BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS				
QUALIFICATION DEVELOPER (S)	University Of Botswana				
TITLE	Master of Philosophy in Geomatics			**NCQF LEVEL**	9
STRANDS (where applicable)					
FIELD	Manufacturing, Engineering and Technology	**SUB-FIELD**	Engineering and Engineering Trades	**CREDIT VALUE**	240

New Qualification												Legacy 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:

The Master of Philosophy in Geomatics (MPhil in Geomatics) qualification has been designed to respond to Botswana's socio-economic needs and that of the region. The qualification's rationale and purpose are aligned to the key strategic sectors of Engineering, Built Environment, Construction, Mining, Water, and advancing Science and Technology through excellence in Research and Innovation as identified and in congruence with the recommendations of: Human Resource Development Council (HRDC 2016), National Human Resource Development Plan (2009-2022) and NDP 11 (2017), which seeks for a high-level workforce to transform Botswana into a knowledge-based and circular economy.

In the HRDC report of 2016, Geoinformatics is ranked among the Top Occupations contributing to Mining, Minerals, Energy and Water Resources sector. In the same report of 2016, Surveying (Geomatics) was listed among the Top 20 Occupations in High Demand in the Creative Industries Sector. From the Forecasts for Botswana's Top Occupations in Demand (2019-2028), Geomatics specialists form part of the Top National Occupations with the deficit growing from 230 in 2019 to 324 in 2028. Thus, the MPhil qualification in Geomatics will significantly contribute to the Top Occupations in High Demand, and will enhance the research and innovation agenda as key areas that require the tertiary education system to play a leading role in transforming Botswana into a knowledge-driven society as envisioned in the Tertiary Education Policy (2008). Towards realizing the NDP 11 (and beyond) objectives, advanced knowledge and skills in Geomatics will be important in achieving the following specific agenda in NDP11 (pages 108, 127, 140, 142 and 147): National mapping programme; Demarcation of the international boundaries; Densification of the national control framework; Establishment of the Continuous Operating Reference System (CORS); Land information management programme; E-Government and National Spatial Data Infrastructure (NSDI) initiatives; Smart cities initiative (Smart Botswana) and the national Digital transformation programme.

As Botswana embraces sustainable development through the implementation of the Sustainable Development Goals (SDGs), the Master of Philosophy in Geomatics qualification graduates will contribute towards bolstering the relevant human resource in support of the Botswana's domesticated SDG targets including: ensuring ownership and control over land and other forms of property (SDG target 1.4); integrated water resources management at all levels (SDG target 6.5); developing quality, reliable, sustainable and resilient infrastructure (SDG target 9.1); ensuring access for all to adequate, safe and affordable housing and basic services and upgrade slums (SDG target 11.1), and to increase significantly the availability of high-quality, timely and reliable geospatial data (SDG target 17.18). The qualification is also in line with Botswana's Vision 2036, transforming the country from an upper middle-income country to a high-income country by 2036, by contributing to the following strategic pillars: Pillar 1 (Sustainable Economic Development), Pillar 2 (Human and Social Development), and Pillar 3 (Sustainable Environment).

The rationale for the postgraduate Master of Philosophy in Geomatics in advancing specialization in Geomatics through training and research, will meet the emerging demands and challenges in the public and private sectors by accomplishing the following:

1. Provide advanced Geomatics specializations to meet the requirements for vertical progressions from Bachelor's qualification to Masters qualification for the support and enhancement of Geomatics service provision.
2. Equip graduates with specialized knowledge and skills required to meet the technical and emerging challenges in Geomatics and related disciplines in Engineering and The Built Environment as researchers, innovators, and managers.
3. Produce postgraduate Geomatics specialists who will effectively contribute to the national development agenda by leveraging advanced Geomatics technologies.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to produce graduates with advanced knowledge, skills, and competence to:

1. Demonstrate theoretical and conceptual knowledge and skills for enhanced research in Geomatics for the solution of practical and real-world problems.
2. Demonstrate ability to think independently, analytically, creatively, and innovatively in multidisciplinary and interdisciplinary work and research environments.
3. Provide significant technical and the Built Environment disciplines through national and regional development.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

- NCQF Level 7 or Equivalent in Geomatics or related
- There is provision for entry through Recognition of Prior Learning (RPL), or Credit Accumulation and Transfer (CAT). RPL and CAT will be assessed on the application to determine the eligibility of the candidates.

