QUALIFICATION SPECIFICATION SECTION A						
QUALIFICATION DEVELOPER	Botswana University of Agriculture and Natural Resources					
TITLE	Bachelor of Science in Biosystematics and Taxonomy				**NCQF LEVEL**	7
FIELD	Agriculture and Nature Conservation		**SUB-FIELD**		Biosystematics	
New qualification	√	Review of existing qualification				
SUB-FRAMEWORK	General Education		TVET		Higher Education	√
QUALIFICATION TYPE	Certificate		Diploma		Bachelor	√
	Bachelor Honours		Master		Doctor	
CREDIT VALUE					528	

RATIONALE AND PURPOSE OF THE QUALIFICATION

Rationale for the qualification

A need assessment survey conducted highlighted the dire need to introduce this qualification. The need was rated 4.2 out of 5 by the appropriate stakeholders from professional, industrial and academic bodies. One of the most highly sought-after areas of specialisation was identified as Taxonomy by 57% of survey respondents. Withal, the Human Resource Development Council Top Occupations in High Demand listing pinpointed the necessity for research technicians, and science and technology researchers at national level. These occupations are either currently experiencing short term supply in the labour market or prospected to show relatively strong employment growth in the long term (Human Resource Development Council, 2016).

The proposed Bachelor of Science in Biosystematics and Taxonomy qualification addresses the need to produce such professionals. Human capital development in Taxonomy (Biosystematics) is important for the attainment of sustainable economic development and sustainable environment (Botswana National Vision 2036). The qualification seeks to contribute to the robust drives from a resource to a knowledge-based economy; aligning training with industry needs as stipulated in Botswana Education & Training Sector Strategic Plan (ETSSP) 2015-2020, thus adding to the reduction value for an ultimate decline in the importation of biodiversity expertise. Graduates of this qualification will be highly inclined to understanding the dynamic nature of the sector or enterprise for which it is developed and will be equipped to respond to innovation and technological advancements. The National Development Plan 11 prioritizes sustainable use of natural resources reflected in Millennium Development Goal 7: to ensure environmental sustainability (BOTSWANA: Millennium Development Goals Status Report 2015). This qualification will

empower the graduates with skills such critical thinking and techniques to solve biodiversity loss. Studies show that limitations associated with taxonomy include a lack of much-needed site-specific data on the species composition of communities in human-dominated landscapes. This hinders ecosystem management and biodiversity conservation. There is a lack of trained taxonomists and taxonomic expertise which can affect the precision and management of biodiversity studies. Since the degree is not currently available in any of the local institutions, it is prospected to attract learners both locally and across the SADC region in a way minimizing the cost government incurs training learners abroad.

Purpose of the Qualification

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

- determine taxonomic nomenclature and phylogenetic pathways of different classes of organisms.
- function effectively in research and technical areas of Biodiversity.
- assess and analyse threats to biological diversity, as well as to implement conservation actions to mitigate these threats.
- plan and execute research on biodiversity and critically evaluate the results and formulate relevant evidence-based biodiversity management principles.
- evaluate current and future developments relevant to the conservation of biological diversity.
- Effectively communicate evolutionary, taxonomic and ecological concepts, data, and interpretation using multiple formats appropriate for target audiences, including non-scientists.

ENTRY REQUIREMENTS (including access and inclusion)

Minimum entry requirement for this qualification is a:

NCQF level 4, Certificate IV, with a pass in Biology, Chemistry, Physics, Mathematics and English Language, or any other relevant subjects.

Recognition of Prior Learning (RPL):

There will be access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) in accordance with the relevant National and ETP-based RPL and CAT Policies and guidelines.

