QUALIFICATION SPECIFICATION								SECTION A
QUALIFICATION DEVELOPER	Botswana University of Agriculture and Natural Resources							
TITLE	Bachelor of Science in Soil Science				**NCQF LEVEL**		7	
FIELD	Agriculture and Nature Conservation			**SUB-FIELD**	Soil Science			
New qualification	√	Review of existing qualification						
SUB-FRAMEWORK	General Education		TVET		Higher Education	√		
QUALIFICATION TYPE	Certificate		Diploma		Bachelor	√		
	Bachelor Honours		Master		Doctor			
CREDIT VALUE	524							

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE

At independence in 1966, the contribution of the agriculture sector to Botswana's GDP was 42.7%. Over the past 42 years, this contribution declined to 1.9%. The decline in contribution to GDP is a result of both rapid growth in other sectors such as mining, government, tourism and the decline in performance of the sector itself. The Botswana farming community is located in rural area where it practices subsistence farming and about 70% of rural households derive their livelihoods from agriculture, through subsistence farming. At subsistence level, production is low and it limits the potential for agriculture to contribute to economic growth. Other factors that limit agriculture's contribution to economic growth are water for livestock, water for domestic use, and water for irrigation. The crop subsector has not performed well over the years due to its heavy dependence on rainfall. As a result of low erratic poorly distributed rainfall and relatively poor soils, crop production is a high-risk venture with low productivity. Crop production growth is limited by recurring drought, limited skills, inadequate market access, marketing facilities and inadequate use of improved technology.

In the past, the government has introduced both production and market-oriented programmes such as Arable Land Development Programme (ALDEP) and the Financial Assistance Policy (FAP) whose objectives were to improve rural livelihoods and national food security, raise farm income and create rural employment. The success of these programmes in transforming the agricultural sector was minimal as they did not achieve their stated objectives. These programmes were transformed into new initiatives like the National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD) and Livestock Management and Infrastructure Development (LIMID) Programme that were intended to transform the

agricultural sector from its subsistence state to a commercial level. Another recent government initiative is the Integrated Support Programme for Arable Agriculture Development (ISPAAD) was introduced to address challenges of poor technology adoption by farmers and low productivity in the arable subsector. In the agricultural sector of vision 2036, it has been indicated that agriculture has a potential to contribute to the GDP of Botswana. This contribution can be achieved only when agriculture is well supported, productivity and competiveness are improved. Several National Development Plans (NDP) have indicated the lack of qualified manpower required to implement policies, projects and programmes.

The agricultural sector of Human Resource Development Council (HRDC) established in 2013 has listed top occupation in demand. This list includes Soil scientists, Agricultural climatologist, and Irrigation specialists to name a few (HRDC Document 2016, Table 1). In addition, the needs assessment conducted by the |CSS department indicated that there is need for BSc qualification in Soil Science. (86% of the interviewees agreed to the degree) (Appendix 2). The survey also showed that there are few organisations offering soil science sections such as organic agriculture, soil and water analysis, waste management to mention the few.

The government of Botswana has developed the national Vision 2036 with several objectives such having a knowledge-based economy, a country with a sustainable, technologically driven and commercially viable agricultural sector to name a few. If well supported, the agricultural sector can provide food, create employment and contribute to government revenue generation and export earnings. Agricultural productivity can be improved by optimizing the use of agriculture related resources, latest technologies, and modern farming methods. The success of these programs and visions calls for a greater emphasis on training in crop production and / soil husbandry to boost the crop sector manpower armed with the relevant skills, experience, and competencies, at the right time. As a result, the development of a BSc in soils science is aligned to the initiatives and visions of Botswana.

Purpose

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

- to manage soil and water for crop production.
- to provide advice on crops and soils management.
- for lecturing and teaching soil science courses at the university and college levels.
- for developing research proposals and research in soils and soil-related fields.

- to evaluate soil resources that contribute to the agricultural production, environmental quality and protection.
- to provide consultancy services in agriculture related fields.

ENTRY REQUIREMENTS (including access and inclusion)

Minimum entry requirement for this qualification is a:

NCQF level 4, Certificate IV (General Education or TVET) or equivalent

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 RPL and CAT National Policies.

QUALIFICATION SPECIFICATION SECTION B	
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
1. Manage and conserve soils and soil fertility in Botswana.	1.1 Apply soil conservation best management practices. 1.2 Determine suitable integrated soil fertility management practices. 1.3 Determine the nutrient requirement for major crops in different regions of Botswana.
2. Develop land use plans for various agricultural districts of Botswana.	2.1 Assess the physiochemical environment of various region for crop production. 2.2 Assess socio-economic conditions of prospective people. 2.3 Develop suitable plans for various regions.
3. Develop and implement research proposals addressing sustainable soil management issues.	3.1 Develop research proposals that address issues of soil health management. 3.2 Develop research proposal addresses the impact of land degradation on crop yield. 3.3 Assess the national stores of soil organic carbon and soil organisms in order to stabilized or increased them.
4. Sample, analyze and interpret soil test results for farmers and stakeholders in agriculture and environmental protection agencies.	4.1 Conduct sampling exercise for soil, plant and water for agriculture purposes. 4.2 Determine fertilizer requirement for crops. 4.3 Determine water quality for irrigation.
5. Promote awareness of farmers on the relationships between soil health and human health	5.1 Package soil science extension materials for farmers. 5.2 Apply extension methods to develop awareness of soil health and food and nutrition. 5.3 Communicate extension messages to farmers and stakeholders.
6. Utilise the aspects of soil science combine with agribusiness in production and marketing.	6.1 Implementation of agribusiness plans using soil science. 6.2 promote value-chains in agribusiness using soils as springboard.

