SECTION A:	***QUALIFICATION DETAILS***															
QUALIFICATION DEVELOPER (S)	Botswana Health Professions Council and Boitekanelo College															
TITLE	Diploma In Clinical Technology												***NCQF LEVEL***		*6*	
STRANDS (where applicable)	1. Cardiology 2. Critical Care 3. Cardiovascular Perfusion 4. Nephrology 5. Neurophysiology 6. Pulmonology *7.* Reproductive Biology (Clinical Embryology)															
FIELD	Health and Social Sciences		***SUB-FIELD***		*Health Sciences*								***CREDIT VALUE***		*360*	
New Qualification			✓		*Legacy 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:

According to Human Resource Development Council (HRDC) December report (2019; pg. 7) Cardiovascular Perfusionists, a specialty in Clinical Technology is one of occupations in high demand in Botswana. The HRDC health sector development plan (2016,pg. 17) also indicate that Botswana continues to import labour on scarce skills that are not available locally and most of the imported labour is placed in the public facilities. The skills

include angiography, echocardiography, pacemaker implantations and programming done by Cardiology Technologists, cardiopulmonary bypass procedures by Perfusionists, lung function studies by Pulmonology Technologist, Electro-encephalography and sleep studies done by Neurophysiology Technologists. With the growing number of kidney failure cases, the country is currently opening more centres for dialysis services which also require Nephrology Technologists' services. A lot of countries including Botswana are experiencing an increase in communicable and non-communicable diseases leading to a reduction in the number of blood donors due to these co-morbidities and the Clinical Technology profession can assist with providing services like intra-operative cell salvaging to manage the shortage of blood.

Clinical Technology was then added to Schedule B of the regulated Health Professions after the recommendation of the stakeholder's meeting held in February 2015 on the need of the Professionals in the country.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to equip learners with advanced knowledge, skills, and competences to:

- Perform diagnostic, therapeutic, and monitoring procedures for the management of physiological dysfunction, using specialized health technology and techniques in their areas of speciality (Cardiology, Cardiovascular Perfusion, Critical Care, Nephrology, Neurophysiology, Pulmonology and Reproductive Biology).
- Interpret patient data from medical instrumentation systems and act accordingly in their areas of speciality.
- Monitor the patient's progress undergoing therapy.
- Set up and calibrate medical equipment in their areas of speciality.
- Provide user interface support for medical equipment to other healthcare professionals in their areas of speciality.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

To be eligible for admission to this programme potential candidates must have:

- Certificate IV (NCQF level 4) or equivalent.
- Applicants who do not meet the minimum entry requirements with NCQF level 4 may qualify for entry through Recognition of Prior Learning (RPL) as per institution RPL policy.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Perform point-of-care diagnostic, therapeutic and monitoring procedures to facilitate patient management in areas of speciality (Cardiology, Cardiovascular Perfusion, Critical Care, Nephrology, Neurophysiology, Pulmonology and Reproductive Biology).	1.1. Pperform diagnostic procedures to determine pathophysiological disorders and take appropriate action. 1.2. Interpret the results based on knowledge of physiological and pathophysiological conditions and take appropriate action. 1.3. Administer appropriate treatment modalities based on the diagnosis. 1.4. Monitor the patient and medical equipment synchrony during diagnostic and or therapeutic procedures. 1.5. Troubleshoot physiological and technical problems during procedures to avoid complications.
2. Perform and monitor health safety, environmental and quality assurance procedures in the clinical environment to ensure the safety of all.	2.1. Apply relevant aspects of the current occupational health and safety legislation in a clinical context. 2.2. Demonstrate understanding of procedures to be followed in emergency situations for the safety of all. 2.3. Apply knowledge of infection control principles and methods applied in terms of the standard operating procedures to minimize infection and contamination. 2.4. Demonstrate knowledge of healthcare waste management procedures to ensure the safety of the workplace environment. 2.5. Interpret and remediate problems related to malfunctioning equipment that affect procedures and results. 2.6. Apply principles of quality control for all procedures performed to ensure quality service. 2.7. Assist with an effective appraisal of healthcare technology for quality assurance
3. Apply ethical principles and concepts in the health establishment to ensure professional, legal and ethical service delivery.	3.1. Treat all health care practitioners, patients and significant others with due respect based on the principles of human rights, ethics, and medical law to uphold human dignity. 3.2. Adhere to the standards of statutory health bodies and professional associations to practise safe