QUALIFICATION SPECIFICATION	SECTION B
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
1. Demonstrate proficiency in scientific methodologies such as experimental design, and the critical analysis of biosystematics data in the field.	1.1 Design experimental research projects in which the knowledge and skills of biosystematics will be applied. 1.2 Collect data on species characteristics useful in biosystematics. 1.3 Analyze biosystematics data. 1.4 Develop phylogenetic trees.
2. Present and communicate ideas effectively to offer professional insight, interpretations and solutions to problems and issues appropriate to field of study.	2.1 Identify biosystematics and taxonomy issues and concerns. 2.2 Develop biosystematics-based solutions. 2.3 Apply biosystematics principles to address problems identified. 2.4 Provide oral and written reports.
3. Interact effectively as part of a team using biosystematics expertise to conserve biodiversity.	3.1 Contribute taxonomic skills as part of a team to conserve biodiversity. 3.2 Analyze case studies as part of a team.
4. Demonstrate effective information processing and retrieval skills using the appropriate ICT.	4.1 Derive taxonomic data from the field experiments and ICT platforms. 4.2 Analyze the data using taxonomic ICT software.
5. Apply specialized knowledge of biosystematics and taxonomy as important components in management and implementation of biodiversity conservation.	5.1 Interpret global taxonomy guides and biodiversity policies. 5.2 Apply policies in the management of biodiversity.
6. Critique current research in biosystematics, taxonomy and climate change issues and make sound and logical judgments based on evidence.	6.1 Interpret trends in biosystematics and taxonomic research associated with climate change. 6.2 Apply inferred trends to make sound and logical judgements to conserve biodiversity.

	6.3 Educate the community on shifts imposed on the composition of species due to climate change. 6.4 Apply standardized mitigation measures to conserve species.
7. Demonstrate skills and knowledge essential to the formation and operation of a small business in the Biosystematics and Taxonomy area.	7.1 Develop proposals for eco-friendly biosystematics and taxonomy businesses. 7.2 Implement strategies of conducting the business. 7.3 Monitor biosystematics businesses.
8. Demonstrate ability to apply advanced research skills appropriate for further study and employment	8.1 Develop research proposal. 8.2 Design and execute research project. 8.3 Analyze data and report findings.

QUALIFICATION STRUCTURE SECTION C			
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	**Title**	**Level**	**Credits**
	Mathematics	5	24
	General and Inorganic Chemistry	5	12
	Physics	5	24
	Biology of Cells	5	12
	Computer Skills Fundamentals	6	16
	Introduction to Communication and Academic Literacy Skills	6	12
	Physical and Organic Chemistry	5	12
	Biodiversity	5	12
	Advanced and Professional Communication	6	12
CORE COMPONENT Subjects / Units / Modules /Courses	Introduction to Plant Biology	7	12
	Biological Systematics	6	12
	Introduction to Genetics	6	8
	Biometry I	6	8
	Population and Community Ecology	6	12
	Evolutionary Biology	6	12
	Introduction to Ecology and Conservation	6	12
	Plant and Animal Diversity	6	12
	Financial Management in Agriculture	6	12
	Introduction to Zoology	7	12
	Field Practical Training I	7	12
	Biometry II	7	8
	Plant Anatomy	7	12
	Animal Anatomy	7	12
	Population Genetics	7	12
	Scientific Writing and Presentation	7	12
	Field and Herbarium Techniques	7	12
	Methods of Plant Systematics	7	12

	Phylogenetics	7	12
	Field Practical Training II	8	12
	Biochemistry	7	8
	Plant and Animal Conservation	7	12
	Climate Change and Natural Resources Management	8	12
	Bioinformatics	7	12
	Morphometrics	7	12
	Project I	7	8
	Bioethics	7	12
	Molecular Systematics	7	12
	Project II	8	8
	Endangered Species	7	12
	Development of Entrepreneurial Skills in Agribusiness	6	12
	Geographical Information Systems and Spatial Modelling	8	12
ELECTIVE COMPONENT Subjects/ units / course	**Set 1 (Select 2 courses)**	6	8
	Introduction to Range Management	6	8
	Food Hygiene and Safety	6	8
	Economic Botany	6	8
	HIV/AIDS Prevention and Control in Botswana	6	8
	Basic Concepts in Marketing	6	8
	Set 2 (Select one course)		
	Crops and Humankind	7	8
	Animal Welfare and You	7	8
	Set 3 (Select one course)		
	Game Farming and Ranching	8	8
	Pet Management	8	8

Rules of combinations, Credit distribution (where applicable):

The rules of combination for this qualification are defined below and cover the minimum and maximum credit values required to be accumulated, along with details of any mandatory units.

