QUALIFICATION SPECIFICATION SECTION A							
QUALIFICATION DEVELOPER	Botswana University of Agriculture and Natural Resources						
TITLE	Master of Science in Soil and Water Engineering				**NCQF LEVEL**	09	
FIELD	Agriculture and Nature Conservation		**SUB-FIELD**	Soil and Water Engineering			
New qualification	√	Review of existing qualification					
SUB-FRAMEWORK	General Education		TVET		Higher Education	√	
QUALIFICATION TYPE	Certificate		Diploma		Bachelor		
	Bachelor Honours		Master	√	Doctor		
CREDIT VALUE					240		

RATIONALE AND PURPOSE OF THE QUALIFICATION

Rationale

Agriculture is the main source of livelihoods for Batswana, with nearly 40 per cent of the country's population residing in rural areas.

The sector's contribution to GDP declined from 40% in 1966 to 1.9% in the current period (Statistics Botswana, 2019). This is due to stagnation of the sector and growth of other sectors especially mining and tourism. Although there are numerous factors (such as climatic constraints) that led to this decline, the shortage of qualified human resources is a key factor hampering the Ministry of Agriculture & Food Security's capacity to implement policies and national development projects.

For a long time, the Government of Botswana has desired to diversify the economic base away from its heavy dependence on diamond export revenues, particularly since (i) the mining sector is capital intensive (so it does not generate much employment) and (ii) the demand, as well as the prices for diamonds are subject to the vagaries of global economic performance. The agriculture sector has been targeted as one of the sectors for facilitating the process of diversification. This reflects the fact that agriculture is a major source of livelihood for about 70 percent of Botswana's rural population. The use of technology can also play a major role in agriculture. Technology can contribute towards improving access to market information (and hence reduction in transactions cost), new technologies and financing opportunities, particularly for the youth who are more literate in technology. However, given that the youth in Botswana are not attracted to the agriculture sector, adoption of technology has major skills and human resource implications. Appropriate skills development and training will be needed to enable the adoption of existing technologies to achieve the above-listed advantages. Diversification and technology uptake are imperative in achieving prosperity for all (Vision 2036) through the Sustainable Economic Development pillar (Government of Botswana, 2016).

The National Development Plan 11 has identified the lack of qualified personnel at all levels including specialized disciplines, as being one of the bottlenecks to the implementation of agricultural policies and development projects (Republic of Botswana, 2016). These plans have also identified soil and water management, tillage practices and soil conservation as other areas essential for improving crop production.

The recent Agricultural Sector HRD Plan report (HRDC, 2019) has identified skills in high demand at MSc level as being 20 Soil conservationists and 50 Irrigation specialists, among others.

This demand can be met, in planned phases, through MSc (Soil & Water Engineering) training.

Purpose

The purpose of the qualification is to;

- develop human resources with in-depth knowledge and skills in Soil & Water Engineering.
- produce high quality graduates who can function at professional positions both in the public and private sectors, international bodies as well as for self-employment endeavor,
- undertake scientific research.

ENTRY REQUIREMENTS (including access and inclusion)

The qualifying learners that will be admitted into the qualification must possess at least one of the following prior learning qualifications.

NCQF Level 7, e.g., BSc holders of agricultural engineering, agriculture, agricultural education, crop science, forest science, and range science or any equivalent qualification.
Or
NCQF Level 8 in Agricultural Engineering or related field.

There will be access through Credit Accumulation and Transfer (CAT) in accordance with the CAT National Policy.

(NB: Since this is an Engineering qualification RPL is restricted)

QUALIFICATION SPECIFICATION
SECTION B

GRADUATE PROFILE (LEARNING OUTCOMES)	ASSESSMENT CRITERIA
• Demonstrate understanding and application of in-depth knowledge and skills of Soil & Water Engineering.	• Explain and apply scientific concepts in Soil & Water Engineering
• Exhibit critical thinking expertise and critic existing body of knowledge and provide synthesized concepts.	• Critically review scientific works • Analyze new and existing scientific data and contribute to advancement of knowledge
• Propose, design, appraise and execute research studies and projects in Soil & Water Engineering	• Formulate and manage scientific research studies and projects in Soil & Water Engineering
• Employ professional expertise in public sector and agribusiness policy formulation and project management in Soil & Water Engineering	• Explain the project development process. • Appraise projects and propose policy interventions.