SECTION B	QUALIFICATION SPECIFICATION
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
1. Systematically review, analyze, assimilate, and interpret the body of scientific literature and innovations to identify the knowledge and scientific gaps in the discipline area.	1.1 Conduct comprehensive literature review to identify gaps that are significant for further research investigations. 1.2 Adopt philosophical standpoints that fit with own context and within the discipline of Geomatics. 1.3 Demonstrate advanced knowledge and skills in developing a research proposal. 1.4 Develop original concepts and ideas to understand, analyze and design intricate solutions in Geomatics.
2. Demonstrate ability to adapt, develop, and independently implement advanced research methodologies for the enhancement and redefinition of existing knowledge in Geomatics.	2.1 Engage in independent and life-long learning in the broader context of technological change. 2.2 Apply theory and advanced research methodologies to contribute to knowledge development in Geomatics. 2.3 Develop and implement a plan of work for research study. 2.4 Generate practical and innovative solutions to problems in the area of specialization. 2.5 Prepare for advanced study (such as PhD) or for industry position as a leader.
3. Critically analyze, evaluate and synthesize new ideas, concepts, and data to make original contributions to the science and professional practice.	3.1 Apply theory from Geomatics and other disciplines to guide problem-solving, decision-making and quality improvement in Geomatics practice, education, research and policy. 3.2 Solve problems with versatility through mastery of critical and creative thinking methodologies. 3.3 Collect high quality research data and validate the research data in the research process. 3.4 Analyze, synthesize and interpret research findings. 3.5 Translate research and evidence-based interventions to actual practice to influence solutions and outcomes.
4. Develop essential work and knowledge transfer skills including collaborative	4.1 Produce and defend an MPhil Thesis.

teamwork for enhanced productivity, and requisite oral and written communication skills sufficient for presentation and publishing of research output.	4.2 Publish at least one (1) research article in peer-reviewed journal from the findings of the research. 4.3 Generate and present scientific outputs and reports in conferences, seminars and or workshops. 4.4 Prepare for early academic or senior position in industry.
5. Understand and apply the required social and ethical standards and responsibilities in carrying out research, with appropriate professional conduct within the set guidelines.	5.1 Observe ethical codes and legal guidelines in the conduct of responsible scientific research and implementation of projects. 5.2 Advocate for protection of the environment and other relevant research. 5.3 Adopt explanations that fit within the cultural, socio-political, scientific, and economic conditions of the contextual environment and discipline.

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SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level			Total Credits
		Level [9]	Level [ ]	Level [ ]	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Research Methods	**15**			15
	Mathematical Methods for Engineers	**15**			15
CORE COMPONENT Subjects/Courses/ Modules/Units	Research Proposal	**60**			**60**
	Dissertation	**150**			**150**
STRANDS/ SPECIALIZATION	Subjects/ Courses/ Modules/Units	Credits Per Relevant NCQF Level			Total Credits
		Level [ ]	Level [ ]	Level [ ]	
1.					
2.					

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	**Credit Value**
9	**240**
TOTAL CREDITS	**240**

Rules of Combination:

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

A candidate shall obtain the qualification by:

1. Attaining the following credits:
   1.1 **Fundamental** component – 30 Credits
   1.2 **Core** component – 210 Credits
   Total Credits: 240 Credits

2. **Publication**: The candidate's supervisor shall submit written evidence that the candidate has, with the approval of the supervisor, **published** OR **submitted** at least one (1) journal paper in a Journal in an Indexed Database.

ASSESSMENT ARRANGEMENTS

All assessments, formative and summative, leading/contributing to the award of credits or qualifications should be based on learning outcomes and/or sub-outcomes.

- **Examination of Coursework**: There will be TWO forms of assessments:
  (a) Formative Assessment (Continuous Assessment), and
  (b) Summative Assessment (End of Semester Final Examinations).
  Formative assessment for taught courses will contribute 40%, and Summative assessment for taught courses will constitute 60% of the overall learning programme.

Assessments shall be carried out by BQA accredited Assessors or assessors with equivalent and recognised qualifications in line with institutional and national policies.

MODERATION ARRANGEMENTS

- The qualification shall have an Internal and External moderator following applicable policies and regulations for quality assurance to ensure fairness, validity, reliability, and consistency of assessments.
- The moderator shall be registered and accredited by the Botswana Qualifications Authority and/or equivalent accreditation board.

RECOGNITION OF PRIOR LEARNING

Learners may submit evidence of prior learning and current competence and/or undergo appropriate forms of RPL assessment for the award of credits towards the qualification in accordance with applicable RPL policy, credit accumulation and transfer system and relevant national-level policy and legislative framework.

