SECTION A:	QUALIFICATION DETAILS																
QUALIFICATION DEVELOPER (S)	Botswana University of Agriculture and Natural Resources																
TITLE	Master of Science in Horticulture													**NCQF LEVEL**	9		
FIELD	Agriculture and Nature Conservation		**SUB-FIELD**	Horticulture										**CREDIT VALUE**	260		
New Qualification	✓		Review of Existing 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:

About 40% of the population of Botswana live in rural areas and the majority 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. 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. Also, low adoption of technologies by farmers, inadequate research-extension linkages and limited highly trained and skilled human resources. These constraints of crop production require highly specialized trained crop scientists, hence the importance of this qualification.

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, 2019). PhD training should no longer be treated as a luxury but a necessity for the agriculture sector (HRDC, 2015). Horticulturits and Farm Managers are among the technical and soft skills for the top occupations in demand in Botswana (HRDC, 2019). Therefore, the importance of this qualification for Botswana.

A Needs Assessment Survey was carried out in June and July 2006. Questionnaires were administered to Governmental and non-Governmental organizations, institutions and individuals. The institutions that were involved in this needs assessment were: Department of Agricultural Research (Sebele, Francistown and Maun), Department of Crop Production and Forestry, and other Departments within the Ministry of Agriculture, all Regional Agricultural Officers (RAOs) and, District Crop Production Officers (DCPOs), NAMPAADD Coordinator, Horticultural Council, National Food Technology Research Centre, Botswana Development Corporation, Ministry of Education, Department of Curriculum Development and Evaluation, University of Botswana (Departments of Environmental Science and Biological Sciences), Blooms, Agrichem, SANITAS, Debswana Masedi Farms and individual progressive farmers. The total number of interviewees were 135. The analysis of the results of the survey indicated the following:

- All the 135 (100%) respondents said they would support MSc qualifications in Crop Science at BCA now BUAN. Ninety seven percent believed that MSc in Crop Science will serve the needs of the arable and irrigated crops sector in Botswana would provide leadership in the crop sector.
- Seventy seven percent of the organizations interviewed said they require the services of MSc degree holders in their organizations.
- Sixty five percent said they would need the MSc degree holders within the next five years while 35% said they would need them after five years.

- When the respondents were asked to choose (multiple options were allowed) their preference for different disciplines of Crop Science, the following figures were obtained: Agronomy (65%), Horticulture (70%), Crop Protection (60%) and Soil Science (56%).

PURPOSE:

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

- Conduct research related to crop production and management.
- Develop and implement strategies for managing horticultural enterprises.
- Solve complex and unpredicted problems in horticulture independently, systematically, and creatively in familiar and unfamiliar contexts facing the crop sub-sector of the Agricultural Industry in Botswana.
- Communicate effectively to a diverse group of people using appropriate technological media.

ENTRY REQUIREMENTS (including access and inclusion)

The minimum admission requirement is:

- Bachelor's Degree NCQF Level 7 in the same or cognate field of study.
- Candidates who do not meet the above minimum entry requirements will be considered through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) as specified in policies by the Education and Training Provider (ETP) in line with the National RPL and CAT policies.

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SECTION B QUALIFICATION SPECIFICATION	
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
LO 1. Demonstrate specialized knowledge in the field of horticulture in horticultural enterprise development.	1.1. Evaluate site information and data before establishing horticultural enterprises. 1.2. Establish appropriate horticultural enterprises. 1.3. Manage horticultural enterprises. 1.4. Analyse and interpret soil and plant data samples for the development for efficient fertilizer management programs. 1.5. Advice stakeholders in horticultural enterprises on the postharvest handling, grading and preservation of harvested horticultural produce. 1.6. Landscape public and private spaces, and waste landfills.
LO 1. Apply and demonstrate advanced knowledge, specialized skills, and competences in the field of horticultural science to design, undertake and communicate research findings.	2.1. Develop research proposals. 2.2. Formulate hypotheses. 2.3. Design field and laboratory experiments. 2.4. Collect data. 2.5. Analyse and interpret the research data concisely. 2.6. Communicate research findings through different platforms and media.
LO 3. Demonstrate specialized skills in selecting appropriate research methods or techniques in solving complex and unpredicted problems in horticulture.	1.1. Analyse and evaluate different scientific procedures and techniques relevant to the problem being investigated. 1.2. Select appropriate research methods or techniques in solving complex and unpredicted problems being investigated. 1.3. Synthesize research information

	1.4. Communicate effectively research findings through various platforms and media 1.5. Develop policies informed by research
LO 4. Utilize specialized skills and knowledge in review of literature relevant to the research problem.	4.1. Review, interpret and synthesize literature from different sources on the problem being researched. 4.2. Draw conclusions from different literature sources and indicate anomalies. 4.3. Develop a theoretical conceptual framework provided by the literature review. 4.4. Compile a complete bibliography.
LO 4. Compile relevant- information and synthesized research data for dissertation and scientific manuscript publication.	5.1. Compile relevant information and synthesized research data. 5.2. Publish a dissertation and manuscripts that are linguistically, technically, and scientifically sound and acceptable to examiners and journal reviewers in different platforms and media. 5.3. Circulate the dissertation and manuscripts in different platforms and media.

