RADIOGRAPHY

DUT
DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

FACULTY OF HEALTH SCIENCES

2024 HANDBOOK

ENVISION2030

transparency • honesty • integrity • respect • accountability
fairness • professionalism • commitment • compassion • excellence

FACULTY of HEALTH SCIENCES

DEPARTMENT of RADIOGRAPHY

The above department offers four programmes

- Diagnostic Radiography
- Diagnostic Sonography
- Nuclear Medicine
- Radiotherapy

This handbook offers information on all four programmes.

What is a University of Technology?

A university of technology is characterized by being research informed rather than research driven where the focus is on strategic and applied research that can be translated into professional practice. Furthermore, research output is commercialized thus providing a source of income for the institution. Learning programmes, in which the emphasis on technological capability is as important as cognitive skills, are developed around graduate profiles as defined by industry and the professions.

NOTE TO ALL REGISTERED STUDENTS

Your registration is in accordance with all current rules of the Institution. If, for whatever reason, you do not register consecutively for every year/semester of your programme, your existing registration contract with the Institution will cease. Your re-registration anytime thereafter will be at the discretion of the institution and, if permitted, will be in accordance with the rules applicable at that time.

IMPORTANT NOTICES

The rules in this Departmental handbook must be read in conjunction with the General Rules (G Rules) contained in the DUT General Handbook for Students as well as the relevant module Study Guides.

Your attention is specifically drawn to Rule G1 (8), and to the process of dealing with students' issues.

FACULTY of HEALTH SCIENCES
FACULTY VISION, MISSION, GOALS & VALUES

Vision

Leading Transformative and Innovative Health Sciences Education

Mission Statement

Developing Holistic Professionals responsive to Healthcare needs
Through Excellence in:

- Teaching and Learning
- Research, Innovation and Engagement
- Fostering Entrepreneurship

Goals

The Faculty aims to:

1. Respond to National human resource and industry needs within the health sector.
2. Ensure the offering of entrepreneurial and leadership skills as a core component of all programmes within the Faculty of Health Sciences.
3. Continue to develop community based projects to foster social responsibility through collaborative projects between programmes.
4. Enhance established quality management frameworks to support teaching and learning.
5. Develop applied research that is responsive to community and industry needs.
6. Develop mechanisms for the dissemination and application of research outcomes to inform teaching and learning, assessment, community engagement and further research.
7. Improve research participation and output through increased post graduate student enrolment, publications and establishment of research groups.
8. Enable the generation of third stream income through research and innovation (patents and or / artefacts) in order to supplement existing sources of income for the next five years.
9. Attract and retain diverse quality staff while promoting advancement of individual potential.
10. Position DUT Health Sciences Nationally.

Values
The Faculty is guided by the following core values:

- Transparency, openness, honesty, and shared governance
- Professional and personal respect for others
- Educational relevance, equity and transformation (curriculum, access and success)
- Loyalty, accountability, dignity and trust

DEPARTMENTAL VISION, MISSION, GOALS & VALUES

Vision
A Global Leader in Transformative Radiography Education

Mission
Develop Medical Imaging and Therapeutic Professionals"
through *excellence* in:

- Student-centred teaching and learning
- Technology transfer and applied research
- Entrepreneurship and engagement

Goals
To be a leading Department of Radiography that exists to embrace the holistic education of the student by:

- Providing advancement of knowledge, skills and attitudes to enable effective teaching, learning, research, community engagement and entrepreneurship, thereby,
- Producing quality radiographers that will become useful members of society, and by this means,
- Serving the needs of the community and industry within a regional, national and global context.

Values

Professionalism
To work within ethical, legal and regulatory standards. To develop and maintain professional expertise and good work ethic

Integrity
To conduct ourselves with strong moral principles. To be honest, transparent and authentic. To do what is ethical and just

Ubuntu
To treat people with respect, fairness, courtesy, politeness and kindness

Collaboration
To work together as effective team players. To create more than the sum of the parts

Accountability
To accept responsibility for one's actions

CONTENTS **Page**

1. DEPARTMENTAL AND FACULTY CONTACT DETAILS

All departmental queries to:

Secretary:	**Ms Zamanguni (Gugu) Gumede**
Tel No:	031 3732450
Fax No:	0865508774
Email:	zamangunig@dut.ac.za
Location of department:	DH1102, Gate 6, Ritson Campus, Steve Biko Rd, Durban

All Faculty queries to:

Faculty officer:	**Thembelihle Mayisela**
Tel No:	031 3732701
Fax No:	031 3732407
Email:	thembim@dut.ac.za
Location of Faculty office:	Gate 8, Ritson Campus, Steve Biko Road, Mansfield Site Area

Executive Dean:	**Professor G G Mchunu**
Executive Dean's Secretary	**Mrs Bilkish Khan**
Tel No:	031 3732704
Fax No:	031 3732620
Email:	bilkishk@dut.ac.za
Location of Executive Dean:	Gate 6, Ritson Campus, Steve Biko Road, Floor above the Faculty office

2. STAFFING	Name and Qualification
Head of Department (Acting)	**Dr T Khoza** **PhD: Health Sciences (DUT)** M Tech: Rad (Diag) (UJ) B Tech: Rad (Diag) (UJ) ND: Rad (Diag) (UJ)
Senior Lectures:	**Dr PB Nkosi** PhD: Health Sciences (DUT); Master of Business Leadership (UNISA); M Tech: Rad (Therapy) (UJ); B Tech: Rad (Therapy) (TN); Nat. Higher Dip: Rad (Therapy) (TN); ND: Rad (Diag) (Wits Tech)
	Mrs S Naidoo Master of Applied Sciences (MRT) (U.Sydney); B Tech: Rad (NM) (TN); ND: Rad (Diag) (KEH VIII); HDip: Ed. Technical (Rad) (Unisa)
Lecturers:	**Mr S Madlala** MSc: H Sci (SGUL), ND: Rad (Diag) (TN)
	Mr T Motaung Masters in Business Administration (DUT); B Tech: Rad (Diag) (TN); ND: Rad (Diag) (TN)
	Mrs N Khuluse B Tech: Rad (US) (DUT) ND: Rad (US) (DUT)
	Dr P Gam Phd in Health Sciences (DUT) B-Tech Radiography M-Tech Radiography (DUT) ND: Rad Diagn

Clinical Instructors:

Mrs FB Ennos
B Tech: Rad (Diag) (DUT)
ND: Rad (Diag) (TN)

Ms LN Shanglee
B Tech: Rad (Diag) (DUT)
ND: Rad (Diag) (DUT)

Secretary:

Miss Z (Gugu) Gumede
B Tech: Bus Admin (DUT)
ND: OMT (MUT)

Technical Assistant

Miss P Ngwenya
B Tech: Business Administration (DUT)
ND: OMT (DUT)

Admin Assistant

Mr MF Ahmed
B Tech: OMT (DUT)
ND: OMT (DUT)

3. DEPARTMENTAL INFORMATION & RULES

3.1. PROGRAMMES OFFERED BY THE DEPARTMENT

This department offers four programmes, namely;

- Diagnostic Radiography
- Diagnostic Sonography
- Nuclear Medicine
- Radiotherapy

3.2. QUALIFICATIONS OFFERED BY THE DEPARTMENT

Learning programmes are offered in this department which will, upon successful completion, lead to the award of the following qualifications:

QUALIFICATION	Qual. Code	SAQA Qual ID Number	Important Dates
Bachelor of Health Sciences in Diagnostic Radiography Bachelor of Health Sciences in Diagnostic Sonography Bachelor of Health Sciences in Nuclear Medicine Bachelor of Health Sciences in Radiotherapy	BHDRD1 BHDSN1 BHNMD1 BHRDT1	94832 94679 94803 94800	
Master of Health Sciences in Radiography	MHRAD1	72200	
Doctor of Radiography	DRRAD1	72111	

3.3. DEPARTMENTAL INFORMATION

3.3.1. Academic Integrity

Please refer to the General Rules pertaining to academic integrity G13 (1)(0). These will be enforced wherever necessary to safeguard the worthiness of our qualifications, and the integrity of the Faculty of Health Sciences at the DUT.

3.3.2. Code of Conduct for Students

In addition to the General Rules pertaining to Student Conduct SR3(3), a professional code of conduct pertaining to behaviour, appearance, personal hygiene and dress shall apply to all students registered with the Faculty of Health Sciences, at all times. Refer to the Radiography WIL Code of Conduct for the additional requirements for the Radiography clinic and/or clinical training centres.

3.3.3. Uniforms

Students must adhere to instructions regarding specific uniforms required during practicals and hospital/clinic sessions. Uniform specifications are supplied by the department and all orders are placed with the preferred supplier who will take measurements on campus during the orientation week. Refer to the WIL Code of Conduct for more details.

3.3.4. Attendance

Students are encouraged to achieve 100% attendance for all planned academic activities as these are designed to provide optimal support for the required competencies. Where absence is unavoidable, the student must timeously advise the department of the reason. Only exceptional reasons will be accepted for absence from guest lectures, industry or field trips. Poor attendance records may lead to penalties.

3.3.5. Health and Safety

Students must adhere to all Health and Safety regulations both while at DUT and in WIL placements. Failure to do so will be treated as a breach of discipline.

3.3.6. Lectures

Lectures are offered at the Ritson, ML Sultan and Steve Biko Campuses of the DUT. Clinical training / placement could be in any HPCSA accredited clinical training centre in KwaZulu-Natal. Lectures are conducted during the day; however some lectures may be conducted during the evenings and on weekends.

3.3.7. Academic Terms and Student Year Planner

All undergraduate programmes/qualifications have a WIL component which will be detailed in the study guide/s. Due to the integrated nature of the WIL component in these undergraduate programmes, workplace based learning will extend beyond the academic terms as determined on the DUT Academic Calendar. This will include all recess periods and may include public holidays.

A department Student Year Planner indicates the DUT and WIL blocks, per level of study. Students are expected to comply with the requirements of the programme in order to complete the qualifications.

3.3.8. Work Integrated Learning (WIL)

- As indicated above, all undergraduate students will be required to attend workplace learning at the relevant HPCSA accredited clinical training centres and placement will be the responsibility of the Department of Radiography at the DUT. The required WIL hours may exceed the minimum hours recommended by the Health Profession Council of South Africa (HPCSA), and is calculated as per the Department Student Year Planner.
- It is important to note that placement of students in the relevant accredited clinical training centres include the Durban and Midlands areas and students may be rotated between the hospitals in the different levels of study. All travel, accommodation, uniform and other related costs would be the responsibility of the student. These need to be budgeted for prior to registration. All rules and regulations associated with attendance, behaviour, and attitude of students during WIL must be adhered to (refer to WIL Code of Conduct). Disciplinary action will be taken when the WIL Code of Conduct is contravened. (Verbal and written warnings, as well as possible expulsion will be the consequences of any individual who does not respect the rules and regulations whilst a registered student in any programme).

3.3.9. Assessment and Moderation

The continuous (ongoing) assessment method is used for all modules/modules in all the programmes. As such, there are no Final and Supplementary examinations. The results for these modules are determined through a weighted combination of assessments, which includes theory and practical assessments; individual and group assignments/projects; written and oral presentations; portfolios and OSCEs. Students are encouraged to work steadily through the period of registration in order to achieve the desired academic results. The assessment plan/schedule for each module/module is included at the back of this handbook. Moderation follows the DUT assessment policy and assessment guidelines. Detailed information on each module/module can be found in the relevant module/module Study Guides. A student who fails a module/module more than once is deemed to be making unsatisfactory academic progress and may not be allowed to re-register for the module.

3.3.10. Special Tests and Condonement

No summative assessments will be condoned. Summative means all assessment marks contribute to the final mark of a module/module.

- If a student misses a summative written, oral or practical test, for reasons of illness, a special test may be granted on condition that the student provides a valid medical certificate specifying the duration of the illness, and a declaration that for health reasons it was impossible for the student to complete an assessment. This certificate must be submitted to the programme coordinator, no later than one week after

the date of the missed assessment.

- In addition, a special test may be granted to student with borderline academic results.
- The special assessment may take the form of an oral. It may be set at the end of the period of registration and includes a wider scope of work than the original assessment.
- Any other student who misses an assessment and does not qualify for a special assessment, or qualifies for a special assessment but fails to write it, shall be awarded a zero mark for the missed assessment.
- A student who qualifies for a special test granted for borderline academic results, but fails to write it, or achieves lower than their original result, shall be awarded their original results.

3.3.11. Student Appeal

Rule G1 (8), in the DUT General Handbook applies.

SECTION A: UNDERGRADUATE QUALIFICATIONS

4 BACHELOR OF HEALTH SCIENCES (BHSc): Diagnostic Radiography; Diagnostic Sonography; Nuclear Medicine; Radiotherapy

4.1 PROGRAMME INFORMATION

This department offers four professional degrees at NQF level 8. The degrees have a minimum number of 480 SAQA credits with modules offered at HEQSF levels 5 through 8 with various SAQA credits. Whilst the majority of the modules are core, some of them are generic in nature and these are offered by both the Faculty of Health Sciences and the institution at large. At each level of study the student has an opportunity to choose from at least two of the elective modules and students will also register for research modules. The areas of specialisation include:

- Bachelor of Health Sciences (BHSc) in Diagnostic Radiography
- Bachelor of Health Sciences (BHSc) in Diagnostic Sonography
- Bachelor of Health Sciences (BHSc) in Nuclear Medicine
- Bachelor of Health Sciences (BHSc) in Radiotherapy

Diagnostic Radiography

Diagnostic Radiography is the creation of radiographs; photographs made by exposing a photographic film or other image receptors to x-rays. Since x-rays penetrate solid objects, but are slightly attenuated by them, the picture resulting from the exposure reveals the internal structure of the object. A radiographer should be able to apply scientific knowledge and technologies, applicable to the clinical presentation, for the production of optimum image quality in a chosen elective; be able to plan, develop and apply total quality management with consideration for equipment, human resources,

quality assurance and health care needs; be able to manage a radiographic service; be able to apply research skills and principles, and be able to apply advanced ethical principles to daily practice.

Diagnostic Sonography

Sonography uses high-frequency sound waves and a computer to create images of blood vessels, tissues, and organs. A Sonographer is qualified to perform abdominal and transvaginal ultrasound scans to determine the size, shape and dimensions of pelvic organs, ovarian follicle production, and the existence of tumours, enlargements or inflammations. Doppler and 3-D ultrasound help identify pathologies such as gallstones, kidney stones, cancers, hematomas and tumours. A Sonographer must operate various types of diagnostic ultrasound equipment and care for patients competently. He or she does not make a diagnosis, as this falls within the scope of a qualified doctor such as a radiologist, obstetrician, surgeon or physician. The sonographer does however report his or her findings.

