SECTION A:	***QUALIFICATION DETAILS***																	
QUALIFICATION DEVELOPER (S)	University of Botswana																	
TITLE	Bachelor of Science in Chemistry													***NCQF LEVEL***		7		
FIELD	Natural, Mathematical and life Sciences			***SUB-FIELD***		Chemistry								***CREDIT VALUE***		505		
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 Bachelor of Science in Chemistry qualification will equip graduates with a systematic and coherent body of chemical knowledge and understanding of underlying concepts and principles. The graduates will be able to access and evaluate chemistry information. The qualification will help Botswana to develop a critical mass of chemists who are employable in all sectors that require chemical knowledge including geochemist, water chemist, and medical laboratory scientist as outlined in the HRDC document for the most needed skills in Botswana), thus, assisting Botswana to achieve the objectives of pillar 1 (Sustainable Economic Development) of the vision 2036 specifically the development of knowledge-based economy, strategy priority 5: strengthening skill development of the Botswana Education and Training Sector, Strategic Plan (ETSSP-2015-2020 and achieve higher transition rates from secondary to tertiary education as highlighted in article 5.9 of the National Development Plan 11 2017-2023).

PURPOSE:

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

- Demonstrate knowledge of contemporary theories, principles and concepts that can form the basis for professional judgment and/or research.
- Develop hypothesis for basic research and be able to evaluate and synthesize ideas, issues and concepts.
- Demonstrate general laboratory skills (GLP) and safety in a chemical environment.
- Use modern instrumentation for chemical analysis and separation.
- Develop, plan and execute independent research in Chemistry using scientific method(s).
- Communicate research findings to relevant stakeholders.

ENTRY REQUIREMENTS (including access and inclusion)

The entry should be:

I. NCQF Level 4 or equivalent. Learners should have passed Mathematics and Sciences.
II. There will be access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) in National Policies.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Demonstrate knowledge of contemporary theories, principles and concepts that can form the basis for professional judgment and/or research.	1.1 Solve scientific problems through research. 1.2 Plan and execute research successfully and write a report.
2. Develop hypothesis for basic research and be able to evaluate and synthesize ideas, issues and concepts	2.1 Perform literature search using various databases. 2.2 Critique literature in selected topics related to chemistry. 2.3 Conduct experiment based on the developed hypothesis.
3. Demonstrate general laboratory skills (GLP) and safety in a chemical environment.	3.1 Practice and maintain a safe working environment in the laboratory. 3.2 Practice the proper procedures and regulations for safe handling and use of chemicals.
4. Use modern instrumentation for chemical analysis and separation.	4.1 Employ standard operating procedures (SOPS) for instruments. 4.2 Apply appropriate techniques to solve Chemistry-related problem.

	4.3 Apply statistics to analyse Scientific data. 4.4 Apply computer-based tools to analyse chemistry data and make relevant and appropriate inferences.
5. Develop, plan and execute independent research in Chemistry using scientific method(s).	5.1 Formulate hypothesis to solve Chemistry-related problems. 5.2 Collect, analyse, and interpret findings to solve Chemistry-related problems.
6. Communicate research findings to relevant stakeholders.	6.1 Write reports using appropriate scientific formats. 6.2 Present the results orally to the relevant stakeholders.

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT ***FUNDAMENTAL COMPONENT*** *Subjects/ Courses/ Modules/Units*	***TITLE***	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [7]			
	General chemistry I & II	40			40
	Introductory mathematics I & II	40			40
	Geometrical optics and Mechanics, vibrations, and waves	20			20
	Computing skills fundamentals	25			25
	Communication and academic literacy skills (science)	15			15
	Electricity, Magnetism, and elements of Modern Physics	20			20

	Academic and professional communication (Science)	15			15
	Student Research Project	15			15
	Literature Based Project	5			5
					195
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Introduction to Analytical Chemistry	10			10
	Analytical Chemistry Laboratory I & II	10			10
	Structure and Survey of Functional groups I & II	25			25
	Organic Chemistry Laboratory I & II	10			10
	Atomic structure, Bonding and Main group chemistry	10			10
	Inorganic Chemistry Laboratory I & II	10			10
	Introductory Physical Chemistry	10			10
	Physical Chemistry Laboratory I & II	10			10
	Separation Techniques	15			15
	Coordination Chemistry	10			10

