SECTION A:	***QUALIFICATION DETAILS***													
QUALIFICATION DEVELOPER (S)	*Botswana International University of Science and Technology*													
TITLE	*Certificate V in Mining Engineering*											***NCQF LEVEL***		*5*
STRANDS (where applicable)	*1. N/A* *2.* *3.* *4.*													
FIELD	*Mining (Field 11)*		***SUB-FIELD***			*Mining Engineering*						***CREDIT VALUE***		*148*
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:

Botswana is a mining-intensive country with many large-scale operating mines like Orapa Mine, Letlhakane Mine, Damtshaa Mine, Jwaneng Mine, Karowe Diamond Mine, Khoemacau Copper Mine etc. Various mines within the Botswana mining industry including Jwaneng, Morupule, Khoemacau, Lucara, Mupane and Orapa mines have indicated the need for skills training and demanded to upgrade the knowledge, and abilities of their employees. This could be achieved by allowing them to pursue different qualifications such as certificate, diploma etc., either locally or abroad. This is to facilitate better understanding and assimilation of the written instructions and information and improve work practices and quicker adaptability to the ever-changing mining and related technologies. This, in turn, will make them eligible to pursue higher studies like Bachelor’s degree and become Mining Engineers.

This has resulted in the development of the proposed qualification Certificate V (Mining Engineering) at BIUST. The qualification is specially designed to develop broad technical knowledge, skills, and competences in mining engineering among personnel to meet the critical needs within Botswana and the SADC region related to mining engineering. The qualification thus will produce competent mining engineering personnel and prepare them to take up jobs in the mines.

The qualification is also developed in line with the Human Resources Development Council (HRDC, 2023/2024) report where it has indicated that the occupations that are in high demand are mining operators in the mining and mineral sector. It has also indicated explosives, drill & blast, load, and haul as the required technical skills. The soft skills required by the mining operators are teamwork, results oriented activities and communication. In addition, the HRDC report has also recommended local training of mining operators at certificate level in the field of mining engineering.

References

1. HRDC (Human Resources Development Council), (2023). Priority Skills 2023/2024 - Consolidated List of Priority Occupations and Skills.
2. HRDC (Human Resources Development Council), (2023). Priority Skills 2023/2024 - Recommendation for Local Training.

PURPOSE: (itemise exit level outcomes)

The Certificate in Mining Engineering is aimed at providing a solid foundation in concepts of mining and related operations. The main objective is to develop the knowledge and skills of the employees in Botswana's mining and allied industries. The purpose of the qualification is to equip graduates with broad technical knowledge, skills, and competences to:

- Assist and participate in the design and planning of mining operations.
- Develop and implement technical solutions to various mining problems.
- Apply, monitoring, and facilitating the implementation of site risk management systems to the workplace.
- Apply, monitor, and facilitate the implementation of work, health and safety policies, procedures, and programs.
- Apply and monitor systems and methods of mining.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

1. Certificate III, NCQF level 3 (General Education or TVET) with at least two years mining industry experience.
2. Prior Learning (RPL) and Credit Transfer and Accumulation (CAT) will be considered according to applicable policies.

(Note: Please use Arial 11 font for completing the template)

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
3. Apply the core concepts and principles of mining engineering to solve typical practical problems encountered in mining and its related operations.	1.1 Examine or Investigate mining operation situations as the basis for addressing practical problems in the field. 1.2 Analyse and develop critical thinking skills to recognize the application of core mining concepts in diverse situations, such as dealing with geological uncertainties, optimizing extraction processes, or addressing environmental concerns to solve mining problems. 1.3 Engage in hands-on problem-solving exercises and practical applications related to mining to effect solutions for the challenges encountered in mining and related operations.
2. Apply the fundamental concepts of Information and Communication Technology (ICT) skills in mining and its related operations.	2.1 Identify and analyse both verbal and non-verbal communication tools in mining and related operations to effectively communicate mining related information to an appropriate audience. 2.2 Utilize the fundamentals of Information and Communication Technology (ICT) to identify and analyse problems in mining and its related operations. 2.3 Utilize software tools commonly used in mining industry for data analysis, resource modelling, and operational optimization to solve mining problems. .
3. Use broad technical knowledge in mining engineering to address environmental sustainability issues.	3.1 Apply the principles of sustainability in mining and its related operations to minimise the impacts of mining and its related operations on the environment and society. 3.2 Apply professional ethics in the daily conduct of duties in mining and related operations to safeguard the environment and society. 3.3 Assist in conducting environmental impact assessments in mining areas to comply with pertinent environmental standards.
4. Apply basic principles of mining engineering in conducting investigations during a mine life.	4.1 Apply basic principles of mining engineering to identify and investigate problems related to mine operations. 4.2 Assist in generating and analysing data required for decision making during various stages of a mine life.

