BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS				
QUALIFICATION DEVELOPER (S)	University of Botswana				
TITLE	Master of Philosophy in Engineering			**NCQF LEVEL**	9
STRANDS (where applicable)	1. Civil Engineering 2. Electrical Engineering 3. Mechanical Engineering				
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 qualification has been designed to provide an interdisciplinary postgraduate qualification that highlights the critical factors of sustainable development in the context of civil, electrical, and mechanical engineering. The qualification responds to the National Research Goals aimed to achieve high rates of economic growth, adopting, and implementing forward-looking policies on research, science, technology, and innovation. One of the main objectives of the Master of Philosophy in engineering is to promote a lifelong learning approach in engineering. The qualification aligns well with the key strategic sectors of Engineering, Civil, Electrical and Mechanical to advance Science and Technology through excellence in Research and Innovation as identified and in congruence with

the recommendations of the Human Resource Development Council (HRDC 2016), National Human Resource Development Priorities (2023-2024) as well as the NDP 11 (2017).

The HRDC report of 2023, identifies Engineering skills among the top occupations contributing to the Manufacturing, Water and Transport and logistics sectors. Thus, the MPhil qualification in the Mechanical, Civil and Electrical engineering strands will significantly contribute to the highly demanded occupations as well as enhance the research and innovation agenda as key areas that require the tertiary education system. Subsequently, the qualification will enable the graduates to play a leading role in transforming Botswana into a knowledge-driven society as envisioned in the Tertiary Education Policy (2008). The qualification will advance research in product Design, construction and maintenance of civil, structural, electrical and mechanical works application of software, computer literacy, and mathematical engineering towards realizing the NDP 11 (and beyond) objectives as identified in the National Human Resource Development Priorities (2023-2024).

Like the Doctor of Philosophy in Engineering, this qualification is commensurate with three pillars of Vision 2036 of producing 'sustainable economic development, human and social development, and sustainable environment' and key future imperatives of research, innovation, and sustainability. The programme is a postgraduate research and is awarded to students after they complete the programme in their chosen strand.

PURPOSE: (itemise exit level outcomes)

The purpose of the qualification is to produce graduate students with advanced knowledge, skills, and competencies to:

1. Apply advanced theoretical and conceptual knowledge and skills for enhanced research in Engineering for the solution of practical and real-world problems.
2. Work independently, analytically, creatively, and innovatively in multidisciplinary and interdisciplinary work and research environments.
3. Provide significant technical and management contributions in Engineering Environment disciplines through national and regional development.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

Bachelor's degree in engineering qualifications or related field with a minimum of NCQF Level 8. There is a 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 a comprehensive literature review to identify gaps that are significant for further research investigations. 1.2 Adopt philosophical standpoints that fit with your context and within the discipline of Engineering. 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 Engineering.
2. Demonstrate ability to adapt, develop, and independently implement advanced research methodologies for the enhancement and redefinition of existing knowledge in Engineering.	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 Engineering. 2.3 Develop and implement a plan of work for a research study. 2.4 Generate practical and innovative solutions to problems in specialization. 2.5 Prepare for advanced study (such as PhD) or for an industry position as a leader.
3. Critically analyze, evaluate, and synthesize new ideas, concepts, and data to make original contributions to science and professional practice.	3.1 Apply theory from Engineering and other disciplines to guide problem-solving, decision-making, and quality improvement in Engineering 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 teamwork for enhanced productivity, and requisite oral and written communication skills sufficient for presentation and publishing of research output.	4.1 Publish at least one (1) research article in a peer-reviewed journal from the findings of the research. 4.2 Generate and present scientific outputs and reports in conferences, seminars and or workshops. 4.3 Prepare for an early academic or senior position in the 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 the 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. 5.4 Initiate and implement processes and systems that ensure good resource and governance practices.

SECTION C	**QUALIFICATION STRUCTURE**				
COMPONENT	**TITLE**	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [9]	**Level [ ]**	**Level [ ]**	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Engineering Research Method	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 [9]	**Level [ ]**	**Level [ ]**	
1. Civil Engineering **2. Electrical Engineering** **3. Mechanical Engineering**	Engineering Research Method	15			**15**
	Mathematical Methods for Engineers	15			**15**
	Research Proposal	60			**60**
	Dissertation	150			**150**
Electives					

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 main 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.

Examination of MPhil Dissertation: Dissertation assessment is by formal examination of the written Dissertation through:

(a) Internal Examination.

(b) External Examination

(c) Scholarly Défense of the Dissertation.

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.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Learning Pathways

- MPhil in Civil Engineering
- MPhil in water Engineering
- MPhil in Electrical Engineering

- MPhil in Electronics Engineering
- MPhil in Mechanical Engineering
- MPhil in industrial Engineering

Vertical Learning Pathways

- PhD in Civil Engineering
- PhD in Water Engineering
- PhD in Electrical Engineering
- PhD in Electronic Engineering
- PhD in Mechanical Engineering
- PhD in Industrial Engineering

Employment Pathways

- Researchers
- Plant Maintenance Engineer
- Energy Engineer
- Civil Engineer
- Electronic Engineer
- Electrical Engineer

QUALIFICATION AWARD AND CERTIFICATION

To be awarded a Master of Philosophy in Engineering, 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 Engineering upon obtaining a minimum of 240 credits.

There will be issuance of an official transcript and a certificate at the award of degree as follows and following the area of specialization: **Master of Philosophy in Engineering**

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed Master of Philosophy in Engineering qualification is a similar qualification in benchmarked institutions in several ways. For example, the title of the qualification Master of Philosophy in Engineering is the same title of qualification offered by Cambridge University in the United Kingdom. However, compared with the qualification offered by the University of Unisa (South Africa), the title of the qualification is slightly different (Master of Engineering), although the NQF level is the same (9). Despite, the slight difference in titles, the qualification is by dissertation – which is research only in all the universities under review.

The noticeable difference is in the total number of credits, with the Master of Engineering at UNISA having a total credit of 180 compared to the proposed qualification with a total of 240 credits. For the qualification offered in all the three Universities under review, the main outcome (s) are research skills, specialised knowledge production, development of research and societal contributions to meet immediate problems. The most noticeable difference between the proposed qualification and benchmarked institutions is the fundamental courses, namely, Engineering Research Method and Mathematical Methods for Engineers offered to Master of Philosophy Students, which is not the case in the two institutions benchmarked.

The assessment strategies for the proposed qualification are in line with those of benchmarked Universities. For example, the graduate attributes for the benchmarked Universities including the proposed qualification are assessed through means such as examiners' reports (external and internal), analysis of these reports, and analysis of the extent to which extensive corrections/resubmissions of these are required. The minimum qualification rules applied in the qualification framework under review are almost like those applied in the two benchmarked Universities. For example, at the University of Botswana, researchers are expected to publish two journal articles in journals listed in ISI or Scopus, while at UNISA it is a requirement for candidates to submit two manuscripts for publication to a peer-reviewed journal as part of the thesis. Regarding education and employment paths, the qualifications in all three Universities provide an excellent transition to full-scale PhD research. However, there is no automatic confirmation from an MPhil to a PhD – a new application must be made, and a suitable supervisor must be identified.

Possible further study qualifications are a Master of Philosophy in Engineering, Master of Philosophy in Water Engineering, Master of Philosophy in Electrical Engineering etc. Possible employment pathways are researchers, plant maintenance engineers, civil engineers etc. The MPhil Engineering qualification compared well with those of the benchmarked institutions in terms of research centred.

REVIEW PERIOD:

The qualification of Master of Philosophy in Engineering is designed to be reviewed every 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**	