BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS				
QUALIFICATION DEVELOPER (S)	Botswana International University of Science and Technology				
TITLE	Master of Engineering in Mining Engineering			**NCQF LEVEL**	9
STRANDS (where applicable)	1. 2. N/A 3. 4.				
FIELD	Mining	**SUB-FIELD**	Mining Engineering	**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 mining industry is very vital to the economy of Botswana as it contributes about 85% of the country's export earnings and 18% of the GDP. Currently, there are over 25 operating large-scale mines in Botswana. Accordingly, there is the need to train personnel with specialised technical skills at Master's level who can take up jobs in the mining and allied industries. In the Southern African Development Community (SADC) region, mining is an important strategic sector with significant contributions to gross domestic product, employment, and foreign exchange earnings. Considering the role of mining in SADC and particularly in Botswana's economy, there is a need for mining engineers with specialised technical skills in order to meet the demands of the country, and the SADC region.

The rationale of the programme takes into consideration the policy documents from organisations like HRDC, Ministry of Tertiary Education, Research, Science and Technology, Botswana Chamber of Mines, etc. The relevant occupations on the HRDC report for 2023/24 in the mining and minerals sector includes Mineral Economists and Geo-Technical Engineers (HRDC, 2023), and the proposed qualification responds to these policy directions.

The qualification aims at achieving high standards in mining engineering education and research; to seamlessly integrate research and education to produce highly skilled mining professionals of international standards; and to position Botswana as a knowledge hub by enhancing socio-economic growth through engineering and technological innovations.

A Master of Engineering in Mining Engineering qualification qualifies individuals with extended knowledge and specialisation gained in the principal subject(s) of a mining engineering research. Alternatively, a master's degree may build on relevant knowledge and skills derived from occupational experience. The degree recognises holders with advanced knowledge at the frontier of a specialised discipline or cross-disciplinary fields and can contribute towards development of professional practice through research or reviewing existing knowledge. The holder will demonstrate a high level of mastery of the field of study or practice and capacity to retrieve, evaluate, analyse and interpret information to make propositions and judgments. They have the capacity to critically analyse and evaluate existing professional practice and ability to comprehend and put issues and ideas in perspective. The graduate demonstrates specialised research and capacity to develop and apply new skills and techniques to identify and solve problems in a range of professional contexts.

Reference

HRDC (Human Resources Development Council), (2023). Priority Skills 2023/2024 - Consolidated List of Priority Occupations and Skills.

PURPOSE: (itemise exit level outcomes)

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

- Undertake mine planning, design, development and operations,
- Conduct mine feasibility studies,
- Provide solutions to the complex problems related to land reclamation, water and air pollution, and sustainability in mining areas,
- Investigate and analyse rock and soil slope stability,
- Conduct environmental impact assessments,
- Conduct mine safety assessments and audits
- Initiate and undertake major research projects in the field of Mining Engineering.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)
1. NCQF level 8 in Mining Engineering or a cognate field of study may also meet admission requirements provided that at least 20 credits at level 8 have been allocated to research methodology within or additional to the qualification. 2. Credits Transfer and Recognition of Prior Learning (RPL) are not applicable for this qualification.

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SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Analyse the advanced principles and methodologies of Mining Engineering to investigate complex problems in mining and related operations.	1.1. Identify and investigate problems related to Mining Engineering applying advanced principles and methodologies of Mining Engineering. 1.2. Conduct research responsibly in line with academic integrity. 1.3. Evaluate the methodologies and analyse data to address complex Mining Engineering problems during various stages of a mine life. 1.4. Interpret the results of the investigation using the advances concepts and principles of Mining Engineering. 1.5. Prepare and publish reports of investigations conducted during various stages of a mine life.
2. Develop and apply advanced Mining Engineering skills to solve complex problems in mining and related operations.	2.1. Analyse the Mining Engineering skills to recognize the scope of application of advanced concepts in diverse mining situations. 2.2. Evaluate and apply the advanced Mining Engineering skills to develop solutions and address challenges in mining and related operations. 2.3. Analyse and appraise the Mining Engineering skills and its limitations in addressing mining and its related problems.
3. Access, evaluate and synthesize the advanced scientific information in Mining Engineering.	3.1. Access information through the library, internet and other data storage and retrieved facilities. 3.2. Apply scientific reasoning to evaluate the quality of the information. 3.3. Synthesise information from a variety of sources, which may be contradictory or divergent. 3.4. Discern the cause - effect relations in the face of uncertainty or gaps in the available information.

