SECTION A:	***QUALIFICATION DETAILS***																	
QUALIFICATION DEVELOPER (S)	University of Botswana																	
TITLE	Bachelor (Honours) of Medical Laboratory Sciences											***NCQF LEVEL***					8	
FIELD	Health and Social Services	***SUB-FIELD***	Medical Laboratory Sciences									***CREDIT VALUE***					630	
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:

Projections from the Ministry of Health Human Resources for Health Strategic Plan (2006-2016) estimated that with an estimated 200,000 people on ARV programme by 2016, Botswana would, among other interventions, need to have educated and trained 170 secondary school leavers to degree level in medical laboratory sciences and trained 14 medical laboratory specialists to MSc/PhD level (MOH Human Resources for Health Strategic Plan: 2006-2016).

Medical laboratory scientists measure chemicals in the body such as blood sugar, cardiac and liver enzymes, and examine blood for diseases such as anemia and cancer. They are trained to operate and troubleshoot high-tech diagnostic equipment. Medical laboratory scientists are trained to isolate pathogenic microorganisms from human specimens and test to find out antibiotics that are effective against the organisms. They are involved in disease surveillance and control of communicable and non-communicable diseases, provision of safe blood and they play an integral role in safe motherhood programmes through screening for infectious diseases and anemia. They play an integral part of public health teams and are

involved in case identification of infections. Botswana as a developing country is experiencing challenges with the supply of health workers to implement national health programs.

The Bachelor of Medical Laboratory Science degree qualification was therefore aligned to this development target. The graduates of the qualification will provide a pool for graduate students in laboratory sciences some of whom will be developed to become lecturers within the fied of medical laboratory science.

The high dependence of the country on expatriate laboratory scientists was one of the factors that motivated the introduction of this qualification at the request of the then Ministry of Health (2007) The National Development Plan (NDP11) identified some of the following challenges:

- Rise in the burden of chronic non-communicable diseases such as; cancer, cardiovascular diseases, chronic respiratory diseases, diabetes and their associated lifestyle risk factors;
- Continuous burden of communicable diseases like HIV/AIDS, TB, diarrheal diseases, acute respiratory infections and malaria;
- Increasing health security threats such as Ebola, Zika virus, and Avian flu;
- Shortage of skilled manpower in some disciplines

These health challenges have continued to pose major threats, including the current Novel Corona virus that is ravaging the world.

The diagnosis, management and prevention of these conditions requires the support of laboratory services manned by adequate and competent personnel. In the past 10 years, new hospitals have been built in the country with a bed capacity in excess of 2000 beds to enable the equitable distribution of health services envisaged in the National Health Policy and vision 2036. This was coupled with introduction of more complex testing to support the ARV Program Covid-19 requiring more competencies in the understanding and application of molecular and immunological procedures. In addition, the medical laboratory sciences cadre has been identified by the Human Resource Development Council as one of cadres that are in short supply throughout the country.

PURPOSE:

The purpose of this qualification is therefore to provide competent human resource who:

- Demonstrate advanced knowledge and understanding of the underlying scientific principles of laboratory testing, including technical, procedural, and problem-solving aspects.

- Perform a full range of testing in a medical laboratory including pre-analytical, analytical, and post-analytical components of laboratory services.
- Adhere to regulations, standards and ethics applicable to medical laboratory practice.
- Conduct research that informs health policy and patient care.

ENTRY REQUIREMENTS (including access and inclusion)

The minimum entry qualification are:
Certificate IV, NCQF Level 4 (BGCSE or Equivalent).