Nuclear Medicine

This is a medical specialty that uses small amounts of radioactive substances to show the function of a body organ, as well as its anatomy. It has diagnostic as well as therapeutic applications. Nuclear medicine radiographers administer radiopharmaceuticals to patients and then monitor the characteristics and functions of tissues or organs in which the drugs localize, with the use of specialized equipment. The radiographers also perform a number of laboratory related procedures. They should be able to apply scientific skills and technologies to the clinical presentation for the production of optimum image quality in the specialised fields and research units of Nuclear Medicine. They need to also plan, develop and manage a Nuclear Medicine department as well as apply strategic management and administration to ensure a quality Nuclear Medicine service.

Radiotherapy

Radiotherapy is the treatment of tumours (malignant tumours [known as cancers] and some benign tumours [e,g keloids], using radiation–such as x-rays, gamma rays, electrons or other ionizing radiation. Radiotherapy radiographers plan radiation treatment and deliver treatment dose of radiation to treat these tumours. They deliver the dose using sophisticated technology machines whereby the source of radiation can be externally or internally (brachytherapy). In addition to this, they advise on general care, care of skin and diet during treatment with radiation. Radiotherapy radiographers function in a multidisciplinary environment which includes radiotherapists (cancer treatment specialists), oncologists (chemo doctors), medical physicists, nurses as well as surgeons, psychologists, dieticians, etc. Some patients diagnosed with cancer are followed up lifeti

4.2 PROGRAMME STRUCTURE: all four programmes

4.2.1 Bachelor of Health Sciences (BHSc) in Diagnostic Radiography (DR) (Qualification Code: BHDRD1) (4yr Minimum) – SAQA ID: 94832

YEAR OF STUDY – 1						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP1	Anatomy I	ANTM101	*5*	*12*	*C*	
SP1	Physiology Ia	PYSA101	*5*	*12*	*C*	
SP1	Cornerstone	CSTN101	*5*	*12*	*C*	
SP1	Chemistry	CSTY101	*5*	*8*	*C*	
SP1	Diagnostic Practice & Procedures Ia	DPPA101	*6*	*8*	*C*	
SP1	**FGE – student to select one module:** isiZulu for Health Care Professionals I Issues of Gender & Society within Health Care	IZHP101 IGSH101	*5*	*12*	*E*	
SP2	Physiology Ib	PYSB101	*5*	*12*	*C*	
SP2	Professional Practice & Management I	PPRM101	*6*	*12*	*C*	
SP2	Diagnostic Imaging Sciences I	DGIS101	*5*	*8*	*C*	
SP2	Diagnostic Practice & Procedures Ib	DPPB101	*6*	*12*	*C*	
SP2	Physics	PHIS101	*5*	*8*	*C*	
SP2	**IGE – student to select 1module:** Values in the Workplace ICT Literacy Skills Cultural Diversity	VWKP101 ICTL101 CLDV101	*5*	*8*	*E*	
SP1+2	Clinical Diagnostic Practice & Procedure I	DPPC101	*6*	*8*	*C*	
YEAR OF STUDY – 2						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP3	Anatomy II	ANTM201	5	*12*	*C*	ANTM101
SP3	General Pathology	GNLP101	*6*	*8*	*C*	ANTM101, PYSA101, PYSB101
SP3	Professional Practice & Management II	PPRM201	*6*	*8*	*C*	PPRM101
SP3	Diagnostic Practice & Procedures IIa	DPPA201	*6*	*16*	*C*	ANTM101, PYSA101, PYSB101, DPPA101, DPPB101 DPPC101
SP3	**IGE – student to select one module:** HIV & Communicable Diseases in KZN The Global Environment	HCDK101 GENV101	*6*	*8*	*E*	
SP3	**FGE – student to select one module:** Environmental Awareness for Health Care Professionals IsiZulu for Health Care Professionals	EVAH101 IZHP101	*6*	*12*	*E*	IZHP101
SP4	Diagnostic Imaging Sciences II	DGIS201	*6*	*16*	*C*	DGIS101

SP4	Diagnostic Practice & Procedures IIb	DPPB201	*6*	*16*	*C*	ANTM101, PYSA101, PYSB101, DPPA101, DPPB101, DPPC101
SP4	Health Sciences Research I	HSRS101	*6*	*12*	*C*	
SP3 + 4	Clinical Diagnostic Practice & Procedure II	DPPC201	*6*	*16*	*C*	ANTM101,PYSA101, PYSB101, DPPA101, DPPB10, DPPC101
YEAR OF STUDY – 3						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP5	Management for Health Professionals	MNHP101	*6*	*8*	*C*	
SP5	Diagnostic Imaging Sciences III	DGIS301	*7*	*16*	*C*	DGIS201
SP5	Diagnostic Practice & Procedures IIIa	DPPA301	*7*	*16*	*C*	ANTM201, GNLP101 DPPA201, DPPB201, DPPC201
SP5	Health Sciences Research II	HSRS201	*7*	*12*	*C*	HSRS101
SP5	**IGE – students to select one module:** HIV & Communicable Diseases in KZN Entrepreneurial Edge	EQDV101 TENE101	*6*	*8*	*E*	
SP6	Diagnostic Practice & Procedures IIIb	DPPB301	*7*	*16*	*C*	ANTM201, GNLP101 DPPA201, DPPB201, DPPC201
SP6	Leadership & Supervisory Development	LDSD101	*7*	*12*	*C*	
SP6	Ethics & Medical Law	ETML101	*7*	*12*	*C*	
SP6	**FGE – student to select one module:** Educational Techniques I IsiZulu for Health Care Professionals II	EDUT101 IZHP301	*7*	*12*	*E*	IZHP201
SP5 + 6	Clinical Diagnostic Practice & Procedure III	DPPC301	*6*	*16*	*C*	ANTM201,GNLP101, DPPA201, DPPB201, DPPC201
YEAR OF STUDY – 4						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP7	Professional Practice & Management III	PPRM302	*8*	*12*	*C*	PPRM201
SP7	Diagnostic Imaging Sciences IV	DGIS401	*8*	*16*	*C*	DGIS301
SP7	Diagnostic Practice & Procedures IVa	DPPA401	*8*	*16*	*C*	DPPA301, DPPB301, DPPC301
SP8	Diagnostic Practice & Procedures IVb	DPPB401	*8*	*16*	*C*	DPPA301, DPPB301, DPPC301
SP8	Small Business Management	SBSM101	*6*	*8*	*C*	
SP8	Clinical Mentoring & Assessment	CLMA101	*8*	*12*	*C*	
SP7+8	Health Sciences Research III	HSRS301	*8*	*28*	*C*	HSRS201
SP7+ 8	Clinical Diagnostic Practice & Procedures IV	DPP401	*6*	*20*	*C*	DPPA301, DPPB301, DPPC301

SP – Study Period; C – compulsory; E - elective
IGE – Institutional General Education; FGE – Faculty General Education
HEQSF – Higher Education Qualification Sub-Framework;
SAQA – South African Qualifications Authority

4.2.2 Bachelor of Health Sciences (BHSc) in Diagnostic Sonography (US) (Qualification Code: BHDSN1) (4yr Minimum) SAQA ID - 94679

YEAR OF STUDY – 1						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP1	Anatomy I	ANTM101	*5*	*12*	*C*	
SP1	Physiology Ia	PYSA101	*5*	*12*	*C*	
SP1	Cornerstone	CSTN101	*5*	*12*	*C*	
SP1	Chemistry	CSTY101	*5*	*8*	*C*	
SP1	Ultrasound Practice & Procedures Ia	UPPA101	*6*	*8*	*C*	
SP1	**FGE – student to select one module:** isiZulu for Health Care Professionals I Issues of Gender & Society within Health Care	IZHP101 IGSH101	*5*	*12*	*E*	
SP2	Physiology Ib	PYSB101	*5*	*12*	*C*	
SP2	Professional Practice & Management I	PPRM101	*6*	*12*	*C*	
SP2	Ultrasound Imaging Sciences I	UMIS101	*5*	*8*	*C*	
SP2	Ultrasound Practice & Procedures Ib	UPPB101	*6*	*12*	*C*	
SP2	Physics	PHIS101	*5*	*8*	*C*	
SP2	**IGE – student to select one module:** Values in the Workplace ICT Literacy Skills Cultural Diversity	VWKP101 ICTL101 CLDV101	*5*	*8*	*E*	
SP1+ 2	Clinical Ultrasound Practice & Procedure I	UPPC101	*6*	*8*	*C*	
YEAR OF STUDY – 2						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP3	Anatomy II	ANTM201	*5*	*12*	*C*	ANTM101
SP3	General Pathology	GNLP101	*6*	*8*	*C*	ANTM101, PYSA101, PYSB101
SP3	Professional Practice & Management II	PPRM201	*6*	*8*	*C*	PPRM101
SP3	Ultrasound Practice & Procedures IIa	UPPA201	*6*	*16*	*C*	ANTM101,PYSA101, PYSB101, UPPA101, UPPB101,UPPC101
SP3	**IGE – student to select one module:** HIV & Communicable Diseases in KZN The Global Environment	HCDK101 GENV101	*6*	*8*	*E*	
SP4	Ultrasound Imaging Sciences II	UIMS201	*6*	*16*	*C*	UIMS101
SP4	Ultrasound Practice & Procedures IIb	UPPB201	*6*	*16*	*C*	ANTM101,PYSA101, PYSB101, UPPA101, UPPB101, UPPC101
SP4	Health Sciences Research I	HSRS101	*6*	*12*	*C*	

SP4	**FGE – student to select one module:** Environmental Awareness for Health Care Professionals IsiZulu for Health Care Professionals II	EVAH101 IZHP201	*6*	*12*	*E*	IZHP101
SP3+4	Clinical Ultrasound Practice & Procedure II	UPPC201	*6*	*16*	*C*	ANTM101,PYSA101, UPPA101, UPPB101, UPPC101
YEAR OF STUDY – 3						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP5	Management for Health Professionals	MNHP101	*6*	*8*	*C*	
SP5	Ultrasound Imaging Sciences III	UIMS301	*7*	*16*	*C*	UIMS201
SP5	Ultrasound Practice & Procedures IIIa	UPPA301	*7*	*16*	*C*	ANTM201,GNLP101, UPPA201, UPPB201, UPPC201
SP5	Health Sciences Research II	HSRS201	*7*	*12*	*C*	HSRS101
SP6	Ethics & Medical Law	ETML101	*7*	*12*	*C*	
SP6	Ultrasound Practice & Procedures IIIb	UPPB301	*7*	*16*	*C*	ANTM201,GNLP101 UPPA201, UPPB201 UPPC201
SP6	Leadership & Supervisory Development	LDSD101	*7*	*12*	*C*	
SP6	Health Sciences Research II	HSRS201	*7*	*12*	*C*	HSRS101
SP6	**IGE – student to select one module:** Equity & Diversity Entrepreneurial Edge	EQDV101	*7*	*8*	*E*	
SP6	**FGE – student to select one module:** Educational Techniques I IsiZulu for Health Care Professionals III	EDUT101 IZHP301	*7*	*12*	*E*	IZHP201
SP5+6	Clinical Ultrasound Practice & Procedure III	UPPC301	*6*	*16*	*C*	ANTM201, GNLP101, UPPA201, UPPB201, UPPC201
YEAR OF STUDY – 4						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP7	Professional Practice & Management III	PPRM302	*8*	*12*	*C*	PPRM201
SP7	Ultrasound Imaging Sciences IV	UIMS401	*8*	*16*	*C*	UIMS301
SP7	Ultrasound Practice & Procedures IVa	UPPA401	*8*	*16*	*C*	UPPA301, UPPB301, UPPC301
SP8	Ultrasound Practice & Procedures IVb	UPPB401	*8*	*16*	*C*	UPPA301, UPPB301, UPPC301
SP8	Small Business Management	SBSM101	*6*	*8*	*C*	
SP8	Clinical Mentoring & Assessment	CLMA101	*8*	*12*	*C*	
SP7+8	Health Sciences Research III	HSRS301	*8*	*28*	*C*	HSRS201

SP7+8	Clinical Ultrasound Practice & Procedures IV	UPPC401	*6*	*20*	*C*	UPPA301, UPPB301, UPPC301

SP – Study Period; C – compulsory; E - elective
IGE – Institutional General Education; FGE – Faculty General Education
HEQSF – Higher Education Qualification Sub-Framework;
SAQA – South African Qualifications Authority

4.2.3 Bachelor of Health Sciences (BHSc) in Nuclear Medicine (NM) – (Qualification Code: BHNMD1) (4yr Minimum) – SAQA ID - 94803

YEAR OF STUDY – 1						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP1	Anatomy I	ANTM101	*5*	*12*	*C*	
SP1	Physiology Ia	PYSA101	*5*	*12*	*C*	
SP1	Cornerstone	CSTN101	*5*	*12*	*C*	
SP1	Chemistry	CSTY101	*5*	*8*	*C*	
SP1	Nuclear Medicine Practice & Procedures Ia	NMPA101	*6*	*8*	*C*	
SP1	**FGE – student to select one module:** IsiZulu for Health Care Professionals I Issues of Gender & Society within Health Care	IZHP101 IGSH101	*5*	*12*	*E*	
SP2	Physiology Ib	PYSB101	*5*	*12*	*C*	
SP2	Professional Practice & Management I	PPRM101	*6*	*12*	*C*	
SP2	Nuclear Medicine Imaging Sciences I	NMIS101	*5*	*8*	*C*	
SP2	Nuclear Medicine Practice & Procedures Ib	NMPB101	*6*	*12*	*C*	
SP2	Physics	PHIS101	*5*	*8*	*C*	
SP2	**IGE – student to select one module:** Values in the Workplace ICT Literacy Skills Cultural Diversity	VWKP101 ICTL101 CLDV101	*5*	*8*	*E*	
SP1 + 2	Clinical Nuclear Medicine Practice & Procedure I	NMPC101	*6*	*8*	*C*	
YEAR OF STUDY – 2						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP3	Anatomy II	ANTM201	*5*	*12*	*C*	ANTM101
SP3	General Pathology	GNLP101	*6*	*8*	*C*	ANTM101, PYSA101, PYSB101
SP3	Professional Practice & Management II	PPRM201	*6*	*8*	*C*	PPRM101
SP3	Nuclear Medicine Practice & Procedures IIa	NMPA201	*6*	*16*	*C*	ANTM101, PYSA101, PYSB101, NMPA101, NMPB101, NMPC101
SP3	**IGE – student to select one module:** HIV & Communicable Diseases in KZN The Global Environment	HCDK101 GENV101	*6*	*8*	*E*	
SP4	Nuclear Medicine Imaging Sciences II	NMIS201	*6*	*16*	*C*	NMIS101

SP4	Nuclear Medicine Practice & Procedures IIb	NMPB201	*6*	*16*	*C*	ANTM101, PYSA101, PYSB101, NMPA101, NMPB101,NMPC101
SP4	Health Sciences Research I	HSRS101	*6*	*12*	*C*	
SP4	**FGE – student to select one module:** Environmental Awareness for Health Care Professionals IsiZulu for Health Care Professional II	EVAH101 ZHP101	*6*	*12*	*E*	IZHP101
SP3 + 4	Clinical Nuclear Medicine Practice & Procedures II	NMPC201	*6*	*16*	*C*	ANTM101, PYS101, PYSB101,NMPA101, NMPB101,NMPC101