QUALIFICATION STRUCTURE SECTION C			
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	**Title**	**Level**	**Credits**
	Engineering Statistics	9	15
	Data Acquisition and Control	9	15
CORE COMPONENT Subjects / Units / Modules /Courses	Irrigation Systems Design	9	15
	Hydraulic Structures	9	15
	Land Drainage and Reclamation	9	15
	Proposal Development	9	30
	Research and Dissertation Preparation	9	90
ELECTIVE COMPONENT Subjects / Units / Modules /Courses	**Set 1 (Select one)**		
	a. Simulation and Modeling OR b. Agricultural Water Management OR c. Design of Concrete Structures	9	15
	Set 2 (Select one)		
	a. Geographical Information Systems OR b. Remote Sensing	9	15
	Set 3 (Select one)		
	a. Climate and Resources in semi-arid Environments OR b. Hydrology and Water Resources	9	15
		Total	**45**

Rules of combinations, Credit distribution (where applicable):

A student shall take courses of specified credits as shown in the components:

- **Fundamental Component: 30** credits.
- **Core Component: 165** credits.
- **Elective Component: 45** credits derived from any one course in Sub-set 1, 2 & 3.

The total Credit limit per student shall, therefore, consist of 120 credits of coursework plus 120 credits of research undertaking culminating to **240** credits for the MSc (Soil and Water Engineering) qualification.

ASSESSMENT AND MODERATION ARRANGEMENTS

Formative assessment

Formative assessment or continuous assessment contributing towards the award of credits should be based on module (unit) outcomes.

The contribution of formative assessment to the final grade shall be **70%.**

Summative assessment

Candidates may undergo assessment including written and practical examinations or projects. The final assessment for each module (unit) contributes **30%** of the final mark for that module.

Assessment shall be carried out by BQA registered and accredited Assessors.

Internal moderation arrangements

All assessments will undergo internal moderation, according to the ETPs Quality Assurance Team (DQUAT) system, by peers before being administered to the students to determine among others, coverage, appropriateness for the level, and allocation of marks. After marking, moderation will be repeated by peers to ensure fairness in marking.

External moderation arrangements

Internal and external moderators to be engaged will be BQA accredited subject specialists in relevant fields with relevant industry experience and academic qualifications.

Both internal and external moderation shall be done in accordance with applicable policies and regulations.
Dissertation will be moderated by independent external faculty.

Dissertation Assessment and Moderation

Examination of the dissertation is by approved internal and external examiners on pass/fail basis whilst moderation is assumed from the examination process.

RECOGNITION OF PRIOR LEARNING (if applicable)

(NB: Since this is an Engineering qualification RPL is restricted).

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 Progression

Master of Science in Irrigation Engineering & Management
Master of Science in Soil & Water Conservation
Master of Science in Land & Water Engineering
Master of Science in Environmental Science

Vertical Progression

Doctor of Philosophy (PhD) in Soil & Water Engineering
Doctor of Philosophy (PhD) in Irrigation Engineering & Management
Doctor of Philosophy (PhD) in Soil & Water Conservation
Doctor of Philosophy (PhD) in Land & Water Engineering
Doctor of Philosophy (PhD) in Environmental Science

Employment opportunities

Lecturers in tertiary institutions
Researchers in public and private institutions
Consultants in consultancy companies
Professional managers in public and private sectors

QUALIFICATION AWARD AND CERTIFICATION

For a Candidate to achieve this qualification they must have acquired a minimum of **240** credits. The Candidate should pass all the **Core, Fundamental and 3 Electives** modules.

Certification

A **Master of Science in Soil and Water Engineering** 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

This qualification compares with identical / similar qualifications regionally and internationally as shown in the matrix. The duration (of 2 years) is the same across the board. The credit value of the MSc qualification is 240 credits across the board. The structure of the MSc qualification is identical across similar qualifications, comprising of Fundamental (General), Core, Optional and Elective courses.
In summary, the MSc (Soil & Water Engineering) qualification compares favourably with regional & international qualifications in terms of structure, credit loading and duration.

REVIEW PERIOD

5 years