SECTION A: QUALIFICATION DETAILS																	
QUALIFICATION DEVELOPER (S)	University of Botswana																
TITLE	Bachelor of Science in Biological Sciences													***NCQF LEVEL***		7	
STRANDS (where applicable)	N/A																
FIELD	Natural, Mathematical, and Life Sciences			***SUB-FIELD***		Biological Sciences								***CREDIT VALUE***		504	
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*									

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE:

National development efforts in agriculture, environment, health, industrial production, natural resources utilization and management, tourism, and other disciplines, have biological resources components – microorganisms, plants and animals and their interactions. Cognizant of this, this qualification would provide training of high-quality personnel and independent thinkers in the various fields of Biological Sciences and its applications.

The BSc (Biological Sciences) qualification aims to advance knowledge and build capacity in biological sciences to meet current and future needs of Botswana and the international community. Biological sciences include, but

are not limited to: Biotechnology, Cell and Molecular Biology, Ecology, Genetics, Plant Sciences, Zoology, Conservation Biology, Wildlife Management, Microbiology, Pollution and Waste Management, Pest Management, Food Microbiology. The qualification strives to be relevant to the University of Botswana Strategy as well as to national, regional, and international development objectives. In pursuit of this, the qualification is premised on national development goals as set out by or in the Botswana Human Resource Development Council (HRDC); National Development Plan 11 (NDP11); the Botswana Education and Training Sector Strategic (ETSSP) Plan and the Vision 2036, particularly to Pillars 1, 2 and 3 dealing with Sustainable Economic Development, Human and Social Development, and Sustainable Environment respectively.

The HRDC (2019) *Priority Skills (Current and Future)* has listed Life Science Professionals among the top professionals in high demand in Botswana. It has further listed entomologists, agronomists and breeders, animal scientists, range ecologists, beekeepers, plant pathologists, and environmental protection professionals among the technical and soft skills occupations in high demand in Botswana. The NDP11 intends to transform Botswana from a resource-based economy to a knowledge-based economy. NDP11 intends to implement the National Human Resource Development Strategy which aims to reduce skills mismatch and graduate unemployment.

The program also addresses the Botswana ETSS Plan whose mandate is to strengthen the match between qualifications and labor market requirements, thereby ensuring that graduates are more closely aligned to current and future employment needs. The ETSSP also facilitates improved outcomes for all learners by addressing issues of quality and relevance, among others.

The BSc Biological Sciences qualification also addresses the African Union Agenda 2063 (Aspiration #1, Goals 2, 3, 5, 6 and & 7) as well as the UN Sustainable Development Goals – 2030 Agenda (# 2, 3, 4, 6, 9, 13, 14 and 15), making our graduates relevant and competitive in a global market. The qualification will contribute in producing HRDC priority occupations such as nursing, pharmacy, medicine, entomology, range ecology, animal sciences, horticulture, food science & technology, and Research and Innovation. Therefore, the qualification will produce graduates who are relevant nationally, regionally, and globally.

PURPOSE:

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

1. Apply specialised theories, principles, and concepts of biology to solve scientific problems.

2. Access, generate, evaluate, and synthesize scientific information considering ethical and cultural issues.

3. Communicate scientific knowledge effectively

4. Solve scientific problems in biological sciences and related fields.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)
• Certificate IV, NCQF Level 4 or its equivalent with passes in Biology, Chemistry, Physics and Mathematics or equivalent • Recognition of Prior Learning (RPL) and Credit Accumulation Transfer (CAT) will be considered.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
LO 1 Independently carry out critical analysis and evaluation of qualitative and quantitative data in the area of biological sciences.	AC1.1: Apply specialised knowledge of theories, principles, and concepts in the area of biological sciences to address biological challenges. AC1.2: Analyse and evaluate qualitative and quantitative data in the area of biological sciences. AC1.3: Understand and use appropriate tools and techniques for collecting, analysing, and evaluating biological data.
LO 2 Understand and use specialised contemporary theories, principles, and concepts in biological sciences.	AC2.1: apply Specialised knowledge of contemporary theories, principles, and concepts of biological sciences and apply them to solve complex biological problems. AC2.2: Develop and apply an awareness of current trends and issues in the area of biological sciences. AC2.3: Promote relevant knowledge for professional judgement and/or research.
LO 3 Demonstrates mastery of professional practice in the field of biological Sciences. .	AC3.1 Write scientific reports following established codes of practice. AC3.2: Exercise good observational skills in carrying out responsibilities in the area of biological sciences.

