	BQA NCQF QUALIFICATION TEMPLATE	Document No.	DNCQF.P01.GD02
		Issue No.	01
		Effective Date	01.08.2022

SECTION A:	QUALIFICATION DETAILS		

QUALIFICATION DEVELOPER (S)	Institute of Development Management		

TITLE	Bachelor of Science in Computer Networks and Security	NCQF LEVEL	7

STRANDS (where applicable)	N/A		

FIELD	Information and Communication Technology	SUB-FIELD	Information Technology	CREDIT VALUE	489

New Qualification		✓	Legacy Qualification	

SUB-FRAMEWORK	General Education		TVET		Higher Education	✓

QUALIFICATION TYPE	Certificate	I		II		III		IV		V		Diploma		Bachelor	✓

	Bachelor Honours		Post Graduate Certificate		Post Graduate Diploma	
	Masters			Doctorate/ PhD		

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![Botswana Qualifications Authority logo]	**BQA NCQF QUALIFICATION TEMPLATE**	Document No.	DNCQF.P01.GD02
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RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE:

Computer Network management and security is one of the degrees in Information Technology that prepares one to protect corporations, small businesses, government agencies, public schools and individuals from computer viruses and cyberattacks. Through a computer networking degree, one can develop technical and risk-management expertise, along with strong business knowledge, develop and implement a plan to keep out unwanted intruders in an organisational network. Information and communication technology (ICT) is one of the cross-cutting issues as reverberated in the Education for All (EFA), the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDG's). Botswana is aligned and committed to the implementation of the National ICT Policy that will position Botswana for sustained growth in the digital age by serving as a key catalyst in achieving social, economic, political, and cultural transformation within the country (ETSSP, 2015). This commitment is subsequent to policies such as the Revised National Policy on Education (RNPE) (1994) and the Information Communication and Technology (ICT) Policy (2004) that emphasized the need for integration and sustainability of ICT in both the education system at the national level. The Government of Botswana has long realized the critical role of Information and Communication Technology (ICT) in economic development. This was consolidated and articulated in the National Information Technology Policy of 2007, commonly referred to as *Maitlamo* which presents ICT as a key driver of social, economic, cultural, and political transformation.

The Thuto Net strategy under the Ministry of Education and Skills Development aims to use ICT as an enabler to enhance the teaching and learning process through E-learning.

The Education and Training Sector Strategic Plan (ETSSP 2015-2020) which sets out to improve the performance of the education sector views ICT as a driver of all the key initiatives and hence sets out to utilize and integrate ICT in the education sector. Similarly, all other sectors are repositioning themselves to optimize

the use of ICT for enhance their performance and contribute to the envisaged transformed Botswana characterized by sustainable economic growth.

Botswana Vision 2036 acknowledges Information and Communication Technology as a key contributor to economic growth by enabling private and public sector employment growth opportunities (Page 17). Cybersecurity and ICT security skills have been identified as being in high demand by HRDC (2016) based on the labor market analysis conducted by the HRDC.

This qualification aims to develop learners with necessary knowledge, skills, and practical experience to enable them to meet this challenge, initiatives, and market demand. The modules provided will equip learners with skills and knowledge in computer networks and computer security.

This qualification focuses on both technical and management aspects of computer networks and security that includes enough technical detail to thoroughly introduce learners to the critical components of networks and security to specialize in this field after adequate practical experience in the field. A balanced combination of modules ensures that learners develop a clear vision of business and the role of IT and network infrastructure as the backbone to support modern business.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to produce graduates with specialised knowledge, skills and competences to:

1. Apply appropriate networking tools, techniques and principles for the design and management of networks.
2. Apply appropriate counter measures to prevent, detect and stop various network breaches and cyber-attacks.
3. Conduct organizational operations within acceptable regulatory, policy and ethical framework.
4. Resolve IT system problems and meet the needs of end users by applying troubleshooting methodologies.
5. Identify, monitor, and define the requirements of the overall security of a system.

