BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS														
QUALIFICATION DEVELOPER (S)	Botswana International University of Science and Technology														
TITLE	Master of Engineering in Geological Engineering											**NCQF LEVEL**	9		
STRANDS (where applicable)	N/A														
FIELD	Manufacturing, Engineering and Technology											**CREDIT VALUE**	240		
SUB FIELD	Engineering and Engineering Trades														
New Qualification	✓	Legacy Qualification	N/A	Renewal Qualification	N/A										
				Registration Code	N/A										
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 Human Resource Development Council (HRDC) report of 2016 lists some specialization areas of Physical and Earth Science, and Mining and Construction among the top occupations that are in high demand in the Mining, Minerals, Energy, Water Resources, and Manufacturing sectors and highlights the need for continuous engagement with industry to produce graduates that are ready to address the ever-changing needs of the industry (HRDC, 2016) for a knowledge-based economy. Keeping in view the country's economic development and sustainability, the need for higher level professionals is

realised. The MEng in Geological Engineering qualification aligns with PILLARS 1, 2, and 3 of HRDC Vision 2036 and the mission and vision of the University i.e., the focus on mining, mineral, environment, water resources, and construction engineering which are critical for the sustainable development of Botswana.

The qualification is designed to generate very advanced knowledge through research in the areas of exploration and mining of mineral resources and construction materials in Botswana, SADC region and globally. The qualification seeks to develop skills and competences among Geological Engineers to enhance civil construction, mining, and environmental industries. The qualification is designed to undertake world-class quality research and teaching that is problem oriented, interdisciplinary, and relevant to the needs of Botswana and will contribute towards business development in Botswana and the SADC region.

Geological Engineering is a modern geoscience discipline that deals with the practical application of principles, concepts, and techniques of the earth sciences to provide sustainable engineering solutions to human needs. Geological Engineers determine the best ways to use the earth's resources to solve technological problems in an environmentally sustainable manner. The MEng in Geological Engineering qualification is multidisciplinary and is fundamental to design and construction in areas of civil, mining and petroleum engineering, environment (Gonzalez de Vallejo and Ferrer, 2011), and related industries in Botswana and the southern Africa region. The qualification emphasizes the integration of Geosciences and Engineering with applications in areas such as construction, rock engineering, foundation design, ground engineering resource exploration and production, geo-hazard assessment and mitigation, waste disposal, and restoration of pollution sites. The Geological Engineer conducts research in mineral resource exploration and exploitation, designs geotechnical processes, and performs non-destructive investigations of the subsurface environment for engineering purposes.

PURPOSE: (itemise exit level outcomes)

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

1. Assess the quality of rock, soil, water, and ground conditions, perform geotechnical site investigations, slope stabilities, and analyze and design foundations.

2. Conduct geotechnical works in roads, railways, airports, mines, transmission lines and pipeline construction work.
3. Model and protect groundwater and surface water resources.
4. Investigate natural and man-made hazards and provide mitigation measures.
5. Provide solutions to the problems related to land reclamation, water and air pollution, and sustainability and, conduct environmental site characterization and planning.
6. Assess and develop fossil fuel and mineral deposits related works/projects.
7. Initiate and undertake major research projects in the field of Geological Engineering.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

Entry into this qualification is through any one of the following requirements:

(i) The minimum admission requirement is a bachelor's honours degree, NCQF Level 8 or equivalent in Geological Engineering or related fields.

(ii) There shall be provision for access through RPL and CAT in line with ETP policies.

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SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Demonstrate advanced knowledge in methodologies, principles, and applications of Geological Engineering.	1.1. Apply, identify, describe, and categorise the core concepts and principles of Geological Engineering. 1.2. Identify the relationships among the core concepts and principles of Geology and Engineering. 1.3. Apply the core concepts and principles of Geological Engineering to solve practical societal and industrial problems. 1.4. Analyse and appraise the limitations of basic techniques used in Geological Engineering. 1.5. Recognise and assess the significance of contested scientific knowledge in a contemporary context. 1.6. Demonstrate an understanding of how engineering information and ideas become generally accepted.

