BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS													
QUALIFICATION DEVELOPER(S)	University of Botswana													
TITLE	Bachelor of Science (Honours) in Radiography and Medical Imaging									**NCQF LEVEL**	8			
STRANDS (where applicable)	Not Applicable													
FIELD	Health and Social Services									**CREDIT VALUE**	561			
SUB FIELD	Health Science													
New Qualification	✓	Legacy Qualification		Renewal Qualification										
				Registration Code										
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: Medical imaging is at the centre of modern healthcare systems. Diagnostic radiographers use cutting-edge technology to take images inside the patient's body to diagnose and monitor medical conditions. Radiographers are highly qualified health professionals who are at the interface between the patient and technology in medical imaging, nuclear medicine and radiotherapy science and practice. The professional diagnostic radiographer takes the lead responsibility for the management and care of patients undergoing the spectrum of imaging examinations together with associated image interpretation. Diagnostic radiographers work in imaging departments of hospitals, outpatient clinics and cancer clinics, but may also work in the emergency department, intensive care, neonatal unit and operating theatres providing mobile imaging.

Although Botswana has progressively become self-reliant in transforming and scaling up education and training of human resources for health, an imbalance in the skills mix remains a major challenge. Increasingly, the country is becoming self-sufficient in producing medical doctors, nurses, pharmacists, medical laboratory scientists, environmental health practitioners, etc, but there is a significant unmet

need for diagnostic radiographers in Botswana. The inadequate skills mix, and uneven distribution of health professionals result in inequitable health care services with populations that access care from the public system being disproportionately affected.

The Ministry of Health has described radiography as an invaluable resource for the diagnosis and management of patients. For a long period, the Ministry has lamented the shortage of radiographers in the public sector with the majority of 33 health facilities having no radiographers or are manned by a skeleton staff. For instance, Princess Marina Hospital which averages 68 000 patients per year is serviced by only 13 radiographers. Because of the shortage, most facilities are unable to offer 24/7/365 radiography services. The Ministry has a total of 92 radiographers against a current national requirement of 300 radiographers.

The World Health Organisation (WHO) does not prescribe a universal population-to-radiographer ratio. Because healthcare systems and imaging needs differ greatly, the WHO instead promotes determining staffing levels based on the actual workload at individual facilities. This approach allows facilities to tailor staffing to their unique operational needs.

According to the 2023 - 2024 Priority Skills list produced by the Human Resources Development Council (HRDC), therapeutic radiography and diagnostic radiography are listed as priority professions recommended for external training and development of new programmes at the bachelor's degree level. The development of the qualification is strongly supported by the professional body, the Radiographers Society of Botswana. The proposed qualification is a result of broad-based consultations with relevant external stakeholders.

The creation of a BSc (Hons) Radiography and Medical Imaging programme at the University of Botswana in the Faculty of Health Sciences is the first step in addressing the shortage of radiographers in the country. Graduates of the BSc (Hons) in Radiography and Medical Imaging will easily find employment opportunities in the country.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to produce graduates with highly specialized knowledge, skills, and competence to:

1. Demonstrate highly specialised knowledge, professional attributes and mastery of skills required to always practise diagnostic radiography within the relevant scope as determined by the relevant professional body.
2. Apply and integrate contemporary theories, principles, concepts, proven techniques, practical experience and professional judgement to solve well-defined and abstract problems in diagnostic radiography.
3. Adhere to regulations, standards and ethics applicable to radiography and medical imaging.
4. Work as part of a team in radiography practice and within the healthcare team.
5. Exercise autonomy, initiative and authority and take responsibility and accountability for own work output and of others in the practice of radiography.
6. Apply critical analysis and independent evaluation of qualitative and quantitative data in radiography
7. Demonstrate positive attitudes towards life-long learning and develop individual capabilities to critically evaluate and synthesise ideas, issues and concepts.
8. Conduct basic and operational research to enhance evidence-based practice of radiography.
9. Identify and solve complex and unpredictable problems in the practise of radiography.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

The minimum entry requirements for the qualification are:

- Certificate IV (NCQF Level 4) plus one year of BSc equivalent with passes in Physics, Biology and Mathematics or equivalent from a recognized university.
- Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) will be applicable/considered for entry into this qualification as per University of Botswana policies in line with national RPL and CAT policies.