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MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

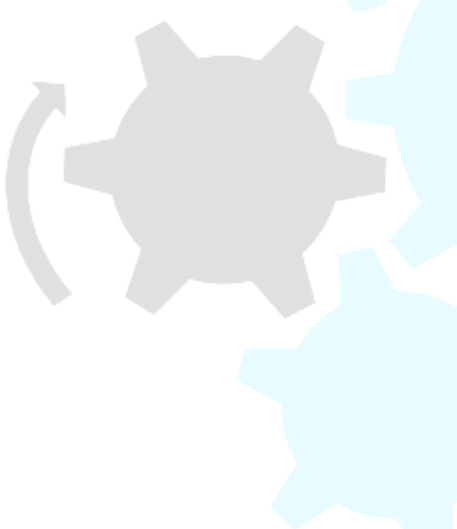The normal entry requirement into the program shall be:

- Certificate IV (NCQF Level IV with) or equivalent.

- There will be a provision for admission through Credit Accumulation and Transfer (CAT) and National Recognition of Prior Learning (RPL) Policies.

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SECTION B	QUALIFICATION SPECIFICATION

GRADUATE PROFILE (LEARNING OUTCOMES)	ASSESSMENT CRITERIA
LO 1 Apply academic management skills and professional communication.	1.1 communicate effectively and professionally to stakeholders and the public including persons from diverse backgrounds. 1.2 Be able to read, understand, and apply written material such as short correspondence and memos in alignment with processes and policies. 1.3 Apply the requisite academic communication skills in their essay writing and other forms of academic writing. 1.4 Use various computer-mediated communication platforms in their academic and professional work. 1.5 Relate to the interpersonal and organizational dynamics that affect effective communication in organizations.
LO 2 Apply knowledge and application skills in Microsoft application	2.1 Create documents and save them in different file formats. Choose built-in options, such as the Help function, to enhance productivity. 2.2 Create mathematical and logical formulas using standard spreadsheet functions. 2.3 Create and edit small-sized word and excel processing documents that will be ready to share and distribute. 2.4 Apply different formats to documents to enhance them before distribution; recognize good practice in choosing the appropriate formatting options. 2.5 Create tables, images, and drawn objects into documents. 2.6 Prepare documents for mail merge operations.

	2.7 Adjust document page settings.
LO 3 Develop strategic vision and plans for the full suite of offerings, including where to partner and what programs to build based on a deep understanding of entrepreneurship and venture creation needs and the resources available for start-up ecosystems	3.1 Develop an entrepreneurial mindset to deal with high uncertainty in market environments. 3.2 Acquire the knowledge and spirit for new business venturing. 3.3 Build skills and abilities in entrepreneurship and new venture creation 3.4 Develop strategic goals and manage team and resources to achieve those goals. 3.5 Work with Partnerships & Advancement to develop short and long-term funding strategies. 3.6 Plan, organize resources, assign, and delegate activities and measure results to achieve organization's expectations. 3.7 Ensure team is achieving set goals.
LO 4 Design, implement, and administer local-area and wide-area networks to satisfy organizational goals.	4.1 Apply computer network concepts using simulators. 4.2 Configure routing and switching in computer networks. 4.3 Apply network concepts in real life environment. 4.4 Create LAN and WAN simulation and logical design. 4.5 Design logical and physical network. 4.6 Create the hardware components for a wireless network. 4.7 Analyze the data transfer in a computer network. 4.8 Analyze the requirement of computer networks data. through Network Interface cards and hard drive access speeds.