YEAR OF STUDY – 3						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP5	Management for Health Professionals	MNHP101	*6*	*8*	*C*	
SP5	Nuclear Medicine Imaging Sciences III	NMIS301	*7*	*16*	*C*	NMIS201
SP5	Nuclear Medicine Practice & Procedures IIIa	NMPA301	*7*	*16*	*C*	ANTM201,GNLP101 NMPA201, NMPB201 NMPC201
SP5	Health Sciences Research II	HSRS201	*7*	*12*	*C*	HSRS101
SP5	**IGE – student to select one module:** Equality & Diversity Entrepreneurial Edge	EQDV101 TENE101	*7*	*8*	*E*	
SP6	Nuclear Medicine Practice & Procedures IIIb	NMPB301	*7*	*16*	*C*	ANTM201,GNLP101 NMPA201, NMPB201 NMPC201
SP6	Leadership & Supervisory Development	LDSD101	*7*	*12*	*C*	
SP6	Ethics & Medical Law	ETML101	*7*	*12*	*C*	
SP6	**FGE – student to select one module:** Educational Techniques I IsiZulu for Health Professional III	EDUT101 IZHP301	*7*	*12*	*E*	
SP5 + 6	Clinical Nuclear Medicine Practice & Procedure III	NMPC301	*6*	*16*	*C*	ANTM201, GNLP101, NMPA201, NMPB201, NMPC201
YEAR OF STUDY – 4						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP7	Professional Practice & Management III	PPRM302	8	12	C	PPRM201
SP7	Nuclear Medicine Imaging Sciences IV	NMIS401	8	16	C	NMIS301
SP7	Nuclear Medicine Practice & Procedures IVa	NMPA401	8	20	C	NMPA301, NMPB301 NMPC301

SP8	Nuclear Medicine Practice & Procedures IVb	NMPB401	8	28	C	NMPA301, NMPB301 NMPC301
SP8	Small Business Management	SBSM101	6	8	C	
SP8	Clinical Mentoring & Assessment	CLMA101	8	12	C	
SP7+8	Health Sciences Research III	HSRS301	8	28	C	HSRS201
SP7+8	Clinical Nuclear Medicine Practice & Procedures IV	NMPC401	8	20	C	NMPA301, NMPB301, NMPC301

SP – Study Period; C – compulsory; E - elective
IGE – Institutional General Education; FGE – Faculty General Education
HEQSF – Higher Education Qualification Sub-Framework;
SAQA – South African Qualifications Authority

4.2.4 Bachelor of Health Sciences (BHSc) in Radiotherapy (RT) (Qualification Code: BHRDT1) (4yr Minimum) SAQA ID - 94800

YEAR OF STUDY – 1						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP1	Anatomy I	ANTM101	*5*	*12*	*C*	
SP1	Physiology Ia	PYSA101	*5*	*12*	*C*	
SP1	Cornerstone	CSTN101	*5*	*12*	*C*	
SP1	Chemistry	CSTY101	*5*	*8*	*C*	
SP1	Radiotherapy Practice & Procedures Ia	RPPA101	*6*	*8*	*C*	
SP1	**FGE – student to select one module:** isiZulu for Health Care Professionals Issues of Gender & Society within Health Care	ZHP101 GSH101	*5*	*12*	*E*	
SP2	Physiology	PYSB101	*5*	*12*	*C*	
SP2	Professional Practice & Management I	PPRM101	*6*	*8*	*C*	
SP2	Radiation Treatment Sciences I	RTSC101	*5*	*8*	*C*	
SP2	Radiotherapy Practice & Procedures Ib	RPPB101	*6*	*12*	*C*	
SP2	Physics	PHIS101	*5*	*8*	*C*	
SP2	**IGE – student to select one module:** Values in the Workplace ICT Literacy Skills Cultural Diversity	VWKP101 ICTL101 CLDV101	*5*	*8*	*E*	
SP1+2	Clinical Radiotherapy Practice & Procedure	RPPC101	*6*	*8*	*C*	
YEAR OF STUDY – 2						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP3	Anatomy II	ANTM201	*5*	*12*	*C*	ANTM101
SP3	General Pathology	GNLP101	*6*	*8*	*C*	ANTM101, PYSA101, PYSB101
SP3	Professional Practice& Management II	PPRM201	*6*	*8*	*C*	PPRM101
SP3	Radiotherapy Practice & Procedures IIa	RPPA201	*6*	*16*	*C*	ANTM101,PYSA101, PYSB101,RPPA101, RPPB101,RPPC101
SP3	**IGE – student to select one module:** HIV & Communicable Diseases in KZN The Global Environment	HCDK101 GENV101	*6*	*8*	*E*	
SP4	Radiation Treatment Sciences II	RTSC201	*6*	*16*	*C*	RTSC101
SP4	Radiotherapy Practice & Procedures IIb	RPPB201	*6*	*16*	*C*	ANTM101,PYSA101, PYSB101, RPPA101, RPPB101,RPPC101
SP4	Health Sciences Research I	HSRS101	*6*	*12*	*C*	
SP4	**FGE – student to select one module:** Environmental Awareness for Health Care Professionals IsiZulu for Health Care Professional II	EVAH101 IZHP201	*6*	*12*	*E*	IZHP101

SP3+4	Clinical Radiotherapy Practice & Procedures II	RPPC201	*6*	*16*	*C*	ANTM101,PYSA101, PSYB101, RPPB101, RPPB101,RPPC101

YEAR OF STUDY – 3						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP5	Management for Health Professionals	MNHP101	*6*	*8*	*C*	
SP5	Radiation Treatment Sciences III	RTSC301	*7*	*16*	*C*	RTSC201
SP5	Radiotherapy Practice & Procedures IIIa	RPPA301	*7*	*16*	*C*	ANTM201,GNLP101 RPPB101,RPPB201, RPPC101
SP5	Health Sciences Research II	HSRS201	*7*	*12*	*C*	HSRS101
SP5	**IGE – student to select one module:** Equality & Diversity Entrepreneurial Edge	EQDV101 TENE101	*7*	*8*	*E*	
SP6	Radiotherapy Practice & Procedures IIIb	RPPB301	*7*	*16*	*C*	ANTM201,GNLP101 RPPA201, RPPB201 RPPC201
SP6	Leadership & Supervisory Development	LDSD101	*7*	*12*	*C*	
SP6	Ethics & Medical Law	ETML101	*7*	*12*	*C*	
SP6	**FGE – student to select one module:** Educational Techniques I IsiZulu for Health Care Professionals III	EDUT101 IZHP301	*7*	*12*	*E*	IZHP201
SP5+6	Clinical Radiotherapy Practice & Procedures III	RPPC301	*6*	*16*	*C*	ANTM201, GNLP101,RPPA201, RPPB201, RPPC201

YEAR OF STUDY – 4						
SP	**MODULE TITLE**	**Module code**	**HESQF Level**	**SAQA Credit**	**C/E**	**Prerequisites**
SP7	Professional Practice & Management III	PPRM301	*8*	*12*	*C*	PPRM201
SP7	Radiation Treatment Sciences IV	RTSC401	*8*	*16*	*C*	RTSC301
SP7	Radiotherapy Practice & Procedures IVa	RPPA401	*8*	*16*	*C*	RPPA301, RPPB301, RPPC301
SP8	Radiotherapy Practice & Procedures IVb	RPPB401	*8*	*16*	*C*	RPPA301, RPPB301, RPPC301
SP8	Small Business Management	SBSM101	*6*	*8*	*C*	
SP8	Clinical Mentoring & Assessment	CLMA101	*8*	*12*	*C*	
SP7+8	Health Sciences Research III	HSRA301	*8*	*28*	*C*	HSRS201
SP7+8	Clinical Radiotherapy Practice & Procedures IV	RPPC401	*6*	*20*	*C*	RPPA301, RPPB301, RPPC301

SP – Study Period; C – compulsory; E - elective
IGE – Institutional General Education; FGE – Faculty General Education
HEQSF – Higher Education Qualification Sub-Framework;
SAQA – South African Qualifications Authority

4.3 SELECTION PROCEDURES

All applicants must apply through the Central Applications Office (CAO). In accordance with Rule G7*, acceptance into the programme is limited. Since more applications are received than can be accommodated, the following selection processes will apply:

- Initial short listing for selection is based on the applicant's academic performance in Grade 11 and/or 12. Applicants are to satisfy the requirements of Table 1 as a minimum in addition to obtaining a minimum of 28 points as calculated as per Table 2.
- Preference will be given to applicants with Radiography disciplines as first and second choices on CAO.

Table 1: Compulsory Modules

COMPULSORY MODULES	NSC Rating	Senior Certificate		NC (V)
		HG	SG	
English (first additional or home language)	4	D	B	70%
Life Sciences/Biology	4	D	B	70%
Mathematics	4	D	B	70%
Physical Sciences	4	D	B	70%

- The point scores for the **NSC** or the **SC** or the **NC (V)** results is obtained by using the table below:

Table 2: Point Scores

RESULTS	NSC Rating	Senior Certificate		NC (V)
		HG	SG	
90 – 100%	8	8	6	4
80 – 89%	7	7	5	4
70 – 79%	6	6	4	4
60 – 69%	5	5	3	3
50 – 59%	4	4	0	0
40 – 49%	3	3	0	0

Note: No points are allocated for ten (10) credit modules.

All applicants that meet the above requirements will receive a selection package from the Department of Radiography with the following:

- All applicants must submit the completed character evaluation form signed by their school principal or former teacher.
- All the applicants must complete eight (8) hours of voluntary service in the relevant Radiography clinical environment and submit the completed log sheet as proof of attendance.
- The applicants must write and submit reports, following the assignment instruction, on their observations and experiences whilst in the clinical environment, as well as reasons for choosing radiography as a career.

- Applicants will be ranked, as in Table 3 below and may be invited to a placement test.

Table 3: Weighting of Assessments

ASSESSMENT	WEIGHTING (%)
Results of the NSC, SC or NC (V) certificate	40%
Hospital Visits - eight (8) hours	20%
Written Essays	30%
School/work characteristic questionnaire	10%

- Placement testing (SATAB) inclusive of an interview will be conducted.
- Final selection will be determined, based on the results of the placement testing (50%) and the interview (50%).
- Selected applicants will be placed into either the four-year degree ~~or an~~
- Successful applicants who are awaiting their final Grade 12 results (NSC, SC or NC (V)) results will be provisionally accepted.
- In the event that the final Grade 12 results do not meet the minimum entrance requirements, this provisional acceptance will be automatically withdrawn.

4.4 PROGRAMME RULES

4.4.1 Minimum admission requirements

In addition to Rule G7*, the minimum entrance requirement is a National Senior Certificate (NSC) or a Senior Certificate (SC) or a National Certificate (Vocational) (NC (V)) that is valid for entry into a Bachelor's Degree and must include the following modules at the stated minimum ratings below:

COMPULSORY MODULES	NSC Rating	Senior Certificate		NC (V)
		HG	SG	
English	4	D	B	70%
Life Sciences/Biology	4	D	B	70%
Mathematics	4	D	B	70%
Physical Sciences	4	D	B	70%

4.4.2 Minimum Admission Requirements in respect of Work Experience, Age, Maturity and RPL

The DUT General Rules G7(3)* and G7(8)* respectively will apply.

4.4.3 Admission of International students

The DUT Admission Policy for International Students and General Rules G4* and G7(5)* will apply.

4.4.4 Duration of the Programme

In accordance with the DUT Rule G23 B(2)* and Rule G23B(3)*, the minimum duration of study is four (4) years, including any periods of clinical practice and the maximum duration will be six (6) years of registered study, including any periods of clinical practice.

4.4.5 Progression rules

In addition to DUT rules G14* and G16* the following rules shall apply: Students must pass all pre-requisite modules before he/ she is admitted to the next level (see Tables on page 10 to 17 in the Department Handbook).

4.4.6 Exclusion rule

In addition to the DUT General Rule G17*, a first year student who fails five or more of the modules with an average of less than 40% in the failed modules during that year is not permitted to re-register in the Department of Radiography. De-registration from any module is module to the provisions of Rule G6 (2)*.

4.4.7 Re-registration

Rule G16* of the General Handbook for Students applies.

4.4.8 Interruption of studies

Should a student interrupt their studies for a period of more than three (3) consecutive years, the student will need to apply to the Department for permission to re-register and will need to prove currency of appropriate knowledge prior to being granted permission to continue with registration.

4.4.9 Registration as a radiation worker

It is mandatory that all students are registered as trainee radiation workers with the Radiation Protection Services at SABS. The following are requirements for registration:

(i) First year students must undergo medical examinations – blood, urine and eye testing as well as a chest x-ray, within a period of 30 days preceding registration as a trainee radiation worker.

(ii) First time entering female students are required to sign a declaration that they are not pregnant at the time of registration. Should it be ascertained that a student was pregnant at the time of first registering, such student will have to deregister from the programme with immediate effect.

(iii) Any returning student who may be or suspects that she is pregnant must notify the HOD immediately, in order to ensure that appropriate safety measures are taken both in the Radiography clinic and during clinical training. Students who fail to disclose their pregnancy absolve the DUT from any consequences of non- disclosure.

(iv) A pregnant student may need to be exempt from certain clinical training placements in the radiography clinic and clinical training centres, which may extend their clinical training completion time.

(v) All pregnant students must comply with the standard radiation monitoring

requirements and in addition, use a direct reading pocket alarm dosimeter.

(vi) The event of a radiation occurrence to a student may result in a delay of completion of the student's studies.

(vii) First year students should turn 18 years of age before 01 July 2021.

4.4.10 Work Integrated Learning (WIL)

- The student must comply with the rules and regulations as set out in the clinical environment where placed. A student shall achieve the required level of clinical competency, determined by the employers/ clinical training centres and department, before application for the issuing of the degree will be made. This includes completion of the required clinical hours.
- Clinical Competency is evaluated through on site assessments.
- In addition, Rule G28* as contained in the General Handbook for Students applies. Students must familiarize themselves with this rule.
- Students must adhere to the rules and regulations, as indicated in the Department of Radiography's WIL Code of Conduct.
- Students are expected to adhere to all Health and Safety regulations and rules of ethical conduct as stipulated by the respective clinical environments.
- Disciplinary matters arising from breach of the Code of Practice will be referred to the Department for student disciplinary action, and thereafter to the DUT Disciplinary Committee.

4.4.11 Registration with the HPCSA – Radiography and Clinical Technology (RCT) Board

Students are required to apply for registration as Student Radiographers with the HPCSA, Clinical Technology and Radiography Professional Board during Term 1 of first registration; as determined in the regulations set out in the Health Professions Act, 1974 (Act 56 of 1974) [Government Notice R1855 (Dated 16/9/77); No R 1379 (12/7/94)]. Registration fees and submission of registration documents is the responsibility of the student. Students not registered will not be permitted to complete their Clinical Practice.

