SECTION A:	***QUALIFICATION DETAILS***																	
QUALIFICATION DEVELOPER (S)	University of Botswana																	
TITLE	Bachelor of Science (Honours) Cytotechnology and Histotechnology Sciences														***NCQF LEVEL***	8		
FIELD	Health and Social Services			***SUB-FIELD***	Laboratory Medicine										***CREDIT VALUE***	607		
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:

Data from the World Health Organization-NCD Country Profiles, 2018 indicate that non-communicable diseases (NCD), including cancer, account for 46% of all deaths in Botswana. The incidence of cancer and other NCDs in Botswana is also increasing. In response to the increasing burden, the Ministry of Health and Wellness (MoHW) launched the Botswana National Multisectoral Strategy for the Prevention and Control of Non-Communicable Diseases in 2017-2022. The National Cervical Cancer program, which initially adopted cytology screening using Pap smear as the only secondary prevention method, will continue to be implemented within this strategy and beyond. The strategy was expanded to strengthen pathology services through development of cytopathology and histopathology infrastructure. These strategies currently under implementation, have significantly increased cytology and histology workload in the only 2 anatomical pathology laboratories in the country. Priority actions within the current strategy is to increase turnaround time of Pap smear results and to increase screening coverage, all of which will be achieved by decentralizing anatomical pathology services. The plan involves expansion of cervical cancer screening coverage to 70% by cervical cytology and 30% by Visual Inspection with Acetic Acid (VIA). In addition, the ministry will implement early

breast cancer detection for women over the age of 40. This will therefore increase testing volumes in cytology and histology laboratories across the country.

On-site assessments of the only 2 public anatomical pathology laboratories in Botswana revealed that they have a combined excess of 10 000 surgical cases and over 48 000 cytology specimens per year. These volumes and the anticipated increases due to scaling up of cancer screening and diagnostic services, require more cytotechnologists and histotechnologists. Cytotechnologists are laboratory professionals who are trained to evaluate cytology specimens for the presence of abnormalities, whereas histotechnologists are specialized laboratory professionals with expertise in processing biopsy and surgical tissue specimens for diagnosis. There is therefore a huge demand for scientists with these skills to prepare and screen cytology specimens and to process histology specimens for diagnoses by pathologists. The increasing number of in-office surgical biopsy procedures used to treat precancerous cervical lesions generates more tissue specimens requiring histological processing. As the volumes continue to increase, this puts a strain on the already inadequate pathology workforce.

According to Botswana's Integrated Health Service Plan: 2010-2020, the new service delivery model requires more than 60 cytotechnologists in primary, district and referral hospitals across the country. The supply of appropriately trained laboratory personnel such as cytotechnologists and histotechnologists, as well as loss to attrition of medical laboratory scientists with skills in cytology and histology remain one of the biggest challenges. Only a small proportion of medical laboratory professionals are trained locally, most of whom hold diploma qualifications. Furthermore, all cytotechnologists and histotechnologists in Botswana are historically trained outside the country. In the region, there are no qualifications offered in cytotechnology and histotechnology at a bachelor's degree level. The only qualifications that exist are offered at diploma or certificate level in South Africa, whereas in other countries, cytology and histology are offered as minor subjects and often as options within Bachelor of Science Medical Laboratory Sciences qualifications.

PURPOSE:

The Bachelor of Science (Honours) Cytotechnology and Histotechnology Sciences degree seeks to produce medical laboratory graduates with knowledge, skills and competences to:

1. Perform cytotechnology and histotechnology diagnostic techniques in accordance with the statutory requirements in the workplace.
2. Interpret cytotechnology and histotechnology test results according to standardized reporting systems.
3. Manage anatomical pathology laboratory operations according to the principles of Good Clinical Laboratory Practice and national and international accreditation requirements.
4. Communicate effectively with patients, peers within the profession, other health care professionals and the public in the delivery of medical laboratory services.
5. Participate in research in compliance with ethical research principles and national guidelines as well as utilize findings to improve service delivery.

ENTRY REQUIREMENTS (including access and inclusion)
The entry requirement shall be NCQF Level IV Certificate (BGCSE) or equivalent. Certificate IV, NCQF Level 4 (BGCSE or equivalent). Entry application through recognition of prior learning (RPL) and credit accumulation and Transfer (CAT) is allowable through Institutional policies in line with the National RPL & CAT policies.

