SECTION A:	QUALIFICATION DETAILS					

QUALIFICATION DEVELOPER (S)	University of Botswana					

TITLE	Bachelor of Education (Computer Science)				NCQF LEVEL	7
FIELD	Education and Training	SUB-FIELD	Computer Science		CREDIT VALUE	508

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:

The call to provide a labour market-responsive teacher education as a means of establishing an innovative sustainable education system is echoed in national and international policies. Following the 1994 Revised National Policy on Education, the Maitlamo National ICT Policy (2004) calls for a strong foundation of computer science and ICT skills among leaners. This sentiment is shared in other development policies of Botswana including Vision 2036 (Pillar 1 – Sustainable Economic Development – to produce productive and competitive human resources that drive growth across economic sectors including emerging industry, and 2) Pillar 2 - Human and Social Development– Education and Skills Development – to provide relevant quality education that is outcome-based with an emphasis on technical and vocational skills as well as academic competencies); as well as in the series of National Development Plans, and the Education and Training Sector Strategic Plan (ETSSP, 2015-20) policy. In addition, computer science related competences at a global scale are deemed foundational to the establishment of countries' sustainable knowledge-based economy, and teachers play a significant role in this regard (Agenda 2030 Sustainable Development Goals (SDGs) (SDG Goal Number 4 – Provision of Quality Education). The argument for computer science and ICT skills is backed up by the belief that learning computer science principles develops skills in problem-solving and logical thinking which are not only

useful for all children in order to access other subject areas, but regarded as indispensable for the 21st century adult life. It is for this reason, that the proposed B.Ed. (Computer Science) qualification reflects a change towards the teaching of algorithms and programming, which is deemed crucial for the generation to work effectively with technology as creators and innovators, not just as consumers. Therefore, the qualification is geared towards developing in student teachers, appropriate skills to cater for learners with diverse educational backgrounds preparing to enter different and multiple pathways (ETSSP, 2015-2020).

This view is in line with the Africa Agenda 2063's *Aspiration 6 which speaks to an Africa whose development is people-driven as well as other local policy documents such as the National Policy on Research, Science, Technology and Innovation that seeks to support the ideals of a knowledge-based economy that the country aspire for.*

PURPOSE:

The B.Ed. (Computer Science) qualification is responding to the call for the training of computer science teachers to assist the country in its endeavor to improve and diversify its economy to be globally competitive as the nation moves towards the envisaged knowledge-based economy. It aims at preparing computer studies teachers for secondary schools, vocational and technical colleges. In order for Botswana to become a sub-Saharan ICT hub and create an enabling environment for the growth of an ICT industry in the country, schools should produce learners who would pursue ICT-related careers. However, that is only possible if schools are equipped with teachers who are competent to produce quality globally competitive and marketable graduates who are creative, innovative, and have entrepreneurship skills. It is envisioned that the qualification will help 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.

Graduates of this qualification will be able to:

- Undertake continuous assessment and evaluation of ICT teaching and learning.
- Demonstrate ability to use technology to enhance teaching and learning.
- Demonstrate a culture of creativity, innovation, and knowledge creation.
- Support IT infrastructure in schools and related institutions.

ENTRY REQUIREMENTS (including access and inclusion)

- Certificate IV NCQF Level 4 (BGCSE or equivalent)
- Entry through Recognition of Prior Learning (RPL) or Credit Accumulation Transfer (CAT) is allowable through institutional policies in-line with national RPL and CAT policies.

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SECTION B	QUALIFICATION SPECIFICATION

GRADUATE PROFILE (LEARNING OUTCOMES)	ASSESSMENT CRITERIA
1. Apply knowledge of computer science content, pedagogy, and learners and to design and execute classroom instruction.	1.1. Select and sequence content to meet the cognitive level of the learners. 1.2. Demonstrate knowledge of the interconnectedness of topics within and between disciplines. 1.3. Design instructional strategies that are appropriate to achieve effective teaching and learning.
2. Undertake continuous assessment and evaluation of ICT teaching and learning.	2.1. Recognise and utilise multiple assessment strategies and systematically gather data to monitor learners' academic progress. 2.2. Use assessment data to evaluate teaching and learning to guide decision making on instructional processes.
3. Create conducive learning environments that support all learners.	3.1. Provide activities that support learners' academic, intellectual, and social development. 3.2. Cater for learners' diverse socio-cultural backgrounds and needs.
4. Demonstrate ability to use technology to enhance teaching and learning.	4.1. Utilise appropriate technologies in teaching and learning. 4.2. Empower learners to use available technologies in learning and in real life situations/applications
5. Engage in continuing professional development.	5.1. Engage in on-going reflective practices and use evidence to continually evaluate practice to adapt instruction to meet the needs of the learner. 5.2. Engage in school-based professional development activities to address contextual challenges affecting teaching and learning. 5.3. Carry out action research on issues affecting teaching and learning
6. Adhere to ethics of the teaching profession.	6.1. Adhere to legal aspects of teaching. 6.2. Evaluate effects of learner actions and choices to provide remediation
7. Demonstrate a culture of creativity, innovation, and knowledge creation.	7.1. Participate in inquiry, critical thinking and problem solving, apply entrepreneurship skills. 7.2. Engage learners in activities such as projects