On successful completion of the qualification and required Clinical Practice, and satisfaction of the requirements of the Professional Board for Clinical Technology and Radiography, a graduate may register as a qualified Radiographer (Community service) with the HPCSA. After completion of the compulsory one year of community service, the registration must be changed to "Independent Practice". This is the sole responsibility of the graduate.

5 BTECH: RADIOGRAPHY: Diagnostic, Nuclear Medicine, Therapy, Ultrasound *(Qualification Codes: BTRAD1, BTRDN1, BTRT1, BTRDU1)*

(The teach-out date for these qualifications was 2019, thus no new students will be admitted into them)

5.1 PROGRAMME INFORMATION

5.1.1 Lectures

Lecture are offered at the Ritson Road Campus of the DUT. Lectures are usually conducted over weekends; however lectures may be conducted during week days and in the evenings.

5.1.2 Work Integrated Learning (WIL)

Currently, there is no WIL component in this programme. However; the student must be clinically placed according to the specific learning outcomes. If not clinically placed, permission must be obtained from appropriate clinical centre for access. Written proof must be submitted at time of registration.

5.2 LEARNING PROGRAMME STRUCTURE

Code	Modules	Year of Study	NQF Level	SAQA Credits	Pre-requisite
MPRD101	Management Principles and Practice 1	4	7	12	NDip: Rad: D, NM, T, US
RMTQ203	Research Methods and Techniques	4	7	12	NDip: Rad y: D, NM, T, US
RPRD401	Radiographic Practice IV: Diagnostic or	4	7	96	NDip: Radiography: D
RPRN401	Radiographic Practice IV: Nuclear Medicine or	4	7	96	NDip: Rad: NM
RPRT401	Radiographic Practice IV: Radiotherapy or	4	7	96	NDip: Radiography: T
RPRU401	Radiographic Practice IV: Ultrasound	4	7	96	ND: Radiography: US

5.3 PROGRAMME RULES

5.3.1 Assessment and Moderation

The continuous (ongoing) assessment method is used for all modules in all the programmes, except Management Principles and Practice 1. As such, there are no final and supplementary examinations. The results for these modules are determined through a weighted combination of assessments, which includes theory and practical assessments; individual and group assignments/projects; written and oral presentations; portfolios and OSCEs. Students are encouraged to work steadily through the period of registration in order to achieve the highest results possible. Assessments are listed under each module at the back of this handbook. Moderation follows the DUT assessment policy and assessment guidelines. Detailed information can be found in the relevant module study guides.

5.3.2 Special Tests and Condonements

No summative assessments will be condoned. Summative means all assessment marks contribute to the final mark of a module.

i. If a student misses a summative written, oral or practical test, for reasons of illness, a special test may be granted if the student provides a valid medical certificate specifying the nature and duration of the illness, and a declaration that for health reasons it was impossible for the student to complete an assessment. This certificate must be submitted to the programme coordinator, no later than one week after the date of the missed assessment.

ii. In addition, a special test may be granted to students with borderline academic results.

iii. The special assessment may take the form of an oral, may be set at the end of the period of registration, and may include a wider scope of work than the original assessment.

iv. Any student who misses an assessment and who does not qualify for a special assessment, and any student who qualifies for a special assessment but fails to write it, shall be awarded a zero mark for the missed assessment.

v. A student who qualifies for a special test granted for borderline academic results, but fails to write it, or achieves lower than their original results, shall be awarded their original results.

5.3.3 Minimum Admission Requirements

In addition to Rule G7, the following programme rules apply:

i. Persons must be in possession of a three year National Diploma: Radiography: Diagnostic or equivalent.

ii. The two (2) year National Diploma: Diagnostic is no longer accepted as an entrance requirement. Candidates who possess this qualification and who wish to obtain the B Tech: Radiography should contact the Head of Department, Radiography.

iii. Students must be eligible for registration with the Health Professions Council of South Africa (HPCSA).

iv. A student wishing to register for the B Tech Radiography programme must have a minimum of 1 year post-diploma clinical experience.

v. A student must be placed or employed in the relevant clinical environment, for e.g. CT/MRI, PET/CT, MSK Ultrasound, IMRT/VMAT,/Stereo, etc. in order to meet the outcomes of the programme.

5.3.4 Selection Criteria

In accordance with Rule G5, acceptance into the programme is limited to 20 places. The following selection process will determine placement in the programme:

i. Applications are made through the Department.
ii. Selection will be on the basis of previous academic performance as determined by a ranking system.
iii. Interviews may be conducted to assess the suitability of the individual for the BTech programme.

5.3.5 Pass Requirements

Notwithstanding the DUT pass requirements (G14 and G15),
and those detailed as follows, students are encouraged to effectively engage with their learning, and strive for the best academic results possible in order to adequately prepare themselves for their future careers, and to maximize possible employment opportunities. A student shall obtain a minimum of 50% in a module to pass that module. Notwithstanding anything to the contrary in the General Rules, no supplementary examinations shall be available for any continuous (on-going) assessment modules in this Department.

5.3.6 Re-registration Rules

Please refer to Student General Handbook for re-registration information (Rule G16). A student who fails a module more than once is deemed to be making unsatisfactory academic progress and may not be allowed to re-register for the module.

5.3.7 Interruption of Studies

Should a student interrupt their studies by more than one (1) year, the student will need to apply to the Department for permission to re-register and will need to prove currency of appropriate knowledge prior to being given permission to continue with registration.

5.3.8 Exclusion Rule(s)

In addition to Rule G17, the following programme rules apply: A student who fails more than one module will not be allowed to repeat the programme and will be instructed to leave the Institution.

5.3.9 Minimum and Maximum Duration of Study

The minimum duration is one year of full time registered study or two consecutive years of registered part-time study, including any periods of work integrated learning.
Should be read in conjunction with the DUT Rule G21 A (3)* and Rule G 21 A (4

SECTION B- POST GRADUATE PROGRAMMES

6 MASTERS OF HEALTH SCIENCES IN RADIOGRAPHY – (Qualification Code: MHRAD1)

6.1 PROGRAMME INFORMATION

The Master of Health Sciences in Radiography is a full research masters offered at NQF level 9. In addition to Rule G24 (1) of the General Handbook, candidates must be in possession of a Bachelor's degree in Radiography (NQF level 8) or a B Tech in Radiography with conferment of status according to Rule G10A of the General Handbook.
Candidates may also apply for admission via Recognition of Prior Learning (RPL) in accordance with Rule G7 (8) and/or G10B of the General Handbook.
Entry into the MHSc programme is not automatic and in accordance with Rule G5, acceptance into the programme is limited.
Please refer to the General Student Handbook and the Postgraduate Student Handbook.

6.1.1 Assessment and Moderation

A dissertation may be submitted for examination only once, although in certain circumstances the examiners may invite a student to revise and re-submit the thesis. A dissertation may be submitted at any time during the year, but prior to submission the PG7 (Intention to submit) form must be completed and submitted through the department to the Faculty Office at least three months prior to submission. At least two examiners, will be selected by the HoD, according to the DUT requirements. Approval for the examiners will be obtained from the Faculty Research and Higher Degrees Committee (RHDC) and this will be ratified by the HDC. Postgraduate assessment is aligned to Postgraduate policies and guidelines. Please refer to the General Handbook and the Postgraduate Student Guide.

6.2 LEARNING PROGRAMME STRUCTURE

This programme is a full research option.

Code	Module	level	*CA/E	Credits
MHRAD1	Dissertation	9	External Examination	180

6.3 PROGRAMME RULES *(wef: 08/11/2017)*

6.3.1 Minimum Admission Requirements

In addition to Rule G24 (1), candidates must be in possession of a Bachelor's degree in Radiography (NQF level 8) or a BTech in Radiography or a Postgraduate Diploma with conferment of status according to Rule G10A. Candidates may also apply for admission via Recognition of Prior Learning (RPL) in accordance with Rule G7 (8) and/or G10B.

6.3.2 Selection Criteria

All applicants should meet the minimum admission requirements stipulated under 6.3.1. All applicants must submit a concept paper outlining the research topic, purpose, proposed methodology and a concise literature review to the Department. Research Committee (DRC). Once the committee approves the topic and allocate a supervisor or supervisors, the student may register for the programme.

6.3.3 Pass Requirements

Rule G24 of the General Handbook and the Postgraduate Student Guide apply. Students are encouraged to apply themselves to their research, and strive for the best academic results possible in order to adequately prepare themselves for their future careers.

6.3.4 Exclusion and Re-registration Rules

i. In accordance with Rule G24, Senate may exclude or refuse re-registration if in the opinion of the supervisor/s and the Faculty Board, the student fails to maintain satisfactory progress in the research project.
ii. In accordance with Rule G24, if a student fails to obtain the qualification within the four (4) years from first registration, Senate may refuse to renew the student's registration or it may impose any condition it may deem fit. A student may apply to the Executive Committee of the Faculty Board for an extension.

6.3.5 Interruption of Studies

i. Should there be bona fide reasons for the interruption of studies for a period of one (1) year or more, once the student is formally registered, the student may apply for an interruption of registration. Registration may be interrupted under exceptional circumstances and is not done retrospectively but the decision is taken by the Faculty of Research Committee.
ii. The student must apply on Form PG4 and is module to the approval of the Faculty.

6.3.6 Minimum and Maximum Duration of study

In accordance with Rule G24 (2), the minimum duration for this qualification shall be one (1) year of registered study and the maximum shall be three (3) years of registered study.

7 DOCTOR OF RADIOGRAPHY (Qualification Code: DRRAD1)

7.1 PROGRAMME INFORMATION

This full research qualification is aligned to Rule G25 and G26 of the General Handbook and the guidelines in the Post Graduate Student Guide. It is a 360 credit qualification and is offered at the HEQSF Level 10.

7.1.1 Assessment and Moderation

A thesis may be submitted for examination only once, although in certain circumstances the examiners may invite a student to revise and re-submit the thesis. A thesis may be submitted at any time during the year, but prior to submission the PG7 (Intention to submit) form must be completed and submitted through the Department to the Faculty Office at least three months prior to submission. At least three examiners (2 locally and one nationally/externally) will be selected by the HOD, according to the DUT requirements. Approval for the examiners will be obtained from the Faculty Research and Higher Degrees Committee RHDC and this will be ratified by the HDC. Postgraduate assessment is aligned to Postgraduate policies and guidelines. Please refer to the General Student Handbook and the Postgraduate Student Handbook.

7.2 PROGRAMME STRUCTURE

This programme is a full research option.

Code	Module	level	*CA/E	Credits
DRRAD1	Thesis	10	External Examination	360

7.3 PROGRAMME RULES

7.3.1 Minimum Admission Requirements

i. In addition to Rule G25 (1), candidates must be in possession of a Master's degree in Radiography (NQF level 9) or a M Tech in Radiography with conferment of status according to Rule G10 A.

ii. Candidates may also apply for admission via Recognition of Prior Learning (RPL) in accordance with Rule G7 (8) and/or G10B.

7.3.2 Selection Criteria

All applicants should meet the minimum admission requirements stipulated under 7.3.1. All applicants must submit a concept paper outlining the research topic, purpose, proposed research methodology and a concise literature review to the Department. Once the Department Research Committee (DRC) approves the topic, the student may register for the programme after which a supervisor will be selected and appointed.

7.3.3 Pass Requirements

Rule G25 and the Postgraduate Student Handbook apply. Students are encouraged to apply themselves to their research, and strive for the best academic results possible in order to adequately prepare themselves for their future careers.

7.3.4 Exclusion and Re-registration rules

i. In accordance with Rule G25, Senate may exclude or refuse re-registration if in the opinion of the supervisor/s and the Faculty Board, the student fails to maintain satisfactory progress in the research project.

ii. In accordance with Rule G25, if a student fails to obtain the qualification within the four (4) years from first registration, Senate may refuse to renew the student's registration or it may impose any condition it may deem fit. A student may apply to the Executive Committee of the Faculty Board for an extension.

7.3.5 Interruption of Studies

i. Should there be bona fide reasons for the interruption of studies for a period of one (1) year or more, once the student is formally registered, the student may apply for an interruption of registration. Registration may be interrupted under exceptional circumstances and is not done retrospectively.

ii. The student must apply on Form PG4 and this is module to the approval of the Faculty Research and Higher Degrees Committee.

7.3.6 Minimum and Maximum Duration of study

In accordance with Rule G24 (2), the minimum duration for this qualification shall be two (2) years of registered study and the maximum shall be four (4) years of registered study.

8 MODULE CONTENT AND ASSESSMENTS

8.1 BACHELOR OF HEALTH SCIENCES (BHSc) in Diagnostic Radiography; Diagnostic Sonography; Nuclear Medicine; Radiotherapy

These are the common modules across the four programmes

MODULE/MODULE	LEARNING CONTENT	ASSESSMENT	%
Anatomy I	• Introduction to Anatomy • Osteology • Muscular anatomy • Arthrology	Theory Assessment Practical	50% 50%
Physiology Ia	• Cells & Tissues • Integumentary system • Muscular system • Nervous system & Special senses	Theory Assessment Practical	60% 40%
Physiology Ib	• Cardiovascular system and Blood • Immunity & Lymphatic system • Respiratory system • Digestive system • Urinary system	Theory Assessment Practical	60% 40%
Physics	• Thermal physics • Waves & sound • Geometrical optics • Electricity& magnetism • Radioactivity & radiation • Quantum physics	Theory Practical Tutorial	70% 20% 10%
Chemistry	• Chemistry and measurements • Matter and Energy • Atoms and Elements	Theory	100%
Professional Practice & Management I	• Students as learners in a University of Technology • History of radiography (including the SA perspective). • Organisational and hierarchy structures in public & private institutions. • Communication and interactions with patients: • Human developmental stages - Patient types & age groups classifications • Patient care • Infection Control – Types and spread of infections • Introduction to drugs	Theory Tests Projects/Assignments/ Practicals	60% 40%
Anatomy II	• Gastrointestinal Anatomy • Respiratory Anatomy • Cardiovascular anatomy • Neuroanatomy	Theory Assessment Practical	50% 50%
General Pathology	• Basic Medical Terminology • Cell adaptations, cell injury & cell death • Causes of cell injury & death • Infections & parasitic diseases • Tissue Responses to injury - inflammation and healing and repair • Immunopathology • Neoplasia • Haemodynamic disorders	Theory tests Assignment/s/Projects/ Portfolios	60% 40%
Professional Practice & Management II	• Communication: • Infection Control • Management of drugs • Venipuncture/Phlebotomy • Principles of Imaging & Treatment for Paediatrics & Geriatrics • Health & safety:	Theory Assessment Project/Assignment/ Practical	40% 60%

Health Sciences Research I	• Recognising academic sources of information • Plagiarism & copyright • Selection of information using a variety of search engines • Analysis, synthesis & evaluation of information • Reviewing academic literature • Scientific writing • Report writing • Reflective writing • Math & Statistics for Health Sciences • Basic concepts and principles	Theory Assessment Project/Assignment/ Presentation/ Reflective Practice	30% 70%
Ethics and Medical Law	• Human Rights • Ethics • Medical Law	Theory Assessment Project/Assignment/ Practical	40% 60%
Health Sciences Research II	• Role of student, supervisor and the institution • Research terminology • Theories and principles of research • Research paradigms and types • Research problem identification and justification • Literature review • Research designs and methodologies • Sampling methods & techniques • Qualitative and quantitative data collection and instruments • Principles - research ethics, human rights & medical law • Data analysis – quantitative & qualitative • Research Plan/Proposal	Theory Assessment Critical Analysis of Literature/Assignment/ Research proposal & Oral Presentation	20% 30% 50%

Management for Healthcare Professionals	• Principles of Management - POLC
	• Tasks of Management
	  ○ Problem identification & Solving
	  ○ Decision making
	  ○ Communication
	  ○ Negotiation
	  ○ Conflict Resolution
	  ○ Leadership
	  ○ Motivation
		Theory Assessment
		Project/Assignment/ Case Study
		Practical
			40%
			60%

Leadership & Supervisory Development	• Leaders verses Managers • Qualities of a leader • Leadership styles • Concepts of leadership • Behaviours • Climate and Culture of leadership • Leadership Theories • Conflict Management; • Cultural Diversity • Leadership Development	Theory tests Assignments/Projects/ Portfolio	50% 50%

Health Sciences Research III	• Conducting research (quantitative or qualitative):
	  ○ Obtaining permission
	  ○ Data collection
	  ○ Management of the research process
	  ○ Management of a budget
	  ○ Research ethics
	• Writing of research report – introduction, literature review and research methodology
	• Data analysis - Quantitative & Qualitative methods
	• Project write-up
	• Presentation of results to peers.
	• Preparing a scientific paper for publication
	Presentation of results to peers
		Proposal & Ethics Approval
		
		Data Collection & Data analysis, Data interpretation, presentation of findings / results.
		Discussion and conclusion.
		