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LO 5. Critically analyse computer network requirements and formulate solutions to business needs.	5.1 Create network simulation using network simulators.
	5.2 Analyze computer network scenario requirements.
	5.3 Create Computer Networking business process for the organization.
	5.4 Analyze key characteristics of computer network infrastructures.
	5.5 Illustrate different internet communication architectures.
LO 6. Critically analyze business and corporate strategies in the context of computer networking.	6.1 Analyze different business network strategies.
	6.2 Analyze the influence of changing strategies on each computer network strategy.
	6.3 Describe the importance of computer network.
	6.4 Identify external and internal factors that impact on the performance of the computer networking.
	6.5 Demonstrate awareness in IT funding strategies.
LO 7. Safeguarding the organization's network in line with business policies by safeguarding computer network infrastructure against network interruption and network threads.	7.1 Ensure proper and regular maintenance of firewalls.
	7.2 Make sure that web and email security protocols are maintained.
	7.3 Track, record, and monitor any security issue.
	7.4 Resolve any vulnerability or security issues that may arise.
	7.5 Ensure periodic testing of the organization's network and systems from a security point of view.
	7.6 Be aware of the latest threats in the cybersecurity domain to guide and advise the organization regarding the up gradation of systems.
	7.7 Make sure that security policies are updated on time and are always up to date.
	7.8 Maintain servers, routers, and switches as required.

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	7.9 Maintain firewalls, VPNs, VLANs, VoIP, and web and email security programs and protocols regularly.
	7.10 Maintaining LAN, WLAN, and architecture of the server as per the business policy.
	7.11 As a precautionary measure, analyze and implement new security protocols for greater efficiency against any threat or malfunctions.
	7.12 Implement a virus detection system beforehand for sound safety.
	7.13 Resolving the existing security issue including hardware malfunctions
	7.14 Tracking the vulnerable scripts to avert the potential threats.
LO 8. Manage and ensure that the databases run efficiently and securely.	8.1 Build database systems of high availability and quality depending on each end user's specialised role.
	8.2 Design and implement database in accordance to end users' information needs and views.
	8.3 Define users and enable data distribution to the right user, in appropriate format and in a timely manner.
	8.4 Use high-speed transaction recovery techniques and backup data.
	8.5 Minimise database downtime and manage parameters to provide fast query responses.
	8.6 Provide proactive and reactive data management support and training to users.
	8.7 Determine, enforce, and document database policies, procedures, and standards.
	8.8 Perform tests and evaluations regularly to ensure data security, privacy, and integrity.

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	8.9 Monitor database performance, implement changes, and apply new patches and versions when required
LO 9 Design and develop web-based applications and test them using appropriate test strategies.	9.1 Demonstrate use of various tools for Web Application Development. 9.2 Create data driven web application to meet design specifications. 9.3 Be able to create and deploy web services. 9.4 Design a website to address loosely defined requirements. 9.5 Develop test strategies and apply these to a website. 9.6 Create web page based on given systems requirements.

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SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	**TITLE**	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [5]	**Level [6]**	**Level [7]**	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Communications and Academic Writing Skills	5			12
	ICDL Computer Essentials	5			5
	ICDL Word Processing	5			5
	ICDL Spreadsheets	5			5
	ICDL Online Essentials	5			5
	Professional Communication		6		12
	Introduction to Entrepreneurship and Innovation			7	10
	Fundamentals of Venture Creation			7	10
CORE COMPONENT	Introduction to Information Systems		6		10
	Mathematics for Computing		6		10

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Subjects/Courses/ Modules/Units	Principles of Computer Networks		6		10
	Principles of Information Security		6		10
	Linux Administration		6		10
	Network Security I - Firewalls		6		10
	Introduction to Artificial Intelligence		6		10
	Database Management Systems and Its Practice		6		10
	Wireless Security		6		10
	Server Architecture and Administration		6		10
	Data Privacy and Protection		6		10
	Cloud Computing Security		6		10
	Cybersecurity I			7	15
	Information Technology Risk Management			7	15
	Information Technology Auditing			7	15

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	Network Security II- Firewalls			7	*20*
	Cybersecurity II			7	*20*
	Enterprise Network Security			*7*	15
	Ethical Hacking and Defence			7	15
	Network Routing and Switching			7	15
	Distributed Networks			7	*15*
	Network Management			7	*15*
	Managing Information Systems			7	*15*
	Digital Transformation			7	*15*
	IT Governance and Compliance			7	*20*
	Computer Forensics			*7*	*15*
	Research Project			7	*20*
	Internship			7	**30**

