SECTION A:	***QUALIFICATION DETAILS***													
QUALIFICATION DEVELOPER (S)	*UNIVERSITY OF BOTSWANA*													
TITLE	*Doctor of Philosophy (Mathematics Education)*												***NCQF LEVEL***	*10*
FIELD	*Education & Training*	***SUB-FIELD***	*Mathematics Education*										***CREDIT VALUE***	*360*
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 professional pool landscape in the Country must change. The shortage of skilled manpower narrative of the 70s as espoused in the first and to some extend the second national commission on education does not hold anymore. The preparation of professionals at all levels of education, including professional qualifications like doctoral degrees, to address the economic, educational, scientific, and social needs of the country is therefore a major goal for Botswana's advancement to address the changing face of its economy from mineral to knowledge based. The National Development Plan eleven (NDP 11) identifies among others, low quality in tertiary education as a challenge in Botswana's developmental advancements or progress. The Education and Training Sector Strategic Plan (ETSSP 2015-2020) vision decried the miss-match between qualifications and industry demands as one of the hindrances to innovation, technological and entrepreneurial advancement of any country, Botswana included. Training at higher degree level to address these and many other needs is of paramount importance. The Government of Botswana has since realized this, as evidenced in policy documents such as Vision 2036 (Pillar 1: Sustainable Economic Development – to produce productive and competitive human resources that drive growth across economic sectors including emerging industry, and 2) Pillar 2: Human and Social Development– Education and Skills Development – to provide relevant quality education that is outcome-

based with an emphasis on technical and vocational skills as well as academic competencies).

The HRDC forecast of Botswana's top occupations in demand (20192028) include university and higher education lecturers. The Mathematics Education doctoral qualification is a research-intensive qualification that responds to this HRDC forecast and prepares graduates for research and teaching as applied to various educational contexts including teaching and curriculum development. The aim of the outputs should be to inform policy direction and help government decide on changes to these policies.

PURPOSE:

The PhD degree qualification responds to the need to prepare practitioner educators who can better serve in a variety of educational positions. On one hand, the qualification's focus is on preparation of practitioner professionals for leadership roles in teacher preparation at graduate and undergraduate levels, on-going professional developments as well as positions centered on practices, life-long learning, innovative problem-solving, critical thinking, research, and reflective practices. On the other hand, the qualification recognizes the need to prepare knowledgeable teacher education curriculum specialists to fill leadership roles in educational reform efforts at school, college, and university levels. The development and implementation of new Outcome Based Education (OBE) in the country at all levels of education also creates a demand for professionals who can assume leadership roles on curriculum revision projects and provide evaluation services to assess the effectiveness of teacher education reform efforts. A robust PhD program in the country would therefore be ideal to address these outcomes and produce professionals who can lead in the new areas of educational reform.

As a practitioner degree, the PhD in Mathematics Education takes student's expectation for future employment in education into cognizance. Graduates are trained to hold responsible positions as curriculum specialists, college and university instructors, educational researchers, curriculum evaluators, and instructional specialists in government, businesses, and industry. The HRDC (2016) priority area justification affirms this by recognizing research and development as well as science and technology specialists as they feed off from such a qualification. Mathematics education as part of science education feeds into the science, technology and innovation careers that are critical for the knowledge economy.

Graduates of this qualification will be able to:

- Conduct independent inquiry and apply technology to assist in the overall inquiry process in mathematics education.
- Demonstrate the ability to develop or create curriculum in different disciplines as well as design a variety of assessment tools to assess curriculum and student outcomes.
- Effectively disseminate research outcomes to a variety of settings using highly developed communication skills and work productively with a team of experts in Mathematics education.
- Provide academic leadership in issues of mathematics teaching and learning and curriculum debates.

ENTRY REQUIREMENTS (including access and inclusion)

- Master's NCQF Level 9 (or Equivalent)
- Entry through Recognition of Prior Learning (RPL) or Credit Accumulation Transfer (CAT) is allowable through to applicants through institutional policies in-line with national RPL and CAT policies.

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SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
LO1: Demonstrate systematic and critical understanding in mathematics education by planning and generating a substantial and original contribution that advances scholarship or professional practice.	**AC1.1:** Demonstrate substantial body of knowledge at the frontier of mathematics education, including knowledge that constitutes an original contribution. AC1.2: Demonstrate substantial knowledge of research principles and methods applicable to the study in mathematics education.
LO2: Synthesize, apply and analyse existing and new knowledge in mathematics education to develop new concepts or interpretations through engagement in ethical research, critical reflection, continuous evaluation and demonstration of research skills.	**AC2.1:** Perform original, feasible and significant design of research in mathematics education. **AC2.2:** Critically review recent work in mathematics education area. **AC2.3:** Effectively communicate by defending original research proposal in writing and oral presentations. **AC2.4:** Demonstrate application of professional ethics in conducting research in mathematics education.
LO3: Effectively disseminate research outcomes to a variety of audiences using highly developed communication skills and work productively within a team in mathematics education.	**AC3.1:** Demonstrate evidence of presenting of research outcomes in activities such as seminars and conferences. **AC3.2:** Effectively communicate by defending dissertation in writing and oral presentations.
LO4: Demonstrate autonomy, authoritative judgement, adaptability, leadership, initiative, resilience and responsibility as an expert and leading practitioner or scholar.	**AC4.1** Demonstrate the application of mathematics education knowledge and skills with: • intellectual independence • initiative and creativity in new situations and/or for lifelong learning • full responsibility and accountability for personal outputs • planning and execute original research • the ongoing capacity to generate new knowledge, including in the context of professional practice.
LO5: Develop knowledge of how instructional	**AC5.1:** Evaluate curriculum and instruction practices based on Pedagogical Content Knowledge and student