		Preparation of a publication
			20%
			
			60%
			
			20%

Professional Practice & Management III	• Private & Public Practice
	• Principles & Applications of :
	  • Strategic management
	  • Organisational development
	  • Change management
	  • Disaster management
	  • Social responsibility
	• Advanced Occupational Health & Safety
	• Human Resources management
	• Labour Relations
	• Procurement processes
	• Quality management
		Theory Assessment
		Project/Assignment
		Case Study
		Portfolio
			40%
			
			30%
			30%

Small Business Management	• Introduction to Entrepreneurship Theory • Self-awareness & Development of Personal Attributes • Industry & Business Classification • Basic Business Plan Development • Business administration • Legislation • Marketing for Entrepreneurs • Finance • Operations Management • Human Resources for Entrepreneurs • Presentation skills	Theory tests Projects/Assignments/ Case studies/ Presentations	40% 60%
Clinical Mentoring & Assessment	• Workplace learning – theories & principles. (Co-op learning, Experiential Learning, Work Integrated Learning). • Role of CHE, HEQC, HEQF, DoH, HPCSA, SETAs, Skills Development • Related terminology • Clinical mentoring teaching and learning strategies • Demonstration techniques • Compiling a task sheet • Communication with mentee, patients/clients • Clinical assessment strategies • Assessment tools/rubrics • Preparing for an assessment • Conducting assessments • Evaluate evidence and making judgements • Providing feedback • Quality Assurance and evaluation	Theory tests Demonstrations/ Practicals/Assignment/ Portfolio	50% 50%

Cornerstone	• concept of journeys, across time, across space, and across human relationships; the first use of the concept will take the journey of the uMngeni River (which is close to all DUT campuses) as a metaphor • analysis of a particular issue or metaphor (one critical event or development will be and analysed; the event in focus will be selected on the basis of its connections to the theme of journeys and its relevance to the issues of ethics, diversity and critical citizenry • identify and integrate learning from earlier sections, and examine implications for further learning.	A weekly blog Tutorial attendance (forfeited if student attends less than 80% of tutorials) Visual artefact Written report Oral presentation Peer assessment	20% 10% 15% 30% 15% 10%
Values in the workplace	• A reflection on personal values and move to a discussion on how they intersect with values in the workplace. • how to build positive values in the workplace and the vital themes of ethics, respect, interconnectedness, honesty, creativity and human diversity will form the basis for building "sacred spaces at work." • leadership values and ethics and ethical decision making • to develop social responsibility and their roles as citizens.	Assignment Oral Presentation Peer Assessment Attendance	50% 30% 10% 10%
ICT Literacies & Skills	• Basics of ICTs Hardware, Software, and Users • Internet Search • Word Processing • Spreadsheets • Referencing • Security, Legal, Ethical, and Societal Issues • Economics of ICTs • Presentations	Quizzes Capstone project-written report & oral presentations	50% 50%
Cultural Diversity	• Culture (local and global context) • Social responsibility • Issues of anti- discriminatory and anti-oppressive practices. • Social justice and the effect of marginalization. • Consciousness raising and social action	Assignments Oral presentation Portfolio	20% 40% 40%
HIV and Communicable Disease in KZN	• Epidemiology of HIV, TB and STIs globally, in sub-Saharan Africa, South Africa and KZN. • HIV infection, transmission and prevention • Two diseases one person • Psychological issues of HIV and TB: ○ Decision making and family autonomy ○ Social isolation and stigma ○ Disclosure • Themes – stigma, disclosure, rights, communication, facilitation, advocacy	Online activities Critical Reflective Diary Communication report	30% 20% 50%
The Global Environment	• Environmental Pollution (Air, water and soil) • Population growth vs. natural resources • Climate change and global warming • Sustainable development	Oral presentation Web based assignment PBL assignment	30% 30% 40%

Equality and Diversity	• Concepts and terminology – e.g. diversity, equality, inclusion, power, oppression • Parameters of diversity as listed in section 9 of the SA Constitution • Prejudice, discrimination and inequality • The diversity competence continuum • Steps to develop competence/sensitivity in relation to diverse others	Theory Reflective assignment Group presentation Diversity festival	33% 17% 17% 33%
The Entrepreneurial Edge	• Becoming an entrepreneur • Addressing risk • Understanding my market • Planning • Financial objectives • Marketing • Ethics & Social responsibility	Theory Assignment	**66%** **34%**
Issues of Gender & Society in Health Care	• Gender and related concepts: gender power relations, gender roles, manifestation of gender bias, gender as one of the many social determinants of health. • The effects of gender discrimination on health matters of the individual. • Effective communication with patients in a health care setting, demonstrating an awareness of the practitioner-patient power differential and gender and cultural differences. • The impact of health care delivery systems in relation to gender. • The workplace impact of gender-based societal and cultural roles and beliefs on health care practitioners.	Project report & presentation Assignment 1 Assignment 2	60% 20% 20%
IsiZulu for Health Care Practitioners I	• Cultural & historical background of the Zulus. • Grammar • Common Zulu terms • Anatomical body parts. • Greetings and conversations • Deep understanding of different responses and cultural etiquette. • Personal details (name, surname, address, • location, occupation, age, marital status, dependants).	Theory tests Practical test Assignment Board game	40% 30% 20% 10%
Educational Techniques	• Introduction to education techniques • Learning theories • Facilitation & communication skills • Learning programme planning • Learner motivation & engagement • Learning material • Assessment & moderation • Management • eLearning & Blackboard • Quality Assurance	Presentations Portfolio	50% 50%

Community Health Care and Research I	• Brief overview of health systems in South Africa • Brief overview of problem identification in communities • Brief overview of project development, implementation and evaluation • Communication	Project Assignment Presentation	40% 30% 30%
Community Health Care and Research II	• Health systems in South Africa in comparison with other successful third world countries like Brazil • Brief overview of problem identification in communities and identification of sector in which primary problem is embedded • Brief overview of project development, implementation and evaluation • Communication and consultation to academic community • Communication to receivers of care	Project proposal Implementation Presentation	40% 30% 30%
Community Health Care and Research III	• Transformation of Health systems in South Africa in comparison with other successful third world countries like Brazil • Brief overview of project evaluation in communities and identification of and evaluation of performance of sector in which primary problem is embedded • Continue project development, implementation and evaluation • Communication and consultation to academic community • Communication to receivers of care • Communication to high level stakeholders	Project proposal Implementation Presentation	40% 30% 30%

Discipline/category specific modules per level of study.

BHSc in Diagnostic Radiography Levels 1 to 4			
Diagnostic Imaging Sciences I	• Basic principles of medical imaging. • X-ray tubes and x-ray production • Image formation – Scatter and latent image • Image recording • Introduction to Digital Radiography. • Image processing • Image display • Radiographic exposure • Radiation Protection • Basic principles of other imaging modalities	Theory Assessment Practical Assessment /Assignment/ Presentation	60% 40%
Diagnostic Practice and Procedures Ia	• Fundamentals of diagnostic practice – selection of equipment & accessories, basic radiographic procedure, exposure factors, cassettes, darkroom procedure. • Radiographic terminology & general patient positioning principles. • Basic radiographic techniques & procedures of the upper & lower limb, thorax, lungs & heart, abdomen. • Normal radiographic anatomy and image evaluation & interpretation of the upper & lower limb, thorax, lungs & heart, abdomen.	Theory Assessment Practical/Assignment/ Image Evaluation	50% 50%
Diagnostic Practice and Procedures Ib	• Fundamentals of diagnostic practice – selection of digital equipment & accessories, basic radiographic procedure, exposure factors, image receptors, image manipulation. • Basic radiographic techniques & procedures of the shoulder & pelvic girdles, skull, spine, sacrum & coccyx. • Normal radiographic anatomy and image evaluation & interpretation of the shoulder & pelvic girdles, skull, spine, sacrum & coccyx.	Theory Assessment Practical/Assignment/ Image Evaluation	50% 50%
Clinical Diagnostic Practice and Procedures I	Diagnostic Procedures & Techniques for: • Basic, additional & modified projections of the axial and appendicular skeleton, • Skull, abdomen and respiratory system. Areas to be covered: • Upper and lower Limbs • Abdomen • Bony Thorax - Sternum and SC Joints • Bony Thorax –Ribs • Shoulder and Clavicle • Pelvis and Hips • Cervical Spine – Trauma • Cervical Spine • Thoracic Spine • Lumbar and Sacral Spine • Skull – Basic Projections Radiographic pathology of the skeletal and respiratory systems and the acute abdomen. Abnormal radiographic anatomy and image evaluation & interpretation of the musculoskeletal system, chest and abdomen. Appropriate usage of relevant radiographic equipment. Application of patient care, professional practice and ethics.	Clinical Assessments: Hand Washing Technique Wheelchair Transfer Technique Ward Rotation Weekly Assessments Reflective Report Clinical Tutor Assessment logbook	100%

Diagnostic Imaging Sciences II	Basic components of medical imaging systems: • Generation and supply of electricity. • Sensitometry • Radiation exposure factors • The radiographic image • Fluoroscopy and its equipment • Digital systems • Care and maintenance Radiation physics: • Atomic structure and laws of modern physics- • Nature of electromagnetic radiation • X-ray beam quality and quantity • Attenuation of electromagnetic radiation • Interaction of X-rays with matter. • Filtration of electromagnetic radiation • Dosimetry for x - and gamma rays • Radiation protection • Radiobiology - Biological effects • Cellular response to radiation	Theory Assessment Practical Assessment Project/Presentation	50% 20% 30%
Diagnostic Practice and Procedures IIa	Diagnostic Procedures & Techniques for: • Additional & modified projections of the skull and respiratory system. • Critical Care Radiography – trauma & emergency, ward and theatre • Paediatric Radiography – basic general techniques and related radiographic pathology Radiographic pathology of the skeletal and respiratory systems and the acute abdomen. Abnormal radiographic anatomy and image evaluation & interpretation of the musculoskeletal system, chest and abdomen. Appropriate usage of relevant radiographic equipment. Application of patient care, professional practice and ethics.	Theory Assessment Practical/assignment/ Image Evaluation	60% 40%
Diagnostic Practice and Procedures IIb	Diagnostic Procedures & Techniques for Contrast Media Studies – arthrography, dacrocystography, sialography, GIT, GUT, Reproductive systems, including radiographic pathology of these systems. Radiographic pathology of the gastrointestinal, accessory organs, genitourinary and reproductive systems. Abnormal radiographic anatomy and image evaluation & interpretation of the gastrointestinal, accessory organs, genitourinary and reproductive systems. Appropriate usage of radiographic equipment. Application of patient care, professional practice and ethics.	Theory Assessment Practical/Image Evaluation/Project	40% 30% 30%
Clinical Diagnostic Practice and Procedures II	Diagnostic Procedures & Techniques for: • Basic, additional & modified projections of the skull, facial bones, sinuses • Critical Care Radiography – trauma & emergency, ward and theatre • Paediatric Radiography – basic general techniques and related radiographic pathology • Contrast media- types, indications, contraindications • Fluoroscopic studies – techniques, patient care, contrast media Radiographic pathology of the skeletal and respiratory systems and the acute abdomen. Abnormal radiographic anatomy and image evaluation & interpretation of the musculoskeletal system, chest and abdomen. Appropriate usage of relevant radiographic equipment. Application of patient care, professional practice and ethics.	Clinical Assessments General Radiography Mobile Radiography Portfolio Logbook	100%

Diagnostic Imaging Sciences III	**C**omputed Tomography (CT): Historical development: CT generations; Instrumentation; CT data acquisition, reconstruction and image manipulation; Radiation protection practices and quality control measures. Advanced digital Imaging and exposure: CR and DR; The imaging plate and detectors; Post processing techniques; Radiation exposure and Image quality; PACS and Teleradiology Fluoroscopy/Fluorography: Electromechanical injectors; Operation principles; Design and construction; Radiation dose; Quality Assurance: Radiation control laws, regulations and protocols in South Africa, Room Design, Equipment repair contracts, QA and QC for analogue radiography, QA and QC for DR and CR, Reject analysis. Bone densitometry: Basic concepts and operation principles, Historical development, Module density and radiation absorption, Methods of x-ray production and x-ray detection, Fan and pencil beam, Precision and accuracy.: Magnetic Resonance Imaging (MRI): History of MRI, magnetism, properties of magnetism, MR system components, MR signal production; tissue characteristics; pulse sequencing, imaging parameters and image formation, MRI safety.	Theory Assessment Practical/Assignment/ Projects Portfolio	40% 30% 30%
Diagnostic Practice and Procedures IIIa	Specialised Radiographic techniques & procedures and related radiographic pathology for: • Paediatric Radiography • Basic mammography • Bone Densitometry – using DEXA, QCT, QUS • Digital Angiography Normal radiographic anatomy of the relevant applications Abnormal patterns of diseases related to paediatric, mammographic, and angiographic imaging. Appropriate usage and maintenance of radiographic equipment. Application of patient care, professional practice and ethics.	Theory Assessment Portfolio/Case Study/ Anatomy Viewing Practical	40% 60%
Diagnostic Practice and Procedures IIIb	Specialised Radiographic techniques & procedures for: Systemic CT Imaging – advanced applications of the CNS, respiratory, GIT, GUT, reproductive and endocrine systems Basic MRI applications in the CNS and Musculoskeletal systems, abdomen and pelvis, thorax. Related radiographic pathology of the nervous, cardiovascular, haemopoeitic and endocrine systems. Abnormal cross-sectional anatomy & imaging evaluation & interpretation on CT & MR images. Appropriate usage and maintenance of radiographic equipment. Application of patient care, professional practice and ethics.	Theory Assessment Portfolio/Case Study/ Anatomy Viewing Practical	40% 60%
Clinical Diagnostic Practice and Procedures III	Specialised Radiographic techniques & procedures and related radiographic pathology for: • Paediatric Radiography • Computed Tomography • General radiography, poly trauma, ICU mobiles Normal radiographic anatomy of the relevant applications Abnormal patterns of diseases related to paediatric, mammographic, and angiographic imaging Appropriate usage and maintenance of radiographic equipment. Application of patient care, professional practice and ethics.	Clinical Assessments: CT Brain General/ Mobile Radiography Reflective Portfolio Logbook	100%