QUALIFICATION STRUCTURE			SECTION C
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	**Title**	**Level**	**Credits**
	Mathematics	5	24
	Chemistry	5	24
	Physics	5	24
	Biology	5	24
	Communication and writing Skills	6	24
	Computer Skills	6	16
CORE COMPONENT Subjects / Units / Modules /Courses	Soil science	7	132
	Agronomy	6	32
	Land Conservation	7	72
	Agricultural Extension	6	48
	Agricultural Economics	6	32
	Biometry	7	16
	Research	8	28
ELECTIVE COMPONENT Subjects/ units / course	**Set 1(Select one course)**		
	Legume, Oilseed and Fiber Crop Production	6	12
	Fruit Production	6	12
	Vegetable Production	6	12
	Set 2 (Select one course)		
	Project appraisal and evaluation	7	8
	Farm business management	7	8
	Basic concept in marketing	7	8
	Small business entrepreneurship	7	8
	Farm workshop	7	8
	Environmental change in Southern Africa	7	8
	Set 3 (Select one course)		
	HIV/AIDS prevention and control in Botswana	8	8
	Sensory Evaluation	8	8
	Introduction to range science	8	8
	Game farming and ranching	8	8

	Equine management	8	8
	Aquaculture	8	8

Rules of combinations, Credit distribution (where applicable):

Candidates will be awarded a Bachelor of Soil Science qualification after completing a minimum of 524 credits. At least 360 credits must come from core courses, 136 credits from fundamental courses and 28 credits from electives to make up the total credits for the qualification.

The credit distribution is shown in the table below.

Level	Total no of credits
5	120
6	140
7	228
8	36
Total	**524**

Candidates will have to choose a total of three electives, one from Set 1 worth 12 credits, one from Set 2 worth 8 credits and another from Set 3 worth 8 credits.

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 registered and accredited with BQA or any other recognized body, with expertise, industry experience and academic qualifications in relevant fields. 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 Environmental Science.
- Bachelor of Science in Agriculture Economics.
- Bachelor of Science in Range Science.
- Bachelor of Science in Crop Science.
- Bachelor of Science in Agricultural Extension.
- Bachelor of Science in Agricultural Mechanization.
- Bachelor of Science in Soil and Water Engineering.

Vertical Progression

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

- Bachelor of Science Honors Soil Sciences.
- Post Graduate Diploma in Plant Nutrition.
- Post Graduate Diploma in Soils and Water Conservation.
- Post Graduate Diploma in Soil Science and Technology.
- Postgraduate Diploma in Soil Fertility and Fertilizers.
- Master of Science in Crops and Soil Science.
- Master of Science in Soil Science management.
- Master of Science in Soil and the Environment.
- Master of Science in Environmental management.
- Master of Science in Ecology and management.
- Master of Science in Natural Resource management.
- PhD on fields related to Soil Science.

Employment Pathways

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

- Soil Surveyors
- Managers
- Advisors
- Lecturers at the university and colleges.
- Researchers in public and private research institutions
- Environmentalist.
- Consultants
- Project management specialists
- Environmental and natural resources managers

QUALIFICATION AWARD AND CERTIFICATION

For a Candidate to achieve this qualification they must have acquired a minimum of **524** credits. The Candidate should pass all the **Fundamental, Core, and 3 Electives** modules.

Certification

A **Bachelor of Science in Soil Science** 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

1. Stellenbosch University (RSA): the qualification is called BSc Agric (Crop Production Systems) with domains in Soil and Water Management, Crop production and Crop protection and Breeding. In the field of Soil and Water Management, students can major in Soil Science and either Agronomy, Chemistry, Horticulture or Viticulture. This is a four-year qualification. The minimum credit value for this qualification is 360 and NQF level 7.
2. University of KwaZulu–Natal (RSA): the qualification is called Bachelor of Science with majors in Geography, Hydrology, Plant pathology and Soil Science. This is a three- year qualification with minimum credit of 384 and NQF level 7.
3. University of Adelaide (Australia): the qualification is called BSc Soil Science.
4. University of Saskatchewan (Canada): the qualification is Bachelor of Science in Agriculture (Soil Science). This is a four-year qualification with 120 credits hours.

REVIEW PERIOD

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