	BQA NCQF QUALIFICATION TEMPLATE	Document No.	DNCQF.QIDD.GD02
		Issue No.	01
		Effective Date	04/02/2020

SECTION A:		QUALIFICATION DETAILS			

QUALIFICATION DEVELOPER (S)	University of Botswana				
TITLE	Bachelor of Science in Mathematics			**NCQF LEVEL**	7
FIELD	Natural, Mathematical and Life Sciences	**SUB-FIELD**	Mathematics	**CREDIT VALUE**	487

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:

The economic strength of any country is linked with the advancement in Science, Technology, Engineering and Mathematics (STEM) disciplines. This sentiment is embraced globally and is articulated well in the Agenda 2030 Sustainable Development Goals (SDGs). The government of Botswana has since realized that as evidenced in policy documents such as Vision 2016/2036 and in the series of National Development Plans, the Revised National Policy on Education (RNPE, 1994), and the Education and Training Sector Strategic Plan (ETSSP, 2015-20) policy. These policies call for training of people in mathematics and science subjects to assist the country in its endeavor to improve and diversify its economy. Mathematics is a major tool in developing science and supporting modern technology through its diverse applications. In the modern world, mathematical modelling plays a crucial role in communication technology, financial systems, biological systems and other branches of mathematical sciences.

Proper training and skills development in mathematics are fundamental to investment and therefore crucial to economic growth. As such, developing a strong mathematics community is one of the highest priorities, yet with the lowest cost.

This qualification is therefore an answer to the call. The qualification will meet the national strategic goal of producing creative, competent and motivated professional graduates ready for the industry and the service sector,

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who are capable of independent, critical and innovative thinking as well as lifelong learning.

It will produce professionals who are competent and globally marketable, and who are creative, innovative, and have entrepreneurship skills.   It will contribute significantly to the following national strategic goals:

a) Fulfill the vision to expand access in ICT related programmes.

b) Contribute to the country's Vision 2036 and National Development Plan 11 (NDP 11) objectives with respect to the diversification of Botswana's economy and employment (NDP 11 Chapter 6).

PURPOSE:

The purpose of the Bachelor of Science in Mathematics is to develop professionals who have specialised knowledge, skills and competences to:

- Carry out research in the field of Mathematics.

- Solve identified national, regional, continental and global mathematical problems through modelling of real-life situations arising in diverse areas.

- Develop new ideas and processes in mathematics.

- Apply modelling and computational processes to solve real-life problems.

- Provide leadership both in Government Departments and the Private Sector.

ENTRY REQUIREMENTS (including access and inclusion)

- The minimum entry requirements into this qualification will be NCQF level 4, Certificate IV (General Education or TVET).

- There will be provision for entry through Recognition of Prior Learning System in accordance with relevant national and Provider-based policies and guidelines.

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SECTION B	QUALIFICATION SPECIFICATION
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
1 Demonstrate wider knowledge and problem-solving skills in Mathematics.	1.1 Demonstrate a general understanding of the basic principles of mathematics. 1.2 Demonstrate knowledge through analysis of different forms of mathematical data.
2 Model real life problems in mathematical terms and use appropriate tools (methods and software) to solve them.	2.1 Model real life natural and industrial situations in mathematical terms. 2.2 Apply modelling and programming skills in solving industrial and or financial mathematics problems. 2.3 Use programming software in solving mathematical problems.
3 Demonstrate ability to carry out research in Mathematics	3.1 Demonstrate knowledge of the interconnectedness of different mathematical fields. 3.2 Carry out action research on issues in Mathematics. 3.3 Formulate problems and conduct research.
4 Design and/or implement algorithms for solving mathematical problems.	4.1 Apply acquired knowledge and skills to deal creatively with industrial problems at analytical and conceptual levels. 4.2 Select and/or *develop* appropriate numerical methods for solving problems in Mathematics. 4.3 Use programming skills to implement methods in computing results.
5 Use technology to enhance mathematics problems solving in the industry.	5.1 Design strategies that are appropriate to achieve effective problem solving in the workplace. 5.2 Apply appropriate technologies in mathematical problem solving. 5.3 Engage in research involving mathematics in industry.
6 Formulate mathematical arguments precisely and logically.	6.1 Apply acquired knowledge and skills in mathematics to prove theorems

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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]	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Communication and Study Skills	24			24
	Computing Skills Fundamentals	16			16
CORE COMPONENT Subjects/Courses/ Modules/Units	Mathematical Analysis	24	60	48	132
	Algebra		24	36	60
	Project (Topics in Mathematics)			19	19
OPTIONAL COMPONENT Subjects/Courses/ Modules/Units	General Chemistry	32			32
	Principles of Biology	16			16
	Diversity of Plants and Animals	16			16
	Geometrical Optics and mechanics	16			16
	Electricity, Magnetism and Elements of Modern Physics	16			16
	Mathematics of Finance	24	12		36
	Computing		12		12
	Discrete Mathematics		12		12
	Newtonian Mechanics		12		12
	Vector Calculus			12	12
	Numerical Methods for Linear Algebra			12	12