choices and actions affect students and other professionals in the teaching and learning community.	characteristics. **AC5.2:** Apply research on pedagogical practices, student learning, and educational policies and issues. **AC5.3:** Investigate ideas that will improve teaching and learning to advance the profession. **AC5.4:** Show evidence of engagement in critical reflection on how their frame of references and potential biases impact expectation for and relationships with learners.

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SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total*** ***(Per** Subject/ Course/ Module/ Units)*
		Level [ ]	***Level [9]***	***Level [10]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*					
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Supervised Research and Proposal Development in Mathematics Education (MPhil)			***10***	***180***
	Supervised Research and Thesis in Mathematics Education (PhD)			***10***	***180***
ELECTIVE/					

OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units*					

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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)***	
This is a research-based qualification with no coursework component. Two key assessment gates exist. At the end of the MPhil and proposal development, it will be assessed with a pass/fail grade. A pass allows the student to transition into the PhD phase which will be assessed terminally at defence. A successful defence will lead to award of a PhD degree.	

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ASSESSMENT ARRANGEMENTS

Candidate is expected to defend a supervised research proposal, with a team of readers picked from relevant Departments in the institution.

The Dissertation Oral defence will be done with a team of internal and external examiners.

All assessments shall be carried out by BQA registered and accredited assessors (or equivalents) as prescribed in the institutional regulations.

MODERATION ARRANGEMENTS

- There shall be provision for both internal and external examination in accordance with institutional policies aligned with national policies.
- Moderators shall all be accredited with BQA.

RECOGNITION OF PRIOR LEARNING

There shall be provision for recognition of prior learning (RPL) in-line with institutional policies.

CREDIT ACCUMULATION AND TRANSFER

There shall be provision for credit accumulation transfer (CAT) in-line with institutional policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

LEARNING

Horizontal Articulation

- PhD degrees in Curriculum and Instruction
- PhD in Measurement and Evaluation

EMPLOYMENT

- Teacher Educator
- Researcher
- Teacher
- Curriculum designer/developer

- Resource developer
- Education officer/Inspector/Administrator
- Educational Consultant

QUALIFICATION AWARD AND CERTIFICATION

Qualification Award

To be awarded a Doctor of Philosophy (Mathematics Education) degree, a candidate must have acquired a minimum of 360 credits.

Qualification Certification

There will be issuance of a certificate and an official transcript at award.

REGIONAL AND INTERNATIONAL COMPARABILITY

Since only one institution offers this qualification locally, regional, and international institutions were used. The qualification was compared with the following universities: The University of South Africa in South Africa, The University of Glasgow in United Kingdom, and The University of Wisconsin-Madison in United States of America. All these qualifications respond to the need to prepare practitioners to serve in a variety of education positions, including scholars, leaders in teacher preparation programs for work in practice, research and policy in colleges and universities, secondary school districts. The three qualifications are like the PhD (Mathematics Education) have a focus on research in mathematics education. Candidates are expected to undertake original research on a mathematics education area. Demonstrate knowledge, skills, and competencies in developing a research proposal, execute the proposal and ultimately put together a dissertation. There are provisions for presentations of proposals and defence of the final dissertation. The qualifications require students to participate in activities meant to demonstrate autonomy, authoritative judgements, adaptability, leadership, initiative, resilience, and responsibility in the fields of mathematics education.

Unlike this proposed qualification, the University of Wisconsin-Madison offers course work (at least 51 total graduate credits), residency requirements and dissertation at the end. Candidates complete coursework and submit a dissertation in their areas of specialization, i.e., mathematics education, to be awarded the qualification. The University of Glasgow offers a qualification like that of the University of South Africa in that there is no coursework requirement though courses maybe audited if needed. This qualification is similar in that it does not require any coursework but differs in that there is no courses audition expected. Both this qualification and that offered by the University of South Africa have a total NQF credits of 360 required to be awarded the qualification. They all emphasise research and life-long learning.

The employment pathways for Ph.D. holders in Mathematics education graduates of the three universities are

mainly: College mathematics education instructors and related subjects, as well as:

1. curriculum development officers,
2. education officers

REVIEW PERIOD

The qualification shall be reviewed every five (5) years.

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