	1.7. Conduct research responsibly in line with academic integrity.
2. Access, evaluate and synthesize the advanced scientific information in Geological Engineering.	2.1. Access information through the library, internet and other data storage and retrieved facilities. 2.2. Apply scientific reasoning to evaluate the quality of the information. 2.3. Synthesise information from a variety of sources, which may be contradictory or divergent. 2.4. Discern the cause effect relations in the face of uncertainty or gaps in the available information.
3. Apply Geological Engineering knowledge to design, analyse and evaluate data.	3.1. Apply the existing body of knowledge in the critical analysis of a new question or problem. 3.2. Design, select, and apply appropriate procedures for generating relevant information with due concern for bias and any ethical or safety considerations. 3.3. Apply standard procedures such as experimental and computational techniques, within the discipline of Geological Engineering to conduct appropriate forms of enquiry and deductive reasoning. 3.4. Search, collect and record data accurately, truthfully and in appropriate formats. 3.5. Analyse and evaluate data and scientific evidence from which valid arguments and conclusions are presented.
4. Demonstrate the key scientific reasoning skills in Geological Engineering.	4.1. Apply scientific knowledge to distinguish inductive and deductive reasoning. 4.2. Evaluate cause-effect relations in the face of uncertainty or gaps in the available information. 4.3. Demonstrate the capacity to judge and solve a Geological Engineering problem. 4.4. Demonstrate responsibility, and accountability in addressing Geological Engineering related problems. 4.5. Make appropriate decisions in Geological Engineering related situations.
5. Effectively demonstrate utilization of Information and Communication Technology (ICT) skills in solving the problems of Geological Engineering.	5.1. Use ICT to record, retrieve and disseminate information to stakeholders. 5.2. Use, develop and modify as appropriate Geological Engineering software packages (geotechnical, mining, exploration, geological software).

	5.3. Apply ICT solutions to design and develop geological, geotechnical, geophysical models.
6. Communicate scientific knowledge in collaborative Geological Engineering projects.	6.1. Communicate ideas, issues, and findings clearly in written and oral work to diverse audience. 6.2. Make appropriate referencing conventions, avoid plagiarism, and respect intellectual property. 6.3. Contribute effectively and participate actively in execution of team projects. 6.4. Effectively communicate the outcomes of teamwork with respect to each member of the group. 6.5. Take initiative as a member of an Engineering team. 6.6. Take personal responsibility as a leader in an Engineering team.
7. Use the advanced Geological Engineering knowledge to address socio-economic problems in an ethical and culturally sensitive manner.	7.1. Apply Geological Engineering knowledge ethically to evaluate complex Geological Engineering problems. 7.2. Critically evaluate public information dealing with current industrial and environmental-related issues. 7.3. Appraise ethically and culturally sensitive decisions on the effects of Geological Engineering-based activities on society. 7.4. Identify and assess the socio-economic impact of interventions in society and industry.
8. Manage learning activities responsibly in Geological Engineering.	8.1. Analyze and synthesize the appropriate study skills. 8.2. Apply effective learning strategies which suite personal needs and context. 8.3. Demonstrate effective time management. 8.4. Apply appropriate skills effectively to organize Geological Engineering-related investigations. 8.5. Apply appropriate analytical skills to design Geological Engineering-related works.
9. Apply the principles of entrepreneurship and innovation in Geological Engineering as tools for driving socio-economic development.	9.1. Define research problems pertinent to society. 9.2. Demonstrate application of Geological Engineering knowledge for the benefit of society in the form of recommendation to policy makers, developing solutions that drive socio-economic development. 9.3. Demonstrate application of the principles underpinning entrepreneurship for the exploitation of product /service/ process opportunities. 9.4. Illustrate models of business innovation and entrepreneurship.

	9.5. Develop comprehensive and well-structured business innovation plans and monitor and evaluate business plans.
10. Apply the advanced knowledge of a wide range of geological materials and processes and design principles in solving infrastructural-related problems.	10.1. Evaluate the design principles that conform to social, legal, health, safety, and environmental standards and regulations. 10.2. Develop briefs and specifications for Geological Engineering projects and generate possible solutions for Geological Engineering problems. 10.3. Evaluate solutions considering possible external factors. 10.4. Solve problems related to Geological Engineering specifications. 10.5. Evaluate the implementation of recommended solutions. 10.6. Apply current practice and appreciate its limitations to possible new developments. 10.7. Apply Geological Engineering techniques in consonance with commercial and industrial constraints.

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SECTION C	**QUALIFICATION STRUCTURE**				
COMPONENT	**TITLE**	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [ ]	**Level [ ]**	**Level [9]**	

FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units					
	N/A				
CORE COMPONENT Subjects/Courses/ Modules/Units	Master of Engineering in Geological Engineering Research Thesis			240	240
STRANDS/ SPECIALIZATION	Subjects/ Courses/ Modules/Units	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [ ]	**Level [ ]**	**Level [ ]**	
1.					