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			that foster creativity, innovation, and entrepreneurship skills.
		7.3.	Demonstrate the ability to conduct and produce research reports.
8.	Support IT infrastructure in schools and related institutions.	8.1.	Provide technical support to the school environment.
		8.2.	Troubleshoot common personal computer problems at school.
9.	Apply computing theory and programming principles to practical software design and development addressing industry and societal problems.	9.1.	Design and analyse algorithms for appropriate solutions.
		9.2.	Design and improve a system based on a quantitative and qualitative assessment of its functionality, usability, and performance to address a specific problem.
		9.3.	Evaluate multiple approaches to solving a given real life problem and be able to choose a suitable approach.
		9.4.	Demonstrate the knowledge of multiple levels of detail and abstraction of a computer system. In particular, how the hardware, operating system and application software interact.
		9.5.	Design websites for specific functions for both educational and/or commercial purposes.

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SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	**TITLE**	**Credits Per Relevant NCQF Level**			**Total** **(Per** *Subject/* *Course/* *Module/* *Units)*
		Level [5]	**Level [6]**	**Level [7]**	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Communication and Study Skills	*24*			*24*
	Introductory Mathematics	*16*	*16*		*32*
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Discrete Structures	*12*	*12*		*24*
	Programming Concepts		*12*		*12*
	Introduction to Computing	*12*			*12*
	Object-Oriented Programming		*16*		*16*
	Basic Teaching Methods in Secondary School Computer Studies		*12*		*12*
	Data Structures		*12*		*12*
	Information Technology Fundamentals		*12*		*12*
	Psychology of Teaching Computer Studies		*12*		*12*

	Instructional Design and E-Learning		12		12
	Introduction to the Nature of Computer Science		12		12
	Practicum in Secondary School Computer Studies Teaching		12		12
	Secondary School Experiences in Computer Studies, Mathematics and Science Education		12		12
	Database Concepts		12		12
	Computer Organisation & Architecture		12		12
	Teaching Strategies for School Computer Studies		12		12
	Operating Systems			12	12
	Computer Networks			12	12
	Systems Analysis and Design			12	12
	Introduction to Web Design, Development and Publishing for Teaching			12	12
	Advanced Practicum in School Computer Studies Teaching			12	12
	Introduction to Research Methods in Computer		12		12

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	Science Education				
	Development and Evaluation of Computer Studies Practical Work			*12*	*12*
	Web Technology and Applications			*12*	*12*
	Human Computer Interaction			*12*	*12*
	Reflective Teaching Practice in Computer Studies, Mathematics and Science Education			*12*	*12*
	Advanced Teaching Methods in School Computer Studies			*12*	*12*
	Computing Project for Teachers			*16*	*16*
	Research-based Teaching Practice in Computer Science, Mathematics and Science Education			*60*	*60*
ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units*	**Computer Education Options:** **Choose 1 Module**				*12*
	Enrichment Topics in Computer Science Education			*7*	*12*
	Contemporary Issues in			*7*	*12*

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	Computer Education				
	Philosophy of Computer Science Teaching			*7*	*12*
	Computer Science Options: Choose 1 Module				*12*
	Algorithms			*7*	*12*
	Introduction to Software Engineering			*7*	*12*
	System Administration			*7*	*12*
	Business Entrepreneurship Options: Choose 2 Modules				*24*
	Mathematics for Business and Social Sciences	*5*			*24*
	Principles of Marketing	*5*			*24*
	Principles of Management	*5*			*24*
	Basic Microeconomics	*5*			*24*

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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	*Credit Value*
5	*88*
6	*188*
7	*232*
TOTAL CREDITS	*508*

Rules of Combination:

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

The B Ed Computer Science is a four-year qualification composed of fundamental, core, and optional/elective modules. The qualification is a double major in Computer Science and Computer Education. To be awarded the qualification, a student must accumulate at least 508 credits composed of:

- 56 credits Fundamental modules
- 404 credits of Core modules
- 48 credits of Optional/elective modules

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ASSESSMENT ARRANGEMENTS

- o There shall be formative and summative assessment.
  - Summative assessment will be 50% and formative assessment will be 50%.
- o Assessors shall all be registered with BQA.

