QUALIFICATION SPECIFICATION								SECTION A
QUALIFICATION DEVELOPER	Botswana University of Agriculture and Natural Resources							
TITLE	Master of Science in Crop Protection				**NCQF LEVEL**		9	
FIELD	Agriculture and Nature Conservation		**SUB-FIELD**		Crop Protection			
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

About 40% of the population of Botswana live in rural areas and most of them derive their subsistence from crop production and related agricultural activities (Statistics Botswana, 2014). The agriculture sector is important because of the multiple backward and forward linkages to other sectors of the economy such as input services, transport, manufacturing, advisory services, financial services, and tourism. Consequently, when agriculture thrives, the rest of the economy will prosper. The sector's contribution to GDP declined from 40% in 1966 at independence to 1.9 % in the current period (Bank of Botswana, 2013). This is due to stagnation of the sector and growth of other sectors especially mining and tourism. However, crop production in Botswana is severely hampered by low and erratic rainfall, endemic droughts, high summer temperatures, low soil fertility and high incidence of pests, diseases, and weeds. A key challenge for Botswana is that the country is drought prone. Low adoption of technologies by farmers, inadequate research-extension linkages and limited highly trained and skilled human resources.

The need for Crop Scientist with advanced knowledge and demonstrate high level of mastery, innovation, autonomy, scholarly and professional integrity in the crop sub-sector of Botswana's agricultural sector cannot be over emphasized. The need to develop human resources in crop science (Horticulturists, Agronomists, Crop Breeders, Crop Protection Scientists and Soil Scientists) for research, extension and managerial positions in the Ministry of Agricultural Development and Food Security, and other related ministries and non-governmental organizations is great. The recent National Development Plans (NDP 8 and NDP 9), NAMPAADD (2002) and Human Resource Development Council (HRDC) reports have identified the lack of qualified personnel in specialized disciplines, as one of the bottlenecks to the

implementation of agricultural policies and development projects (HRDC, 2015). In 2015, HRDC identified skills that are in high demand for agriculture sector by level. In the crops sub-sector the skills in demand per annum are Agronomists (40), Crop Scientists (20), Soil Scientists (20), Research Scientists (20), Molecular Biotechnologists (20), Plant Breeders (30), Soil Physicists (30), Soil Chemists (30), Soil Biologists (20), Seed Technologists (20), Weed Scientists (30), Florists (40), Pomologists (Fruit Scientists) (50), Olericulturists (Vegetable Scientists) (50), Postharvest Physiologists (60), Geneticists (30), Plant Pathologists (100), Entomologists (60), Greenhouse Technicians (80) and Field Crop Producers (50). The above mentioned skilled and competent personnel are to be provided by BUAN (HRDC, 2015). The above skilled and competent personnel required at higher level of training at masters and PhD levels to provide evidence-based policy reforms for the agriculture sector (HRDC, 2015). PhD training should no longer be treated as a luxury but a necessity for the agriculture sector (HRDC, 2015).

A country-wide needs assessment survey with the relevant stakeholders in agriculture (Ministry of Agriculture, Ministry of Higher Education, Farmer Associations, Government Parastatals, NGOs, Current and Former Students, etc.) was conducted in May, June and July of 2006. An overwhelming majority (97%) of the respondents indicated that they require graduates in Crop Science in their organizations at master's level.

Purpose

The purpose of the qualification is to provide graduates with advanced knowledge, skills, and applied competences in:

- crop protection disciplines.
- conducting research related to crop protection and management.
- development and implementation of strategies integrated pest management.
- solving complex problems independently, systematically, and creatively in familiar and unfamiliar contexts facing the crop sub-sector of the Agricultural Industry in Botswana.
- Communicating effectively to a diverse group of people using appropriate technological media

ENTRY REQUIREMENTS (including access and inclusion)

The minimum admission requirement for Master of Science in Crop Protection shall be one of the following:

NCQF Level 7, for example, Bachelor of Science in, Biology, Plant Pathology, Plant Health, Entomology, Plant Science, Crop Science, Agriculture, Horticulture, Landscape Horticulture, Natural Resources,

Environmental Science and other related fields from any recognized university. The BSc holders in the same or cognate field must undertake course work.

