QUALIFICATION SPECIFICATION							SECTION A
QUALIFICATION DEVELOPER	Limkokwing University of Creative Technology						
TITLE	Bachelor of Science in Information Technology			**NCQF LEVEL**	7		
FIELD	Information and Communication Technology		**SUB-FIELD**	Information Technology			
NEW QUALIFICATION	√	**REVIEW OF EXISTING QUALIFICATION**					
SUB-FRAMEWORK	General Education		TVET		Higher Education	√	
QUALIFICATION TYPE	Certificate		Diploma		Bachelor	√	
	Bachelor Honours		Master		Doctor		
CREDIT VALUE	**480**						

RATIONALE AND PURPOSE OF THE QUALIFICATION

Rationale

Botswana is a developing country, with a per capita GDP (PPP) of US$16,100 classifying it as an “upper middle-income economy. With the country striving to move to a “high income country”, the government continues to exert efforts to lure investment and improve infrastructure. Speaking at the 48th St Gallen Symposium in Switzerland on the future of work, artificial intelligence, challenges and opportunities of job creation in the fourth industrial revolution Honorable Kenewendo, Minister of Investment, Trade and Industry stated that “We recognise that innovation and productivity are keys to unlock high growth and catapult us to even become a high-income country,”. Such efforts by the country translate into continuing growth in various industries, ICT included as infrastructure is needed to house the various businesses.

Botswana Investment and Trade Centre (BITC) identifies ICT amongst investment opportunities, with key focus on:

- ICT investment in Botswana presents an opportunity for growth in R&D and global competitiveness in ICT.
- An objective of National ICT Policy is to utilise ICT to facilitate economic diversification and foreign direct investment (FDI).
- Infrastructure development: widespread fibre-optic network and e-government services
- Communications and security, e-health, e-education, e-tourism, including mobile access to e-government. (*https://www.gobotswana.com/sector/ict)*

The thrust of Vision 2016 was ‘prosperity for all’ through a strategy of employment creation. This theme was carried through to the NDP10 whose Mid-term Review identified six strategic factors to drive economic growth. Amongst these strategies was Information and Communications Technology, whose

thrust is to enhance employment creation by increasing the contribution of the private sector to the economy. *(Botswana Education & Training Sector Strategic Plan (ETSSP 2015-2020) pg 14)*

The Human Resources Development Council Top Occupations in Demand report of 2017 lists ICT occupations related to this qualification amongst those in demand:

- Computer Network Professionals
- ICT Sales Professionals
- IT Service Managers
- Systems Administrators

(Human Resources Development Council Top Occupations in Demand (2017) pg 5)

The National Development Plan 11 (2011-2016) expresses the need for information technology expertise by stating that "… *training of ICT personnel will continue to be accorded priority in order to enhance the sector's contribution to economic and export diversification, as well as the creation of high quality jobs.*"(p.80) and this strategic intuition is further confirmed by HRDC's Top 20 occupation of priority in the ICT sector by the (HRDC TOP OCCUPATIONS IN HIGH DEMAND report, December 2016) that *ICT Security Managers* are needed. This qualification, therefore, will fill the skills gap and provide the country with much needed expertise in the ICT industry.

Purpose

The qualification Bachelor of Science in Information Technology is designed to produce information and communication technology (ICT) specialists who can play a crucial role in designing, implementation and maintaining systems for industries in a variety of sectors, considering the role of information technology in driving and supporting innovation, fuelling small business start-up and growth and accommodating external environment and marketplace changes. With the advent adoption of technology by users, both corporate and individuals alike, the need for ICT specialists continues to grow.

The purpose of this qualification is to equip graduates with knowledge, skills and competencies to be able to:

- Analyse users' ICT needs to then design and develop ICT infrastructure to meet their specific needs.
- Apply policy and procedure in set-up, use and protection of ICT, use networks and data to develop protocol.
- Manage a team of individuals with different ICT expertise to develop and manage ICT projects within the scope of expectations.
- Analyse, design, implement, maintain and upgrade an organisation's ICT network to facilitate communication.
- Develop computer systems using variety of programming languages to integrate into and facilitate the organisation's operations.
- Analyse, design, develop and operate relational databases to perform complex data manipulations using database design and development skills.