	Applications of Thermodynamics and Electrochemistry	10			10
	Chemical Informatics	5			5
	Analytical Spectroscopy	10			10
	Group Theory and Organometallic Chemistry	15			15
	Physical Organic Chemistry	10			10
	Quantum Chemistry and its Applications	15			
	Advanced Analytical Techniques	15			
	Advanced Transition Metal Chemistry	15			
	Advanced Physical Chemistry	15			
	Heterocyclic chemistry, synthetic reactions and design of organic synthesis	15			
	Sample Handling and Biochemical analysis	15			
	Advanced organometallic and solid-state chemistry	15			
	Secondary metabolites and Biomolecules	15			
					290

ELECTIVE/ OPTIONAL COMPONENT ***Subjects/Courses / Modules/Units***	Advanced Analytical Chemistry Laboratory	10			10
	Advanced Inorganic Chemistry Laboratory	10			10
	Advanced Organic Chemistry Laboratory	10			10
	Advanced Physical Chemistry Laboratory	10			10
					20

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
7	***505***
TOTAL CREDITS	***505***
Rules of Combination: ***(Please Indicate combinations for the different constituent components of the qualification)***	
A candidate must complete a minimum of 505 credits. The student shall register for 195 credits of fundamental courses, 290 credits of the core courses, and at least 20 credits of elective courses.	

ASSESSMENT ARRANGEMENTS

Assessment shall be composed of 50% formative and 50% summative.

MODERATION ARRANGEMENTS

Assessments will be internally and externally moderated by BQA registered and accredited moderators in accordance with approved moderation policies.

RECOGNITION OF PRIOR LEARNING

Recognition of Prior Learning will be acceptable for awarding this qualification in accordance with the National and ETPs' RPL policies.

CREDIT ACCUMULATION AND TRANSFER

Transfer of credit from another recognised university or equivalent institution of higher education may be considered on production of satisfactory documentation and references. No more than one-third of the total number of credits required can be credited from another institution.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Learning

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

- Bachelor of Education (Chemistry)
- Bachelor of Pharmacy
- Bachelor of medicinal chemistry; BSc. in industrial chemistry, BSc in Forensic Science; BSc Environmental Science.

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

- Master of Science (Chemistry)
- Master of Science (Pharmacy)
- Master of Science (Medicinal Chemistry)
- Master of Science Forensic Science)
- Master of Science (Environmental Science)
- Master of Science (Industrial Chemistry)
- Doctor of Philosophy (Chemistry)

Employment

- Secondary School Teacher
- Teaching assistant in academic institutions
- Research and development chemist
- Environmental quality control professional.

- Quality control chemist
- Consultant for pharmaceutical manufacturers
- Consultant in agricultural enterprises
- Consultant in all enterprises dealing with chemicals.
- Consultant in customs departments

QUALIFICATION AWARD AND CERTIFICATION

On successful completion, a candidate will be awarded a Bachelor of Science in Chemistry. The candidate should have achieved a minimum of 505 credits according to the rules of combination to be awarded this qualification.

Successful candidate will be issued with a certificate indicating the award-Bachelor of Science in Chemistry and an official transcript

REGIONAL AND INTERNATIONAL COMPARABILITY

Main Similarities

- Both this qualification and the one at University are at level 7.
- Learners taking BSc in Chemistry degree in the compared Universities learn all the main areas of Chemistry: Analytical, Inorganic, Organic, and Physical as the core modules.
- Credits per module of this qualification are almost similar to all the listed Universities (mostly 10-20).

Main Differences

- BSc (Chemistry) degree at UK universities is at FHEQ level 6.
- This qualification takes 4 years, while it takes 3 years in the other Universities listed.
- The minimum credits for this qualification are 505 credits a, 430 at the University of Pretoria, 360 at Newcastle University, and 427.5 at the University of Liverpool.

In summary this qualification compares well with qualifications from the compared Universities.

REVIEW PERIOD

The qualification shall be reviewed every 5 years