Diagnostic Imaging Sciences IV	Advanced CT Technology: • Advanced data acquisition principles: Volumetric imaging; pitch • Advanced image reconstruction & algorithms: Multidetector row spiral; longitudinal interpolation with Z-axis filtering; interlaced sampling; 3D reconstruction (including software) • Archiving & PACS • Image quality in CT: determiners; influencing factors; measurements by physicists; quality control programmes– principles & common QC tests. • Advanced Radiation Protection Practices: measuring patient radiation dose; reducing dose; paediatric doses. • Hybrid systems & fusion Imaging principles Mammography equipment: Design and construction, Focal spot, Heel effect, Compression devices, Filtration devices, the magnification setup, use of grids and automatic exposure controls, applications, radiation protection Advanced Magnetic Resonance Imaging (MRI): MR pulse sequences, image formation and image contrast, MR parameters, imaging options, and QA in MRI, Advanced MRI safety QA and QC in Advanced Imaging Systems: • Principles of QA and QC tests for Fluoroscopy units, CT systems, Cardiac Cath Labs, MRI • Tendering and commissioning of imaging equipment	Theory Assessment Practical Assessment/ Project/Assignment/ Portfolio	40% 60%
Diagnostic Practice and Procedures IVa	Specialised advanced imaging procedures & techniques: • Interventional radiography – vascular & non-vascular applications • Advanced CT imaging – advanced applications in systemic imaging, advanced image processing, contrast media usage & optimisation, image quality versus radiation dose, dose optimisation techniques, advanced/abnormal cross sectional anatomy and image evaluation & interpretation. Introduction to fusion imaging and radiotherapy planning. Advanced Quality Assurance Procedures for CT.	Theory Assessment Image Evaluation and Interpretation/ Assignment/Portfolio/Case Study	50% 50%
Diagnostic Practice and Procedures IVb	Specialised advanced imaging procedures & techniques: • Advanced MRI applications – thoracic and abdomino-pelvic imaging, contrast media usage & applications, MRA, spectroscopy, DWI, and Paediatric applications • Advanced Quality Assurance Procedures for MRI • Future Trends in Radiography	Theory Assessment Image Evaluation and Interpretation/ Assignment/Portfolio/Case Study	50% 50%
Clinical Diagnostic Practice and Procedures IV	Specialised advanced imaging procedures & techniques: [including learning areas in DPPC201 & DPPC301] • Interventional radiography – vascular & non-vascular applications • Advanced CT imaging – advanced applications in systemic imaging, advanced image processing, contrast media usage & optimisation, image quality versus radiation dose, dose optimisation techniques, advanced/abnormal cross sectional anatomy and image evaluation & interpretation. Introduction to fusion imaging and radiotherapy planning. Advanced Quality Assurance Procedures for CT.	Clinical Assessments	100%

BHSc in Diagnostic Sonography Level 1 to 4			
Ultrasound Imaging Sciences I	Basic principles of medical ultrasound: • Sound wave, ultrasound wave generation and detection. Piezo- electric effect, Interaction of ultrasound with human body Ultrasound Equipment: • Structure of a basic transducer, images display modes- A mode, M Mode and basic principles of real time B Mode. Introduction to: • Image artefacts • Biohazards and safety in ultrasound imaging	Theory Assessment Project/Assignment	60% 40%
Ultrasound Practice and Procedures Ia	Fundamentals of ultrasound practice: • Introduction to gynaecology sonography • Introduction to obstetrics sonography Points to be noted for the above procedures • Anatomy, physiology and detailed pathology associated with the above procedures: • Principles of imaging • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, drugs or diet, before, during and after the examination. • Adhere to safe practices guided by ALARA	Theory Assessment Project/Assignment/	60% 40%
Ultrasound Practice and Procedures Ib	Fundamentals of ultrasound practice: • Introduction to general abdominal sonography • Principles of sonography report writing Points to be noted for the above procedures Anatomy, physiology and detailed pathology associated with the above procedures: • Principles of imaging • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, drugs or diet, before, during and after the examination. • Adhere to safe practices guided by ALARA	Theory Assessment Project/Assignment/	60% 40%
Clinical Ultrasound Practice and Procedures I			

Ultrasound Imaging Sciences II	Ultrasound equipment: • structure of electronic ultrasound transducers, • operation of real time B mode scanners, principles of digital scan converters and signal processing features and • characteristics of focused and unfocused ultrasound beam. Principles of Doppler Ultrasound: • the Doppler effect, Doppler frequency shift, • types of Doppler signal output and • principles of continuous and pulsed wave Doppler ultrasound. • Duplex scanners Image Quality: • Resolution- axial, lateral, geometric, temporal and contrast, Artefacts Hazards and safety: • potential hazards of ultrasound, heating, cavitation, standing waves, streaming and policies and protocols for safe practice	Theory Assessment Project/Assignment	50% 50%
Ultrasound Practice and Procedures IIa	Gynaecology scanning: • Scanning technique : Trans vaginal • Pathologies of the female reproductive organs. • Image interpretation of abnormal organs: uterus, ovaries and adnexae Obstetric Sonography: • Appropriate scanning technique for different trimesters of pregnancy • Complications in the first trimester • Routine second trimester scanning • Foetal environment monitoring • Third trimester foetal growth monitoring scanning Report writing skills Points to be noted for the above procedures • Anatomy, physiology and detailed pathology associated with the above procedures. • Principles of imaging. • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, before, during and after the exam. • Adhere to safe practices guided by the ALARA principle	Theory Assessment Project/Assignment/ Portfolio/Case Study	40% 60%
Ultrasound Practice and Procedures IIb	General abdomen sonography: • Appropriate scanning technique to evaluate abdominal organs • Clinical indications • Image interpretations of abnormal findings in the : liver and biliary system, renal tract, pancreas , spleen and spleen. Pancreas, urinary system and associated vascular structures • Sonography report writing skills Points to be noted for the above procedures • Anatomy, physiology and detailed pathology associated with the above procedures. • Principles of imaging. • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, drugs or diet, before, during and after the examination. • Adhere to safe practices guided by the ALARA principle	Theory Assessment Project/Assignment/ Portfolio/Case Study	40% 60%

Clinical Ultrasound Practice and Procedures II			
Ultrasound Imaging Sciences III	Ultrasound equipment:: • M Mode scanning • 3 Dimension and 4 Dimension real time imaging • Elastography • Image recording devices PACS Principles of Doppler Ultrasound: • Doppler spectral analysis • Colour and power Doppler Image Quality: Resolution Hazards and safety: • Intensity and power • Biological effects and Clinical safety • Quality Control: Performance testing tests	Theory Assessment Project/Assignment	50% 50%
Ultrasound Practice and Procedures IIIa	Advanced procedures in Gynaecology scanning: • Interventional procedures • 3D and 4D gynaecology scanning • Advanced image interpretation • Doppler studies in gynaecology Advanced procedures in obstetric sonography: • Screening tests for chromosomal anomalies in the first trimester and second trimester • High Risk Pregnancies: • Congenital anomalies • Foetal Growth disorders • Maternal diseases in pregnancies • Interventional studies • Doppler studies in obstetrics General Abdomen sonography: • Organ transplant • Male Reproductive organs POINTS TO BE NOTED FOR THE ABOVE PROCEDURES • Anatomy, physiology and detailed pathology associated with the above procedures. • Principles of imaging. • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, before, during and after the examination.	Theory Assessment Project/Assignment/ Portfolio/Case Study	40% 60%

Ultrasound Practice and Procedures IIIb	Small parts sonography Appropriate scanning technique protocols and procedures for small parts. • Breast • Neck • Chest • Eye Vascular Sonography: • Peripheral arterial upper and lower limbs • Carotid scanning • Peripheral venous upper and lower limb • Trans cranial Doppler Abdominal vessels Paediatric Sonography: • Abdomen • Cranial and small parts Introduction to Musculosketal Sonography and Echocardiography POINTS TO BE NOTED FOR THE ABOVE PROCEDURES • Anatomy, physiology and detailed pathology associated with the above procedures. • Principles of imaging. • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, before, during and after the examination	Theory Assessment Project/Assignment/ Portfolio/Case Study	40% 60%
Clinical Ultrasound Practice and Procedures III			
Ultrasound Imaging Sciences IV	Advanced and specialised ultrasound equipment:: • Latest and future technological advances • 3 Dimension and 4 Dimension real time imaging • Elastography • Contrast agents • Image recording devices and storage devices Advanced Principles of Doppler Ultrasound:	Theory Assessment Project/Assignment/ Portfolio/Case Study	50% 50%

	Hazards and safety: • Policies and protocols for safe practice Quality assurance and control: • Purpose • Performance testing tests • Phantoms, test selection		
Ultrasound Practice and Procedures IVa	Musculoskeletal Sonography • Appropriate scanning technique for each joint and muscles • Upper limb and lower limb • Image interpretation of normal and abnormal findings • Detailed and concise report writing of sonographic findings Nerve Block Fusion imaging Latest developments and future trends in sonography •	Theory Assessment Project/Assignment/ Portfolio/Case Study	60% 40%
Ultrasound Practice and Procedures IVb	Echocardiography • Scanning technique trans thoracic. TEE B Mode, M Mode • Image interpretation normal and abnormal • Detailed and concise report writing of sonographic findings • Latest developments and future trends in echocardiography POINTS TO BE NOTED FOR THE ABOVE PROCEDURES • Anatomy, physiology and detailed pathology associated with the above procedures. • Principles of imaging. • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, before, during and after the examination.	Theory Assessment Project/Assignment/ Portfolio/Case Study	60% 40%
Clinical Ultrasound Practice and Procedures IV			

BHSc in Nuclear Medicine Levels 1 to 4			
Nuclear Medicine Imaging Sciences I	Nuclear Medicine Sciences • Radioactivity • Radionuclides • "hot-lab" rules and regulations; construction and design • Quality control tests • Mechanisms of localization of radionuclides/radiopharmaceuticals • Regulations and legal aspects of radiopharmaceuticals Nuclear Medicine Equipment • Fundamentals of Nuclear Medicine Equipment; basic design and principle of operation of gamma camera, Na-I crystals, photomultipliers tubes, collimators.	Theory Assessment Project/Assignment/ Portfolio/Case Study	50% 50%

Nuclear Medicine Practice and Procedures Ia	**Radionuclides and Radiopharmaceuticals** Musculoskeletal System • Technetium-99m labelled radio-pharmaceuticals for bone and joint imaging Endocrine System: • Thyroid imaging agents **Detailed information for all of the above in terms of the** Physical, chemical, bio distribution, and other properties of the radionuclides and radiopharmaceuticals of different systems of the body. dispensing and administration of the various radionuclides different radionuclides used for the same body systems radiation dosimetry to the relevant organs when administering radiopharmaceuticals premedication needed for the different studies contraindications for certain studies types of medication and / or food substances that would interfere with the procedure. differences between radiopharmaceuticals/radionuclides that are used for therapeutic purpose those that are used for diagnostic purposes dispensing of all radiopharmaceuticals for the various nuclear medicine procedures the preparation of standard solutions for procedures where necessary the accurate handling and dispensing of radionuclides/radiopharmaceuticals the use of ALARA principles **Nuclear Medicine Procedures:** (*this will include a theory and practical component)* • bone imaging • thyroid imaging ***points to be noted for the above procedures*** • anatomy, physiology and detailed pathology associated with the above procedures. • Principles of imaging. • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, drugs or diet, before, during and after the examination. • Radiopharmaceuticals used, precautionary measures, routes of administration, adult and paediatric doses, radiation effects: T 1/2 physical, biological, effective, target organ, whole body dose received • Instrumentation used, quality control, instrument calibration, choice of instruments for specific studies • Image acquisition and data processing, patient positioning orientation, variation of views to show special areas of interest, artefacts • Interventions (where applicable) • Image interpretation and reporting • Recognition of normal and abnormal patterns of radionuclide/radiopharmaceutical activity. • Sources of error • Quality Control	Theory Assessment Project/Assignment/ Portfolio/Case Study	50% 50%

Nuclear Medicine Practice and Procedures Ib	**Radionuclides and Radiopharmaceuticals** • Lung perfusion agents • Radioactive gases for lung ventilation agents • Radio aerosol inhalation pulmonary agents **Detailed information for all of the above in terms of the** Physical, chemical, bio distribution, and other properties of the radionuclides and radiopharmaceuticals of different systems of the body. dispensing and administration of the various radionuclides different radionuclides used for the same body systems radiation dosimetry to the relevant organs when administering radiopharmaceuticals premedication needed for the different studies contraindications for certain studies types of medication and / or food substances that would interfere with the procedure. differences between radiopharmaceuticals/radionuclides that are used for therapeutic purpose those that are used for diagnostic purposes dispensing of all radiopharmaceuticals for the various nuclear medicine procedures the preparation of standard solutions for procedures where necessary the accurate handling and dispensing of radionuclides/radiopharmaceuticals the use of ALARA principles **Nuclear Medicine Procedures:** (*this will include a theory and practical component)* Respiratory System: • pulmonary ventilation • pulmonary perfusion ***points to be noted for the above procedures*** • anatomy, physiology and detailed pathology associated with the above procedures. • Principles of imaging. • Definitions of terms • Indications for the examination • Information pertinent to performing the procedure • Patient Preparation, drugs or diet, before, during and after the examination. • Radiopharmaceuticals used, precautionary measures, routes of administration, adult and paediatric doses, radiation effects: T 1/2 physical, biological, effective, target organ, whole body dose received • Instrumentation used, quality control, instrument calibration, choice of instruments for specific studies • Image acquisition and data processing, patient positioning orientation, variation of views to show special areas of interest, artefacts • Interventions (where applicable) • Image interpretation and reporting • Recognition of normal and abnormal patterns of radionuclide/radiopharmaceutical activity. • Sources of error • Quality Control	Theory Assessment Project/Assignment/ Portfolio/Case Study	50% 50%