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ELECTIVE COMPONENT Subjects / Units / Modules /Courses	Machine Learning			7	15
	Data Analysis			7	15
	Financial and Regulatory Technologies			7	15
	Robotics			7	15

STRANDS/ SPECIALIZATION	Subjects/ Courses/ Modules/Units	Credits Per Relevant NCQF Level			Total Credits
		Level [5]	Level [6]	Level [7]	

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	Credit Value
5	32
6	132

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7	*325*
TOTAL CREDITS	***489***

Rules of Combination:

(Please Indicate combinations for the different constituent components of the qualification)

- This qualification will have at least 489 credits and take at least four years to complete including a full semester internship under the normal full-time mode of study.

- The credit combination for this qualification is from 64 fundamental components, 395 core components and the remaining 30 is from elective components, where candidates will choose any two.
- The 30 credits internship module, called the Internship module, may typically be done after the student has passed at least 459 credits worth of modules.

- The qualifications structure is premised on these rules of combination.

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ASSESSMENT ARRANGEMENTS

This qualification is assessed and moderated as follows:

Integrated Assessment:

Both formative and summative assessment processes are monitored during the qualification to determine competence at the end of the qualification. This is because assessment practices must be open, transparent, fair, valid, and reliable, and ensure that no learner is disadvantaged in any way whatsoever, an integrated assessment approach is incorporated into the qualification.

Summative assessment

Summative assessment based on learning outcomes leading to the award of the qualification will be done by means of a written examination (of at least 3 hours) at the end of every module (per module) contributing 60% of the overall mark.

Formative assessment- informs teaching and learning

Learners are continuously assessed to evaluate learner learning, knowledge, and proficiency which constitutes 40% of the overall module mark.

Internship Assessment

Summative assessments will be used to assess students during the internship where there will be tutor visits, a work supervisor's report and a final internship student report.

Moderation:

The moderation process of assessments focuses on ensuring the assessment is aligned with the module learning objectives and the learning outcomes.

Professional registration and accreditation

Assessors and moderators must have valid registration and accreditation with all or some of the relevant bodies such as Botswana Qualifications Authority (BQA).

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MODERATION ARRANGEMENTS

The moderation process of assessments focuses on ensuring the assessment is aligned to the module learning objectives and the learning outcomes.

Professional registration and accreditation

Assessors and moderators must have valid registration and accreditation with all or some of the relevant bodies such as the Botswana Qualifications Authority (BQA).

RECOGNITION OF PRIOR LEARNING

Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of RPL assessment for the award of credits towards the qualification in accordance with applicable RPL policies and relevant national-level policy and legislative framework. Implementation of RPL shall also be consistent with requirements, if any, prescribed for the field or sub-field of study by relevant national, regional, and international professional bodies.

CREDIT ACCUMULATION AND TRANSFER

CAT for the award of this qualification will be supported by institutional policies in line with national policies on CAT.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal articulation (related qualifications of similar level that graduates may consider)

Bachelor of Science in Computer Networks

Bachelor of Science in Mobile Applications

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Vertical Articulation- Pathways which the holders may progress to

Bachelor of Science (Hons) in Computer Networking

Bachelor of Science (Hons) in Network Security

Employment Pathways

System Administrator

Network Administrator

IT Entrepreneur

IT User Support

Systems Analyst

IT Consultant

Network Specialist

Cyber Incident Specialist

IT Manager

In the face of the declining job market, some graduates of the programme may consider self-employment as software developers, systems development and network support.

QUALIFICATION AWARD AND CERTIFICATION

Graduate will be awarded **Bachelor of Science in Computer Networks and Security** certificate after successfully completing 64 Credits of the Fundamental Component, 395 Credits of the Core component and 30 Credits of the Elective components.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

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The **Bachelor of Science in Computer Networks and Security** has a high level of similarity in structure and design with the qualifications referred to above in some of the leading universities of South Africa and United Kingdom

The qualifications were also comparable in terms of the target market; they were all geared towards upskilling Computer Networks and Security. In terms of assessments, there were slight variations in terms of the weightings for continuous assessment against final assessments, but all had components of assignments, projects, and final assessments. The duration of study is different ranging between three (3) - four (4) years of study, and subsequently the credits are different as well as the entry requirements in the different countries vary. What sets the qualification apart is that it has a wider scope of modules heavily focused on Computer Networks and Security based on the skills needed by the market identified by HRDC. The credit weight also set it apart as it has more credit value compared to others.

