BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS				
QUALIFICATION DEVELOPER (S)	Botswana International University of Science and Technology				
TITLE	Master of Engineering in Civil and Environmental Engineering			**NCQF LEVEL**	9
STRANDS (where applicable)	1. N/A 2. N/A 3. N/A 4. N/A				
FIELD	Manufacturing, Engineering and Technology	**SUB-FIELD**	Engineering and engineering trades	**CREDIT VALUE**	240

New Qualification							*x*	*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 world is currently undergoing the phase of economic development using strategies proposed by the UN Sustainable Development Goals (SDGs) and Goals laid down in the 4th Industrial Revolution (4IR). These, in turn have opened doors to the development of strategies that encapsulate aspirations for the future of the world through flagship programs which can not only boost economic growth but also cater to the rapid transformation taking place in the different continents along with their sub-regions. In fact, some of the recently developed strategy documents, such as: Africa's Path to Vision (2063) and Botswana Vision (2036) bear allegiance to these. From amongst the many other goals

identified in these documents, the importance on skills development through quality education has been one of the main agenda intended to be achieved within the coming decades such that the nation can derive economic benefits through the developed human capital, thus contributing towards a knowledge-based economy on top of resource based economy. In essence, these will need countries or even the regions to be ready with specialists and professionals in all areas of Science, Engineering and Technology to overcome the unimagined challenges and complexities expected soon in Botswana, the Southern African region, and beyond.

It is therefore envisaged that higher professional qualifications through advanced learning will have to be undertaken by the professionals to improve their skills at least at the Master's (M.Eng) (NCQF 9) level. Since various areas of Civil and Environmental Engineering are associated with activities that eventually contribute to sustainable economic development, sectors such as Infrastructure Development, Transportation and Logistics services, Construction with Problematic Soils, Water Security, Energy Security, Climate Resilience and Disaster Risk Reduction, Pollution Reduction, Sanitation and Waste management among many others, will need innovative leadership who can not only be technologically sound but also be able to integrate strategic plans and operational activities to achieve sustainable development goals. The qualification therefore aims to produce engineers and technologists whose competencies are recognised locally, regionally, and internationally.

PURPOSE: (itemise exit level outcomes)

The purpose of the qualification is to produce graduates with advanced knowledge, skills and competences to be able to:

1. Undertake independent research and pose research questions based on the gaps identified through relevant literature review and arrive at conclusions through rigorous use of advanced research methods.
2. Apply research and analytical skills in selected fields of specialisation in civil engineering using a multi-disciplinary approach, artificial intelligence and innovation.
3. Demonstrate professional and leadership skills to work competently in the civil and environmental industry.
4. Effectively communicate scientific research findings to relevant stakeholders at all levels.

5. Apply specialist and contextual knowledge of civil and environmental engineering to solve problems.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

1. NCQF Level 8 bachelor's degree in civil and environmental engineering or related field.

2. Applicants who do not meet the above criteria but possess relevant work and/or research experience may be considered through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) policies for access. This consideration will be done following the guidelines of the ETP, which are aligned with national policies on RPL and CAT.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1. Demonstrate advanced knowledge at the frontier of civil and environmental engineering to Identify, formulate, analyse and solve complex civil and environmental engineering problems creatively and innovatively.	1.1 Create and interpret knowledge through original research or other advanced scholarship. 1.2 Evaluate possible solutions to a civil and environmental engineering problem. 1.3 Critically assess and appraise literature at global, regional and local levels to determine their applicability. 1.4 Identify and apply the best possible method or solution to a civil and environmental engineering problem.

