National University

الجامعة الوطنية ـ السودان

National University - Sudan

M.Sc. Diagnostic Medical Radiography Introduction

Introduction

Diagnostic Medical Radiography is an entry-to-practice program. It qualifies specialists in medical Radiography (CT &MRI) to provide trusted accurate diagnosis for prevention and treatment of diseases. For this, the program has adopted hands-on practical learning module. The module integrates clinical applications, Radiography physics, Radiography identifications of: anatomy, physiology, pathology and patho-physiology of human body.

General objective

Qualify critical mass of Radiography specialists to work in health care units' universities and in research centers.

Specific objectives

- The program qualifies the students to:
- Identify the normal and abnormal anatomy patterns in Radiography images
- Use Radiography instrumentations
- Utilize advanced technologies in Radiography
- Apply quality control measures in Radiography

Implement strategies to minimize Radiography dose to patients.

- Efficiently teach, learn and communicate with peers and other healthcare colleagues.
- Conduct health and health-related research.

Expected learning outcomes

Upon completion of the program, successful graduates should be able to:

- Provide physician with apt anatomic, pathologic, and/or physiologic reports.
- Record, analyze, and process diagnostic data and other pertinent observations
made during the Radiography exam.
- Demonstrate appropriate communication skills with patients and colleagues;
- Behave in a professional and ethical manner;
- Apply good health Radiography practices.

Admission requirements

Applicants must satisfy the general regulations set by the faculty of graduate studies and scientific research of National University for registration for master degrees.

Eligible candidates are:

- Holders of B.Sc. Radiology Sciences: Diagnostic Imaging, Nuclear Medicine, Radiotherapy with grade C at least and pass an interview.

- Holders of B.Sc. Radiology Sciences in: Diagnostic Imaging, Nuclear Medicine, Radiotherapy with grade C at least with cGPA 2.5, out of 4.0 or 3.5 out of 5.0 and pass an interview

Study program

Semester One

Code	Course	Credit hours	Contact hours	
			Theory	Practical
RAD-511	Advanced Medical Education	1(1+0)	1	0
RAD-512	Applied Anatomy	3(2+1)	2	2
RAD-513	Applied Physiology	2(1+0)	2	0
RAD-514	Applied Pathology	2(2+0)	2	0
RAD-515	CT and MRI Physics and Instrumentation	2(2+0)	2	0

Semester Two

Code	Course	Credit hours	Contact hours	
			Theory	Practical
RAD-521	Applications of Computer in Radiology	2(2+0)	2	0
RAD-522	Normal Appearance of CT and MRI Investigation	2(2+0)	2	0
RAD-523	Quality Assurance and Patient Management	1(1+0)	1	0
RAD-524	Cross Sectional Anatomy	2(2+0)	2	0
RAD-525	Radiographic Pathology	2(2+0)	2	0
RAD-526	Ethics in Medical Imaging	1(1+0)	1	0
RAD-527	Clinical Applications of CT and MRI	4(0+4)	0	12

Semester Three

Code	Course	Credit hours	Contact hours	
			Theory	Practical
RAD-631	CT Scanning Procedures	3(3+0)	3	0
RAD-632	MRI Scanning Procedures	3(3+0)	3	0
RAD-633	Advanced Radiological Procedures	2(2+0)	2	0
RAD-634	Clinical Applications of CT and MRI	4(0+4)	0	8
RAD-635	Research Methods	2(2+0)	2	0

Semester Four

Code	Course	Credit hours	Contact hours	
			Theory	Practical
RAD-641	Clinical Applications of CT and MRI	4(0+4)	0	8
RAD-642	Dissertation	4(0+4)	0	8

Courses contents

RAD-511 Advanced Medical Education

Health profession education; Adult learning theories; Learning outcomes and skills acquisition; Instructional design (models); Instructional design (micro teaching); Formative Assessment; Communication in multidisciplinary teams; Simulation in multidisciplinary teams; Purposeful assessment; Reflection and feedback; Learning portfolios and Mentorship.

RAD-512 Applied Anatomy

Cardiovascular system; Lymphatic system; Respiratory system; Digestive system; Urinary system; Peritoneum; Developmental anatomy; Nervous system; General and special senses and autonomic nervous system.

RAD-513 Applied Physiology

Homeostasis; Body fluid; Cardiac cycle; Cardiac output; Blood; Respiratory; Platelets; Renal physiology; GIT physiology; Endocrine physiology; Male and female genital physiology.

RAD-514 Applied Pathology

Cell Injury; Apoptosis and necrosis; Adaptation to cell injury; Acute Inflammation; Sequel of acute inflammation; Inflammatory mediators; Intracellular accumulation; Chronic inflammation; Healing and repair; Neoplasia-1; Neoplasia-2; Carcinogenesis; Laboratory diagnosis of cancer o Genetic.

RAD-515 CT and MRI Physics and Instrumentation

Basic Physics of CT, CT Image Formation, CT Instrumentation and Components. CT Image Quality and Artifacts, Radiation Dose in CT, Basic Physics of MRI, MRI Signal Generation, MRI Instrumentation and Hardware, MRI Pulse Sequences, MRI Image Quality and Artifacts, MRI Safety and Applications.

RAD-521 Applications of Computer in Radiology

Digital Imaging Basics, PACS Systems, RIS and HIS Overview, Image Processing Techniques, DICOM Standards, 3D Imaging and Reconstruction, Artificial Intelligence in Radiology, Teleradiology, Data Storage and Management, Cybersecurity in Radiology, Future Trends in Radiology IT.

RAD-522 Normal Appearance of CT and MRI Investigation

Normal Brain CT Appearance, Brain MRI Appearance, Chest CT Appearance, Abdominal CT, Spine MRI Appearance, Musculoskeletal MRI Appearance, CT vs MRI: Normal Differences, Normal Variants in CT and MRI, Cross-sectional Anatomy in CT and MRI.