(Note: Please use Arial 11 font for completing the template)

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1 Manage anatomical pathology laboratory operations according to the principles of Good Clinical Laboratory Practice and national and international accreditation requirements.	1.1 Employ quality management standards to process patient samples and report results. 1.2 Perform routine equipment maintenance and calibration. 1.3 Develop Standard Operating Procedures (SOP). 1.4 Apply quality assurance procedures when processing laboratory samples to ensure quality results.
2 Perform cytotechnology and histotechnology diagnostic techniques in accordance with the statutory requirements in the workplace.	2.1 Apply the principles behind methods used in anatomical pathology laboratory. 2.2 Develop new testing protocols. 2.3 Evaluate new techniques, procedures, and testing equipment/instruments. 2.4 Prepare cellular and tissue specimens for examination. 2.5 Choose appropriate investigations for the sample type and disease condition. 2.6 Perform operator preventive maintenance procedures on equipment. 2.7 Perform laboratory tests in conformity with established standard operating procedures.
3 Interpret cytotechnology and histotechnology test results according to standardised reporting systems.	3.1 Interpret cytology and histology laboratory test results. 3.2 Prepare cytology reports using standardised format and terminology. 3.3 Correlate cytology and histology laboratory test results with test results from other clinical laboratories.

4 Manage laboratory supplies to ensure uninterrupted testing.	4.1 Demonstrate knowledge of supply chain in relation to laboratory supplies. 4.2 Maintain an inventory of all laboratory supplies. 4.3 Calculate order quantities using consumption data. *4.4* Monitor inventory of laboratory supplies.
5 Apply laboratory safety and waste management principles.	5.1 Demonstrate knowledge of safety and health risks associated with hazardous material and equipment in the laboratory. 5.2 Practice general safety guidelines including wearing appropriate PPE to minimize risk of infection and injury in the laboratory. 5.3 Explain emergency procedures to be followed in the event of a laboratory accident. 5.4 Administer safety controls to comply with all safety guidelines.
6 Communicate effectively with patients, peers within the profession, other health care professionals and the public in the delivery of medical laboratory services.	6.1 Demonstrate professional conduct in offering services. 6.2 Communicate clinical information both orally and in writing to patients, peers, other health professionals and the public/stakeholders. 6.3 Present information using professional language and format.
7 Conduct research in compliance with ethical research principles and national guidelines as well as utilize findings to improve service delivery.	7.1 Formulate a research question. 7.2 Develop a research proposal to address the question. 7.3 Obtain ethical clearance for the conduct of human research. 7.4 Execute the research project. 7.5 Analyse the findings. 7.6 Draw appropriate conclusions. 7.7 Prepare a scientific report. *7.8* Present findings.

(Note: Please use Arial 11 font for completing the template)

SECTION C		***QUALIFICATION STRUCTURE***				
COMPONENT	***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	14				14
	Introductory Mathematics I	12				12
	General Chemistry I	14				14
	Introduction to Communication and Academic Literacy Skills for Health Sciences	11				11
	Computer Skills Fundamentals I	10				10
	Diversity of Plants and Animals	14				14
	Introductory Mathematics II	13				13
	General Chemistry II	14				14
	Health Communication	12				12
	Computer Skills Fundamentals II	10				10
	Physics for Nurses	12				12
	Human Physiology		14			14
	Cell Biology		12			12
	Genetics		12			12

	Human Anatomy		12			12
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Introduction to Cytology and Histotechnology		12			12
	Laboratory Quality Management Systems		12			12
	Introduction to Medical Laboratory Sciences		14			14
	Histotechnology Techniques		14			14
	Histotechnology Techniques Practical		14			14
	Biology of Disease			14		14
	Histotechnology Special Procedures			14		14
	Special Histotechnology Procedures Practical			12		12
	Normal Gynaecology Cytology			12		12
	Normal Gynaecology Cytology Practical			12		12
	Abnormal Gynaecology Cytology			12		12
	Abnormal Gynaecology Cytology Practical			12		12
	Non-Gynaecology Cytology			12		12
	Non-Gynaecology Cytology Practical			12		12