ENTRY REQUIREMENTS (including access and inclusion)

- **Minimum entry requirements**

The minimum entry requirement for this qualification is NCQF Level IV Certificate with passes in English and any two social science subjects or equivalent.

- **Recognition of Prior Learning (RPL) and Credit Accumulation Transfer (CAT)**

Applicants who do not meet the above criteria but possess relevant performing arts industry experience may be considered through Recognition of Prior Learning (RPL) and Credit Accumulation Transfer (CAT) policies for access. This consideration will be done following guidelines of the ETP's policies which are aligned with National RPL and CAT policies.

QUALIFICATION SPECIFICATION **SECTION B**

GRADUATE PROFILE (LEARNING OUTCOMES)	ASSESSMENT CRITERIA
1. Demonstrate understanding of software development methodologies with emphasis on best practices, tools and techniques to analyse and design information systems.	1.1 Describe the major alternative methodologies used in developing information systems and the considerations involved in choosing which methodology to use. 1.2 Produce the requisite systems documentation at each point in the analysis and design of an information system, and to do so with clarity and completeness. 1.3 Analyse an organisation's need for information and to develop an appropriate strategy to solve the problem and provide the required information service. 1.4 Prepare and use various information gathering techniques for eliciting user information requirements and system expectations. 1.5 Interpret and construct and a variety of system description documents, including physical and logical data flow diagrams, entity-relationship diagrams, Structured English, structure charts, and decision tables, as well as screen, form, and report layouts. 1.6 Communicate effectively, in both written and oral forms, systems specifications, and to be persuasive in these presentations. 1.7 Develop a personal plan for improving oneself to become a better system professional or user/manager of a system, by understanding one's own strengths and weaknesses and matching those with the critical success factors of a modern business manager.
2. Model objects using the Object-Oriented Approach.	2.1 Analyse an organisation's need for new systems and conceptualize using OOA. 2.2 Select appropriate and situational tools and techniques for analysis i.e. functional, static and dynamic models.

	2.3 Design and implement appropriate techniques for using OOA to design i.e. static classes, packaging, data models. 2.4 Produce the requisite systems documentation at each point in the analysis and design of an information system, and to do so with clarity and completeness using OOA. 2.5 Construct and interpret a variety of system description documents, including physical and logical models. 2.6 Implement and demonstrate small to medium systems using OOA techniques.
3. Design and implement real life databases as well as access data through the use of SQL.	3.1 Describe how modern databases evolved from files and file systems. 3.2 Differentiate various types of data models. 3.3 Examine different kinds of relationships and how such relationships might be handled in the relational database environment. 3.4 Explain how ERD components affect database design and implementation. 3.5 Explain normalization and the role it plays in the database design process. 3.6 Use the basics of the SQL to manipulate database and table structures. 3.7 Evaluate and revise activities within a framework known as Database Life Cycle (DBLC) 3.8 Discuss the various concepts of database transaction management & concurrency controls. 3.9 Discuss the Distributed & Object-Oriented database design techniques. 3.10 Define and manipulate data using Advanced SQL.
4. Use an object-oriented programming language to solve computational problems by Object Oriented Approach	4.1 Develop and test Java programs with the correct syntax. 4.2 Design, compile and test Java programs that display objects, patterns and words. 4.3 Create methods that carry out tasks using Java programming. 4.4 Design and develop application using java programming. 4.5 Analyse and evaluate problem domains an object-oriented and distributable fashion including the use of UML. 4.6 Implement OO applications in Java using encapsulation, data hiding, inheritance and polymorphism to write compact, reusable, distributable code, and reuse existing class libraries to implement more substantial programs. 4.7 Use security models in security programming.
5. Create and develop database driven websites.	5.1 Design and develop databases using database packages. 5.2 Design and develop PHP pages and connect to the database. 5.3 Compile, run and debug errors in structured programs containing advanced language features.