Recognition of Prior Learning (RPL) and Credit accumulation and Transfer (CAT) will be applicable/ considered for entry into this qualification as per Individual Education and Training Provider (ETP) policies in line with national RPL and CAT policies.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
3.1 Apply advanced knowledge in managing and organizing clinical laboratory operations according to recognized national and international clinical laboratory standards institute.	3.1.1 Utilize quality management documents in processing patient samples and reporting results 3.1.2 Perform routine equipment maintenance and calibration 3.1.3 Maintain quality management documents 3.1.4 Document evidence of education, training and ongoing assessment of competence
3.2 Perform and interpret routine and specialized diagnostic techniques (including molecular biology techniques) in clinical laboratory science and in accordance with the statutory requirements in the workplace.	3.2.1 Apply an understanding of test principles in solving analytical problems. 3.2.2 Perform laboratory tests in conformity with established standard operating procedures 3.2.3 Develop a Standard Operating Procedures (SOP) for new laboratory activities 3.2.4 Undertake quality assurance procedures to ensure accurate laboratory results 3.2.5 Interpret laboratory results and correlate information with other laboratory tests
3.3 Differentiate and resolve technical, equipment and physiological causes of unexpected test results and take appropriate corrective action.	3.3.1 Review and validate patient test results or worksheets, quality control records and proficiency test results. 3.3.2 Analyse and interpret preventative maintenance records to detect unexpected results. 3.3.3 Undertake operator preventive maintenance procedures on analyzers and equipment.
3.4 Manage laboratory supplies to ensure uninterrupted testing	3.4.1 Use the appropriate Supply Chain Management terms when procuring or sourcing laboratory supplies 3.4.2 Maintain an inventory of all laboratory supplies 3.4.3 Determine stock at hand and use consumption data calculate order quantities 3.4.4 Monitor inventory updates and adhere to the frequency of checking the laboratory supplies

3.5. Apply specialized knowledge and practice of safety to reduce risk of infection and injuries in the clinical area.	3.5.1 Demonstrate knowledge of safety and health risks associated with hazardous material and equipment in the laboratory. 3.5.2 Practice general safety guidelines including wearing appropriate PPE to minimize risk of infection and injury in the laboratory. 3.5.3 Induct new employees and students on emergency procedures to be followed in the event of a laboratory accident.

SECTION C		***QUALIFICATION STRUCTURE***				
COMPONENT10	***TITLE***		***Credits Per Relevant NCQF Level***			***Total (Per** Subject/ Course/ Module/ Units)*
		Level [5]	***Level [6]***	***Level [7]***	***Level [8]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Principles of Biology	10				10
	Introductory Mathematics I	10				10
	General Chemistry I	10				10
	Introduction to Communication and Academic Literacy Skills for Health Sciences	10				10
	Computer Skills Fundamentals I	10				10
	Diversity of Plants and Animals II	10				10
	Introductory Mathematics II	10				10
	General Chemistry II	10				10
	Health Communication	10				10
	Computer Skills Fundamentals II	6				6
	Physics for Nurses		14			14
	Cell Biology		14			14
	Genetics		14			14
	Human Anatomy		14			14
	Clinical Laboratory Instrumentation		14			14
	Human Physiology		14			14

CORE COMPONENT *Subjects/Courses / Modules/Units*	Laboratory Quality Management Systems			14		14
	Medical Virology Virology and Flow Cytometry Practicum			24		24
	Introduction to Immunology and Serology			15		15
	Clinical Immunology				15	15
	Medical Parasitology				15	15
	Medical Bacteriology I				15	15
	Medical Bacteriology II				15	15
	Bacteriology, Serology and Parasitology Practicum			40		40
	Haematology I				15	15
	Haematology II				15	15
	Haematology and Blood Bank Practicum			40		40
	Immunohematology and Blood Transfusion Techniques			15		15
	Blood Transfusion Practice Practicum			18		18
	Clinical Chemistry I				15	15
	Clinical Chemistry II				15	15
	Clinical Chemistry Practicum			40		40

	Principles of Molecular Diagnostics			15		15
	Introduction to Biostatistics			15		15
	Research Methods and Proposal Writing				15	15
	Research Project				15	15
	Laboratory Management and Education				15	15
	Special Microbiology and Medical Mycology				10	10
	Epidemiology			15		15
ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses / Modules/Units*						
	Health Informatics			10		10
	Resource Management in Africa			10		10
	Health Economics			10		10

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	*Credit Value*
5	**96**
6	*84*
7	*270*
8	*180*
TOTAL CREDITS	*630*

Rules of Combination:

