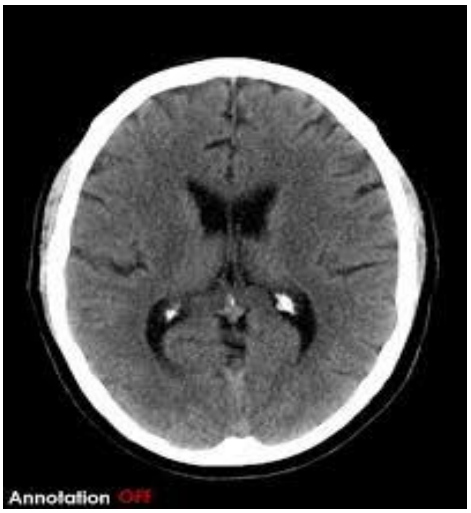
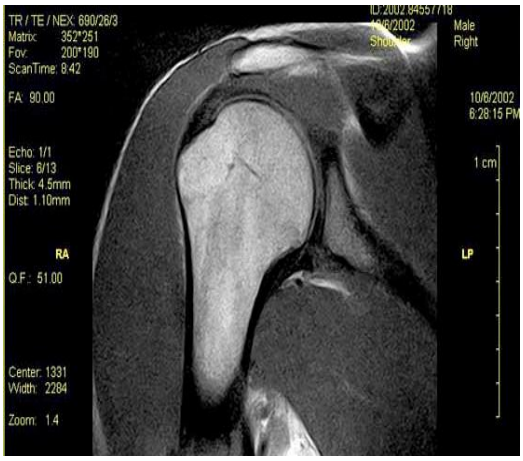
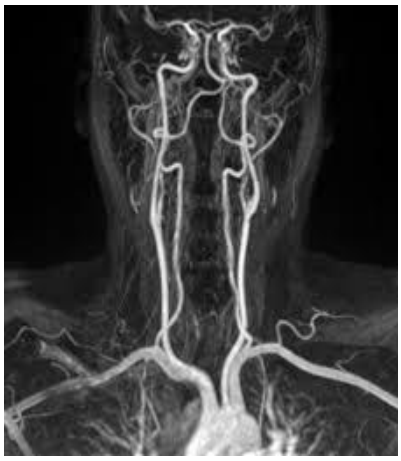
National University-Sudan
Faculty of Graduate Studies and Scientific Research
Faculty of Radiography and Medical Imaging Sciences



M.Sc. Medical Diagnostic Radiography





M.Sc. Medical Diagnostic Radiography

General introduction

Medical Diagnostic Radiography is an entry-to-practice program. It qualifies specialists in medical technology to provide trusted accurate image for diagnosis and treatment of diseases. For this, the program has adopted hands-on practical learning module to grantee high quality services.

General objective

Qualify critical mass of diagnostic 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 CT and MRI images
- Use CT and MRI instrumentations
- Employ advanced technologies in CT and MRI
- Apply quality control measures in CT and MRI
- Implement strategies to minimize the radiation dose to patients.
- Efficiently communicate with peers and other healthcare colleagues
- Conduct health and health-related researches

Expected learning outcomes

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

- Operate diagnostic radiographic instrumentation to optimise image quality and minimise radiation dose or other potential patient hazards
- Employ protocols and techniques associated with diagnostic and interventional radiographic examinations procedures
- Identify normal and abnormal imaging appearances within current diagnostic radiographic procedures
- Use patient information management systems.

Admission requirements

- Satisfy the general regulations set by the faculty of graduate studies and scientific research of National University for registration for master degree.
- Eligible candidates are:

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

(b) 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(1+1)	1	2
RAD-522	Normal Appearance of CT and MRI Investigation	2(2+0)	2	0
RAD-523	Quality Assurance and Patient Management	2(1+1)	1	2
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	2(0+2)	0	8

Semester Three

Code	Course	Credit hours	Contact hours	
			Theory	Practical
RAD-631	CT Scanning Procedures	3(2+1)	2	2
RAD-632	MRI Scanning Procedures	3(2+1)	2	2
RAD-633	Advanced Radiological Procedures	2(2+0)	2	0
RAD-634	Clinical Applications of CT and MRI	4(0+4)	0	12
RAD-635	Research Methodology	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	12
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; 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; Introduction to genetics.