	AC3.3: Identify problems and develop ways to solve them through research using the scientific method.
LO 4 Conduct basic research in areas of biological sciences using relevant scientific method(s).	AC4.1: Solve a problem using knowledge from various disciplines in an integrative manner. AC4.2: Use appropriate tools to collect biological data. AC4.3 Analyse biological data AC4.4 Interpret results of the data analysis and make relevant and appropriate inferences. AC4.5 Communicate research findings
LO 5: Apply a range of specialised knowledge and skills with a sense of identification with and responsibility for the integrity of the profession.	AC5.1 critically think about a problem and develop it into a researchable idea. AC5.2: Competently execute techniques and experimental approaches in the chosen field of biological sciences. AC5.3: Competently collect, analyse, interpret, and present research data.

SECTION C		***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***		***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [5]	***Level [6]***	***Level [7]***	***Level [8]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Communication Skills	16				16
	Information Communication Technology	8	*8*			16
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Principles of Biology	16				16
	Diversity of Animals and Plants		*16*			16
	General Chemistry	32				32
	Mathematics	24				24
	Cell Biology		14			14

	Genetics		14			14
	Plant Structure and Function		14			14
	Introduction to Mammalian Physiology		14			14
	Principles of Ecology		14			14
	General Microbiology		14			
	Animal Diversity		14			14
	Biology of Flowering Plants		14			14
	Quantitative Biology			14		14
	Developmental Biology			14		14
	Biochemistry			14		14
	Molecular Biology			14		14
	Research Proposal Writing				9	9
	Research Project				11	11

ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units*	Mycology			14		14
	Bacteriology			14		14
	Plant Systematics			14		14
	Virology			14		14
	Dynamics of Savannah Ecosystems			14		14
	Conservation Biology			14		14
	Invertebrate Zoology			14		14
	Plant Physiology			14		14
	Comparative Vertebrate Physiology			14		14
	Applied Botany			14		14
	Wildlife Biology			14		14
	Life History Strategies			14		14

	Wetlands Ecology and Management			14		14
	Aquatic Biology			14		14
	Immunology			14		14
	Biotechnology			14		14
	Food Microbiology			14		14
	Medical Microbiology			14		14
	Plant Pathology			14		14
	Entomology			14		14
	Applied Entomology			14		14
	Vertebrate Structure			14		14
	Parasitology			14		14
	Behavioural Ecology			14		14
	Evolution			14		14

	Ecological Impact Assessment			14		14
	Post-harvest Physiology			14		14
	Plant Responses to Environmental Stress			14		14
	Plant Tissue Culture			14		14
	Plant Ecology			14		14
	Environmental Microbiology			14		14

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
5	***96***
6	***136***
7	***196***
8	***20***
5/6/7 (electives taken at any level)	***56***
TOTAL CREDITS	***504***

Rules of Combination:

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

A Bachelor of Science in Biological Sciences qualification is composed of 96 credits at NCQF Level 5, 136 credits at Level 6, 196 credits at Level 7, 20 credits at NCQF 8, and 56 credits of Electives.

Its qualification structure is made of:

Fundamental components – 32 credits

Core components – 252 credits

Optional components (students choose 10 out of the 31 courses) - 140.credits

Electives – 56 credits

Total credits – 504 credits

ASSESSMENT ARRANGEMENTS

Formative assessment weighting of 40%

Summative assessment with weighting of 60%

Assessment will be carried out by BQA accredited assessors

MODERATION ARRANGEMENTS

The following shall apply for both internal and external moderation in accordance with ETP applicable policies and regulations, which are aligned with BQA/ National policies:

Internal
Internal moderation shall be carried out by BQA accredited/ suitably qualified moderators in the institution within each cognate area.

External
External moderation shall be carried out by BQA (or equivalent) accredited moderators from other institutions recruited specifically for this purpose.

Requirements for assessors and Moderators

A minimum of master's degree (NCQF level 9) in a relevant field and registered with BQA.