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

Fundamentals	**Level 5**	**= 96 Credits**
Fundamental	**Level 6**	**= 84 Credits**
Core	**Level 7**	**= 260 Credits**
Core	**Level 8**	**= 180 Credits**
Elective	**Level 7**	**= 10 Credits (choose 1 from 3)**
Total		**630 Credits**

ASSESSMENT ARRANGEMENTS
All assessments, formative and summative, leading/contributing to the award of credits or a qualification should be based on learning outcomes and/or sub-outcomes. • Unless specified otherwise, the continuous assessment (CA) mark shall constitute 50% and the final examination mark (Summative) 50% of the overall assessment for the course. • Candidates may undergo assessment including written, practical and simulated projects. The continuous assessment components of each course may include one or more of the following: Written assignments, written tests, practicals, projects, research exercises, essays, open book tests, independent study, dissertation/thesis, oral test, plus other forms of continuous assessment.
MODERATION ARRANGEMENTS
6.1.1 ***Pre-assessment Moderation*** Before administering any assessments that contribute towards the award of credits, moderation must take place. This should entail but not limited to the following: • ascertaining that the assessment strategy to be used is appropriate for the learning outcome to be assessed • ascertaining that the assessment instrument adequately captures the learning outcomes against which assessment is to be carried out • ascertaining whether the assessment tasks or questions can enable the assessor to collect sufficient evidence that is typical of relevant exit level descriptors There shall be internal and external moderation as a quality assurance measure. Assessment and moderation must be conducted by suitably qualified people in the related field. Assessors and moderators must be registered and accredited by BQA
RECOGNITION OF PRIOR LEARNING
RPL will be applicable for award of this qualification on a case-by-case basis, as per the individual ETPs RPL policies in line with national RPL Policy
CREDIT ACCUMULATION AND TRANSFER
CAT will be applicable for award of this qualification
PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)
Horizontal Articulation – NCQF Level 8 *(related qualifications of similar level that graduates may*

articulate to):

- Bachelor of Science (Honours) in Cytotechnology and Histotechnology Sciences,
- Bachelor of Biomedical Science (Honours),
- Bachelor of Science (Honours) in Medical Laboratory Science

Vertical Articulation NCQF Level 9 (*qualifications to which the holder may articulate to*):

- Master of Science in Medical Technology
- Master of Philosophy in Medical Sciences
- Master of Science in Medical Microbiology
- Master of Science in Virology,
- Master of Science in Haematology,
- Master of Science in Clinical Chemistry,
- Master of Science in Blood Transfusion Science,
- Master of Science in Biomedical Technology
- Master in Public Health,
- Master in Business Administration.

Employment pathways

Medical Laboratory Scientist

Medical Laboratory Research Scientist

Medical Equipment and Supplies Specialist (with appropriate product orientation)

Private Laboratory Services Provider (After 2 years experience)

Medical Laboratory Demonstrator (University Teaching Labs)

QUALIFICATION AWARD AND CERTIFICATION

To be awarded Bachelor of Medical Laboratory Sciences degree, a student must earn a minimum of 630 credits and have passed all components of the qualification (rules of combination) as shown in the qualification structure.

REGIONAL AND INTERNATIONAL COMPARABILITY

The Bachelor of Medical Laboratory Sciences 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 South Africa and New Zealand. For this Bachelor of Medical Laboratory Sciences, the credit hours surpass both institutions as it has 630 credits compared to 502 and 480 from CPUT and University of Otago, respectively. The credits, however, meet the

minimum 600 credits for NCQF Level 8 qualifications .The minimum entry requirements, articulation options, courses offered and number of credits are comparable or exceeds what is obtaining in the region.

This qualification and the CPUT are both NQF level 8 qualification compared to New Zealand programme which is an NQF level 7. This qualification will offer one year clinical attachment and completion of a research project to fulfil the requirements of Bachelor of Medical Laboratory Sciences. The other qualifications differ from this qualification offering in that both include elements of cytopathology or histology. On the other hand, this qualification offers courses in Research, starting from proposal writing to execution and writing of scientific reports. This prepares graduates for research in graduate programmes.

REVIEW PERIOD

5 years in line with the NCQF