	4.3 Provide assistance in the preparation of reports of investigations conducted during various stages of a mine life.
5. Apply basic principles of mining engineering in conducting investigations related to a mine life.	5.1 Apply basic principles of mining engineering to identify and investigate problems related to mine operations. 5.2 Assist in generating and analysing data required for decision making during various stages of a mine life. 5.3 Provide assistance in the preparation of reports of investigations conducted during various stages of a mine life.
6. Apply basic principles of mine planning and design to maximise the benefits from mining operations.	6.1 Identify and analyse input data required for mine planning and design. 6.2 Apply hands-on practical knowledge to assist in developing efficient mine plans and designs. 6.3 Interpret mine plans and designs to ensure mining operations are conducted according to the mine plan and design.
7. Apply the basic principles of engineering supervision and management in mining operations.	7.1 Utilize the basic principles of engineering management to identify and analyse issues in mining for efficient and safe operations. 7.2 Apply appropriate mine legislation and workplace practices in mining and its related operations to ensure compliance with the legislative requirements and appropriate standards. 7.3 Apply good teamwork practices in a range of situations to facilitate efficient mining operations.

(Note: Please use Arial 11 font for completing the template)

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	**TITLE**	**Credits per Relevant NCQF Level**			**Total Credits**
		Level [3]	**Level [4]**	**Level [5]**	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Bridging Course (Mathematics, Physical Science and Basic Engineering)		8		8
	Mathematics		8		8
	Computer Awareness			8	8
	Communications Skills & Study Skills			8	8
	Mining/Plant Equipment Engineering & Maintenance			8	8

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	**TITLE**	**Credits per Relevant NCQF Level**			**Total Credits**
		Level [3]	**Level [4]**	**Level [5]**	
CORE COMPONENT Subjects/Courses/ Modules/Units	Mineral Processing			8	8
	Mining Environmental Management			8	8
	Management			8	8
	Mine Life Stages			8	8
	Introduction to Geology			8	8
	Introduction to Mine Surveying			8	8
	Mine Safety, Health, and Loss Control			8	8
	Mine Supervision and Management			8	8
	Botswana Mining Laws			4	4
	Project Report			8	8
	Field Trip to Mines in SADC region			8	8
STRANDS/ SPECIALIZATION	*Subjects/ Courses/ Modules/Units*	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [3]	***Level [4]***	***Level [5]***	
Electives Subjects/Courses/ Modules/Units	Open pit auxiliary operations			8	24
	Underground metalliferous auxiliary operations			8	
	Underground coal auxiliary operations			8	
	Open cast auxiliary operations			8	
	Open pit production cycle			8	
	Underground metalliferous production cycle			8	
	Underground coal production cycle			8	
	Open cast production cycle			8	
	Surface drilling and blasting			8	
	Underground drilling and blasting			8	
				Total	***148***

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
Level 4	***16***
Level 5	***132***
TOTAL CREDITS	***148***

Rules of Combination:

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

The Certificate V qualification in Mining Engineering constitutes a minimum total number of **148 credits** and takes one year to complete. The credit combination for the qualification is **32 of the fundamental components, 92 core components** and **24 elective components**. The credits which are distributed as follows (based on the above Qualification Structure) with respect to NCQF levels:

- NCQF Level 4 – 16 Credits
- NCQF Level 5 – 132 Credit

Students need to choose three electives out of ten modules listed under electives as indicated below:

- One module from the auxiliary operations modules, from Open Cast, Open Pit, Underground Coal and Underground Metalliferous Auxiliary Operations
- One module from the production cycle modules, from Open Cast, Open Pit, Underground Coal and Underground Metalliferous Production Cycle
- One module from drilling and blasting modules, from Surface and Underground Mining.

Distribution of credits is as follows (based on the above Qualification Structure) with respect to NCQF levels:

	As per BQA, min. number of credits	Certificate V Qualification	Remarks
Total	***132***	***148***	Number is within the allowed allowance.
Maximum credits at NCQF Level 4	20	16	Number of credits is within the allowed maximum requirement.
Minimum credits at NCQF Level 5 or above	90	132	Number of credits meets the minimum requirement.

