SECTION A:	***QUALIFICATION DETAILS***																	
QUALIFICATION DEVELOPER (S)	University of Botswana																	
TITLE	Bachelor of Science in Computer Science														**NCQF LEVEL**	7		
FIELD	Information and Communications Technology			***SUB-FIELD***	Computer Science										**CREDIT VALUE**	496		
New Qualification	√			*Review of Existing 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*														

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE

Computer systems are evolving at an alarming rate. All sectors of the economy are continually deploying ever-changing complex computer systems in their day-to-day operations. This has resulted in huge demand for people who can understand, analyze, design, and develop computing solutions to various complex problems.

In response to this huge demand, there exist global trends in curricula developments in the field of Computer Science (ACM/IEEE model curricula 2013), which are continually adapting to the ever- changing technological advancements in the field. There is need, therefore, for strategic curriculum

developments within Botswana to align to these developments. This is endorsed in the country's vision 2036 pillar 1 and 2 which aims at achieving sustainable economic and human social development in the country.

In addition, the country has seen the need to move towards a knowledge-based economy in order to realize economic growth that is globally competitive. This includes improvements in the quality of education, which should hasten the country's move from a natural resource driven as articulated in the National Development Plan (NDP 11). In addition, the Human Resource Development Council (HRDC, 2016) calls for a need to have advanced computing knowledge and skills required for the country's development and employability of human capital.

The departmental national computing skills survey (CS Computing Skills Survey 2017) and HRDC report on Top Occupations in Demand (December 2016) also indicated that there is a need for graduates who can apply broad knowledge of core computing to different sectors. Some of the occupations in high demand are Software Engineers, Computer Network Professionals, Database Designers and Administrators, and Applications Programmers.

PURPOSE

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

- Solve problems in broad computing practical applications.
- Develop system and software applications.
- Apply broad knowledge of core computing to different sectors.
- Conduct research in a computing environment.

ENTRY REQUIREMENTS (including access and inclusion)

For entry to the B.Sc. Computer Science, the following entry requirements shall apply.

i) Certificate IV, NCQF level 4 (General Education or TVET)
ii) *Candidates with Diploma in a related field may be considered through Recognition of Prior Learning in accordance with applicable policies*.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Develop medium to large scale software systems.	1.1. Formulate technical software solutions for different scenarios. 1.2. Build appropriate interfaces between systems. 1.3. Integrate core computing system components such as operating systems, databases, and service applications. 1.4. Select appropriate architectural designs, platforms, and components for a system.
2. Apply effective problem-solving skills of the computing theory.	2.1. Design algorithms for various problems to provide appropriate solutions. 2.2. Perform quantitative and qualitative assessments of system functionality, usability, and performance. 2.3. Model solutions with multiple levels of detail and abstraction of a computer system. 2.4. Troubleshoot IT problems for different environments. 2.5. Use multiple programming languages, tools, paradigms, and technology.
3. Devise new ways to use computers.	3.1. Apply computing applications to address various social problems innovatively. 3.2. Explore new ideas, techniques, and tools independently. 3.3. Explore different problem-solving techniques.

	3.4. Apply entrepreneurial solutions using computing knowledge.
4. Conduct self-directed learning through research for the acquisition of lifelong skills.	4.1 Evaluate the organizational and societal impact of computing and technological solutions. 4.2 Analyse data collected to make relevant recommendations. 4.3 Conduct experiments in a computing environment. 4.4 Articulate the role of computer-based systems in modern societies. 4.5 Discuss new technologies in computer science. 4.6 Select suitable approaches and methods in solving real-life problems.
5. Apply strong professional practices in the field.	5.1 Describe legal and ethical standards, protocols, and practices in computing. 5.2 Apply knowledge of professional codes of conduct. 5.3 Apply personal decision-making skills. 5.4 Exhibit team-spirit.

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total*** ***(Per** Subject/ Course/ Module/ Units)*
		Level [6]	***Level [7]***	***Level [8]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Introductory Mathematics I		**16**		***16***
	Discrete Structures I		**12**		***12***
	Introduction to Computing		**12**		***12***
	Communication and Study Skills	**12**			***12***
	Academic and Professional Communication	**12**			***12***
	Introductory Mathematics II		**16**		***16***
	Discrete Structures II		**12**		***12***
	Discrete Structures III		**12**		***12***
	Calculus I		**12**		***12***
	Introductory Linear Algebra		**12**		***12***
	Introductory Concepts of Probability		**12**		***12***
	Entrepreneurship and Business Formation		**12**		***12***