	Molecular Diagnostics in Cytology and Histology			12		12
	Histotechnology Clinical Practicum			33		33
	Cytology Clinical Practicum			65		65
	Body Fluid Cytology				17	17
	Fine Needle Aspiration Cytology				15	15
	Introduction to Biostatistics				14	14
	Research Methods and Proposal Writing				17	17
	Fine Needle Aspiration Cytology Practicum				18	18
	Slide Screening, Case Studies and Seminars in Cytology				15	15
	Laboratory Management and Education				12	12
	Research Project				13	13
ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units*	Health Economics			12		12
	Health Informatics			12		12
	Resource Management in Africa			12		12
	Epidemiology			12		12
	Law and Health Care			12		***12***

(Note: Please use Arial 11 font for completing the template)

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
5	***136***
6	***116***
7	***234***
8	***121***
TOTAL CREDITS	***607***

Rules of Combination:

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

To be awarded the qualification, the following rules of combination shall apply:

Component	***NCQF Level***	***Credits Per Relevant NCQF Level***
Fundamental	5	136
Core	6	116
	7	222
	8	121
Elective	7	12
	Total Credits	607

A total of 121 credits at NCDF level 7 should be achieved in research to be awarded the qualification.

(Note: Please use Arial 11 font for completing the template)

ASSESSMENT ARRANGEMENTS

Assessment arrangements shall be done by assessors and moderators that are accredited by BQA. Where the assessment of a module includes final examination, the contribution of formative and summative assessment to the final grade shall be 60% and 40% respectively.

MODERATION ARRANGEMENTS

Internal and external moderation arrangements shall be done by assessors and moderators that are accredited by the Botswana Qualifications Authority (BQA).

RECOGNITION OF PRIOR LEARNING

Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of recognition of prior learning (RPL) assessment for the award of credits towards the qualification in accordance with applicable university 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

Candidates who took a course or courses at another recognized university or institution within ten semesters prior to registration, may transfer credits required toward the qualification.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

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

- Bachelor of Science Medical Laboratory Sciences
- Bachelor of Science Biomedical Science
- Bachelor of Science Clinical Laboratory Science and Medical Technology

Vertical Articulation (*qualifications to which the holder may progress to*):

- Master of Philosophy in Medical Sciences
- Master of Science in Medical Laboratory Sciences
- Master of Cellular Pathology
- Master of Pathologists' Assistance
- Master of Public Health
- Master of Business Administration

Employment Pathways

Graduates with the qualification of Bachelor of Science (Honours) Cytotechnology and Histotechnology Sciences have the following employment options:

- Medical Laboratory Scientist (Cytology and histology)
- Research Scientist
- Lecturer
- Teaching Laboratory Demonstrator
- Technologist
- Application Scientist
- Laboratory Director
- Laboratory Manager
- Medical Scientific Officers

QUALIFICATION AWARD AND CERTIFICATION

Candidates who have achieved a minimum of 607 credits shall be awarded a certificate for the award Bachelor of Science Honours (Cytotechnology and Histotechnology Sciences).

REGIONAL AND INTERNATIONAL COMPARABILITY

Regionally and internationally, there is no university that offers Bachelor of Science (Honours) Cytotechnology and Histotechnology Sciences qualification. Cytopathology and histotechnology are commonly offered as modules or courses within Bachelor of Science Medical Laboratory Sciences/Medical Science/Laboratory Medicine/Medical Technology qualifications. Closely related qualifications offered separate Medical Laboratory Sciences are usually offered in the United States of America (USA), although the qualifications are not offered as double degrees. Consequently, the qualification was compared to similar qualifications offered in the USA and Uganda.

The main exit outcomes and assessment criteria surpass those of similar qualifications offered in the United States of America and Uganda. The credit in the Bachelor of Science Cytotechnology and Histotechnology Sciences qualification surpass those in comparable qualifications at 607 credits compared to 360 credits and 495 from Makerere and Old Dominion University, respectively. However, all the compared qualifications are bachelor's degrees and are therefore at NCQF level 7.

The Bachelor of Science (Honours) Cytotechnology and Histotechnology Sciences qualification includes a total of three clinical practicums in Exfoliative Cytology, Histotechnology and Fine Needle Aspiration (FNA)/Body Fluid Cytology, and the credit weight of these practicums surpasses those in comparable qualifications.

The proportion of credits from research modules outweighs those in comparable qualifications.

REVIEW PERIOD

The Qualification shall be reviewed every five years.

(Note: Please use Arial 11 font for completing the template)