SECTION B	QUALIFICATION SPECIFICATION
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
LO1. Analyse principles and theories that inform diagnostic imaging practices in radiography.	AC1.1. Apply key terms, rules, concepts, principles and theories of diagnostic imaging in radiography. AC1.2. Recognise the signs and symptoms of contrast media reaction and take appropriate action. AC1.3. Demonstrate a comprehensive and systematic knowledge base in diagnostic imaging. AC1.4. Apply relevant knowledge in selection of anatomical regions for imaging of specialised areas. AC1.5. Evaluate a request for a diagnostic imaging procedure and select appropriate techniques to produce images necessary for providing diagnostic information to assist in patient management.
LO2. Select and apply the basic procedures and techniques to perform routine and specialised diagnostic imaging requests for selected anatomical regions.	AC2.1. Choose appropriate patient care actions and imaging procedures relevant to the presenting clinical condition of patients. AC2.2. Select and appropriately utilize imaging systems, accessory equipment and positioning techniques to ensure the production of quality routine images diagnostic images. AC2.3. Apply approved infection control measures for all diagnostic imaging procedures. AC2.4. Evaluate selected routine diagnostic images for quality according to relevant positioning and exposure criteria. AC2.5. Perform routine and specialized techniques and procedures, with and without contrast media, for selected anatomical regions. AC2.6. Recognise and report the signs and symptoms of contrast media reactions and support nursing staff with the management of patients.

	AC2.7. Apply principles of quality assurance and quality control to all imaging procedures and when assisting in the development of departmental protocols. AC2.8. Apply appropriate corrective measures to radiographic techniques where necessary to ensure optimal diagnostic images. AC2.9. Adjust and maintain imaging equipment to adhere to prescribed standards.
LO3. Apply current health and safety guidelines, including ionising radiation regulations, to protect yourself and others.	AC3.1. Apply radiation protection and safety measures for all diagnostic imaging procedures. AC3.2. Implement and adhere to standard operating procedures to ensure the safe and accurate use of ionizing radiation. AC3.3 Apply skills to select exposure factors to produce images of diagnostic quality while keeping radiation as low as reasonably possible. AC3.4 Maintain radiation safety in the work area, including checking equipment for malfunctions and errors. AC3.5 Uphold legal obligations when handling ionising radiation in radiography
LO4. Operate effectively in complex, ill-defined contexts as part of the healthcare team, making sound theoretical judgments based on evidence while performing diagnostic imaging procedures (i.e. trauma, theatre, ICU).	AC4.1. Display professional independence by communicating radiographic appearances to the referring healthcare practitioner professional to support further patient management (not replacing radiologist reporting). AC4.2. Manage complex and rapidly changing diagnostic radiographic services. AC4.3. Execute all tasks related to diagnostic imaging autonomously, professionally and ethically. AC4.4. Analyse patient referral information critically to allow informed decisions for imaging. AC4.5. Communicate and cooperate with all role players effectively to provide health service delivery to the patients.
LO5. Present and communicate diagnostic imaging information reliably and coherently, using academic/professional discourse and formats appropriately.	AC5.1. Present and communicate diagnostic imaging information using basic information technology principles. AC5.2. Practice effective written, verbal and non-verbal communication skills during interaction with patients and healthcare team members. AC5.3. Communicate and cooperate with all role players effectively to provide health service delivery to the patients.

	AC5.4. Present and communicate academic/professional work effectively, catering for a range of audiences by using a range of different genres appropriate to the context. AC5.5. Interact effectively in a learning and professional community as part of an integrated health team.
LO6. Work within the current legal and ethical frameworks in your jurisdiction.	AC6.1. Reflect on and apply professional patient care concerning all the needs and rights of the patients and their family members as prescribed by relevant medical law. AC6.2. Respect cultural and psychological diversity of patients to ensure a quality service. AC6.3. Evaluate radiographic images for diagnostic quality according to relevant evaluation criteria to ensure that the images conform to medico-legal requirements. AC6.4. Recognise the rights of patients as entrenched in the Ministry of Health National Health Quality Standards and relevant medical law to ensure confidentiality. AC6.5. Provide support and reassurance to patients and families, taking into account their physical, cultural, and psychological needs. AC6.6. Apply professional boundaries as articulated in the scope of practice of a radiographer.
LO7. Manage unfamiliar concrete and abstract problems and issues within an acquainted diagnostic imaging context using evidence-based solutions and theory-driven arguments.	AC7.1. Display an ability to solve well-defined but unfamiliar problems under guided practice. AC7.2 Apply learned information, concepts or procedures to solve a problem/challenge that arise in diagnostic imaging under guided practice.
LO8. Manage and care for patients undergoing the spectrum of imaging examinations together with associated image interpretation.	AC8.1. Integrate knowledge of management, technology and legislation while displaying the ability to design and equip a new, or alter an existing, diagnostic facility. AC8.2. Demonstrate independent judgement and discretion in the selection and performance of additional diagnostic imaging projections to demonstrate anatomy and pathology optimally. AC8.3. Develop performance management strategies to show an understanding of management principles and current relevant legislation. AC8.4. Select, order and maintain imaging and related equipment within an available