4. Evaluate the advanced Mining Engineering knowledge to design of mines and planning of mining and related operations.	4.1. Synthesize data for mine planning and design. 4.2. Select, design, and apply appropriate procedures for generating relevant information with due concern for bias and any ethical or safety considerations. 4.3. Apply standard procedures within the discipline of Mining Engineering to monitor and ensure the conduct of operations as per mine plan and design. 4.4. Search, collect and record data accurately, truthfully and in appropriate formats.
5. Analyse and apply the advanced mining Engineering knowledge to address environmental sustainability issues in mining.	5.1. Apply the principles of sustainability in mining and its related operations to minimise the impacts of mining on the environment and society. 5.2. Apply professional ethics in the daily conduct of duties in mining and related operations to safeguard the environment and society. 5.3. Actively participate in conducting environmental impact assessments in mining areas to comply with pertinent environmental standards.
6. Develop and apply the advanced Information and Communication Technology (ICT) skills in Mining Engineering.	6.1. Use ICT to record, retrieve and disseminate information to stakeholders. 6.2. Apply ICT knowledge to identify and analyse complex problems in Mining Engineering. 6.3. Apply ICT solutions to design and develop mining, geotechnical, geophysical models. 6.4. Use, develop and modify the Mining Engineering software packages (geotechnical, mining, design) for data analysis, resource estimation, operational optimization as part of solving complex problems in mining. 6.5. Generate innovative solutions to complex mining engineering problems using appropriate software, to analyse mine design, operational planning, and management systems.
7. Analyse the advanced scientific methods of communication related to Mining Engineering.	7.1. Identify the appropriate communication tools to effectively communicate the Mining Engineering related information in written and oral to diverse audience. 7.2. Apply appropriate referencing conventions, avoid plagiarism, and respect intellectual property. 7.3. Apply advanced skills to present research findings and other Mining Engineering related information. 7.4. Contribute effectively and participate actively in execution of team projects. 7.5. Effectively use the tools to communicate the outcomes of teamwork with respect to each member of the group.

8. Develop the advanced Mining Engineering knowledge to address socio-economic problems in an ethical and culturally sensitive manner.	8.1. Apply Mining Engineering knowledge ethically to evaluate complex Mining Engineering problems. 8.2. Critically evaluate public information dealing with current industrial and environmental-related issues. 8.3. Appraise ethically and culturally sensitive decisions on the effects of Mining Engineering-based activities on society. 8.4. Identify and assess the socio-economic impact of interventions in society and industry.
9. Evaluate and apply the principles of entrepreneurship and innovation in Mining Engineering as tools for driving socio - economic development.	9.1. Apply Mining Engineering knowledge for the benefit of society in the form of recommendation to policy makers, developing solutions that drive socio-economic development. 9.2. Apply the principles of entrepreneurship for the exploitation of product /service/ process opportunities. 9.3. Illustrate models of business innovation and entrepreneurship. 9.4. Develop comprehensive and well-structured business innovation plans.
10. Develop the advanced Mining Engineering knowledge in evaluating mining projects as well as operating, closure, and rehabilitation of mines.	10.1. Apply the design principles that conform to social, legal, health, safety, and environmental standards and regulations. 10.2. Develop briefs and specifications for Mining Engineering projects and generate possible solutions for Mining Engineering problems. 10.3. Apply current practice and appreciate its limitations to possible new developments. 10.4. Apply Mining 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 [ ]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*					
	NOT APPLICABLE				
CORE COMPONENT *Subjects/Courses/ Modules/Units*					
	Mining Engineering Thesis			9	240
STRANDS/ SPECIALIZATION	*Subjects/ Courses/ Modules/Units*	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [ ]	***Level [ ]***	***Level [ ]***	
1.					
	NOT APPLICABLE				
Electives	NOT APPLICABLE				

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)***	
Master of Engineering in Mining Engineering is by research only and constitutes a minimum total number of 240 credits at level 9.	