Clinical Nuclear Medicine Practice and Procedures I	**Radiopharmacy and radiopharmaceuticals:** • Introduction to radiopharmacy — basic principles, definitions and basic quality control within a nuclear medicine laboratory, • Basic nuclear medicine instrumentation, quality control and use of; dose calibrators, survey meters and gamma cameras. • Practical knowledge of the radiochemistry of radionuclides and radiopharmaceuticals used in specific musculoskeletal, endocrine and pulmonary imaging procedures. • Radiopharmaceutical compound selection, handling, preparation, dispensing and administration. • Basics of Radiation protection- safe handling of radionuclides, safety procedures and radiation hazards, radiation dosimetry to the relevant organs, modification of radiation doses appropriate to adult and/or pediatric patients and application of the ALARA principles. • Safe clinical practices – radiation safety and hygiene, pharmaceutical technology and aseptic techniques, application of current Good Radiopharmacy Practice (cGRPP), quality assurance, record keeping and waste management. **Nuclear Medicine Imaging Procedures:** • Principles of bone, thyroid and lung imaging procedures • Clinical application of medical and radiographic terminology • Clinical pertinent information such as; knowledge of specific indications for each examination, patient preparation, anatomical, physiological and pathological appearances related to musculoskeletal, endocrine and pulmonary scintigraphy. • Instrumentation- Selection of appropriate equipment, quality control and calibration of equipment. • Image acquisition - selection and modification of appropriate image acquisition parameters, gamma camera and patient positioning principles. • Patient care- application of the Batho Pele Principles, patient radiation protection and ALARA principles. • Data processing, Image interpretation and reporting- selection, application and manipulation of appropriate image processing tools and activities for bone, thyroid and lung scintigraphy, recognition of normal and abnormal patterns of radionuclide/radiopharmaceutical activity and identification of possible sources of error.	Clinical Assessments	100%

Nuclear Medicine Imaging Sciences II	Interaction of radiation with matter; Photoelectric absorption, Compton interaction, Pair production, Relative importance of interaction process, Different energies used in Nuclear. Medicine. Imaging. Measurement of Radiation Radiation Detectors; Ion collection detectors, Use & calibration, Scintillation detectors, Associated electronic devices, Ionisation chamber, Geiger Muller counter, Survey meters Computers Gamma camera, Na I (T1) crystal, Photomultiplier tube Collimators, Parallel hole, Diverging, Converging, Pinhole, Others, Sensitivity, Resolution, Uniformity , Resolving time , Uniformity correction, Count density, Field uniformity & sensitivity, Photopeak calibration operational characteristics, Image Recording accessories , Image formation, CT scanners - basic principle of operation.' basic Quality control PET - Principle of operation Radiopharmacy: "B" and "C" type laboratory; rules and regulations; principles and techniques for the separation of biological compounds, quality control procedures associated with the eluate, generator elution, radiochemistry, radiopharmacology associated with specific organ systems	Theory Assessment Project/Assignment/ Portfolio/Case Study	50% 50%
Nuclear Medicine Practice and Procedures IIa	Radionuclide and Radiopharmaceuticals • Laboratory and general procedures. • Radioactive waste disposal • Endocrine System: adrenal and parathyroid imaging agents • Gastrointestinal system agents Nuclear Medicine Procedures • Endocrine system • Gastrointestinal imaging Note: Detailed information and Points to be noted as in NM Practice & Procedures 1a	Theory Assessment Project/ Assignment Portfolio/Case Study/	40% 30%
Nuclear Medicine Practice and Procedures IIb	Radionuclide and Radiopharmaceuticals • Cardiovascular system agents • Renal agents Nuclear Medicine Procedures • Cardiac imaging • Renal imaging Note: Detailed information and Points to be noted as in NM Practice & Procedures 1a	Theory Assessment Project/ Assignment Portfolio/Case Study/	40% 30%
Clinical Nuclear Medicine Practice and Procedures II	**Radiopharmacy** • Laboratory- types, designs, operation, maintenance, assembly and cleaning of laboratory equipment & glassware contamination • Practical knowledge of the radiochemistry of radionuclides and radiopharmaceuticals used in specific endocrine, gastrointestinal cardiovascular and genitourinary imaging procedures. • Radiopharmaceutical compound selection, handling, preparation, dispensing, quality control and administration. • Radiation protection- safe handling of radionuclides, safety procedures and radiation hazards, decontamination equipment, protocols and procedures, radiation dosimetry to the relevant organs, modification of radiation doses appropriate to adult and/or pediatric patients and application of the ALARA principles. • Safe clinical practices – radiation safety and hygiene, pharmaceutical technology and aseptic techniques, application of current Good Radiopharmacy Practice (cGRPP), quality assurance, record keeping and waste management.	WIL Clinical Assessments	100%

	Nuclear Medicine Imaging Procedures: • Principles of adrenal, *parathyroid, myocardial perfusion, gastrointestinal, and renal imaging.* • Clinical application of medical and radiographic terminology • Clinical pertinent information such as; knowledge of specific indications for each examination, patient preparation, anatomical, physiological and pathological appearances related to adrenal, parathyroid, myocardial perfusion, gastrointestinal, and renal imaging. • Instrumentation- Selection of appropriate equipment, quality control and calibration of equipment. • Image acquisition - selection and modification of appropriate image acquisition parameters, gamma camera and patient positioning principles. • Patient care- application of the Batho Pele principles, patient radiation protection and ALARA principles. • Advanced data processing, Image interpretation and reporting- selection, application and manipulation of appropriate image processing tools and activities in adrenal, parathyroid, myocardial perfusion, gastrointestinal, and renal imaging, recognition of normal and abnormal patterns of radionuclide/radiopharmaceutical activity and identification of possible sources of error.		
Nuclear Medicine Imaging Sciences III	Gamma camera, Na I (T1) crystal, Photomultiplier tube Collimators, Parallel hole, Diverging, Converging, Pinhole, Others, Sensitivity, Resolution, Uniformity , Resolving time , Uniformity correction, Count density, Field uniformity & sensitivity, Photo peak calibration operational characteristics, Image Recording accessories , Image formation, CT scanners - principle of operation.' Quality control PET and PET/CT- Principle of operation- parts of the scanner In-vitro counting Other Imaging Modalities Radiopharmacy Sciences: "B" and "C" type laboratory ; advanced rules and regulations; principles and techniques for the separation of biological compounds, advanced quality control procedures associated with the eluate, generator elution, radiochemistry, radiopharmacology associated with specific organ systems; namely brain and cardiac.	Theory Assessment Project/Assignment/ Portfolio/Case Study	50% 50%
Nuclear Medicine Practice and Procedures IIIa	Radionuclide and Radiopharmaceuticals • Cardiac imaging agents- myocardial perfusion imaging • Nervous system - brain imaging agents • Breast imaging agents • Sentinel node imaging agents Nuclear Medicine Procedures: (this will include a theory and practical component) • Cardiac imaging - myocardial perfusion imaging • Genitourinary - renal imaging • Nervous system - brain imaging • Breast imaging • Sentinel node imaging • Other newer imaging applicable to the third level of study Note: Detailed information and Points to be noted as in NM Practice & Procedures Ia	Theory Assessment Project/ Assignment Portfolio/Case Study/	50% 50%

Nuclear Medicine Practice and Procedures IIIb	Radionuclide and Radiopharmaceuticals • Tumour and Infection imaging agents • Other newer radiopharmaceuticals Nuclear Medicine Procedures: (this will include a theory and practical component) • Tumour and Infection imaging • Imaging with labelled blood products • Other newer imaging applicable to the third level of study Note: Detailed information and Points to be noted as in NM Practice & Procedures 1a	Theory Assessment Project/ Assignment Portfolio/Case Study/	50% 50%
Clinical Nuclear Medicine Practice and Procedures III	Radiopharmacy: • Practical knowledge of the radiochemistry of radionuclides and radiopharmaceuticals used in nuclear medicine for tumor, infection, cardiovascular, nervous system, breast and lymphatic imaging procedures. • Radiopharmaceutical compound selection, handling, preparation, dispensing, quality control and administration. • Radiation protection- safe handling of radionuclides, safety procedures and radiation hazards, decontamination equipment, protocols and procedures, radiation dosimetry to the relevant organs, modification of radiation doses appropriate to adult and/or pediatric patients and application of the ALARA principles. • Safe clinical practices – radiation safety and hygiene, pharmaceutical technology and aseptic techniques, application of current Good Radiopharmacy Practice (cGRPP), quality assurance, record keeping and waste management. Nuclear Medicine Imaging Procedures: • Principles of tumor, infection, cardiovascular, nervous system, breast and lymphatic imaging procedures. • Clinical application of medical and radiographic terminology • Clinical pertinent information such as; knowledge of specific indications for each examination, patient preparation, anatomical, physiological and pathological appearances related to tumor, infection, cardiovascular, nervous system, breast and lymphatic imaging procedures. • Instrumentation- Selection of appropriate equipment, quality control and calibration of equipment. • Image acquisition - selection and modification of appropriate image acquisition parameters, gamma camera and patient positioning principles. • Patient care- application of the batho pele principles, patient radiation protection and ALARA principles. • Advanced data processing, Image interpretation and reporting- selection, application and manipulation of appropriate image processing tools and activities in tumor, infection, myocardial perfusion, renal, nervous system, breast and lymphatic nuclear medicine studies, recognition of normal and abnormal patterns of radionuclide/radiopharmaceutical activity and identification of possible sources of error. • Knowledge of appropriate interventions applicable to specific studies.	WIL Clinical Assessments	100%
Nuclear Medicine Imaging Sciences IV	<u>Equipment and Instrumentation</u> Scintillation detector systems Principles of scintillation detection Properties of detector materials	Theory Assessment Practical/Image Evaluation and Interpretation	40%

	Survey meter: Operating principles, Quality control consistent with NRC regulations Source selection Interpretation of QC results Dose calibrator; Operating principles, Types of quality checks, Frequency of quality checks, Source selection PET detector materials: . Sodium iodide (NaI), Bismuth germinate (BGO), Lutetium oxyorthosilicate (LSO), Gadolinium oxyorthosilicate (GSO) Terminology; Aperture size, Field of view, Overlap, Bed positions, Full ring tomograph, Partial ring tomograph, Panel detector Gamma PET camera Quality control; Normalization, Blank scan, Gains (singles) Cross-calibration, System performance, Scatter fraction Noise equivalent count rate, Theory of operation: Principles of coincidence detection True coincidence; Lines of response (LOR); Randoms Scatter; Delayed event; Coincidence window and timing Image formation and reconstruction: Sinograms, 2-D, 3-D, Fourier rebinding Single slice rebinding, Filtered back projection (FBP), Iterative reconstruction, Ordered subset expectation maximization (OSEM), Maximum likelihood expectation maximization (MLEM), Image filters, Matrix selection, Data processing and corrections: Normalization corrections, Decay corrections, Dead time corrections, Arc corrections, Randoms corrections, Scatter corrections, Attenuation corrections Radiation Protection Personal protection and monitoring • Area / facilities monitoring • Packaging and storage of radioactive materials • Radioactive decontamination • Disposal of radioactive waste • Medical events-definition and reporting, Radiation safety with positron decay, Hot cells, Facility monitoring considerations, Personnel • Exposure from patients Radiopharmacy: PET Radionuclides and Radiopharmaceuticals, Physical properties of radioactive materials, Types of emissions (decays), Energies, Decay rate and half-life (physical half-life), Radiopharmaceutical quality control, Clearance from the body (biological half-life), Kinetics of distribution in the body, dosage determination, Dosage preparation and administration, assay in dose calibrator, proper radiopharmaceutical labeling, administration records, PET radiopharmaceutical principles (Positron decay, coincidence events.	Project/Assignment/ Portfolio/Case Study	60%
Nuclear Medicine Practice and Procedures IVa	Radionuclides and Radiopharmaceuticals: • Physical properties of radioactive materials -PET/CT • Types of emissions (decays, . Energies, Decay rate and half-life (physical half-life), • Radiopharmaceutical quality control, • Clearance from the body (biological half-life), kinetics of distribution in the body, • Dosage determination, • Calculation of radiopharmaceutical/pharmaceutical doses, calculation of pediatric dose, volume determination • Dosage preparation and administration, • Verify correct radiopharmaceutical for exam, Assay in dose calibrator, Proper radiopharmaceutical labeling, Administration technique, Administration records • PET radiopharmaceutical principles, Positron decay, Positron energy and effect on resolution, coincidence events, Bremsstrahlung radiation • Decay factors, (HVL) – lead and concrete	Theory Assessment Project/ Assignment Portfolio/Case Study/	50% 50%

	Nuclear Medicine Procedures: (this will include a theory and practical component) • Colon cancer, Head/neck cancer, Oesophageal cancer, • Lung cancer, Breast cancer, Melanoma Note: Detailed information and Points to be noted as in NM Practice & Procedures 1a		
Nuclear Medicine Practice and Procedures IVb	Radionuclides and Radiopharmaceuticals: As in NM Practice and Procedures Iva Nuclear Medicine Procedures: (this will include a theory and practical component) • Lymphoma, Thyroid cancer, Ovarian cancer, Sarcoma, other Note: Detailed information and Points to be noted as in NM Practice & Procedures 1a	Theory Assessment Project/ Assignment Portfolio/Case Study	50% 50%
Clinical Nuclear Medicine Practice and Procedures IV	Radiopharmacy: • Radiochemistry- Physical, biological and chemical properties of radioactive materials used in PET/CT imaging, quality control • Radiopharmaceutical compound selection, handling, preparation, dispensing and dose/volume determination, quality control and administration • Radiation protection- safe handling of high energy (18F, Ga68) radionuclides, safety procedures and radiation hazards, decontamination equipment, protocols and procedures, radiation dosimetry to the relevant organs, modification of radiation doses appropriate to adult and/or pediatric patients and application of the ALARA principles. • Safe clinical practices – radiation safety and hygiene, pharmaceutical technology and aseptic techniques, application of current Good Radiopharmacy Practice (cGRPP), quality assurance, record keeping and waste management. Nuclear Medicine Procedures: • Principles of PET/CT imaging for Thyroid cancer, Ovarian cancer, Sarcoma, Colon cancer, Head/neck cancer, Esophageal cancer, Lung cancer, Breast cancer and Melanoma. • Clinical application of advanced medical and radiographic terminology. • Clinical pertinent information such as; knowledge of specific indications for each PET/CT examination, patient preparation, anatomical, physiological and pathological appearances related to specific tracers used in PET/CT imaging. • Instrumentation- Selection of appropriate equipment, quality control and calibration of PET/CT equipment. • Image acquisition - selection and modification of appropriate image acquisition parameters and patient positioning principles. • Patient care- application of the batho pele principles, patient radiation protection and ALARA principles. • Advanced data processing (PET-CT Fusion), Image interpretation and reporting- selection, application and manipulation of appropriate image processing tools and activities in PET/CT imaging, recognition of normal and abnormal patterns of radionuclide/radiopharmaceutical activity and identification of possible sources of error.	WIL Clinical Assessments	100%

