


	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	Doctor of Philosophy (Mathematics)								NCQF LEVEL	10		
FIELD	Natural, Mathematical and Life Sciences			SUB-FIELD	Mathematics			CREDIT VALUE	360			
<i>New Qualification</i>					<input checked="" type="checkbox"/>	<i>Review of Existing Qualification</i>						
SUB-FRAMEWORK	<i>General Education</i>			<input type="checkbox"/>	<i>TVET</i>			<input type="checkbox"/>	<i>Higher Education</i>			<input type="checkbox"/>
QUALIFICATION TYPE	<i>Certificate</i>	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>Diploma</i>	<i>Bachelor</i>				
	<i>Bachelor Honours</i>			<input type="checkbox"/>	<i>Post Graduate Certificate</i>			<input type="checkbox"/>	<i>Post Graduate Diploma</i>			
	<i>Masters</i>				<input type="checkbox"/>	<i>Doctorate/ PhD</i>					<input type="checkbox"/>	

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

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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.

The qualification will meet the national strategic goals of producing creative, competent, and motivated professional graduates ready for the industry and the service sector, who are capable of independent, critical and innovative thinking as well as lifelong learning. It will produce graduates who are competent and globally marketable, and who are creative, innovative, and have entrepreneurship skills.

Research in the various disciplines of Mathematical Sciences (Mathematics of Finance, Mathematics of Biology, Optimization and Control, Numerical Analysis, Algebraic Topology, Real Analysis, Functional Analysis and Fluid Dynamics) plays an important role in generating new knowledge, solving national (as well as regional and global) industrial problems, for national development and advancing knowledge and skills.


Learners in this qualification mainly focus their research on these areas of national, regional as well as international interest. The qualification contributes towards building, sustaining, and strengthening the nation's human resource capacity for impact-oriented research for development.

PURPOSE: The purpose of the PhD in Mathematics is to develop professionals who have knowledge, skills and competences to:

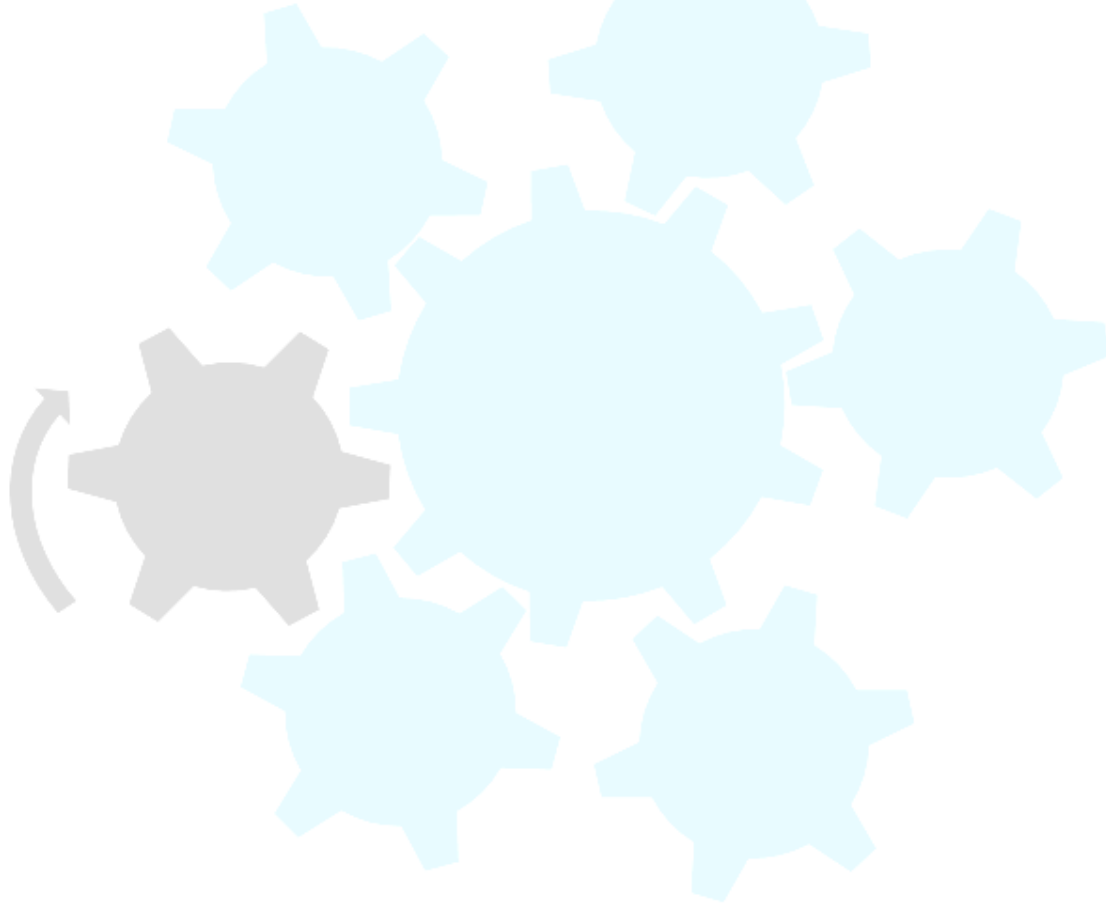
- Carry out original research to generate knowledge in the various fields of Mathematical Sciences.
- Develop and implement a strategy for dissemination of research findings and outputs in an appropriate scholarly way.
- Solve identified national, regional, continental, and global mathematical related problems through research.
- Demonstrate a sustained commitment to development of new ideas and processes through research.