	5.4 Use pre-defined sample codes and libraries to reduce programming workload. 5.5 Manipulate different databases using SQL language and statements.
6. Develop practical event driven programming skills to solve, create, adjust and modify an event driven program.	6.1 Design and develop a full application using Visual basic and either files or databases. 6.2 Correct error(s) that may be affecting an application. 6.3 Maintain application developed using visual basic.
7. Interpret law and how it impacts on computer technology.	7.1 Explain the concept of cyber law. 7.2 Define all relevant legal terms in information technology law. 7.3 Illustrate the features of internet and relevant law that governs the internet. 7.4 Explain the concept of e-rights. 7.5 Differentiate between available e-rights and know the law that governs each of the e-rights. 7.6 Discuss the concept of e-contract. 7.7 identify any relevant issues as regards e-contract and legal rules that governs the same 7.8 Apply the relevant law to the issues such as e-contract. 7.9 Discuss the concept of computer crimes and identify types of offences in computer crimes. 7.10 Explain the concept of privacy protection. 7.11 Identify some legal problems that may arise in business (e.g. digital signature & the law of contract and some ability to predict how a legal problem might be solved).
8. Demonstrate practical understanding and application of data communication concepts to analyse user data communication needs, design and develop relevant network systems.	8.1 Apply fundamental Communication Concepts to all types of data communication systems – application layer, physical layer, data link layer, transport and network layer. 8.2 Explain various data communications hardware like analog and digital modems, multiplexers, data switches, network adapter cards, Ethernet and Token Ring components, etc. 8.3 Identify how the Web and e-mail work. 8.4 Discuss Protocols & Standards like OSI, TCP, IP, UDP, etc 8.5 Recognize network topologies either LAN or WAN that are comprised of servers, clients, hubs, switches, routers, etc. 8.6 Describe and analyse and the current/recent data communication development.
9. Configure, manage, maintain, and troubleshoot computer hardware and software in the workplace to improve and ensure organisational effectiveness and efficiency.	9.1 Describe the basic systems inside a PC-based computer. 9.2 Tear down and re-assemble a PC. 9.3 Customize configuration or modify hardware for improved performance. 9.4 Perform preventive maintenance on personal computer components. 9.5 Install, configure, optimize and upgrade operating systems. 9.6 Identify tools, diagnostic procedures and troubleshooting techniques for operating systems.

	9.7 Perform preventative maintenance for computer security. 9.8 Explain the importance of safety and environmental issues. 9.9 Use good communication skills and demonstrate professionalism while working with customers and colleagues.

1.0 QUALIFICATION STRUCTURE		SECTION C	
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	**Title**	**NCQF Level (1-10)**	**Credits**
	1. Object-Oriented Techniques	6	10
	2. Multimedia Technology	6	10
	3. Multimedia Authoring	7	10
	4. Mobile Commerce Systems	6	10
	5. Event Driven Programming	6	10
	6. Object Oriented Programming	7	20
	7. Web Programming Techniques	7	10
	8. Discrete Structures	7	10
	9. Report Writing Skills for I.T.	7	10
	10. Operating Systems	7	10
	11. Networking Administration	7	15
	12. IT Project Management	7	10
	13. Ethics & Professional Conduct	7	10
CORE COMPONENT Subjects / Units / Modules /Courses	1. Introduction to Computer Skills	5	10
	2. Principles of Programming Logic & Design	5	10
	3. Computerized Mathematics	5	10
	4. Principles of Structured Programming	6	10
	5. Introduction to Computer Hardware	6	10
	6. Principles of Software Engineering	6	10
	7. Database Systems	7	20
	8. Fundamentals of Computer Systems	7	10
	9. Web Design	6	20
	10. Introduction to Information Systems	6	10
	11. Human Computer Interaction	7	10
	12. Data Communications & Networking	7	20
	13. Systems Analysis and Design	7	10
	14. Industrial Attachment	7	30
	15. Security Implementation & Management	7	10
	16. Computer Maintenance & Upgrade	7	10
	17. Practical Project	7	25
	18. Distributed Systems	7	10
	19. Creative and Innovation Studies	5	10
	20. Business Communication	5	10
	21. Introduction to Business Management	5	10
	22. Communication in New Economy	6	10
	23. Probability & Statistics	7	10
	24. Knowledge Management	8	10

	25. Data Structures and Algorithms Analysis	7	10
	26. Information Technology Law	7	10
ELECTIVE COMPONENT Subjects / Units / Modules /Courses *(to select 1)*	1. Interactive Multimedia	7	10
	2. Web Hosting	8	10
	3. E-Commerce Systems	7	10

RULES OF COMBINATIONS, CREDIT DISTRIBUTION (WHERE APPLICABLE):

Learners are to select one module under Electives Component to make up the 480 credits indicated for the qualification.

