SECTION A:	QUALIFICATION DETAILS																
QUALIFICATION DEVELOPER (S)	University of Botswana																
TITLE	Master of Science in Mathematics													NCQF LEVEL	9		
FIELD	Natural, Mathematical and Life Sciences		SUB-FIELD		Mathematics and Statistics									CREDIT VALUE	240		
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.

PURPOSE:

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

- Demonstrate independent ability to carry original research as part of vocational training for professional mathematicians.
- Demonstrate a sustained commitment to development of new ideas and processes in mathematics.
- Apply modelling and computational processes to solve real-life problems.

ENTRY REQUIREMENTS (including access and inclusion)

- Bachelor of Science in Mathematics or equivalent (NCQF level 7)
- There is provision to enter the qualification through Recognition of Prior Learning.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Demonstrate an advanced level of general knowledge in Mathematics.	1.1 Demonstrate advanced understanding of fundamental principles of mathematics. 1.2 Carry out analysis of different forms of mathematical data.
2. Demonstrate skills and competences of mastering research.	2.1 Demonstrate a high level of understanding in compiling literature review research. 2.2 Exhibit a high level of understanding of Scientific literature appropriate to practice of Mathematics at a professional level. 2.3 Carry out research involving mathematics in industry.
3. Use technology to enhance mathematics problems solving in the industry.	3.1 Design strategies that are appropriate to achieve effective problem solving in the workplace. 3.2 Employ appropriate technologies in problem solving.
4. Display a culture of creativity and innovation in the mathematics profession.	4.1 Participate in professional development activities at local and global level. 4.2 Foster collaboration within and between mathematics professions. 4.3 Formulate mathematical arguments precisely and logically.
5. Apply acquired knowledge and skills to present and solve industrial problems at analytical and conceptual levels.	5.1 Apply acquired knowledge and skills in mathematics to prove theorems. 5.2 Develop appropriate numerical methods for solving problems in Mathematics.

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

SECTION C	***QUALIFICATION STRUCTURE***				
SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total (Per** Subject/ Course/ Module/ Units)*
		Level [ ]	***Level [ ]***	***Level [9]***	
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Advanced Mathematical Analysis			***9***	***15***
	Supervised research and dissertation (Pure Mathematics or Applied Mathematics)			***9***	***120***
OPTIONAL COMPONENT	Logic and set theory			***9***	***15***
	Coding theory			***9***	***15***

Subjects/Courses/ Modules/Units	Ergodic theory			***9***	***15***
	Algebraic number theory			***9***	***15***
	Advanced Topics in Pure Mathematics			***9***	***15***
	Module Theory			***9***	***15***
	Homological Algebra			***9***	***15***
	Commutative rings			***9***	***15***
	Commutative algebra			***9***	***15***
	Representation theory of groups			***9***	***15***
	Lattice theory			***9***	***15***
	Orthogonal and Fourier series			***9***	***15***
	Advanced Functional Analysis			***9***	***15***
	Geometry of curves and surfaces			***9***	***15***
	Differential geometry			***9***	***15***
	Algebra Topology 1			***9***	***15***
	Algebraic Topology 2			***9***	***15***
	Ordinary Differential Equations			***9***	***15***

	Constrained Optimization			***9***	***15***
	Calculus of Variations			***9***	***15***
	Numerical Linear Algebra			***9***	***15***
	Finite Element Methods			***9***	***15***
	Unconstrained Optimization			***9***	***15***
	Interval Iterative Methods			***9***	***15***
	Approximation Theory			***9***	***15***
	Mathematical Software			***9***	***15***
	Multivariate Statistical Analysis			***9***	***15***
	Bayesian Inferences			***9***	***15***
	Statistical Analysis of Reliability			***9***	***15***
	Mathematical Statistics Computing II			***9***	***15***
	Mathematical Statistics Computing I			***9***	***15***
	Applied Stochastic Processes			***9***	***15***
	Mathematical Methods			***9***	***15***
	Compressible Flow Theory			***9***	***15***

	Computational Fluid Mechanics			***9***	***15***
	Hydrodynamic Stability			***9***	***15***
	Viscous Flow Theory			***9***	***15***
	Magnetohydrodynamics			***9***	***15***
	Stochastic Differential Equations			***9***	***15***
	Theory of Arbitrage in Stochastic Financial Models			***9***	***15***
	Theory of Pricing in Stochastic Financial Models			***9***	***15***

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)

The qualification requires **15** credits of Core courses, **105** credits of Optional courses and **120**credits of Supervised Research and Dissertation. From the pool of Optional courses, the learner must choose **7** courses from itemised courses offered by the Departments of Mathematics.

ASSESSMENT ARRANGEMENTS

Assessment will consist of both formative and summative assessments and should be based on learning outcomes and/or sub-outcomes. Assessment will be carried out by BQA registered and accredited assessors.

Formative Assessment

Continuous assessment shall contribute 50% to the final grade of each course.

Summative Assessment

There shall be a formal examination of all courses taken in each semester. The examination shall contribute 50% to the final grade.

MODERATION ARRANGEMENTS

There is provision to carry out internal and external moderation in accordance with applicable policies and regulations:

Assessors and moderators must have valid registration and accreditation with all relevant bodies such as Botswana Qualifications Authority (BQA).

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 institutional 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.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation (related qualifications of similar level (level 9) that graduates may consider)

- Master of Science in Actuarial Science
- Master of Science in Statistics

Vertical Articulation (qualifications at level 10 to which the holder may progress to)

- Doctor of Philosophy (Mathematics)

Employment Articulation

- Consultants
- Researchers in Government Departments and Private Sector
- Analyst in a bank or Insurances company
- Mathematics lecturer in a tertiary institution

QUALIFICATION AWARD AND CERTIFICATION

Qualification Award

To be awarded the Master of Science (Mathematics) qualification, a candidate is required to achieve a minimum of **240** credits.

Certification Award

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

REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification generally compares well with the three qualifications studied in terms of content scope and the core areas of mathematics covered and the emphasis of the qualifications.

The proposed qualification is similar to the regional and international qualifications studied for comparison in terms of the total credits, level, exit outcomes and assessment criteria. The proposed qualification differs with the one offered at the University of Auckland by one year duration. Furthermore the titles of the qualifications is different for all the universities.

REVIEW PERIOD
The qualification will be reviewed after every 5 years.