	budget to provide an efficient and cost-effective imaging service. AC8.5. Exercise personal responsibility and initiative and work collaboratively as a member of an integrated healthcare team. AC8.6. Display a good understanding of the diagnostic imaging environment as a system within a wider context of health care delivery. AC8.7. Display a sound understanding of departmental and professional society/council requirements for the maintenance of patient records and statistics. AC8.8 Supervise radiography and imaging support assistants.
LO9. Conduct basic research and development to continue to build the knowledge necessary for evidence-based practice in radiography and Medical Imaging.	AC9.1. Critique current research and advanced scholarship in the profession. AC9.2. Retrieve information and display the skills to identify, critically analyse, synthesize and evaluate quantitative and/or qualitative data. AC9.3. Apply acquired knowledge of basic research principles and methodologies to engage in research related to the profession. AC9.4. Critically evaluate scientific resources to inform the framework of a research project related to the profession. AC9.5. Engage in research in line with national needs and biomedical ethical policies and procedures where data and information are scientifically reported. AC9.6. Present/Report research findings and conclusions in oral and written formats following established scientific research practice.
LO10. Educate, train and mentor within the profession so that patients receive the highest quality and standard of diagnostic radiographic services.	AC10.1. Assist same-level peers with learning needs with confidence. AC10.2 Evaluate own learning and identify learning needs within a clinical environment. AC10.3. Facilitate skills development among peers. AC10.4. Participate independently in activities for continuing academic and professional development in radiography AC10.5. Engage with current research and scholarly literature in the profession.

SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level			Total Credits
		Level [6]	Level [7]	Level [8]	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Health Informatics	12			12
CORE COMPONENT Subjects/Courses/ Modules/Units	Radiation Physics I		12		12
	Imaging Technology I	12			12
	Anatomy, Physiology and Pathology I basics, chest (soft tissue, ribs, sternum) and abdomen]		16		16
	Patient Care and Management I		12		12
	Theory of Radiography I[chest (bones, lungs, heart, soft tissue, ribs, sternum) and abdomen]		12		12
	Radiation Physics II		12		12
	Imaging Technology II		12		12
	Anatomy, Physiology and Pathology II (upper extremity: shoulder, humerus, elbow, forearm, wrist, hand and fingers)		16		16

	Patient Care and Management II		12		12
	Introduction to Radiotherapy and Ultrasound		12		12
	Theory of Radiography II (upper extremity: shoulder, humerus, elbow, forearm, wrist, hand and fingers)		12		12
	Radiographic Practice I [basics, chest – (bones, lungs, heart, soft tissue, ribs, sternum) and abdomen]			32	32
	Radiographic Practice II (upper extremity: hand, wrist, forearm, elbow humerus, shoulder)			32	32
	Radiation Physics III		12		12
	Anatomy, Physiology and Pathology III (lower extremity: foot, ankle, lower leg, knee, hip, pelvic girdle)		16		16
	Patient Care and Management III		12		12
	Theory of Radiography III (lower extremity: foot, ankle, lower leg, knee, hip, pelvic girdle)		12		12

	Introduction to Biostatistics		15		15
	Anatomy, Physiology and Pathology IV (spinal column- cervical, thoracic lumbar, sacrum and coccyx, spinal cord included)		16		16
	Anatomy, Physiology and Pathology V (skull, facial bones and sinuses, brain included)		16		16
	Patient Care and Management IV		12		12
	Theory of Radiography IV (spinal column, facial bones and sinuses; routine and trauma imaging)		12		12
	Research Methods and Proposal Writing			15	15
	Radiographic Practice III (lower extremity: pelvis girdle, hip, knee, lower leg, ankle, foot and toes)			32	32
	Radiographic Practice IV ((spinal column and trauma imaging)			24	24
	Radiographic Practice V (skull, facial bones and sinuses)			24	24