ENTRY REQUIREMENTS (including access and inclusion)

- Applicants must have obtained a relevant qualification at NCQF Level 9 or equivalent, e.g. (MSc, MPhil or equivalent) in Mathematics.

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- Transfer from an NCQF 10 mathematics or equivalent qualification from an accredited institution.



SECTION B

QUALIFICATION SPECIFICATION

GRADUATE PROFILE (LEARNING OUTCOMES)

ASSESSMENT CRITERIA

1. Advance boundaries of existing knowledge, professional and/or interdisciplinary discourse through research and high-level reflective practice.


- 1.1 Formulate a research question.
- 1.2 Conduct comprehensive literature review and synthesize knowledge.
- 1.3 Design an appropriate research methodology for the problem at hand.
- 1.4 Develop a research proposal that can be used to seek funding and obtain ethical approvals.
- 1.5 Write up and defend a research proposal

2. Initiate and conduct independent original research of the highest international standard that will result in novel findings or innovative solutions to solve problems of the community and nation.

- 2.1 Demonstrate an understanding of research methods.
- 2.2 Select appropriate research methods and specialized analytical techniques.
- 2.3 Analyse critically and synthesise scientific findings.
- 2.4 Demonstrate sound judgement based on evidence generated from research.
- 2.5 Demonstrate requisite skills for solving the identified problem.
- 2.6 Identify the right data required for solving the identified problem.






3. Use technology to enhance mathematics problem solving in industries and other real-life situations

- 3.1 Apply acquired knowledge in development of software that enhances mathematics problem solving in real life situations.


	<p>3.2 Develop software that enhances mathematics problems solving.</p> <p>3.3 Write up reports using scientific academic writing technologies.</p>
<p>4. Demonstrate an ability to think in an analytical and organised manner and formulate mathematical arguments precisely and logically.</p> 	<p>4.1 Work independently to plan and execute a research project.</p> <p>4.2 Demonstrate a high degree of competence in analysing a problem and designing steps towards solving the problem.</p> <p>4.3 Apply advanced research methodologies to contribute significant knowledge in mathematics.</p> <p>4.4 Demonstrate leadership skills in research.</p> <p>4.5 Adhere to ethical research and academic integrity.</p> <p>4.6 Demonstrate an enquiring mind and intellectual independence.</p> <p>4.7 Present and defend research findings at national, regional, or international scientific fora.</p> <p>4.8 Publish at least two manuscripts in international-peer reviewed journals with a known impact factor.</p> <p>4.9 Compose an original research doctoral thesis that places research within the broader context of research.</p>

SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level			Total <i>(Per Subject/ Course/ Module/ Units)</i>
		Level [10]	Level []	Level []	
FUNDAMENTAL COMPONENT <i>Subjects/ Courses/ Modules/Units</i>					
CORE COMPONENT <i>Subjects/Courses/ Modules/Units</i>					
	PhD Thesis				
	Supervised research and thesis in Mathematics	10			360

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<p>ELECTIVE/ OPTIONAL COMPONENT</p> <p><i>Subjects/Courses/ Modules/Units</i></p>					
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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	Credit Value
10	360
TOTAL CREDITS	360
Rules of Combination: (Please Indicate combinations for the different constituent components of the qualification)	
The qualification requires 360 credits of core component (research and publication).	

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ASSESSMENT ARRANGEMENTS

There shall be formative assessment which will contribute 100% towards the final mark.
 Assessment shall be carried out by registered and accredited BQA assessors.

MODERATION ARRANGEMENTS

There shall be both internal and external moderation conducted by moderators who are accredited by BQA or any other relevant and recognised body in accordance with ETP policies and regulations.

RECOGNITION OF PRIOR LEARNING

This qualification is designed to allow award through RPL assessment, in accordance with institutional and National RPL policy.

CREDIT ACCUMULATION AND TRANSFER

This qualification is designed to allow award of credits towards through Credit Accumulation and Transfer, CAT in accordance with institutional and National CAT policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)


Horizontal Articulation

- Doctor of Philosophy in Pure or Applied Mathematics.
- Doctor of Philosophy in Actuarial Sciences.

Vertical Articulation

- Post Doctorial research in Mathematics.

Employment Pathways

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- Consultants
- Researchers in both Government Departments and Private Sectors
- Academics (Research and/or Teaching Scholars)
- Professional Scholars
- Risk Analysts

QUALIFICATION AWARD AND CERTIFICATION

Qualification Award
 To be awarded the Doctor of Philosophy in Mathematics qualification, a candidate is required to achieve a minimum of 360 credits.

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

REGIONAL AND INTERNATIONAL COMPARABILITY

Benchmarking with SAQA www.saqqa.org.za and www.nzqa.govt.nz

The proposed qualification compares well with other qualifications from regional and international universities, such as University of Pretoria, University of Western Cape (both in South Africa) and, in terms of title and assessment. The Universities' qualifications are at QF level 10 which are similar to the proposed qualification.

REVIEW PERIOD

The qualification will be reviewed after every 5 years.