	N/A				
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)**	
There is no coursework. Learners must undertake research and produce a research thesis in the area of Geological Engineering.	

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ASSESSMENT ARRANGEMENTS

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

Formative assessment

Formative assessment or continuous assessment should include concept note, research proposal development, term papers, seminars, presentations, regular consultation meetings with supervisors, and feedback as well as progress report presentations. Formative assessment is not credited.

Summative assessment

Assessment will be as per the candidate's work that should demonstrate:

1. Significant contribution to knowledge and scholarship.
2. Capacity for original and critical thought.
3. Display an appropriate depth and breadth of knowledge and understanding of the relevant field(s) of study in the thesis and at the viva voce examination.
4. Gained significant expertise with respect to basic and specialized methodologies and techniques.
5. Oral examination (viva voce) of the thesis material.

Summative assessment is credited and carry100% weightage (240 credits).

MODERATION ARRANGEMENTS

1. Internal Moderation – Internal moderation is done by internal examiners who are suitably qualified with PhD in Geological Engineering.
2. External Moderation – The final MEng thesis, outcome of the proposed research shall be moderated by External Examiners.

RECOGNITION OF PRIOR LEARNING

Not Applicable, as the MEng in Geological Engineering Qualification is purely research-based. So, no prior learning is applicable.

CREDIT ACCUMULATION AND TRANSFER

Credit Accumulation

MEng in Geological Engineering Qualification is based on research. The credits are calculated based on the successful completion of a thesis. Duration of the MEng in Geological Engineering Qualification is two years (4 semesters) for full time and 4 years (8 semesters) for the part-time program that accumulate to a minimum of 240 credit units, at NCQF level 9.

Credit Transfer

Credits transfer is not applicable for this qualification.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal articulation:

Learners may articulate horizontally to:

- Master of Engineering in Civil Engineering
- Master of Engineering in Environmental Engineering
- Master of Engineering in Mineral Engineering
- Master of Science in Geology

Vertical articulation:

Learners may articulate vertically to:

- Doctor of Philosophy in Geological Engineering
- Doctor of Philosophy in Civil Engineering
- Doctor of Philosophy in Environmental Engineering
- Doctor of Philosophy in Mineral Engineering
- Doctor of Philosophy in Geology
- Doctor of Philosophy in Geotechnical Engineering

EMPLOYMENT PATHWAYS

The graduates of this qualifications can be employed as:

- Geological Engineers
- Engineering Geologists
- Geologists
- Environmental Engineers

- Field Regiment Engineers (Military)
- Materials Engineers
- Academics

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

A candidate is required to achieve pass status for the thesis which is equal to 240 credits. Candidates meeting the prescribed requirements will be awarded the qualification of Master of Engineering in Geological Engineering in accordance with standards prescribed for the award of the qualification and applicable policies.

Certification

A certificate for the award of the degree of Master of Engineering in Geological Engineering will be given upon successful completion of the qualification.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

Regional benchmark:

This qualification is not offered regionally. However, the qualification is benchmarked against the Master of Science in Engineering Geology offered by theUniversity of Pretoria, South Africa because of their closely related content.

International benchmark:

Master of Philosophy in Geological Engineering offered by Kwame Nkrumah University of Science and Technology.

Titles: This qualification titled Master of Engineering in Geological Engineering while the benchmarks are Master of Philosophy and Master of Science respectively. The variation in titles is acceptable naming preferences for engineering qualifications, but the intent and purpose of the qualification is similar as all of them are research-based masters in Geological Engineering.

NQF Level: The Master of Science in Engineering Geology offered by University of Pretoria South Africa and this qualification are both at equivalent NQF Level (9). No qualification framework was fond in Ghana.

Duration: The duration is the same (2 years full time) for all the benchmarks.

Modules: This qualification, like the regional and international benchmarks is purely research based, therefore does not have taught modules.

Employment and Learning Pathways: Eligibility criterion is similar in all cases, that is, bachelor's degree in the relevant field of study. The vertical progression for all the qualifications is doctoral degree in geological engineering related fields. Graduates of all the qualifications have similar employment opportunities in the field of geological engineering.

REVIEW PERIOD

The review period of qualification is five years.

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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**	