(Note: Please use Arial 11 font for completing the template)

ASSESSMENT ARRANGEMENTS

All assessments, formative and summative, leading to the award of credits in this qualification shall be based on module learning outcomes, and the qualification exit-level outcomes.

- Formative assessment (weighs more than Summative Assessment) and will include continuous assignments/assessments that will collectively contribute to the final grade.
- Summative assessment (weighs less than Formative Assessment). There shall be integrated assessment procedures to ensure that the purpose of the qualification is achieved. There shall be examinations that shall contribute to the final grade. Assessment will be in accordance with respective ETP's regulations and procedures.
- Most modules have a 40:60 formative to summative assessment ratio. Some special modules such as project reports and mine tours have 100% summative assessment without any formative assessment.

MODERATION ARRANGEMENTS

Both internal and external moderation will be carried out or done on all assessment materials prior to use, and results after assessment by registered assessors and moderators.

RECOGNITION OF PRIOR LEARNING

Recognition of Prior Learning shall be considered for the award of this qualification in accordance with institutional Recognition of Prior Learning Policy and in line with the National Recognition of Prior Learning Policy.

CREDIT ACCUMULATION AND TRANSFER

Credit Transfer Accumulation shall be considered for the award of this qualification in accordance with institutional credit accumulation and transfer (CAT) Policy and in line with the National CAT Policy.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Learning Pathways

This qualification is intended to provide learners with both horizontal and vertical articulation pathways:

Horizontal articulation:

Students may articulate horizontally to:

- Certificate V in Geological Engineering (NCQF level 5),
- Certificate V in Environment Engineering (NCQF level 5).

Vertical articulation:

Completion of a Certificate V in Mining Engineering meets the requirement for admission to a

- Diploma in Mining Engineering (NCQF level 6),
- Diploma in Mineral Engineering (NCQF level 6),
- Diploma in Geological Engineering (NCQF level 6),
- Diploma in Mine Surveying (NCQF level 6)

EMPLOYMENT PATHWAYS

The graduates of this qualification can be employed as:

Mining Supervisors such as foreman, crew boss, shift boss, Mining Technician, Mining Safety Officer, Environmental Technician and Mine Planning Technician

QUALIFICATION AWARD AND CERTIFICATION

Qualification award:

The students enrolled in the qualification will be able to obtain a **Certificate V in Mining Engineering**.

To obtain the **Certificate V in Mining Engineering** the student must accumulate **148** credits.

Certification:

Candidates meeting prescribed requirements will be awarded a **Certificate V in Mining Engineering** in accordance with standards prescribed for the award of the qualification and applicable policies.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification is similar to the certificate V qualification offered by Kland International College, Johannesburg (South Africa) and Shalom Technical College, Johannesburg (South Africa). Duration of the proposed qualification which is one year (full time) is similar to the qualification offered by the University of

Witwatersrand, South Africa. However, it being an integrated qualification (NQF levels 5 & 6) the duration is two years. Eligibility criterion is similar in all cases, that is, National Senior Certificate, or equivalent (NQF level 4) in the relevant field of study. Title of the proposed qualification is similar to the one offered by Kland International College and Shalom Technical College. The assessment criteria are more or less similar between the proposed and the qualification offered by the University of Witwatersrand, South Africa.

The proposed qualification differs from that of the benchmarked ones in terms of credit hours where the proposed qualification has 148 credits while the qualification offered by the University of Witwatersrand has 360 (it is an integrated qualification), Kland International College and Shalom Technical College have 120 credits. Duration of the proposed qualification also differs with the benchmarked ones. In the case of Kland International College and Shalom Technical College, the duration is six months. The proposed qualification and the qualification offered by the University of Witwatersrand have project report component in addition to the coursework, while it is only coursework in the case of Kland International College, and Shalom Technical College. Title of the proposed qualification differs with the qualification offered by the University of Witwatersrand. The assessment criteria of the proposed qualification differ with the Kland International College, and Shalom Technical College as they offer only coursework. All the benchmarked qualifications also differ with the proposed qualification in terms of mine visit module.

The NQF level of the proposed and the benchmarked qualifications are the same (NQF level 5). All the qualifications are aligned to the Washington accord. The proposed qualification is accredited by Botswana Qualification Authority (BQA). The qualification offered by the Kland International College, Shalom Technical College and the University of Witwatersrand are approved by the Higher Education of Quality Council, and Council on Higher Education (CHE) and aligned to ECSA and SAQA.

REVIEW PERIOD

Every five (5) years or as and when the need arises, such as significant change in mining technology, equipment, employers demand, or delivery problems identified from time to time.