	CT and MRI Basics (Physics and Anatomy)			12	12
	Vascular Interventional Angiography Breast Imaging (Physics, Anatomy)			12	12
	Forensic Radiography		12		12
	Entrepreneurship Principles and Practice		12		12
	Radiography Research Project			15	15
	Radiography Internship including Specialised Modalities (CT, MRI, Vascular Interventional Angiography, Breast Imaging)			64	64
STRANDS/ SPECIALIZATION	Subjects/ Courses/ Modules/Units	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [ ]	**Level [ ]**	**Level [ ]**	
1.	**N/A**				
Electives	**NIL**				

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	**Credit Value**
6	**24**
7	**275**
8	**262**

TOTAL CREDITS	561

Rules of Combination:

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

This qualification comprises of:

Fundamental Components:

Level 6 = 12 credits
Level 7 = 0 credits
Level 8 = 0 credits

Core Components:

Level 6 = 12 credits
Level 7 = 275 credits
Level 8 = 262 credits

Elective Components:

No elective courses are offered in the qualification.

TOTAL CREDITS: **561**

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.

- The formative assessment mark shall constitute 50% and the summative) mark 50% of the overall assessment.
- Assessment will be carried out by those registered and accredited by the BQA as assessors.
- Assessment will also be conducted by those who hold qualifications at a higher level and in a related field

MODERATION ARRANGEMENTS

There shall be both internal and external moderation in accordance with institutional policies aligned with national policies.

Internal Moderators

- Internal moderators and assessors shall normally hold a PhD qualification in a related field, are registered with Botswana Health Professions Board and accredited by Botswana Qualification Authority.

External Moderators

- External moderators and assessors shall normally hold a PhD qualification in a related field and accredited by BQA or an equivalent body.

RECOGNITION OF PRIOR LEARNING

Recognition of prior learning (RPL) will be applicable for award of this qualification on a case-by-case basis, as per the individual ETP's RPL policies in line with national RPL policy.

CREDIT ACCUMULATION AND TRANSFER

Credit accumulation and transfer (CAT) will be applicable for award of this qualification on a case-by-case basis, as per the individual ETP's CAT policies in line with national CAT policy.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Learning Pathways:

Horizontal Articulation – NCQF Level 8 *(related qualifications of a similar level that graduates may articulate to*):

- Bachelor of Science (Hons) Radiation Therapy
- Bachelor of Science (Hons) in Nuclear Medicine Technology
- Bachelor of Radiation Science and Health Physics

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

- Postgraduate Diplomas in the Specialisation Fields of Diagnostic Radiography (i.e. CT, MRI, Vascular/Interventional Angiography, Mammography, Image Interpretation, Trauma Imaging, Magnetic Resonance, etc.)
- Master of Diagnostic Radiography
- Master of Magnetic Resonance Technology
- Master of Medical Ultrasound
- Master of Science in Nuclear Medicine and Molecular Imaging Sciences
- Professional Master's in CT/MRI (also called Sectional Imaging), Vascular/Interventional Angiography, Mammography, Image Interpretation, Trauma Imaging, etc.
- Master of Philosophy in Radiography

Employment Opportunities

- Diagnostic radiographer
- Clinical Educators
- Application Medical Specialist for imaging companies
- Medical representative and salesperson for selected medical companies.
- Law enforcement officer in customs and excise/border crossing and prisons

QUALIFICATION AWARD AND CERTIFICATION

Qualification Award

To be awarded the Bachelor of Science (Honors) in Radiography and Medical Imaging, a student must earn a minimum of 561 credits and have passed all components of the qualification as shown in the qualification structure.

Certification

Candidates meeting the prescribed requirements will be awarded a certificate of the qualification in accordance with the institutions'' standards and applicable policies for awarding. A Bachelor of Science (Honors) in Radiography and Medical Imaging certificate will be awarded upon successful completion of the qualification.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

SIMILARITIES

Title of Qualification

- The title of the proposed qualification reflects the discipline area, and this is comparable to the two qualifications, Bachelor of Medical Imaging, Deakin University, Melbourne, Australia and Bachelor of Radiography in Diagnostics, Central University of Technology, South Africa, that were benchmarked with.