RAD-523 Quality Assurance and Patient Management

Quality Control in CT and MRI, Equipment Performance Testing, Radiation Safety and Protection, Patient Preparation and Care, Patient Positioning Techniques, Infection Control in Radiology, Patient Communication and Ethics, Risk Management in Imaging Departments, Documentation and Reporting Standards.

RAD-524 Cross Sectional Anatomy

Axial Anatomy of the Brain, Axial Anatomy of the Chest, Axial Anatomy of the Abdomen, Axial Anatomy of the Pelvis, Coronal and Sagittal Anatomy, CT Cross Sectional Anatomy Review, MRI Cross-Sectional Anatomy Review, Anatomical Variants in Cross-Sectional Imaging, Clinical Correlation in Cross-Sectional Anatomy.

RAD-525 Radiographic Pathology

Basic Principles of Pathology in Imaging, Inflammatory Diseases in Imaging, Infectious Diseases on Radiographs, Neoplastic Lesions in Imaging, Trauma and Fracture Imaging, Chest Pathology (X-ray, CT), Abdominal Pathology in Imaging, Musculoskeletal Pathology, Neurological Pathology in CT and MRI, Common Radiographic Signs, Differential Diagnosis in Imaging.

RAD-526 Ethics in Medical Imaging

Introduction to Ethics; Medico-legal issues in radiology; Principles of ethics; ARRT standard of ethics; Confidentiality; Informed consent and negligence.

RAD-527 Clinical Applications of CT and MRI

Knobology of radiography; Positioning of patients for radiography; Patient preparation for radiography; Normal CT and MRI appearance of organs: abdomen, and chest; Examination protocols of abdomen, obstetrics and chest; Evaluation of abnormalities; Writing diagnostic reports.

RAD-631 CT Scanning Procedures

Patient Preparation for CT, CT Protocols and Techniques, Contrast Media in CT, CT Scan Positioning, Scanning Parameters (kVp, mAs, Slice Thickness), CT Safety and Radiation Protection, Multiphase CT Studies, Post-Processing and Reconstruction, Emergency CT Procedures, Quality Control in CT Scanning.

RAD-632 MRI Scanning Procedures

Patient Preparation for MRI, MRI Safety Screening, MRI Protocols and Techniques, Patient Positioning in MRI, MRI Coil Selection and Setup, Contrast Media in MRI, MRI Pulse Sequence Selection, Image Acquisition Parameters, Motion Reduction Techniques, Post-Processing in MRI, Emergency MRI Procedures.

RAD-633 Advanced Radiological Procedures

Angiography Techniques, CT-Guided Procedures, MRI-Guided Interventions, Biopsy Techniques in Imaging, Drainage Procedures, Vascular Interventions (Stents & Embolization), Emergency Interventional Procedures, Radiation Safety in Interventions, Post-Procedure Care and Complications.

RAD-634 Clinical Applications of CT and MRI

Knobology of Radiography; Positioning patients for Radiography; Patient preparation for Radiography; Normal CT and MRI appearance of organs: vascular, small parts and musculoskeletal; Examination protocols of vascular, small parts and musculoskeletal; Evaluation of abnormalities; Writing diagnostic reports.

RAD-635 Research Methods

Layout of thesis; definition and importance of research; Characteristics of research; Classification of health research; Identify a research topic: Introduction (problem of the study, objective, significance and overview), Literature review (theoretical background and previous studies); Materials and methods (materials, design, population, sample, method of data collection and analysis, ethical approval); Research proposal, Results, discussion and conclusion; References citation and bibliography; Central tendency and dispersion; Association; Tests of significance; Statistical decision theory.

RAD-641 Clinical Applications of CT and MRI

Advanced CT and MRI and clinical applications of Radiography in medicine.

RAD-642 Dissertation

Scientific writing of dissertations: Preliminaries; Introduction; Literature Review; Materials and Methods; Results; Discussion; References; Appendices.

Human resource and facilities

Teaching staff:

- One professor
- Two associate professors
- Four assistant professors
- One lecturer

Facilities:

Rooms: One lecture room: 42 seats

Laboratories: Radiology Lab: 15 seats

Hospitals:

Alraqi University Hospital; Primary Health care (PHC); Royal Care International Hospital; Dar Elag Hospital; Alribat Teaching Hospital; Omar Sawie Hospital; Military Hospital; Antalya Medical Centre; Alemtiaz Hospital; Alneeleen Diagnostic Centre

Libraries:

- National University Main Library: 400 seats
- E- Library: 250 seats

Duration of the program: Four semesters: 52 weeks

Teaching modules: Lectures, group discussion, workshops

Examination regulations

- Abide by the examinations rules of the general regulations of the graduate studies of the National University-Sudan
- A student failing any supplementary examination should repeat the course.
- Duration of the dissertation shall be 16 weeks. If need be, an extension of 4 weeks is allowed if approved by the program coordinator.
- Exceeding the aforementioned period the student has to settle a one semester fees to allow her/him an extension of four weeks.

- Expiring the extension periods without completing the dissertation, the student shall be dismissed from the program.
- A student scoring less than 60% in the dissertation oral examination will be allowed only one chance for oral defense. In such case the student should settle 50% of one semester fees.

Assessment:

Continuous assessment	25%
Mid examination	25%
Final examination	50%

Grading system: A+ (≥ 85) A (80- 84) B+ (70- 79) B (65-69) C (60-64) F (> 60)

Award of the degree

The Scientific Council of the National University, based on the recommendation of the board of the Faculty of Graduate Studies and Scientific Research, shall award the successful candidate

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