	patient care as a recognised and registered healthcare practitioner. 3.3. Assess the performance of self and others according to the norms of the healthcare environment for the provision of quality service. 3.4. Compile medico-legal reports concisely, comprehensively, clearly, and courteously for compliance and transparency. 3.5. Investigate public liability and malpractice insurance for ethical clinical practice
4. Demonstrate effective communication and interpersonal skills in a clinical environment.	4.1. Demonstrate verbal and non-verbal skills in a clinical context for optimum service delivery. 4.2. Apply the approved academic referencing practices to avoid plagiarism. 4.3. Apply industry-specific software information technology skills to ensure professional services. 4.4. Incorporate the impact of socio-cultural, emotional, and religious factors on human behaviour to communicate with clients in a clinical context. 4.5. Apply basic counselling skills to inform patients about treatment procedures and management of conditions. 4.6. Apply conflict management, negotiation, mediation, and collaboration in the clinical context to facilitate resolutions to problems. 4.7. Present patient cases systematically to other medical professionals for any legitimate purpose within the ordinary course and scope of a health practitioner's duties.
5. Apply research skills in a specific clinical science specialization relating to a particular context of practice and application to the benefit of the patient.	5.1. Utilize research skills to Identify medical problems. 5.2. Collect data using appropriate methods. 5.3. Interpret data from investigations using appropriate statistical tools and intervene appropriately.

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [5]	***Level [6]***	***Level [7]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	General Chemistry:	***9***			***9***
	Organic Chemistry:	***9***			***9***
	Communication and Study Skills:	***9***			***9***
	Entrepreneurship			***8***	***8***
	Healthcare Professionalism			***8***	***8***
	Basic Computer Applications:	***9***			***9***
	Biochemistry:		***9***		***9***
	Calculations and Statistics	***9***			***9***
	SUBTOTAL				***70***
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Introduction to Psychology	***8***			***8***
	Physics for Health Sciences	***10***			***10***
	Medical Microbiology	***10***			***10***
	Introduction to Clinical Technology	***9***			***9***
	Anatomy and Physiology	***8***	***12***		***20***

	Biomedical Instrumentation		***24***		***24***
	Clinical Technology Practice		***24***		***24***
	Pharmacology		***20***		***20***
	Organ and System Pathophysiology		***24***		***24***
	Research Methods			***12***	***12***
	SUBTOTAL				***161***
STRANDS/ SPECIALIZATION		***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [5]	***Level [6]***	***Level [7]***	
1. Cardiology	Biomedical Instrumentation		***38***		***38***
	Clinical Technology Practice		***45***		***45***
	Pharmacology:		***15***		***15***
	Pathophysiology:		***22***		***22***
	Total				***120***
2. Critical Care	Biomedical Instrumentation		***38***		***38***
	Clinical Technology Practice		***45***		***45***
	Pharmacology:		***15***		***15***
	Pathophysiology:		***22***		***22***

	Total				***120***
3. Cardiovascular Perfusion	Biomedical Instrumentation		***38***		***38***
	Clinical Technology Practice		***45***		***45***
	Pharmacology:		***15***		***15***
	Pathophysiology:		***22***		***22***
	Total				***120***
4. Nephrology	Biomedical Instrumentation		***38***		***38***
	Clinical Technology Practice		***45***		***45***
	Pharmacology:		***15***		***15***
	Pathophysiology:		***22***		***22***
	Total				***120***
5. Neurophysiology	Biomedical Instrumentation		***38***		***38***
	Clinical Technology Practice		***45***		***45***
	Pharmacology:		***15***		***15***
	Pathophysiology:		***22***		***22***
	Total				***120***
6. Pulmonology	Biomedical Instrumentation		***38***		***38***
	Clinical Technology Practice		***45***		***45***
	Pharmacology:		***15***		***15***
	Pathophysiology:		***22***		***22***