CREDIT ACCUMULATION AND TRANSFER

The Credit Accumulation and Transfer System shall be used for credit transfer between institutions of higher learning towards the award of this qualification in line with national CAT policies

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Learning Pathways

- Master of Science in Geodesy and Geoinformation
- Master of Science in Geomatics Engineering
- Master of Science in Engineering Surveying and Geodesy
- Master of Science in Photogrammetry and Geoinformatics

- Master of Science in Geodesy
- Master of Spatial Science Technology
- Master of Science in Earth Observation and Geoinformation Management

Vertical Learning Pathways

- PhD in Geomatics
- PhD in Photogrammetry and Remote Sensing
- PhD in Geospatial Information Sciences
- PhD in Geodetic Science
- PhD in Geomatics Engineering
- PhD in Engineering Surveying and Space Geodesy

Diagonal Learning Pathways

- PhD in Computer Science
- PhD in Environmental Informatics
- PhD in Geosciences
- PhD in Environmental Science

Employment Pathways

- Researchers
- Academics –Lecturers
- Senior Land Surveyors
- Senior Mine and Engineering Surveyors
- Senior Photogrammetrist
- Senior GIS Specialist
- Senior Remote Sensing Specialist
- Assistant/Deputy/Director of Surveys and Mapping

QUALIFICATION AWARD AND CERTIFICATION

Qualification Award

- To be awarded a Master of Philosophy in Geomatics, a candidate should have satisfied all exit learning outcomes and met the minimum credit requirements (240 credits), Fundamental and Core components as indicated in the qualification structure.
- Candidates shall be awarded a Master of Philosophy in Geomatics upon obtaining a minimum of 240 credits.

Certification

- There will be issuance of an official transcript and a certificate at award of degree as follows and in accordance with the area of specialization:

  Master of Philosophy in Geomatics

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The MPhil in Geomatics qualification is compared with similar qualifications regionally at the University of Cape Town (South Africa), Namibia University of Science and Technology (NUST) (Namibia), and internationally with Curtin University (Australia) and York University (Canada).

Similarities

- The minimum duration of study is similar and stipulated at 24 months (4-semsters(of full-time research study, with the candidates exiting with National Qualification Level 9 at the University of Cape Town (South Africa), NUST (Namibia) and Curtin University (Australia).
- The exit outcomes emphasize on advanced research in Geomatics and presentation of results as a Thesis. The assessment of the Thesis is based on internal and external examination of the Thesis.
- The areas of specialization within the field of Geomatics are generally similar (Geodesy and Navigation; Engineering Surveying; Photogrammetry and Remote Sensing; Land Administration and Development), and the resulting Education and Employability pathways are also largely similar.
- For the award of the qualification, all the Universities require publication of a refereed Journal paper except for NUST (Namibia).
- Comparatively, York University program includes two (2) compulsory foundational courses termed Research Evaluation courses, which is a similar requirement for the MPhil in Geomatics qualification.
- The requirement of progress reports and seminars attendance is in similarity with NUST (Namibia) and York University (Canada).

Differences

- The Universities compared offer Master of Philosophy (MPhil) qualifications, however the specific titles of the qualifications differ. University of Cape Town offers Master of Philosophy in Engineering (Geomatics); Namibia University of Science and Technology offers Master of Philosophy in Spatial Science and Curtin University offers Master of Philosophy in Surveying and Mapping. York University offers MSc by Thesis in Earth and Space Science (Geomatics Science and Engineering) and includes two (2) compulsory Research Evaluation foundational courses.
- For the same qualification, the exit level credits differ based on the Country that is: University of Cape Town (180 credits); Namibia University of Science and Technology (NUST) (240 credits), Curtin University (96 credits) and York University (120 credits).

- At Curtin University the Thesis can be presented as a traditional thesis or a compilation of published papers.

Summary

The qualification is highly comparable with similar qualifications regionally at the University of Cape Town (South Africa) and Namibia University of Science and Technology (NUST) (Namibia), and internationally, Curtin University (Australia) and York University (Canada). The Master of Philosophy qualifications have the same structure and emphasize the purpose of providing students with extensive, detailed knowledge of the theory, scientific methods, and practices in Geomatics, combined with a high level of competence in the acquisition, processing, modelling, analysis and visualization of geospatial data. The exit level outcomes are similar as well as the pathways for further study and career growth. The MPhil in Geomatics qualification compares favourably with similar accredited qualifications within the region and internationally. In addition to the MPhil degree Dissertation, the main emphasis in the MPhil in Geomatics qualification is on the publication of at least one (1) Journal paper before the award of the degree of Master of Philosophy in Geomatics.

REVIEW PERIOD

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

For Official Use Only:

CODE (ID)			
REGISTRATION STATUS	**BQA DECISION NO.**	**REGISTRATION START DATE**	**REGISTRATION END DATE**
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**	