	Principles of Management		**12**		***12***
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Programming Principles		**12**		***12***
	Object-Oriented Programming		**16**		***16***
	Data Structures		**12**		***12***
	Database Concepts		**12**		***12***
	Web Technology and Applications		**12**		***12***
	Systems Programming		**12**		***12***
	Computer Architecture and Organization		**12**		***12***
	Algorithms		**12**		***12***
	Operating Systems		**12**		***12***
	Computer Networks		**12**		***12***
	Systems Analysis and Design		**12**		***12***
	Programming Languages		**12**		***12***
	Introduction to Software Engineering		**12**		***12***
	Theory of Computation		**12**		***12***
	Industrial Attachment		**12**		***12***
	Social Informatics		**12**		***12***
	Project			***16***	***16***

	Computer Networks and Security		**12**		***12***
ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units*	Programming Language Translations		**12**		***12***
	Software Design		**12**		***12***
	Requirements Engineering		**12**		***12***
	Intelligent Systems		**12**		***12***
	Sensor Networks			***12***	***12***
	Software Project Management		**12**		***12***
	Human-Computer Interaction		**12**		***12***
	Integrative Programming			***12***	***12***
	Artificial Intelligence		**12**		***12***
	Mobile Computing		**12**		***12***
	Network Algorithms			***12***	***12***

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
6	***24***
7	***468***
8	***52***
TOTAL CREDITS	***520***
Rules of Combination: ***(Please Indicate combinations for the different constituent components of the qualification)***	
The qualification requires **164** credits of fundamental courses, **224** credits of core courses, and **108** credits of elective courses. The total credit a learner must achieve is **496**.	

ASSESSMENT ARRANGEMENTS

Assessment will consist of both formative and summative assessments and should be aligned with learning outcomes and sub-outcomes. Assessment will be carried out by registered and accredited assessors.

1. **Formative assessment**

Formative assessment or continuous assessment component of each course may include one or more of the following: written assignments, written tests, practical projects, research exercises, and independent study. Continuous assessment shall contribute 60% to the final grade of each course.

2. **Summative assessment**

Summative assessments are conducted in the form of examinations and practical assessments. The practical assessment is mainly on the final year project which comprises of project demonstration and research reports. Summative assessment shall contribute 40% to the final grade of each course.

MODERATION ARRANGEMENTS

In accordance with relevant policies and regulations, internal and external moderations are conducted at the end of each semester by registered and accredited moderators.

1. Internal moderation requirements

Internal moderation is carried out by BQA accredited moderators in the department whose area of expertise is in line with the courses to be moderated and by the staff members of the course clusters.

2. External moderation requirements

External moderation is carried out by BQA accredited moderators from other institutions recruited for this purpose.

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 as per applicable university RPL policies and relevant national-level policy and legislative framework.

Horizontal Articulation

Learners in this qualification will have the following options for horizontal articulation:

- BSc Computer Science (Software Engineering)
- BSc Computer Science (Intelligent Systems)
- BSc Computer Science (Cyber Security)
- BSc Information Technology
- BSC Information Systems

Vertical Articulation

Graduates of this qualification will have the following options for postgraduate education:

- MSc Software Engineering
- MSc Computer Science
- MSc Information Systems
- MSc Data Science

CREDIT ACCUMULATION AND TRANSFER

Credit Accumulated transfer will be administered according to the Institutional policy

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation

Learners in this qualification will have the following options for horizontal articulation:

- BSc Computer Science (Software Engineering)
- BSc Computer Science (Intelligent Systems)
- BSc Computer Science (Cyber Security)
- BSc Information Technology
- BSC Information Systems
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Vertical Articulation

Graduates of this qualification will have the following options for postgraduate education:

- MSc Software Engineering
- MSc Computer Science
- MSc Information Systems
- MSc Data Science

EMPLOYMENT PATHWAYS

Graduates of this qualification will be able to take up the following jobs

- Systems analyst
- Applications programmer
- Database designer
- Database administrator
- Network Administrator
- Network Engineer
- Web application developer

QUALIFICATION AWARD AND CERTIFICATION

1. *Minimum standards of achievement for the award of the qualification*

To be awarded a BSc Computer Science qualification, a candidate must satisfy the appropriate provisions of the university. A candidate is expected to complete a minimum of 496 credits where at least two-thirds of the total credits must come from core and fundamental courses prescribed for the qualification, and the total number of credits from elective courses shall not exceed one-third of the total credits.

2. Certification

Candidates meeting prescribed requirements will be awarded the qualification **Bachelor of Science in Computer Science** in accordance with standards prescribed for the award of the qualification and applicable policies of the university.

REGIONAL AND INTERNATIONAL COMPARABILITY

A comparison was made for the proposed qualification both regionally and internationally. At the regional level, we made a comparison with the BSc Computer Science offered by Wits University [6]. Internationally, we made a comparison with the BSc Computer Science qualifications offered by University College London (UCL) [7] and Grinnell College, USA [8]. The proposed qualification generally compares well with the three qualifications studied in terms of content, structure, scope, number of credits, the core areas of computer science covered, and the general learning outcomes.

REVIEW PERIOD

5 years