- The Fundamental Component consists of **136 credits** all of which are compulsory
- The Core Component consists of **360 credits** all of which are compulsory
- The Elective Component consists of 3 sets of modules of which a candidate is to choose 2 from set one, 1 from set two and 1 from set three which makes a total of 4 elective modules worth **32 credits**.

The credit distribution is shown in the table below

Level	Total no of credits
5	96
6	148
7	232
8	52
Total	**528**

ASSESSMENT AND MODERATION ARRANGEMENTS.

Formative Assessment (50%)

The contribution of formative assessment to the final grade shall be **50%**

Summative Assessment (50%)

The contribution of summative assessment to the final grade shall be **50%**

Moderation Arrangements

Internal and external moderators to be engaged will be subject specialists in relevant fields, with relevant industry experience and academic qualifications, and accredited by BQA or any other recognized body.

Both internal and external moderation shall be done in accordance with applicable policies and regulations.

RECOGNITION OF PRIOR LEARNING (if applicable)

There shall be provision for award of the qualification through Recognition of Prior Learning (RPL) in accordance with institutional Policies in line with the National RPL Policy.

Candidates may submit evidence of credits accumulated in related qualification in order to be credited for the qualification they are applying for.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation,

The qualification articulates horizontally with various Bachelor at NCQF level 7 such as:

- Bachelor of Science in Biodiversity and Ecology
- Bachelor of Science in Biodiversity and Conservation
- Bachelor of Science in Wildlife Management
- Bachelor of Science in Range Sciences
- Bachelor of Science in Biological Sciences

Vertical Progression

Graduates of this qualification may progress to higher level qualifications level 8 such as:

- Bachelor of Science Honours in Biodiversity
- Post Graduate Diploma in Biodiversity
- Master of Science in Biodiversity

Employment Pathways

The graduates from this qualification will have requisite competences and attributes to work as:

- Herbarium curator
- Lecturer in tertiary institutions
- Taxonomy consultant
- Research scientist
- Biology field technician
- Biosecurity officer
- Environmental officer
- Set up their own environmental consultancy firms

QUALIFICATION AWARD AND CERTIFICATION

For a Candidate to achieve this qualification they must have acquired a minimum of **528** credits. The Candidate should pass all the **Fundamental, Core,** and 4 **Electives** modules.

Certification

A **Bachelor of Science in Biosystematics and Taxonomy** certificate will be awarded to a Candidate upon completion of the qualification in accordance with applicable policies. A certificate and transcript will be issued at award.

REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification was compared with similar or equivalent qualifications from several institutions, both regionally and internationally. The qualifications have been registered according to their respective frameworks.

Information gathered shows that there is no university regionally which offers an undergraduate qualification in Biosystematics and Taxonomy. At international level, Ohio University offers BSc in Biological Sciences which has some courses in taxonomy and biosystematics. The University of Hradec Kràlové in Czech Republic offers a Bachelor of Science degree in Systematic Biology and Ecology, which also offers some courses on systematics and phylogenesis. Qualifications in Biosystematics or Taxonomy could only be found at master's level.

Similarities:

Courses/modules which are common to this qualification and Ohio University's BS Biological Sciences are as follows: Ecology, Evolution, Animal Body Systems; General genetics; Animal Systematics, Principles of Evolution, Animal Conservation Biology; Comparative Vertebrate Anatomy; Biological Chemistry; Biochemistry I; and Biochemistry II.

The BSc Systematic Biology and Ecology at the University of Hradec Kràlové covers the following biological disciplines, which share similarity with this qualification: anatomy and morphology of plants; general zoology; systematics and phylogenesis of plants and animals; physiology and ecology of plants and animals; and genetics and microbiology.

Differences:

This qualification focuses on the biosystematics and taxonomy of biodiversity. Other universities may cover taxonomy or biosystematics as individual courses in their qualification, but no universities have been found to offer Biosystematics and Taxonomy as a full qualification. The credit value of this qualification structurally varies from institution to institution.

REVIEW PERIOD

The qualification will be reviewed every five **(5) years**.