Duration

- The duration of the qualification is four years, which is the same as the Bachelor of Medical Imaging, Deakin University, Melbourne, Australia and the Bachelor of Radiography in Diagnostics, Central University of Technology, South Africa

NQF Level

- The qualification is at NCQF Level 8, and that is the same as the two qualifications that were benchmarked. The Bachelor of Medical Imaging offered by Deakin University, Melbourne, Australia is AQF Level 8 and the Bachelor of Radiography in Diagnostics offered by Central University of Technology, South Africa, is an NQF Level 8.

Main Exit Outcomes

- The graduate learning outcomes of this qualification focus on knowledge of theories and technical competence in diagnostic imaging, radiation safety, professional communication, medico-legal-ethics in radiography practice, problem-solving skills, management and professional development, and operational research to improve the practice of diagnostic imaging are comparable to similar qualifications offered at Central University of Technology, South Africa and Deakin University, Melbourne, Australia.

Domains/Modules

- In comparison to Bachelor of Medical Imaging, Deakin University, Melbourne, Australia and the Bachelor of Radiography in Diagnostics, Central University of Technology, South Africa, the courses are organised and delivered according to body systems with each system concluding with a work placement to develop competencies.
- The qualification includes compulsory clinical training and is similar to the Bachelor of Medical Imaging, Deakin University, Melbourne, Australia and Bachelor of Radiography in Diagnostics, Central University of Technology, South Africa that were benchmarked with.

Qualification Rules and Minimum Standards for the Award of the Qualification

- To earn the BSc (Hons) in Radiography and Medical Imaging, students must pass all required courses with a minimum grade of 50%. This academic standard is fully aligned with benchmarks set by comparable degree programs.
- Graduates will be eligible to sit for licensure examinations upon successfully completing this qualification, mirroring the standards of our benchmarked programs.

Education Pathways

- The proposed qualification aligns with the Bachelor of Medical Imaging qualification, Deakin University, Melbourne, Australia and the Bachelor of Radiography in Diagnostics qualification, Central University of Technology, South Africa, that were benchmarked with, offering identical educational pathways and progression routes.

Employment Pathways

- The employment pathways of the proposed qualification are the same as those of the benchmarked Bachelor of Medical Imaging, Deakin University, Melbourne, Australia and Bachelor of Radiography in Diagnostics, Central University of Technology, South Africa qualifications**.** Graduates of these qualifications will be able to work as diagnostic radiographers, clinical educators, and applied medical specialists for imaging companies

DIFFERENCES

NQF Level

- The NCQF level descriptor is included in the title of the qualification. This is different from the two qualifications Bachelor of Medical Imaging, Deakin University, Melbourne, Australia and Bachelor of Radiography in Diagnostics, Central University of Technology, South Africa, that were benchmarked with. The difference is due to the need to comply with BQA guidelines.

Credit Value

- The number of credits for the proposed qualification, which are 561 credits exceeds those of qualifications that were compared with i.e. Bachelor of Medical Imaging, Deakin University, Melbourne, Australia and Bachelor of Radiography in Diagnostics, Central University of Technology, South Africa, which are 480 credits. This variance in credits is primarily due to a mandatory 64-credit internship, a practical component not required in similar programs that were benchmarked with.

Assessment Strategies and Weightings

- The assessment combines continuous assessment 50% and final examination 50%. This is different from the two programmes that were benchmarked. For these comparators, assessment is based on continuous assessment (100%).

Conclusion

The proposed Bachelor of Science (Honors) in Radiography and Medical Imaging is on par with similar qualifications benchmarked with regard to NQF level of qualification, domains/modules, main exit

outcomes, duration of study, integrated clinical training, qualification rules and employment pathways. However, the proposed qualification carries a higher credit total than its equivalent at the Central University of Technology due to the inclusion of a 64-credit internship. Additionally, the assessment strategies and weightings differ from both benchmarked programs.
REVIEW PERIOD
5 years in line with the NCQF.

For Official Use Only:

CODE (ID)			
REGISTRATION STATUS	**BQA DECISION NO.**	**REGISTRATION START DATE**	**REGISTRATION END DATE**
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**	