SECTION A:	QUALIFICATION DETAILS																	
QUALIFICATION DEVELOPER (S)	University of Botswana																	
TITLE	Doctor of Philosophy in Medical Science													NCQF LEVEL				10
FIELD	Health and Social Services			SUB-FIELD		Medical Science								CREDIT VALUE				384
New Qualification				X		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								X				

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE:

Health research capacity in developing economies is a key ingredient to the overall development strategy of the country and is a precondition to achieving the Millennium Development Goals. Although Botswana is one of the countries with a high HIV and AIDS burden in sub-Saharan Africa, the amount of research in this area and attendant infections, and non-communicable diseases remains mooted. The limited research taking place in the country is largely driven by foreign institutions and the research agenda is to a certain extent motivated by external interests. This scenario obtaining in the country can be attributed in part to a scarcity of competent citizen scientists to drive the national research agenda and deliver research outputs that contribute to the health of the nation.

While combating the HIV/AIDS pandemic has been specified as one of the eight Millennium Development Goals, non-communicable diseases (e.g. cardiovascular diseases, diabetes, cancer, chronic lung diseases, etc) are expected to be the leading cause of death in developing countries by 2020. Rising life expectancy and the increasing number of people on HIV antiretroviral treatment will inevitably result in higher prevalence of non-communicable diseases. Research on prevention and control of non-communicable diseases must be

stepped up in order to reduce the impact of these diseases on quality of health, social and economic wellbeing of the population. It is hoped that the students enrolled in the proposed degree programmes will focus their research on these areas of national interest.

One of the major challenges faced by many governments in Africa is the high costs of healthcare. This is attributed in part to the high costs of *in vitro* diagnostics. Diagnostic equipment as well as reagents and other consumables are manufactured in Europe, North America or East Asia. Procurement entails multiple intermediate agents and shipping costs are very high. As a result the cost per laboratory test is many times higher in Botswana than in countries where reagents are procured. In order to reduce the costs of clinical laboratory investigations in Africa, there is need to develop capacity to manufacture laboratory reagents and *in vitro* diagnostics equipment on the continent. This is feasible if there is a critical mass of local research scientists who can lead these efforts.

One of the stated strategic goals of the University is to be research-intensive by 2021 in order to address national research priorities, contribute to the social and economic development of the country and to enhance the profile of the University in the global arena of knowledge generation and innovation. In order to achieve this noble goal there is a need to increase the number of graduate programmes on offer and expand areas of research. This PhD qualification directly addresses this strategy. It is envisaged the qualification will contribute towards building capability, sustaining and strengthening the University's capacity for impact-oriented research for development. Graduates from this programme will contribute to the development of the next generation of researchers.

PURPOSE:

The purpose of the PhD in Medical Science qualification is to develop scholars and leaders who can:

- demonstrate skills for critical analysis and synthesis of complex scientific information.
- undertake independent advanced study and original research to broaden and deepen knowledge in medical science using complex research techniques.
- develop *in vitro* diagnostic solutions and interventions that impacts on the practice of laboratory medicine.
- effectively communicate scientific findings to various audiences
- demonstrate strategic leadership.

ENTRY REQUIREMENTS (including access and inclusion)

Minimum Entry Requirement

- The minimum admission requirement for the PhD in Medical Science degree shall normally be a Masters' degree, NCQF Level 9 (MSc, MPhil or equivalent) in medical laboratory science, medicine, pharmacy, biomedical science, with course work and research from a recognized university or equivalent.

- An applicant with a Master's degree, NCQF Level 9 (MSc, MPhil or equivalent) in pure or applied biological science subject or related science fields **plus** relevant experience in a clinical laboratory may also apply.

Recognition of Prior Learning (RPL):

- There will be access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) in accordance with the RPL and CAT National Policies.

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SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Demonstrate advancement of frontiers of existing knowledge through research.	a. Formulate a research question b. Conduct comprehensive literature review and synthesize knowledge c. Design an appropriate research methodology d. Develop a research proposal that can be used to seek funding and obtain ethical approvals.
2. Initiate and conduct an independent original research of international standard that will result in novel findings or innovative solutions to problems of the community and nation.	a. Plan and conduct an independent research. b. Demonstrate an understanding of research methods c. Select appropriate research methods and specialized analytical techniques.
3. Demonstrate specialized skills and techniques including critical analysis, evaluation and synthesis of new and complex ideas to develop new knowledge or interventions.	a. Implement and manage a research project. b. Analyze and synthesize scientific findings. c. Demonstrate sound judgment on the basis of evidence generated from research. d. Contribute new knowledge in a chosen field. e. Present at journal clubs to critically evaluate literature and apply it to medical science research.
4. Communicate effectively using professional language, science and technology to a diverse audience.	a. Write reports using scientific academic writing b. Publish at least two manuscripts in reputable international-peer reviewed journals with a known impact factor c. Present and defend research findings at national, regional or international scientific meetings

	d. Compose an original research doctoral thesis that places research within the broader context of research.
5. Work independently and in research teams to implement, effectively deploy resources and manage research projects in the field of medical science.	a. Apply theory and advanced research methodologies to contribute significant knowledge in medical science. b. Demonstrate leadership skills in research c. Demonstrate an enquiring mind and intellectual independence. d. Adhere to ethical research and academic integrity when conducting research
6. Demonstrate strategic leadership, expertise and professional integrity in research.	a. Conduct small group tutorial classes for undergraduate and Master's learners requiring additional assistance in your field of study. b. Guide and mentor undergraduate learners undertaking research projects in your area of study. c. Independently retrieve and process advanced information relating to the selected field of study. d. Work autonomously in specialized, complex, ill-defined and unpredictable contexts