2. Apply specialised knowledge of mathematics, natural science, and engineering skills to solve advanced civil engineering problems.	2.1 Compare and contrast different methods of research and use appropriate model(s) for solutions to complex research problems. 2.2 Conceptualise models and enable engagement with and critique of current and emerging research and practices. 2.3 Use in-depth, theoretically based knowledge in civil engineering, informed by current developments and emerging issues.
3. Perform creative, procedural and non-procedural civil and environmental engineering design and synthesis of components, systems, engineering works, products or processes;	3.1 Propose interventions to civil engineering design problems at an advanced level. **3.2** Address intended and unintended consequences resulting from the design of engineering works, products or processes.
4. Undertake original and scholarly research of international standards.	4.1 Develop a researchable proposal together with its boundaries. 4.2 Analyse the problem and take responsibility for learning requirements. 4.3 Design and conduct investigations and experiments in civil and environmental engineering. 4.4 Execute detailed technical investigations and review current advances in the field to contribute new knowledge to the field of research and design. 4.5 Undertake data collection procedures involving planning and selecting appropriate tools or instruments.

	4.6 Effectively interpret and process research results for the purpose of prediction and design. 4.7 implement strategies for the processing and management of information.
5. Apply advanced civil and environmental engineering methods, skills and tools, including those based on information technology.	5.1 Use civil and environmental engineering tools, processes or procedures, including those for assessing and promoting sustainability. 5.2 Use computers and networks and information infrastructures for accessing, processing, managing, and storing information.
6. Communicate orally and in writing with engineering audiences and all relevant stakeholders.	6.1 Use academic, professional and occupational discourses to communicate and defend substantial ideas that are products of research, investigation or development in civil and environmental engineering before a diverse audience. 6.2 Write and publish theses in recognised journals in their field of study. 6.3 Present research findings in high-level international conferences.
7. Demonstrate critical awareness of the sustainability and impact of civil and environmental engineering	7.1 Establish and explain the impact of a design on the environment or society to various stakeholders.

activity on the social, industrial and physical environment;	7.2 Authenticate the sustainability of the intended product to the various stakeholders.
8. Work effectively as an individual, in teams and in multidisciplinary environments.	8.1 Carry out independent work in the civil and environmental engineering field and report at an advanced level. 8.2 Work cooperatively in multidisciplinary teams across at least one disciplinary boundary. 8.3 Collaborate with various stakeholders for purposes of research and project implementation.
9. Engage in independent learning through well-developed learning skills.	9.1 Develop own learning strategies to sustain independent learning, academic and professional development. 9.2 Interact within the learning or professional group as a means of enhancing learning.
10. Demonstrate professionalism, and ethics to exercise judgement and take responsibility within own limits of competence.	10.1 Maintain the highest standards of personal, academic, and professional integrity. 10.2 Observe ethical codes and legal guidelines in conducting responsible scientific research and implementing projects. 10.3 Account for leading and initiating processes and implementing systems, ensuring good governance practices.
11. Demonstrate advanced / specialised knowledge and understanding of	11.1 Apply principles of project management to one's work.

engineering management principles and economic decision-making.	11.2 Advise on the control of a project budget using basic economic strategies.

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [9]	***Level [ ]***	***Level [ ]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*					
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Master of Engineering (Civil and Environmental Engineering) Thesis	9			240
STRANDS/ SPECIALIZATION	*Subjects/ Courses/ Modules/Units*	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [ ]	***Level [ ]***	***Level [ ]***	

1.					
2.					
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)***	
The successful outcome of an oral examination and the final written research thesis examination. The student must have attained 240 credits from the core component.	

ASSESSMENT ARRANGEMENTS

The Master of Engineering (Civil and Environmental Engineering) degree will be conferred to candidates who successfully pass the dissertation assessment in accordance with the ETP guidelines. The summative assessment will contribute 100% towards the final grade.

Assessors must be registered with Botswana Qualifications Authority.

MODERATION ARRANGEMENTS

Moderation arrangements

Internal and external moderation will be done in line with both institutional and national policies on moderation.

Both internal and external moderators must be registered with Botswana Qualifications Authority or any recognised body.

RECOGNITION OF PRIOR LEARNING

Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of Recognition of Prior Learning, RPL assessment for the award of credits towards the qualification in accordance with applicable RPL policies and relevant national-level policy and legislative framework.