RECOGNITION OF PRIOR LEARNING

Recognition of Prior Learning (RPL) will be applicable for consideration for award in this qualification and will be in line with institutional and National policies

CREDIT ACCUMULATION AND TRANSFER

Credit Accumulation and Transfer (CAT) will be applicable for consideration for award in this qualification and will be in line with institutional and National policies

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Vertical
Biological Sciences graduates can enrol in:

- MSc (Biological Sciences)
- MSc (Microbiology)
- MSc (Ecology)

- MSc (Animal Sciences)
- MSc (Plant Sciences)
- MSc (Genomics and Bioinformatics)

Horizontal

The Biological Sciences degree program contributes to other degree programs such as:

- Bachelor of Environmental Health,
- Bachelor of Education Science (Biological Sciences)
- Bachelor of Nursing Science,
- Bachelor of Family and Consumer Science.
- Bachelor of Medicine,
- Bachelor of Laboratory Science
- Bachelor of Cytotechnology and Histotechnology
- Bachelor of Pharmacy
- Bachelor of Science Laboratory Technology

Employment Opportunities

Graduates from this qualification may work in the areas listed below, even though they may need some further specific training in some of the areas.

- Aquatic ecologist
- Bacteriologist
- Field Ecologist
- Food Science
- Microbiologist
- Molecular Biologist
- Mycologist
- Parasitologist
- Plant Physiologist
- Plant Ecologist
- Plant taxonomist
- Researcher (Biological Sciences)
- Virologist
- Wildlife Ecologist

QUALIFICATION AWARD AND CERTIFICATION

Candidates must earn a minimum of 504 credits and satisfy all rules of combinations to be awarded BSc in Biological Sciences. BSc Biological Sciences certification will be granted according to the institution's certification policies.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The Bachelor of Science (Biological Sciences) degree offered by the University of Botswana has been compared with degrees offered by the University of Kwazulu-Natal.

REGIONALLY

University of Kwazulu-Natal– the Bachelor of Science Degree at UKZN is over 3 years of full-time study. NQF Level 7 with a minimum of 360 credits.

Similarities: The course modules offered by the two universities are very similar even if the course names may be slightly different, e.g.

University of Botswana	**University of Kwazulu-Natal**
Parasitology	Parasite and People
Comparative Animal Physiology	Evolutionary Animal Physiology
Entomology	Insect Diversity and Evolution
Evolution	Evolution and Systematics

Differences: University of Kwazulu-Natal is located near the Indian Ocean. For this reason, the university offers courses in marine biology and ecology which would be not very relevant for Botswana.

	University of Botswana	**University of Kwazulu-Natal**	**Similar/Different**
Degree Title	Bachelor of Science (Biological Sciences)	Bachelor of Science in	Similar
NCQF Entry Level	4	5	Different
NCQF Exit Level	7	7	Similar
Duration	4 years	3 Years	Different
Minimum credits	504	360	Different

The difference in minimum credits is accounted for by the difference in the entry level. The developed qualification compensates for the lower entry level by offering the degree over 4 hears with 144 more credits. This brings the graduates of the two universities to the same level at completion – at NCQF Level 7

Exit Outcomes: they are very much similar.

Assessment: Although the ratio of formative to summative assessment for University of Kwazulu-Natal is not given, the assessment criteria are quite similar to those of the developed qualification.

INTERNATIONALLY

NCQF Level
University of Edinburgh – the Bachelor of Science Biological Sciences degree at the Edinburgh university is 4 years of full time. Scottish Credit Qualifications Framework (SCQF) level 9 with a minimum of 360 credits. This is very much comparable to the developed Bachelor of Science (Biological Sciences) at Level 7.

Entry requirements: there are differences in that in Scotland, the normal entry level is A level (NCQF Level 5) compared to Level 4 for developed qualification.

Minimum Credits: University of Edinburgh BSc Biological Sciences, 360 credits. The developed qualification is BSc (Biological Sciences), 504 credits. The higher credits for the University of Botswana would compensate for lower entry level.

Exit Outcomes: These are very similar, even though there may some slight differences in wording, for example both cover Recognition that scientific knowledge and understanding are changeable and accessing and evaluating of scientific information.

Modules and Courses: Just as in the developed qualification - Bachelor of Science (Biological Sciences) the qualification at the University of Edinburgh has 4-year duration. Students take specialisations at year 3 after a common first 2 years.

Course names may be different, but the intended content is similar, e.g.

University of Botswana	University of Edinburgh
Genetics	Genes and Gene Action
Evolution	Evolution in Action
Cell Biology	Dynamic Cell
Biology of Flowering Plants	Green Planet
General Microbiology	Microbial world

REVIEW PERIOD

The qualification will be reviewed every 5 years.