SECTION A:	QUALIFICATION DETAILS																
QUALIFICATION DEVELOPER (S)	New Era College of Arts, Science and Technology																
TITLE	Bachelor of Science in Geology													NCQF LEVEL	7		
FIELD	Mining			SUB-FIELD	Geology									CREDIT VALUE	525		
New Qualification	√			Review of Existing 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

Developer conducted an extensive market survey prior to the designing of the Qualification where critical gaps in Geological Industry and other Organisational training were identified. The development of the qualification in Bachelor of Science in Geology was guided by the Education and Training Sector Strategic Plan, ETSSP, (2015-2020) for the provision of quality and relevant education. The ETSSP was aimed at reforming the education system and addressing issues of poor performance in the sector, National Development Plan 11, NDP11, (2017 -2023, Page 118). The Human Resource Development Council, HRDC, (2016-2021, Page 119), through the 14 HRDC Sector Committees which were established to address the problem of skills mismatch, to produce a globally competitive Human Resource. Vision 2036, which is focused on "achieving prosperity for all", under Pillar 2, *Human and Social Development* is aimed at education and skills development. This would ensure that Botswana society will be knowledge based with relevant quality education that is outcome based, emphasizing on education with production, Vision, (2036, Page 31). Furthermore, Statistics Botswana through its data portal led the 2030 agenda for sustainable development and refined its mandate through sustainable development goals. Goal number 4 was aimed at leading quality education to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, (http://botswana.opendataforafrica.org). The Qualification Developer in its quest developed a robust home-grown qualification that meets the demands of the niche market. The qualification has unique modules that are relevant for ensuring unique skills for Higher Education. The Qualification Developer developed a robust home-grown Bachelor of Science in Geology that meets with the national and economical needs of Botswana in the training of Bachelor of Science in Geology and related field.

PURPOSE:

The purpose of the qualification is to equip candidates with knowledge, skills and competence to:

- Demonstrate a grounded understanding about surveying and different types of surveying.
- Demonstrate competence in use of surveying equipment to collect data (such as in elevations from levelling equipment, angular measurements) independently undertake simple surveys using equipment.
- Integrate Python Programming, Geology, Geological Mapping Techniques, Geotechnics, Thermodynamics and Thermo-Fluids, sedimentology and Ore Microscopy.
- Apply geotechnical engineering and soil mechanics in the broader discipline of civil engineering.
- Apply a range of techniques used to measure and map geologic, geophysical, and geochemical characteristics of the lithosphere, with applications to mineral and energy exploration.

Graduates have excellent job opportunities in the Geology as well as in other sectors. Their extensive knowledge in Geology, outstanding computer skills and strong command of the English Language make our graduates very attractive to businesses in the private and public sectors. Graduates would engage in employment in Public and Private Mining Organizations. They will get career positions as Certified Geologists through the Geology and Surveyors of Botswana. The graduate will have knowledge, skills and competencies in Geology of Mineral Deposits, Hydrogeology, Mine Economics, Processing and Environment, Exploration Geophysics, Digital Land Survey And GPS, Structural Geology and Tectonics, Tunneling and excavation Design.

ENTRY REQUIREMENTS (including access and inclusion)

Minimum entry requirement:

- NCQF Level 4, Certificate IV (General Education or TVET) or equivalent with passes in 6 subjects including English, Mathematics and Sciences.

- Access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) will be provided through ETP policies in line with National RPL and CAT Policies.

SECTION B QUALIFICATION SPECIFICATION

GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. *Recognize and describe the* importance of geology in the mining industry	• Give an overview of what geology involves with focus in its practical application for mining. • Learn about minerals and principal rock types as well as their formation.

	• Study the internal structure of the earth. • Explain the Earth's internal structure, plate tectonics. • Discuss the internal and surface processes that control geological evolution. • Classify common minerals and igneous, metamorphic and sedimentary rocks, and understand how they form • Classify geological structures with an understanding of how the form. • Apply their knowledge of stratigraphic principles and geological histories as well as methods for determining relative and absolute ages of rock succession. • Identify the outcrop patterns produced on geological maps.
2 *Demonstrate a grounded understanding* about surveying and different types of surveying.	• Offer hands on opportunity for students to learn the fundamental techniques in engineering surveying. • Apply the traditional surveying methods as well as modern techniques, such as the application of GPS. • Demonstrate skills in surveying techniques (levelling, angle and distance measurement, traversing, area calculations, GPS, setting out) • Demonstrate competence in use of surveying equipment to collect data (such as in elevations from levelling equipment, angular measurements) independently undertake simple surveys using equipment.
3 Demonstrate the understanding of the nature of soils and their variability, the state and behaviour of a soil.	• Apply geotechnical engineering and soil mechanics in the broader discipline of civil engineering. • Explain the different types of soil and their engineering properties.