BHSc in Radiotherapy Levels 1 to 4			
Radiation Treatment Sciences I	Basic Radiation physics Radiation physics of Radiotherapy Equipment Radiation Protection - Imaging and Target volume developments in imaging Quality Control	Theory Assessment Assignment/ Portfolio/ Case Study	50% 50%
Radiotherapy Practice and Procedures Ia	Common terminology relevant to radiation therapy and oncology practice and procedures. Description of basic Radiographic Positions • Head and Neck cancers, • Cancers of the GI tract, Chest -Lung cancer, • Pelvis Cancers - male & female reproductive system, Cancers in the urinary system Treatment planning and delivery • Mould room and Immobilisation devices • Simulation and Planning of various cancer treatments o Manual planning and calculations o Planning Units and CT Simulation Room & equipment preparation for planning & treatment delivery	Theory Assessment Project/Assignment/ Practical	50% 50%
Radiotherapy Practice and Procedures Ib	Modalities available for cancer treatment (Surgery, Chemotherapy, Radiation Therapy): Conventional (Xrt , 3D- CRT, IMRT, Rapid-Arc, Stereo-tactic radiotherapy), immunotherapy, Hormonal therapy, Radio Nuclide therapies Treatment delivery • Mould room and Immobilisation devices • Simulation and Planning of various cancer treatments • Manual planning and calculations • Room & equipment preparation for planning & treatment delivery • Describe the indications, contra-indications, side effects and emergency drugs for contrast media used in radiotherapy Modalities available for cancer treatment o Surgery, Chemotherapy, Radiation Therapy Equipment: • Treatment Units, • Planning Units and CT Simulation, Brachytherapy and Treatment Accessories	Theory Assessment Project/Assignment/ Practical	50% 50%
Clinical Radiotherapy Practice and Procedures I	**UNIT I** - Treatment delivery at WIL centres (Prepare the patient for a radiotherapy procedure): • Patient identification, informed consent, explanation of XRT procedure, patient care pre-during-post radiotherapy, infection control, • The use of the mould room and the type of immobilization devices used for therapy	WIL Clinical	

	treatment. Masks/Shells, Vaclok, Bite-Blocks, Breast-board, Hip, Knee, Ankle fixation devices, • Simulation and Planning of various cancer treatments, • Manual planning and calculations, • Prepare the room, equipment and accessories for a radiotherapy planning and treatment delivery, • Identify and describe contrast media used during preparatory imaging for radiotherapy CT simulation, planning and treatment, • Describe the indications, contra- indications, side effects and emergency drugs for contrast media used in radiotherapy (acute, acute-chronic, chronic side effects of radiotherapy). **UNIT 2** – Treatment delivery Treatment delivery at WIL centres (Perform the following in the radiotherapy procedure): • ***ASSESS*** patient and his/her history prior to commencement of radiation planning and treatment in terms of:- i)-tumour classification ii)-diagnostic and staging procedures iii)-presenting signs and symptoms iv)-the correlation of disease with epidemiological and aetiological patterns. • ***LOCALISE*** tumour using appropriate tumour localisation methods and use such information to plan radiotherapy treatment. • ***PLAN*** patients using manual and computer methods AND to gain further experience in mould-room techniques and calculate measurements for compensators. • ***PERFORM*** treatment time/monitor dose calculations for a variety of treatment set-ups. Students are expected to be knowledgeable of the manual calculation methods. • ***ACCURATELY*** treat patients, operating all department equipment under supervision by a qualified person. • ***GAIN*** competency in the various sites / systems including thorax, head and neck, pelvis, abdomen. • ***ASSIST*** with quality assurance of patient treatment set-ups, verification films checking treatment vs. planning parameters. • ***MAINTAIN*** accurate records and statistics of all treatment given. • ***COMMUNICATE*** with patients-emphasis particularly on providing patient with concise and correct information about skin care, side effects of treatment, diet, etc.	Assessments	**100%**

Radiation Treatment Sciences II	Radiobiology Basic Radiation physics Radiation physics of Radiotherapy Equipment Basic principles of operation; basic quality control: - CT Scanners for Virtual and CT-simulation - Radiotherapy Planning Systems for 3D planning - PET/CT Scanner -Radiation protection -Imaging and -Target volume -Image interpretation in radiotherapy -Quality Control	Theory Assessment Project/Assignment/ Portfolio/Case Study	50% 50%
Radiotherapy Practice and Procedures IIa	Treatment of malignancies: Aetiology, Epidemiology, Signs and symptoms, Staging, Treatment modalities, Radiotherapy treatment, planning and treatment delivery for the following: • Integumentary system • Bone tumours • Soft tissue tumours • Breast • Haemopoeitic and lymphatic systems	Theory Assessment Project/ Assignment	40% 60%
Radiotherapy Practice and Procedures IIb	Treatment of malignancies: Aetiology, Epidemiology, Signs and symptoms, Staging, Treatment modalities, Radiotherapy treatment, planning and treatment delivery for the following: • Special senses: eye and ear • Endocrine system- • Nervous system • Paediatrics • Non-malignant conditions • Emergency radiotherapy	Theory Assessment Project/Participation	40% 60%
Clinical Radiotherapy Practice and Procedures II	**UNIT I** - Treatment delivery at WIL centres (Prepare the patient for a radiotherapy procedure): • Patient identification, informed consent, explanation of XRT procedure, patient care pre-during-post radiotherapy, infection control, • The use of the mould room and the type of immobilization devices used for therapy treatment. Masks/Shells, Vaclok, Bite-Blocks, Breast-board, Hip, Knee, Ankle fixation devices, • Simulation and Planning of various cancer treatments, • Manual planning and calculations, • Prepare the room, equipment and accessories for a radiotherapy planning and treatment delivery, • Identify and describe contrast media used during preparatory imaging for radiotherapy CT simulation, planning and treatment,	WIL Clinical Assessments	**100%**

	• Describe the indications, contra- indications, side effects and emergency drugs for contrast media used in radiotherapy (acute, acute-chronic, chronic side effects of radiotherapy). **UNIT 2** – Treatment delivery Treatment delivery at WIL centres (Perform the following in the radiotherapy procedure): • ***ASSESS*** patient and his/her history prior to commencement of radiation planning and treatment in terms of:- i)-tumour classification ii)-diagnostic and staging procedures iii)-presenting signs and symptoms iv)-the correlation of disease with epidemiological and aetiological patterns. • ***LOCALISE*** tumour using appropriate tumour localisation methods and use such information to plan radiotherapy treatment. • ***PLAN*** patients using manual and computer methods AND to gain further experience in mould-room techniques and calculate measurements for compensators. • ***PERFORM*** treatment time/monitor dose calculations for a variety of treatment set-ups. Students are expected to be knowledgeable of the manual calculation methods. • ***ACCURATELY*** treat patients, operating all department equipment under supervision by a qualified person. • ***GAIN*** competency in the various sites / systems including thorax, head and neck, pelvis, abdomen. • ***ASSIST*** with quality assurance of patient treatment set-ups, verification films checking treatment vs. planning parameters. • ***MAINTAIN*** accurate records and statistics of all treatment given. • ***COMMUNICATE*** with patients-emphasis particularly on providing patient with concise and correct information about skin care, side effects of treatment, diet, etc.		
Radiation Treatment Sciences III	-Clinical radiation beam dosimetry -Measurement of radiation output for radiation beams -Filters in radiotherapy -Radiotherapy treatment apparatus -Radiation protection -Particle beams in radiotherapy -Practical radiotherapy and fractionation (radiobiology) -Radioactivity	Theory Assessment Project/Assignment/ Portfolio/Case Study	50% 50%

Radiotherapy Practice and Procedures IIIa	**Integumentary system** – Staging, histopathological types, tumour localisation and treatment planning, dose fractionation, total skin irradiation. **Bone tumours** – Staging, histopathological types, cytotoxics, immunotherapy, neutron therapy, hemi-body therapy. **Soft tissue tumours** - Interstitial brachytherapy and neutron therapy. **Breast** - Clinical mark-up, electron treatment, hormonal treatment Immobilisation methods, megavoltage and DXR techniques, and brachytherapy.	Theory Assessment Assignment	40% 60%
Radiotherapy Practice and Procedures IIIb	**Haemopoeitic and lymphatic systems** – Immunotherapy, dose fractionation, total body irradiation. **Special senses: eye and ear** – Cryotherapy, brachytherapy **Endocrine system** - Hormonal therapy, unsealed Iodine -131, stereotactic radiosurgery. **Nervous system** – Brachytherapy, immunotherapy, stereotactic radiotherapy, hyper fractionation. **Paediatric** - Bone marrow transplant, brachytherapy, isotope therapy. **Non-malignant** – DXR or electron – keloids, beta plaque – pterygium Iodine-131. **Treatment techniques and protocols for all of the above.**	Theory Assessment Project/ Assignment	40% 60%
Clinical Radiotherapy Practice and Procedures III	**UNIT 1** - Treatment delivery at WIL centres (Prepare the patient for a radiotherapy procedure): • Patient identification, informed consent, explanation of XRT procedure, patient care pre-during-post radiotherapy, infection control, • The use of the mould room and the type of immobilization devices used for therapy treatment. Masks/Shells, Vaclok, Bite-Blocks, Breast-board, Hip, Knee, Ankle fixation devices, • Simulation and Planning of various cancer treatments, • Manual planning and calculations, • Prepare the room, equipment and accessories for a radiotherapy planning and treatment delivery, • Identify and describe contrast media used during preparatory imaging for radiotherapy CT simulation, planning and treatment,	WIL Clinical Assessments	100%

	• Describe the indications, contra- indications, side effects and emergency drugs for contrast media used in radiotherapy (acute, acute-chronic, chronic side effects of radiotherapy). **UNIT 2** – Treatment delivery Treatment delivery at WIL centres (Perform the following in the radiotherapy procedure): • ***ASSESS*** patient and his/her history prior to commencement of radiation planning and treatment in terms of:- i)-tumour classification ii)-diagnostic and staging procedures iii)-presenting signs and symptoms iv)-the correlation of disease with epidemiological and aetiological patterns. • ***LOCALISE*** tumour using appropriate tumour localisation methods and use such information to plan radiotherapy treatment. • ***PLAN*** patients using manual and computer methods AND to gain further experience in mould-room techniques and calculate measurements for compensators.		
Radiation Treatment Sciences IV	Radiobiology - Other Radiation Modalities Advanced Radiotherapy Equipment: Planning and Treatment with Advanced Methods and Techniques: • Advanced immobilisation devices • Thermoplastic shells, precise mouth-bite, custom head rests, vaclok, hip-fix, knee-fix, ankle-fix, breast board • Virtual simulation, CT simulation • Contrast agents • Fusion imaging modalities – CT, PET, MRI, US • 4DTIC-Trilogy, IGRT, respiratory gating • IMRT vs 3D Conformal XRT • Rapid arc / VMAT vs IMRT • Stereotactic radiotherapy Radiation Protection – advanced principles Technological Advances • PACS • Image Recording Devices Quality Control and Advanced Performance Tests Clinical Safety	Theory Assessment Assignment/ Portfolio/Case Study	40% 60%
Radiotherapy Practice and Procedures IVa	Advanced treatment planning: • Intensity Modulated Radiotherapy (IMRT) vs 3D conformal radiotherapy planning, quality assurance and quality control, advantages and disadvantages). • Virtual-simulation, quality assurance and quality control, advantages and		

	disadvantages. • VMAT treatment planning versus IMRT) Advanced treatment delivery: • Image Guided Radiotherapy – IGRT, quality assurance and quality control, immobilization and application • Respiratory gating, advantages and disadvantages, and application • Rapid arc treatment delivery, quality assurance ad quality control, immobilisation, advantages and disadvantages, and application • Stereotactic radiosurgery, immobilisation, quality assurance and quality control, advantages and disadvantages, and application	Theory Assessment Project/Assignments	50% 50%
Radiotherapy Practice and Procedures IVb	Advanced treatment planning: • Intensity Modulated Radiotherapy (IMRT) vs 3D conformal radiotherapy planning, quality assurance and quality control, advantages and disadvantages). • Virtual-simulation, quality assurance and quality control, advantages and disadvantages. • Rapid arc treatment planning versus IMRT) Advanced treatment delivery: • Image Guided Radiotherapy – IGRT, quality assurance and quality control, immobilization and application • Respiratory gating, advantages and disadvantages, and application • Rapid arc treatment delivery, quality assurance ad quality control, immobilisation, advantages and disadvantages, and application • Stereotactic radiosurgery, immobilisation, quality assurance and quality control, advantages and disadvantages, and application	Theory Assessment Project/Assignments	50% 50%
Clinical Radiotherapy Practice and Procedures IV	**UNIT I** - Treatment delivery at WIL centres (Prepare the patient for a radiotherapy procedure): • Patient identification, informed consent, explanation of XRT procedure, patient care pre-during-post radiotherapy, infection control, • The use of the mould room and the type of immobilization devices used for therapy treatment. Masks/Shells, Vaclok, Bite-Blocks, Breast-board, Hip, Knee, Ankle fixation devices, • Simulation and Planning of various cancer treatments, • Manual planning and calculations,	WIL Clinical Assessments	100%

	• Prepare the room, equipment and accessories for a radiotherapy planning and treatment delivery, • Identify and describe contrast media used during preparatory imaging for radiotherapy CT simulation, planning and treatment, • Describe the indications, contra- indications, side effects and emergency drugs for contrast media used in radiotherapy (acute, acute-chronic, chronic side effects of radiotherapy). **UNIT 2** – Treatment delivery Treatment delivery at WIL centres (Perform the following in the radiotherapy procedure): • ***ASSESS*** patient and his/her history prior to commencement of radiation planning and treatment in terms of:- i)-tumour classification ii)-diagnostic and staging procedures iii)-presenting signs and symptoms iv)- the correlation of disease with epidemiological and aetiological patterns. • ***LOCALISE*** tumour using appropriate tumour localisation methods and use such information to plan radiotherapy treatment. • ***PLAN*** patients using manual and computer methods AND to gain further experience in mould-room techniques and calculate measurements for compensators. • ***PERFORM*** treatment time/monitor dose calculations for a variety of treatment set-ups. Students are expected to be knowledgeable of the manual calculation methods. • ***ACCURATELY*** treat patients, operating all department equipment under supervision by a qualified person. • ***GAIN*** competency in the various sites / systems including thorax, head and neck, pelvis, abdomen. • ***ASSIST*** with quality assurance of patient treatment set-ups, verification films checking treatment vs. planning parameters. • ***MAINTAIN*** accurate records and statistics of all treatment given. • ***COMMUNICATE*** with patients-emphasis particularly on providing patient with concise and correct information about skin care, side effects of treatment, diet, etc.		

CHE – Council of Higher Education * DHET – Department of Higher Education and Training

NB: Students are to read this section in conjunction with the relevant study guide.