NCQF Level	NCQF Qualification Credits	Cumulative Qualifications Credit Distribution
NCQF Level 5	60	60
NCQF Level 6	110	170
NCQF Level 7	300	470
NCQF Level 8	10	480

For a candidate to graduate they must attain a minimum of 480 credits.

ASSESSMENT AND MODERATION ARRANGEMENTS

Assessment Arrangements

The qualification will encompass both formative and summative assessment, which will be designed by assessors who are BQA registered and accredited.

The weightings for the assessments will be as follows.

Assessment Method	Weight (%)
Formative Assessments	60
Summative Assessments	40

Moderation Arrangements

There will be internal and external moderation undertaken by moderators registered and accredited by BQA. All processes and procedures will be in line with NCQF requirements. This will be conducted in reference to the institution's moderation policy and procedures.

RECOGNITION OF PRIOR LEARNING

Provision for **Recognition of Prior Learning (RPL)** and **Credit Accumulation and Transfer System (CATS)** will be considered for this qualification. Individual providers will implement RPL and CATS in accordance with relevant policies and procedures, compliant with BQA policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

LEARNING PATHWAY

This qualification is designed to facilitate vertical, horizontal and diagonal progression both locally and internationally.

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

- Bachelor of Technology in Information Technology
- Bachelor of Information Technology
- Bachelor of Engineering Science: Information Technology
- Bachelor of Science: Applied Information Technology

Vertical Articulation (qualifications to which the holder may progress to)

- Master of Information Technology
- Master of Science in Information Technology
- Master of Technology: Information Technology
- Master of Commerce: Information Technology Management
- Master of Engineering Technology in Information Technology

EMPLOYMENT PATHWAYS

Below are possible jobs or employment the holder of this qualification can take up:

- Database Administrator
- Information Systems Manager
- ICT Technical Support Officer
- ICT Consultant
- Systems Analyst, IT Sales Professional
- ICT Trainer
- Technical Author
- Digital Forensics Experts
- Security Administrators
- Information Security Analysts
- Network Security Analyst

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

To qualify for award and certification of **Bachelor of Science in Information Technology**, a candidate must

- Attain a minimum of **480** credits overall.
- Complete satisfactorily any additional and specified requirements of the qualification.
- Have official verification that he/she has covered and passed all the modules.

Certification

The successful candidate, upon meeting minimum standards of achievement for the award of the qualification, shall be awarded a certificate.

Regional and International Compatibility

The qualification was benchmarked against institutions offering similar qualifications as indicated below;

- Bachelor of Information Technology - Monash University
- Bachelor of Information Technology – Kent Institute Australia
- Bachelor of Information Technology – University of Pretoria

Benchmarking for BSc in Information Technology

Criteria	Monash University	Kent Institute Australia	University of Pretoria
Degree Status	General	General	General
Average Modules Per Semester	5	6	5
Duration	3 years	3 years	4 years
Capstone Project	Yes	Yes	Yes
Electives Modules	Yes	Yes	Yes
Work Placement	Yes	Yes	Yes

Similarities

- All the universities offer a compulsory capstone project, elective modules and work-placement.
- There is close to 90% similarity in modules offered.

Differences

Key differences were noted in the following areas:

- The universities have different number of modules per semester, either five (5) or six (6).
- Duration of the course is three (3) to four (4) years.

Contextualization

The qualification is generally in line with similar qualifications offered by other institutions. However, the proposed qualification is unique in that it has the highest number of modules which provide graduates a wider range of skills and competences. The qualification also offers electives which enable students to prepare areas of specialization.

REVIEW PERIOD

This qualification will be reviewed every five (5) years.