	Total				***120***
7. Reproductive Biology	Biomedical Instrumentation		***38***		***38***
	Clinical Technology Practice		***45***		***45***
	Pharmacology:		***15***		***15***
	Pathophysiology:		***22***		***22***
	Total				***120***
Electives	Purchasing and Supply Chain Management:			***9***	***9***
	Introduction to Healthcare Management:			***9***	***9***
		Total Credits			***360***

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
5	***130***
6	***193***
7	***37***
TOTAL CREDITS	***360***

Rules of Combination:

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

The qualification structure is as follows.

Fundamental Component: 70 credits

- Compulsory for all learners.

Core Component: 161 credits

- Compulsory for all learners:

Specialization: 120 credits

- Learners must choose from one of the following areas of specialty for **120** credits.
  - Cardiology.
  - Cardiovascular Perfusion.
  - Critical care.
  - Nephrology.
  - Neurophysiology.
  - Pulmonology.
  - Reproductive Biology.

- **Electives**

Learners are expected to choose at least one elective component which carries a total of 9 Credits.

To achieve clinical competency in this qualification, it is required that all learners complete a prescribed minimum of **1500 clinical hours** under direct mentoring at an accredited Clinical unit

ASSESSMENT ARRANGEMENTS
This will be assessed using formative at 50% and summative at 50%.
MODERATION ARRANGEMENTS
The following shall apply for both internal and external moderation. Internal moderation requirements and external moderation shall be carried out in accordance with ETP moderation policy and BQA requirements.
RECOGNITION OF PRIOR LEARNING
Candidates with relevant work-related experience will be considered using institutional and BQA RPL policies.
CREDIT ACCUMULATION AND TRANSFER
Credit accumulated shall be evaluated and transferred guided by the institutional CAT policy
PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)
PROGRESSION PATHWAYS **Horizontal Articulation** Graduates of this qualification may consider pursuing one of the remaining areas of speciality (Cardiology, Critical Care, Nephrology, Neurophysiology, Perfusion, Pulmonology, and reproductive biology) at level 6, for the purpose of multiskilling, etc. **Vertical Articulation** Graduates may progress to higher level qualifications such as: Bachelor's degree in clinical technology (Cardiology, Critical Care, Nephrology, Neurophysiology, Perfusion, Pulmonology and Reproductive Biology), NQF level 7. **EMPLOYMENT PATHWAYS** Graduates will have requisite competencies and attributes to work as: • Clinical Technologists in their respective areas of specialties (Cardiology, Critical Care, Nephrology, Neurophysiology, Cardiovascular perfusion, Pulmonology and Reproductive Biology).

- Application specialist for medical equipment distributors
- Clinical Demonstrators

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

Candidates must meet the minimum standards to be awarded the qualification.

Certification

Learners must complete and pass all courses for the 3-year diploma in Clinical Technology with a total of 360 credits to be awarded a certificate for the qualification

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The Central University of Technology, Diploma in Clinical Technology, worth 360 Credits at NQF level 6 which produces candidates with competence to be registered by the Health Professions Council of South Africa (HPCSA) and practice as Clinical technologist- supervised practice in their areas of specialty.

Other qualifications offered in countries such as the USA; Community College of Philadelphia, generally emphasize the development of competencies in Clinical Physiology mostly at NQF level 6, which is a bachelor's degree in the following specialist areas, Cardiology, Cardiovascular Perfusion, Neurophysiology, Pulmonology, Nephrology, Critical Care

The difference is that graduates of Diplomas in Clinical Technology at international institutions do not cover a wider spectrum of specialities. Although there are differences, though not significant, graduates will articulate well in both the regional and international market and it also addresses the needs of Botswana Healthcare labour needs.

REVIEW PERIOD

The qualification will be reviewed in 5 years from date of registration.