RAD-515 CT and MRI Physics and Instrumentation

Computed tomography: Physical principle and clinical applications; CT image quality; Image manipulation; Image reconstruction; Image artifact; Pitch; CT dose; Effect CT and MRI machines parameter in image contrast; Quality control in CT and MRI; Physical principles of MRI: Excitation, relaxation and processing; MRI equipment; Pulse sequence-1; Pulse sequence 2; Image quality and contrast; Factors affecting image quality; MRI artifacts; MR safety.

RAD-521 Applications of Computer in Radiology

Introduction to computer and program flow chart; Computerized tomography image formation; Magnetic resonance image formation; Application of computer in Nuclear

Medicine (planner, SPECT and PET); Ultrasound image formation; Introduction to image processing (Digital image, enhancement and texture analysis).

RAD-522 Normal Appearance of CT and MRI Investigation

Introduction; Plane evaluation in CT and MRI; Normal radiographic anatomy CT and MRI of: brain , neck, chest upper abdomen, abdomen, male and female pelvis, knee and ankle joints femur and legs, upper limp, breast upper limp, breast.

RAD-523 Quality Assurance and Patient Management

Definition Quality control; Quality assurance and six sigma; Radiation protection measures in radiology department; of Image quality tests; Parameters to be checked in ultrasound unit;, CT unit, and MRI scanner; Measure Quality in Radiology; Factors causing image problems.

RAD-524 Cross Sectional Anatomy

Introduction; Plan evaluation in human anatomy; Cross section anatomy of: brain, neck, chest, upper abdomen, abdomen, male and female pelvis, knee and ankle joints, femur and legs, upper limp, breast, lower limp.

RAD-525 Radiographic Pathology

General concepts; Making best use of radiology; Acute abdomen, Abdomen and hepatic biliary systems; Bone pathology and tumors; Chest pathology; Cardiovascular pathology; GIT disorder; Haemodynamic disorders; Musculoskeletal; Urinary pathology; Central nervous system pathology; Inflammatory and metabolic disorders; Gynecological pathology.

RAD-526 Ethics in Medical Imaging

Introduction to Ethics; Medico-legal Issues in Radiology; Principle of ethics; ARRT Standards of Ethics; Confidentiality; Informed consent and Negligence.

RAD-527 Clinical Applications of CT and MRI

Equipment and accessories of CT and MRI; Safety and precautions measures in CT and MRI; Warm up (CT); Scheduling cases; Positioning of patient and CT and MRI protocols; Routine investigations and special protocols; Contrast agent of CT and MRI.

RAD-631 CT Scanning Procedures

Introduction to technique; Brain; Chest; Abdomen; Pelvis; Ischemic stroke protocol and soft tissue of neck; Contrast agents; COW (Brain Angio) Sinuses+IAC protocols; CT radiation dose; CT spines and limbs; CT artifacts and Patient's care in CT

RAD-632 MRI Scanning Procedures

Introduction; Parameters and trade-offs; Head and neck; Chest and mediastinum; Abdomen and liver protocol; Pelvis (Male and Female); Soft tissue of neck MRI; Knee and Ankle MRI; Posterior fossa and internal auditory meatus; PNS; Thyroid and parathyroid gland; MRI safety; MRCP; Cardiac MRI; Breast; TMJ and vascular imaging; Spine; Musculoskeletal; Thymus; Upper and lower limbs.

RAD-633 Advanced Radiological Procedures

Cardiac imaging (CT, MRI); Virtual colonoscopy; Entrography and entroclysis; MRS; FMRI.

RAD-634 Clinical Applications of CT and MRI

Advanced protocol in CT and MRI; CT and MRI angiographic protocols; Cardiac investigations; Pediatric scan.

RAD-635 Research Methodology

General layout of thesis; Definitions and importance of research; Characteristics of research; Classification of health research; Criteria of a research topic and selection; 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 conclusions; References citation and bibliography; Central tendency and dispersion; Association; Significance tests; Statistical decision theory.

RAD-641 Clinical Applications of CT and MRI

Diagnostic medical imaging management; CT and MRI routine and advanced Investigations; Emergency CT scan

RAD-642 Dissertation

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

Human resource and facilities

Teaching staff: One professor
Four associate professors
Four assistant professors
Two lecturers

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, Case studies, 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^+ ($\geq$ 85) A (80 – 84) B^+ (70 – 79) B (65 – 69) C (60-64) F (<٦٠)

Award of the degree

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

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