	• Demonstrate an awareness of soil description. • Explain soil compaction and ground improvement. • Examine the concept of effective stress and its influence on soil behaviour. • Explain the influence of water flow on the engineering behaviour of soils. • Explain the compressibility of soils and the concept of consolidation. • Examine soil shear strength. • Interpret and use experimental data; and • Demonstrate the ability to report the results of a laboratory experiment at a professional standard.
4. *Apply* an in-depth learning of the techniques and steps involved in the search, survey, excavation, preparation, curation and management of invertebrate and vertebrate fossils and sites.	• Recognise sedimentary deposits capable of preserving fossils. • Prepare a basic fieldtrip for a paleontological excavation. • Apply the principal elements of fossil excavation. • Learn how to extract, annotate (context recording), prepare, preserve and catalogue fossils. • Understand the multidisciplinary nature of modern palaeontology and the importance of collaborative research. • Communicate aspects of paleontological discovery and heritage to their peers and the community in accessible language.
5. *Apply a range of techniques* used to measure and map geologic, geophysical, and geochemical characteristics of the lithosphere, with applications to mineral and energy exploration.	• Demonstrated proficiency in common practical skills in resource exploration. • Explore the scientific basis of mineral, energy, and natural resource exploration.

	• Examine the generic characteristics of economic mineral and energy resources – geological, geophysical, and geochemical anomalism. • Demonstrate the knowledge of the geophysical techniques (seismic, gravity, magnetic, electrical, and electro-magnetic). • Use the geochemical techniques (sampling media, sampling strategies, analytical techniques). • Apply field-based data collection – sampling strategies • Explain the importance of data quality – collection, analysis, processes techniques
6. Apply their research knowledge, skills and competence in a practical research project which is aligned to their areas of specialization and organization of their choice.	• Choose a research topic to work their dissertation on the organisations of their choice. • Make a write up of the backgrounds of the topic and the organisations following a research guideline. • Critic literature review and relate their topic to what has been researches by other scholars to answer the research questions. • Come up with the relevant research methodology and design incorporating data collection methods ensuring the accuracy and validity of the instruments used. • Present the data and discuss the findings of the research. • Prepare Conclusion and recommendation.
7. *Demonstrate the Capacity and ability to* Work at companies of their choice under supervised Industrial Attachment to consolidate their knowledge, and tally theory and skills to gain experience in appropriate Geological systems.	• Visit companies for industrial companies. • Enhance their Geological skills through practice and processes of organization of attachment. • Produce placement report detailing work done and skills acquired.

	• Present on their placement experience. • Keep a detailed logbook of work done, with workplace supervisor approvals.

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SECTION C	***QUALIFICATION STRUCTURE***					
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***				***Total (Per** Subject/ Course/ Module/ Units)*
		Level [5]	***Level [6]***	***Level [7]***	***Level [8]***	***Credits***
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Pure Mathematics	10				10
	Chemistry	10				10
	Physics	10				10
	Introduction To Information Technology	12				12
	Key Skills For Engineers And Scientists	10				10
	Engineering Mathematics 1	10				10
	Professional Communication Studies	10				10
	Introduction To Python Programming		*12*			12
CORE COMPONENT *Subjects/Courses / Modules/Units*	Engineering Science		13			13
	Introduction to Geology		13			13
	Surveying and CAD		13			13
	Engineering Mathematics II		13			13
	Geological Mapping Techniques		13			13
	Chemistry For Geologists		13			13
	Mining Geo-statistics		13			13

	Thermodynamics And Thermo-Fluids		13			13
	Stratigraphy And Palaeontology		13			13
	Sedimentology			14		14
	Crystallography And Mineralogy			14		14
	Mining Geology			14		14
	Structural Geology and Tectonics II			14		14
	Exploration Geophysics			14		14
	Exploration Geochemistry			14		14
	Mineral Resources Management			14		14
	Hydrogeology			14		14
	Igneous and Metamorphic Petrology			14		14
	Contaminant Hydrogeology			14		14
	Analytical Techniques			14		14
	Mine Economics, Processing and Environment			14		14
	Applied Field Geology			14		14
	Geology of Mineral Deposits			14		14
	Dissertation			40		40
	Industrial Placement			60		60
	ELECTIVES (Choose TWO)					
	Water Distribution Systems			14		14

ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses / Modules/Units*	Digital Land Survey And GPS			14		14
	Environmental Impact Assessment			14		14
	Tunnelling and excavation Design			14		14
	Integrated Waste Management			14		14
	Structural Geology and Tectonics			14		14
	Igneous and Metamorphic Petrology			14		14
	TOTAL					**525**

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL

TOTAL CREDITS PER NCQF LEVEL

NCQF Level	***Credit Value***
Level 5	72
Level 6	129
Level 7	324
TOTAL CREDITS	***525***

Rules of Combination:

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

No	Component	Modules	Credits
1	Fundamental Component	*8*	84
2	Core Component	*25*	413

3	Elective/ Optional Component Choose 2 Modules	*2*	28
	Total	***35***	**525**

ASSESSMENT ARRANGEMENTS

Formative Assessment

Formative assessment or continuous assessment (Course work) include:

Formative assessment contributes to **40%** of the final course grade.

Summative Assessment

Summative assessment shall contribute to **60%** of the final course grade.

Industrial Attachment and Project

MODERATION ARRANGEMENTS

MODERATION REQUIRENTS

Internal and external moderators to be engaged will be BQA accredited subject specialists in relevant fields with relevant industry experience and academic qualifications. Both internal and external moderation shall be done in accordance with applicable policies and regulations.

RECOGNITION OF PRIOR LEARNING

There will be provision for awarding of the qualification through RPL mode which will be in line with the national RPL Policy.

CREDIT ACCUMULATION AND TRANSFER

There will also be provision for Credit Accumulation and Transfer, CAT policies which is in line with National Policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Progression

Graduates of this qualification may consider pursuing related qualification for the purpose of multiskilling, retooling and gain expert knowledge in the field.

- Bachelor's Degree in Mining Engineering
- Bachelor of Science in Hydrogeology
- Bachelor's Degree in Economic Geology

- Bachelor of Science in Geophysics

Vertical Progression

Graduates may progress to qualifications such as:

- Post Graduate Diploma in cognate area.
- Honours Degree in Geology.
- Master of Science in Geological Studies.
- Master's Degree in Geophysics.

Diagonal Progression

Graduates may progress to qualifications such as:

- Post Graduate Diploma in Education if want to pursue lecturing.
- Post Graduate Diploma in Project Management if want to manage projects.
- Post Graduate Certificate in Research for those with passion for research and analysis and evaluations.

EMPLOYMENT PATHWAYS

Graduates from the Bachelor of Engineering in Construction Engineering will have requisite competencies and attributes to work as:

- Geology Engineers.
- Geophysics
- Mineral Surveyors
- Engineering geologist
- Geochemist
- Geophysicist
- Geoscientist
- Geotechnical engineer
- Hydrogeologist
- Mudlogger
- Wellsite geologist
- Lecturer.

- Postdoctoral Researcher.
- Professor.

QUALIFICATION AWARD AND CERTIFICATION

Minimum Standard of achievement for the award of the qualification.

To be awarded the qualification the graduate, must complete 84 Credits of the Fundamental Component, 413 Credits of the Core component and 28 credits of the Elective component to make a total of 525 credits.

Certification

Students should pass all modules for the **Bachelor of Science in Geology** to be awarded the qualification according to the standards prescribed for the award of the qualification and applicable policies.

REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification generally compares well with all the qualifications studied since the exit outcomes cover similar scope and depth and are aligned to exit-level descriptors typical to this level and type of qualification as done within the region and beyond as well as competencies required for registration and accreditation with regulatory and professional bodies such as Botswana Qualifications Authority and Botswana Geoscience Institute (BGI). However, what sets it apart from the other qualifications examined is that there is provision for development of attributes such as Chemistry for Geologists, Stratigraphy and Palaeontology, Exploration Geochemistry and Hydrology which are crucial for the Mining Industry. The qualification for the developer is outcome based and is anchored on a competency and credit-based qualification framework.

REVIEW PERIOD

The qualification will be reviewed every five years.