MODERATION ARRANGEMENTS

- There shall be provision for both internal and external moderation in accordance with institutional policies aligned with national policies.
- Moderators shall all be registered with BQA.

RECOGNITION OF PRIOR LEARNING

There is provision for award of this qualification through RPL in-line with institutional and national RPL policies.

CREDIT ACCUMULATION AND TRANSFER

There is provision for credit accumulation transfer in-line with institutional policy.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation
- Bachelor of Computer Science
- Bachelor of Science (Mathematics)
- Bachelor of Education (Mathematics)

Vertical Articulation
- Master of Education (Computer Science)
- Masters in Science (Computer Science)
- Masters in Educational Technology
- Master of Education Degree in Curriculum and Instruction
- Master of Education Degree in Measurement and Evaluation

Employment Pathways
- Computer Studies Teacher/Lecturer
- Computer Studies Curriculum Developer
- Computer Studies Education officer
- Research Assistant
- Computer technician

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	BQA NCQF QUALIFICATION TEMPLATE	Document No.	DNCQF.QIDD.GD02
		Issue No.	01
		Effective Date	04/02/2020

QUALIFICATION AWARD AND CERTIFICATION

Qualification Award

To be awarded Bachelor of Education (Computer Science), a candidate is required to have achieved a minimum of 508 credits.

Qualification Certification

There will be issuance of a certificate and an official transcript at award.

REGIONAL AND INTERNATIONAL COMPARABILITY

Bachelor of Education (Computer Science) qualification is offered by only one local university. The qualification therefore has been benchmarked regionally and internationally. The qualification is being compared with one university in the region (Central University of Technology, South Africa: (https://www.cut.ac.za/programmes/computer-science) and two international universities (University of Queensland, Australia (https://future-students.uq.edu.au/study/programs/bachelors-science-education-secondary-2479/computer-science-coscic2479); and University of East Anglia, UK (https://www.schoolfinder.com/Programs/95740/Computing-Science-(with-Education)). Computing is an essential skill for young people. There is a high demand for computer science teachers especially in the United Kingdom and Australia where computing, specifically coding skills are an essential skill for youth with the subject taught at primary school. The entry requirements for the Central University of Technology, and the University of Queensland is Grade 12 (known as Matric in South Africa, and Queensland Year 12 in Queensland). For the University of East Anglia, the entry requirement is Advanced Level, with minimum C in relevant science subjects. In Botswana the entry requirement is BGCSE, which is lower than those mentioned above. Both Central University of Technology and the University of Queensland qualifications are 4 years full time, 480 (AQF Level 7) and 64(NQF Level 7) credits respectively, while the University of East Anglia qualification takes 3 years full-time to complete, with 360 (NQF Level 6) credits. In Botswana, the qualification has 508 (NQF Level 7) covered in four years of full-time study.

The nature of the subject means students have a wide range of backgrounds in programming, education and some mathematics required for computer science. All the three universities offer a blend of computer science content courses and computer education courses simultaneously for the qualifications. They all have a strong grounding in the theory of computing science, as well as gaining experience and skills in software engineering, problem solving and education courses. They also explore the underlying principles of computer science, and learn to adopt a logical, systematic approach to developing solutions to real-world problems, including modules in Object-Oriented Programming in Java and Python, Teaching Methodologies, Discrete Mathematics, Computer Vision, Database Systems, Object-Oriented Programming, Operating Systems, Computer Networks, and Web Design. They all have a practicum component that takes place in secondary schools. The duration of teaching practice differs for each university. The University of East Anglia offers teaching practice year two and year three. Each level has two sessions of four weeks each. The University of

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Queensland starts placements of students from the first year up to the fourth year. At the Central University of Technology, students are required to do at least 12 weeks of teaching practice. Botswana offers comparable combination of computer science and education modules with teaching practice from the second to the fourth year. The teaching practice spans a longer period than at most of the comparable institutions.

The employment pathways for computer science education graduates of the three universities are mainly: secondary school computer science/studies teaching and related subjects. Other possible employment pathways are:

1. Curriculum Development Officers.
2. Item Writers.
3. Computer Laboratory Technicians.
4. Education Officers.
5. Software And Web Developers.

The developed qualification focusses mainly on preparation of secondary school computer science/studies teachers. The graduates could access employment as in the list above.

REVIEW PERIOD

The qualification shall be reviewed every five (5) years.

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