniques, enabling them to become proficient researchers in their respective fields. Topics covered include understanding research foundations, research design, research methods, data analysis techniques, and ethical considerations.

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Risk Analysis and Cyber Security Assessments
This module teaches students how to identify, assess, and mitigate cybersecurity risks in organisations. Risk management methods are emphasised in this module to promote proactive cybersecurity. Students will learn to assess security vulnerabilities, conduct cybersecurity assessments, and create risk mitigation plans to protect critical assets and data. The course includes practical exercises, simulations, and case studies to apply risk analysis and assessment methods to real-world situations. Students will also be ready to assess and manage cybersecurity risks and improve organisation security.