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	Mathematical Programming and Game Theory			*12*	*12*
	Mathematical Statistics			*24*	*24*
	Numerical Methods			*12*	*12*
	Introduction to Computational Mathematics			*12*	*12*
	Dynamics			*24*	*24*
	Mathematical Methods			*12*	*12*
	Further Group Theory			*12*	*12*
	Measure Theory			*12*	*12*
	General Topology			*12*	*12*
	Optimization and Control Theory			*12*	*12*
	Multivariate Statistics			*12*	*12*
	Advanced Topics in Mathematics			*12*	*12*
	Number Theory			*12*	*12*
	Combinatorics and Graph Theory			*12*	*12*
	Introduction to Galois Theory			*12*	*12*
	Functional Analysis			*12*	*12*
	Dynamical Systems			*12*	*12*
	Partial Differential Equations			*12*	*12*
	Introduction to Probability Theory			*12*	*12*
	Algebraic Topology			*12*	*12*
	Introduction to Fluid Mechanics			*12*	*12*
	Introduction to Mathematical Modeling Applied to Life			*12*	*12*

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	Sciences				
	Linear Models			*12*	*12*
	Stochastic Processes			*12*	*12*
	Introduction to Statistical Analysis of Reliability			*12*	*12*

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	*Credit Value*
5	*120*
6	*120*
7	*247*
TOTAL CREDITS	*487*

Rules of Combination:

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

The qualification requires 40 credits of Fundamental courses, 211 credits of Core courses and 236 credits of Optional courses (made up of 4 courses from NCQF Level 5, 3 courses from NCQF Level 6 and 12 courses from NCQF Level 7).

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ASSESSMENT ARRANGEMENTS

Assessment will consist of both formative and summative assessments.

- Formative Assessment: 50%
- Summative Assessment: 50%.

Assessment will be carried out by BQA registered and accredited assessors.

MODERATION ARRANGEMENTS

There shall be both internal and external moderation in accordance with applicable institutional policies and regulations, aligned to national policies. Moderation will be carried out by BQA registered and accredited moderators.

RECOGNITION OF PRIOR LEARNING

Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of RPL assessment for the award of credits towards the qualification in accordance with applicable university RPL policies and relevant national-level policy and legislative framework. Implementation of RPL shall also be consistent with requirements, if any, prescribed for the field or sub-field of study by relevant national, regional or international professional bodies.

CREDIT ACCUMULATION AND TRANSFER

Credit accumulation and transfer is applicable for this qualification and will be guided by the relevant CAT system policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation (related qualifications of similar level that graduates may consider)

- Bachelor of Science (Mathematics of Finance)
- Bachelor of Science (Computing with Finance)
- Bachelor of Science (Actuarial Science)
- Bachelor of Science (Operations Research)

Vertical Articulation (qualifications to which the holder may progress to)

- Master of Science in Mathematics

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- Master of Philosophy in Mathematics
- Master of Science (Actuarial Science)
- Master of Science (Operations Research)
- Master of Science (Financial Mathematics)

Employment Pathways

- Data Analyst
- Risk control officers
- Investment Analyst
- Financial Brokers
- Curriculum Developers
- Software Engineer
- Statistician
- Operational Researcher
- Examination Officers
- Academic Researcher (college/university)
- Industrial researcher

QUALIFICATION AWARD AND CERTIFICATION

Qualification Award

To be awarded the Bachelor of Science (Mathematics) qualification, a candidate is required to achieve a minimum of **487** credits.

Certification Award

Candidates awarded the qualification shall receive a certificate and an official transcript.

REGIONAL AND INTERNATIONAL COMPARABILITY

This Bachelor of Science in Mathematics qualification is comparable to other similar BSc qualifications from around the region (e.g., University of the Pretoria, South Africa, University of Zimbabwe, Zimbabwe) and

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across the world with regards to outcomes and assessment criteria, degree of difficulty and notional learning time.

This BSc in Mathematics is worth **487** credits and is thus comparable to the Bachelors (BSc) Degrees in New Zealand and some universities in South Africa. The Bachelors (BSc) degree in New Zealand is at Level 7 and is worth **360** credits. The BSc Honours Degree is at Level 8 and is worth 480 credits.

The main difference is that in these other countries, their Bachelor's degree is 3 years whereas this one is 4 years. In these countries, entrance in the qualification is mostly at NCQF level 5 while for us is Level 4.

REVIEW PERIOD

The qualification will be reviewed after every 5 years.

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