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**
• Demonstrate advanced knowledge of the influence of soil chemical properties on water and nutrient uptake, soil microbes and crop yields.	• Carry out pest surveys. • Write research proposals that indicate that learners are able to identify problem(s) in crop protection and formulate research problems.
• Apply and demonstrate advanced knowledge, skills and competences in the field of crop protection to design, undertake and write up research.	• Formulate and test hypotheses. • Select and utilize research instruments that are relevant in research problems in crop and soil science and related fields. • Undertake field and laboratory work during actual research or investigation relevant to the research project. • Report the findings of the investigation and formulate recommendations that emanate from the findings.
• Apply the appropriate research methods or techniques in solving complex or simple problems being investigated	• Identify and analyze different scientific procedures in reference to the problem being researched. • Select appropriate methods and tools for analyzing research data. • Compile and present scholarly research work.
• Demonstrate an understanding of literature relevant to the research problem.	• Critically read, interpret and analyse literature from different authors on the topic being researched. • Draw conclusions from different readings and indicate anomalies. • Create a theoretical conceptual framework provided by the literature review. • Compile a complete bibliography or list of cited references.
• Demonstrate the ability to write a thesis or dissertation that is linguistically, technically and scientifically correct.	• Write a dissertation or thesis that shows that learners can express themselves clearly. • Write a dissertation or thesis that is linguistically correct and of an acceptable standard.

	• Write a dissertation that is technically and scientifically correct and acceptable to the examiners.

QUALIFICATION STRUCTURE SECTION C			
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	**Title**	**Level**	**Credits**
	N/A		
CORE COMPONENT Subjects / Units / Modules /Courses	Insect taxonomy and systematics	9	15
	Mycology	9	15
	Experimental design	9	15
	Economic entomology	9	15
	Nematology	9	15
	Weed management	9	15
	Proposal development	9	30
	Research and dissertation	9	90
ELECTIVE COMPONENT Subjects / Units / Modules /Courses	**Set 1 (Select one)**		
	Plant virology	8	15
	Plant biotechnology	8	15
	Cropping systems	8	15
	Set 2 (Select one)		
	Genetic improvement of plants	8	15
	Plant bacteriology	8	15
	Postharvest physiology	8	15
	Total		240

Rules of combinations, Credit distribution (where applicable):

Candidates will have to complete 210 credits from the core subjects and 30 credits from the electives. There are two groups of electives provided. Candidates are expected to select 1 from each group. The total number of credits to be completed will add up to 240 credits.

Level 8: 30 credits
Level 9: 210 credits

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 **50%.**

Summative assessment

There shall be a thesis to be submitted at the end of the research. The thesis shall contribute **50%** of the final grade. Assessment of the thesis will be in accordance with respective ETP's regulations and procedures. Assessment shall be carried out by BQA registered and accredited Assessors or any others who are recognized by any other recognized authority.

Internal and 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)

Recognition of prior learning (RPL) shall be used to augment entry into the qualification into the qualification for candidates who do not have formal entry requirement into the qualification. Assessment shall be done to determine whether the candidate has an abundance of relevant knowledge and skills acquired through formal or informal methods, workplace learning, or work experience gained from a related field.

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's Degree in Plant Health

- Master's Degree in Plant Pathology
- Master's Degree in Entomology
- Master's Degree in Mycology
- Master's Degree in Biological Science

Vertical Progression

- Doctoral Degree in Entomology
- Doctoral Degree in Plant Pathology
- Doctoral Degree in Mycology
- Doctoral Degree in Weed Science
- Doctoral Degree in Biological Science
- Doctoral Degree in Plant Health

Employment opportunities

- Consultant.
- Researcher
- Entrepreneur
- Farm manager
- Lecturer
- Policy Analyst

QUALIFICATION AWARD AND CERTIFICATION

For a Candidate to achieve this qualification they must have acquired a minimum of **210** credits. The Candidate should pass all the **Core and 2 Electives** modules.

Certification

A **Master of Science in Crop Protection** 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

Extensive regional and international comparability was conducted with various qualifications and the following qualifications were chosen because of their best practice:

Benchmarking for the Master of Science in Crop Protection was done with regional and international universities. Comparisons were done using the qualification name, the credit load, the duration of study, the qualification structure as well as the entry requirements. Although the qualifications are similar in many aspects, they will differ in the structure because it will mostly likely reflect challenges of crop protection in a particular country. One of the commonalities among all institutions is the existence of courses in proposal writing and thesis or dissertation. Some institutions, for example, University of Pretoria and North Carolina State University do not offer course work at graduate level, thus the MSc is research based. Furthermore, North Carolina State University and Washington State University base admission of students on a GRE general test. The most similar qualification to this MSc in Crop Protection was that offered by the Sokoine University of Agriculture in Tanzania.

REVIEW PERIOD

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