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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*					
	N/A				

CORE COMPONENT *Subjects/Courses/ Modules/Units*	**Critical Appraisal and Research Seminars**		***30***		***30***
	PhD Thesis			***354***	***354***
ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units*	***None***				

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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
9	***30***
10	***354***
TOTAL CREDITS	***384***

Rules of Combination:

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

Critical Appraisal and Research Seminars (30 Credits)

This course involves development of skills to critically review, assimilate and present scientific reports/journal articles to an audience that includes a scientific community. The students will undertake guided scientific readings and present a summary of the works at journal clubs or research seminars organized by the Department. The Supervisor will select the readings and these shall normally be recent publications representing cutting edge research in the scientific area the student is engaged in.

PhD Thesis (354 Credits)

A PhD Thesis must provide evidence of sound scholarship and constitute an original contribution to the advancement of knowledge in the subject chosen. It should demonstrate that the candidate has mastered relevant research techniques for collecting, analyzing and interpreting data; acquired a wide knowledge and understanding of literature in the field of study; developed a capacity for critical appraisal of existing facts, ideas and theories; and is capable of producing a treatise through the analysis and synthesis of the relevant data, concepts and theories. The contribution to knowledge should be original and substantial and demonstrate evidence of a greater depth of scholarship.

Each PhD candidate should produce at least two papers/articles published in international peer-reviewed journals (or produce evidence of acceptance of manuscripts) before submission of the Thesis for examination. The candidate should be the first author (or single author) in at least one such publication. The publications shall be based on the work undertaken as part of the PhD studies.

It is not permitted to present a Thesis that has been submitted to another University or Institute of Higher Education.

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ASSESSMENT ARRANGEMENTS

Formative Assessment

- There are no credits allocated to formative assessment. All credits are attained at the completion of the qualification.

Summative Assessment (100% Weighting)

- **Thesis**
  Assessment focusing on the exit-level outcomes is done by means of a doctoral thesis in fulfilment of the award of the Doctor of Philosophy in Medical Science. The PhD thesis should clearly demonstrate evidence of original work that contribute to the knowledge of and insight into the field of study.
- **Publications**
  Publication of at least two data-based manuscripts in reputable international peer-reviewed journal with a known impact factor is mandatory.
- **Oral Examination**
  Oral Examination is mandatory for PhD in Medical Science degree and shall be held in English.

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

MODERATION ARRANGEMENTS

Internal moderation requirements

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

External moderation requirements

- External moderators to be engaged will be subject specialists in relevant fields with relevant industry experience and academic qualifications.
- External moderation shall be done in accordance with applicable policies and regulations.

RECOGNITION OF PRIOR LEARNING

Applicants who have obtained other qualifications and have relevant experience may be considered through Recognition of Prior Learning (RPL) and the arrangement for RPL will be in accordance with institutional Policies in line with the National RPL Policy.

CREDIT ACCUMULATION AND TRANSFER

Candidates may submit evidence of credits accumulated in related qualification in order to be credited for the qualification they are applying for.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation

The PhD in Medical Science is comparable to other Doctor of Philosophy qualifications offered at the same level nationally, regionally and worldwide (e.g. PhD in Biomedical Science, PhD in Anatomical Pathology, PhD in Biological Sciences, PhD in Cancer Biology, PhD in Medical Virology, PhD in Microbiology, PhD in Biochemistry).

Vertical Articulation

PhD in Medical Science is at the highest qualification and there is no possible vertical articulation. Graduates of the programme can access post -doctoral studies to expand their knowledge in the area of research.

Employment Pathways

There are employment opportunities for PhD in Medical Science graduates in the country and beyond. Graduates can join:

- Academic institutions as lecturers and/or research scholars
- Research institutions as medical science researchers
- Ministry of Health public health institute as researchers/consultant laboratory scientists
- Manufacturing industry of *in vitro* laboratory diagnostic reagents

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

- For a Candidate to be awarded this qualification they must have acquired a minimum of **384** credits as per the total credits indicated for this qualification.

Certification

- A **Doctor of Philosophy in Medical Science** will be awarded to a Candidate upon successful completion of the qualification in accordance with applicable policies. A certificate and transcript will be issued at award.

REGIONAL AND INTERNATIONAL COMPARABILITY

The Doctor of Philosophy in Medical Science qualification is comparable to similar qualifications offered regionally and internationally. The main exit outcomes and assessment criteria are comparable to or surpasses similar qualifications offered in most countries. For this PhD in Medical Science qualification, a candidate must publish at least two articles based on the doctoral research before completing the programme, whereas other institutions only require that the work should meet requirements for publication. The minimum entry requirements, number of credits and articulation options are comparable. Similar to other qualifications, this qualification has no coursework. The qualification was benchmarked against comparable qualifications offered at the following institutions:

- Doctor of Philosophy: Medical Sciences, Stellenbosch University, South Africa
- Doctor of Philosophy in Nursing, SGB Nursing, South Africa
- Doctor of Philosophy in Health Sciences, Auckland University of Technology, New Zealand

REVIEW PERIOD

The qualification will be reviewed every 5 years as per the NCQF Regulations.

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