The course modules are similar even though they differ in names, but the content is similar. The qualifications have targeted the same educational pathways for aspiring graduates who want to be computer network and security specialists. The graduates' profiles also articulate similar outcomes and qualification objectives. The NQCF is at the same level.

Differences

Assessments strategies and weightage of different assessment components eg Continuous Assessment, Projects/Assignments and Exams are different.
The credit value is at 480.

The **Bachelor of Science in Computer Networks and Security** qualification will prepare the candidate for a successful career in this rapidly changing industry with opportunities under the following employment being:
Network Specialist, Network Technician, Network Administrator, Network Analyst, Information Technology Manager, Network Engineer,
Network Solutions Architect and various fields with the computer network and security domains.

Regionally

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1. Botho University - Bachelor of Science in Computer Networking (**Botswana Qualification Authority**, **2018**)

   NCQF Level: 7

   Credit Value: 480

Similarities:

The qualification offered by Botho University consists of modules offered by this qualification which are Databases, Computer Networks, Computer/Information Security, Entrepreneurship, Computer Mathematics and Communications and Academic Writing like, this qualification.

Differences:

The developed qualification shares many common modules with the benchmarked qualifications. However, this qualification has additional modules like Wireless Security, Computer Forensics, Linux Network Administration, FinTech, Server Management, Professional issues, and Ethics and ICDL which are not included in Botho University qualification.

Education and Employment Pathways

- Network Specialist.
- Network Technician.
- Network Administrator.
- Network Analyst.
- Network Manager.
- Network Engineer.
- Network Solutions Architect.

2. Botswana Open University – Bachelor of Technology in Information Systems

   NCQF Level: 7

   Credit Value: 480

Similarities:

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The qualification offered by Botswana Open University consist of modules offered by this qualification which are Databases Theory and Practice, Computer Networks, Computer/Information Security, Entrepreneurship, Computer Mathematics and Communications and Academic Writing similar to this qualification.

Differences:

This qualification shares many common modules with the benchmarked qualifications. However, this qualification has additional modules like, E-Business, Server Management, Professional issues and Ethics and ICDL which are not included under Botswana Open University qualification.

Education and Employment Pathways

- Database Management Specialist
- Systems developer
- Application Developer
- Web Developer
- Software Engineer & Analyst
- Software Business Entrepreneurs
- Research & Development (R&D) Engineer & Manager
- IT Sales & Marketing professional

3. UNISA **-** Bachelor of Science in Computing

Similarities:

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The qualification offered by UNISA consist of modules offered by this qualification which are Object Oriented Analysis, Programming Concepts, Databases Design, Computer Networks, Computer Networks similar to this qualification.

Differences:

This qualification shares many common modules with the benchmarked qualifications. However, this qualification has additional modules like , E-Business, Server Management, Professional issues and Ethics and ICDL which are not included under UNISA and it have modules like Numerical Methods, Techniques of Artificial Intelligence, Human Computer Interaction and Theoretical Computer Science which are not included in this qualification.

Internationally

Middlesex University London, Bachelor of Science Computer Networks and Security

Similarities:

Computer Networks

Computer Systems Architecture

Network Security

Database Theory and Practice

Computer Organisation and Architecture

IT Project

Differences:

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Fundamentals of Science, Technology, Engineering and Mathematics

Managing Information Systems Project

Enterprise Networking and Automation

Digital Transformation

IT Governance

Robotics

Machine Learning

Financial Technology and Regulatory

Data Analytics

REVIEW PERIOD

Every 5 years. However, the IT landscape is forever changing, and review of the qualification will provide a window for constant refining and updating where applicable, arising from legislative changes or stakeholder feedback.

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