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SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	**TITLE**	**Relevant NCQF Level**			**Total Credits** (**Per** Subject/ Course/ Module/ Units)
		Level [9]	**Level [ ]**	**Level [ ]**	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units					
CORE COMPONENT Subjects/Courses/ Modules/Units	Ecophysiology of Crop Plants	9			15
	Experimental Design	9			15
	Pomology	9			15
	Olericulture	9			15
	Postharvest Physiology	9			15
	Landscaping	9			15
	CSP701 Proposal Development	9			15
	CSP702 Research & Dissertation	9			125
	Group 1 electives				

ELECTIVE/ OPTIONAL COMPONENT Subjects/Courses/ Modules/Units	Plant Biotechnology	8			15
	Flower Science	8			15
	Plant Nutrition	8			15
	Group 2 electives				
	Economic Entomology	8			15
	Seed Production	8			15
	Weed Management	8			15

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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	**Credit Value**
Level 8	**30**
Level 9	**230**
TOTAL CREDITS	**260**

Rules of Combination:

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

- Candidates will have to complete 230 credits from the core subjects and 30 credits from the electives.
- There are two groups of electives provided.
- Candidates are expected to select 1 subject from group 1 and another from group 2.
- The total number of credits to be completed will add up to 260 credits.

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ASSESSMENT ARRANGEMENTS

Formative and summative assessments will be used.

Formative assessment

Will include continuous assignments that will collectively contribute 50% of the final grade. Integrated assessment procedures to ensure that the purpose of the qualification is achieved.

Summative assessment

There shall be a dissertation to be submitted at the end of the research. The dissertation shall contribute 50% of the final grade. Assessment of the dissertation will be in accordance with respective ETP's regulations and procedures.

MODERATION ARRANGEMENTS

Pre-moderation is done by relevant internal structures. Quality assurance of the assessment instruments is conducted prior to administration. Research proposal seminar are pre- and post-moderated internally. The thesis and thesis defence seminar will also be internally moderated.

Moderation will be carried out by BQA registered and accredited moderators.

External Moderation Arrangements

The thesis and thesis defence seminar will be externally moderated.

RECOGNITION OF PRIOR LEARNING

There shall be an award of the qualification using Institutional RPL Policy in line with the National RPL Policy.

CREDIT ACCUMULATION AND TRANSFER

There shall be access and award of credits of the qualification using Institutional Credit Accumulation and Transfer (CAT) Policy in line with the National CAT Policy.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Progression

- Master's Degree in Agronomy
- Master's Degree in Agriculture
- Master's Degree in Crop Science

• Master's Degree in Biological Science

Vertical Progression

Holders of the qualification meets the requirement for vertical progression and admission to:

• Doctoral Degree in Horticulture

• Doctoral Degree in Agronomy

• Doctoral Degree in Agriculture

• Doctoral Degree in Crop Science

• Doctoral Degree in Biological Science.

Employment Pathways

Holders of the qualification can work as:

• Horticulture Consultant

• Horticulture Researcher

• Horticultural Entrepreneur

• Farm manager

• Horticulture Lecturer

• Horticulture Policy Analyst

QUALIFICATION AWARD AND CERTIFICATION

For a candidate to graduate with a Master of Science in Horticulture, they should have:

• Satisfactorily completed all courses

- Presented research proposal before a panel of judges.
- Passed the dissertation.
- Attained 260 credits.

Certification:

There shall be an award of **Master of Science in Horticulture** upon successful completion of the qualification.

REGIONAL AND INTERNATIONAL COMPARABILITY

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

Benchmarking for the Master of Science in Horticulture was done with regional and international universities. Nationally, there are no universities offering this qualification. Comparisons were done using the qualification name, the credit load, the duration of study, the qualification structure as well as the entry requirements with the following universities: Sokoine University of Agriculture (Master of Science in Crop Science (Horticulture), University of Pretoria [Master of Science in Agriculture with streams (Agronomy, Horticulture, Soil Science, Pathology, Entomology, Plant Science, Medicinal Plants)[, Stellenbosch University (Master of Science in Agriculture (Horticulture)), North Carolina State University (Master of Science Crop Science) and Oregon State University (Master of Science Crop Science). All universities except the South African ones and Oregon State University, offered both course work and research. All universities selected are ranked high on the world scale and were selected because of their long history of best practices in academia. This qualification is at par with the qualifications offered by the universities used in the comparative study. See the attached comparability matrix.

REVIEW PERIOD

Every five (5) years

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