CREDIT ACCUMULATION AND TRANSFER

Credit transfer will be awarded in accordance with the University Credit Accumulation and Transfer Policy which is aligned to BQA/National policies on the same.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Graduates may progress horizontally to the following qualifications:

- Master of Engineering/Science in Structural Engineering
- Master of Engineering/Science in Environmental Engineering
- Master of Engineering/Science in Geotechnical Engineering
- Master of Engineering/Science in Highway and Transportation Engineering
- Master of Business Administration
- Master of Project Management

Graduates may progress vertically to level 10 qualifications:

- Doctor of Philosophy in Civil engineering

- Doctor of Philosophy in Civil and Environmental Engineering
- Doctor of Philosophy in Environmental Engineering
- Doctor of Philosophy in Structural Engineering
- Doctor of Philosophy in Geotechnical Engineering
- Doctor of Philosophy in Highway and Transportation Engineering

QUALIFICATION AWARD AND CERTIFICATION

A candidate will be awarded a qualification in Master of Engineering (Civil and Environmental Engineering) upon meeting the minimum of 240 credits as prescribed in the rules of combination.

Certificate and transcript will be issued to graduates upon successful completion of Master of Engineering in Civil and Environmental Engineering.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed masters by research, Master of Engineering (Civil and Environmental Engineering) qualification compares with similar qualifications, Master of Philosophy/Master of Engineering/ Master of Science (Engineering) offered by the University of Queensland in Australia, Master of Philosophy / Master of Science (Engineering) offered by the University of Birmingham in the United Kingdom as well as Master of Engineering (Research) from Stellenbosch University in South Africa.

Similarities

Learner exit outcomes

All the qualifications benchmarked with have similar learner exit outcomes to the proposed Master of Engineering (Civil and Environmental Engineering). All the qualifications aim at producing graduates who will be able to conduct advanced, independent research to contribute to the body of knowledge in the relevant area of engineering. The graduates from all these qualifications should also be able to communicate research findings and defend ideas in a coordinated and coherent way.

Duration: This qualification compares well with the ones benchmarked with as they are offered within a two- year duration.

Assessment: The mode of continuous examination and monitoring of graduates' students is similar in that both University of Birmingham, UK, and the proposed qualification conduct yearly graduate student progress reviews to ensure that students can timely complete their studies.

Differences

Titles

This qualification is titled Master of Engineering (Civil and Environmental Engineering). It has been benchmarked against Master of Engineering (Research) from Stellenbosch University and Master of Philosophy/Master of Science Engineering from University of Queensland and the University of Birmingham. This qualification title shows that it is inclined to civil and environmental engineering, while the titles of qualifications benchmarked with are general and allow learners to conduct research in any specialised area within the engineering field.

Credits: This qualification is composed of 240 credits, while the University of Birmingham qualification has 360 credits and the

The University of Stellenbosch offers a 180-credit qualification.

Assessment: In this qualification, the viva voce examination for Masters and MPhil is obligatory, while in The University of Birmingham and University of Queensland, it is the prerogative of the examiners whether to hold it or not. This is a major point of difference between these Universities.

Comparability and articulation of the proposed qualification with the ones examined

This qualification is similar to those in the region and globally in that they both aim to attain novelty and mastery of knowledge in the field of study. In all comparable institutions of learning, the candidate follows a carefully guided developmental path that examines the extent of attainment of deliverables on a yearly basis. This ensures that the candidate is always on the path to attaining the desired qualification. Across comparative institutions, there is a satisfactory level to be attained so that the candidate can transfer from a lower degree to be admitted to the proposed qualification. This ensures the suitability of candidates for the degree and increases the probability of timely completion of the degree.

It is envisaged that the proposed qualification will meet both the present and future labour needs of the regional and global markets.

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**	
REVISION DATE:		**NAME OF PROFESSIONAL BODIES/REGULATORY**	