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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 includes satisfactory concept note, research proposal, progress report presentations. But they are not credited.

Summative assessment

Oral presentation and assessment of the thesis

Summative assessment is credited and carry 100% weightage (240 credits).

MODERATION ARRANGEMENTS

1. Internal Moderation – Internal moderation is done by internal examiners who are suitably qualified with PhD in Mining Engineering.

2. External Moderation – The final MSc thesis, outcome of the proposed research shall be moderated by External Examiners.

RECOGNITION OF PRIOR LEARNING

The qualification Master of Engineering in Mining Engineering is purely research-based. So, no prior learning is applicable.

CREDIT ACCUMULATION AND TRANSFER

Credit Accumulation

Master of Engineering in Mining Engineering Qualification is based on research. The credits are calculated based on the successful completion of a thesis. Duration of the MEng in Mining 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:

Students may articulate horizontally to:

- Master of Engineering in Civil Engineering
- Master of Engineering in Environmental Engineering
- Master of Engineering in Mineral Engineering
- Master of Engineering in Industrial Engineering

Vertical articulation:

Students may articulate vertically to:

- PhD in Mining Engineering
- PhD in Civil Engineering
- PhD in Environmental Engineering
- PhD in Mineral Engineering
- PhD in Industrial Engineering

EMPLOYMENT PATHWAYS

The graduates of this qualifications can be employed as:

- Mining Engineers,
- Ventilation Engineers,
- Geotechnical Engineers,

- Mining Inspectors,
- Explosive Engineers,
- Drill and Blast 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 ***MEng in Mining 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 Mining Engineering*** will be given upon successful completion of the qualification.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification, which is offered by research only, is similar to that of the University of Pretoria, South Africa in terms of assessment criteria and award of degree procedures. Duration of the proposed qualification, 2 years (Full-time) is similar to that of Colorado School of Mines (USA), University of New South Wales (Australia) and Curtin University, Australia. Eligibility criterion is similar in all cases, that is, Bachelor's degree in the relevant field of study. Title of the proposed qualification is similar to the qualification offered by Colorado School of Mines. The assessment criteria are also more or less similar between the proposed and the qualification offered by the University of Pretoria.

The proposed qualification differs from that of the University of Pretoria in terms of duration and credits where it is 2 years and 240 credits in the former and 1 year and 180 credits in the later. University of New South Wales is offering coursework with thesis with 96 credits, Curtin Universities is offering the Master's degree with coursework and thesis with 200 credits while Colorado School of Mines offers both thesis and non-thesis options with 30 credits. The credit hours differ with the proposed qualification significantly. Title of the proposed qualification also differs with other benchmarked qualifications such as Master of Engineering in Mining Engineering by the University of Pretoria, Master of Engineering in Mining by the University of New South Wales and Master of Engineering Science in Mining by Curtin University. The assessment criteria differ between the proposed qualification and Colorado School of Mines, University of New South Wales and Curtin University because of the coursework in the latter three.

The NCQF level of the proposed and the benchmarked qualifications are the same e.g. AQF level 9, and NQF level 9. All the qualifications are aligned to the Washington accord. The proposed qualification is accredited by Botswana Qualification Authority (BQA). The qualification offered by University of Pretoria is approved by the Council on Higher Education (CHE); the qualification offered

by Colorado School of Mines is accredited by Accreditation Board for Engineering and Technology (ABET); the qualifications offered by the University of New South Wales and Curtin Universities are accredited by Tertiary Education Qualification and Standards Agency (TEQSA). All programs produce graduates who qualify for professional engineering registration by the appropriate boards or organizations in their respective countries.

The structure of the qualifications irrespective of their locations are similar. In most of the Universities globally, the proposed qualification in Mining Engineering is being offered in three formats, by course work only, research only and coursework with research. Employability pathways are largely similar, and the vertical progression remains the same including PhD degree admission though preference remains for those done by research and coursework with research. All programmes produce postgraduates who qualify for professional engineering registration by the appropriate boards or organisations in their countries.

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