

COURSES OFFERED BY THE DEPARTMENT OF RADIOGRAPHY/RADIOTHERAPY

FIRST YEAR FIRST SEMESTER

AH 1107 Basic Biochemistry (Credits-02)

Structure and function of cell organelles, structure and function of carbohydrates, lipids, amino acids, proteins and nucleic acids, biochemical tests for identification of carbohydrates, lipids & proteins, pH and buffers, enzyme properties and kinetics, chemistry & function of haemoglobin, chemistry and functions of vitamins, plasma protein and their functions, metabolism of carbohydrates, lipids, proteins and amino acids, integration and regulation of metabolic pathways.

Mid semester -20% -T

End semesters -80% -T

RA 1101 General Physics (Credits-02)

Fundamentals of Physics, Electricity and Magnetic phenomena, Solid state Physics and Nuclear Physics.

Mid semester -20% -T

End semesters -80% -T

RA 1102 Electronics & Instrumentation (Credits-01)

Introduction to Electricity and Electronics, Instrumentation, Concept of transducers, Operation of different transducers, Digital Electronics, Process automation concepts, Equipment maintenance and calibration.

Assignments – 25% End semester: 75% -T

RA 1103 Medical Imaging Equipment –I (Credits-02)

Assembly of the X-ray unit, Main electrics and circuits, Methods of scatter control.

Mid semester -25% -T

End semesters -75% -T

RA 1104 Radiobiology (Credits-01)

Radiation interactions at cellular and tissue levels, Biological basis of radiation cell killing, Biological, Physical and Chemical factors affecting cellular radiosensitivity, Radiation effects on normal tissues, Radiation carcinogenesis, Genetic effects, Radiation effects on developing embryo.

Mid semester -25% -T

End semesters -75% -T

RA 1206 Radiation Protection-1 (Credits-01)

Quantities and units used in Radiation Protection, Background radiation, Biological effects of ionizing radiation, Introduction to external and internal hazards of radiation and methods of evaluation, Elements of a Radiation Protection Programme, National and International Regulations and Standards, Basic principles of Radiation Protection, Personal dosimetry and work place monitoring; visiting a radiation facility.

Mid semester -25% -T End semesters -75% -T

RA 1207 Care of Patient -1 (Credits-01)

Routine patient care in an X-ray Department/Radiotherapy unit, Effective communication and team work/handling adult patients, First Aid, Infection and cross infection, Introduction to care of patients with tubes and catheters (Urinary catheters, Colostomy, NG tubes, IV drips, drainage bags), Care of paediatric and elderly patients, CPR.

Mid semester -20% -T End semesters -80% -T

SECOND YEAR FIRST SEMESTER

RA2101 Principles of Nuclear Imaging (Credits-02)

Basic principles of nuclear imaging, Radiopharmaceuticals in nuclear imaging, Production of radiopharmaceuticals, Instrumentation in nuclear medicine imaging, Techniques of Nuclear Medicine Imaging, Quality assurance in nuclear imaging, Quality control of Nuclear Medicine Equipment

Mid semester -25% -T End semesters -75% -T

RA 2102 Fluoroscopy & C arm: Principles & Equipment (Credits-02)

Basic Principles of fluoroscopy image formation, Fluoroscopic X-ray tube setup and cooling chart, Image intensifier, Camera system and Viewing of fluoroscopy image, Fluoroscopy Image recording, Fluoroscopy table assemblies and accessories, Patient preparation, Duties and responsibilities of radiographer, Image quality and quality assurance, Radiation protection, Introduction to C arm, Applications of C arm and Fluoroscopy.

Assessments/ Labs -20% End semesters -60%- T, 20% - P

RA 2103 Computed Tomography- I (Credits-02)

Basic principles of CT, Evolution of CT, Generations of CT, Data processing and image formation in digital imaging, Hardware.

Mid semester -30% End semesters -70% -T

RA 2104 Basics of Maintenance of Equipment (Credits-01)

Health and safety in maintenance work, Management of medical equipment, Preventive and corrective maintenance, Basic electricity and electronics, Instrumentation.

Mid semester -20% End semesters -80% -T

RA 2105 Ethics in Medical Radiation Technology & Forensic Radiography (Credits-01)

Ethical Issues: Values, Ethical schools of thought, Principles of Beneficence and Non maleficence, Patient Autonomy and Informed Consent, Truthfulness and Confidentiality, Student Rights, Diversity and Caring, and Challenges, Forensic Radiography.

Assessments -20% End semesters -80% - T

RD 2101 Mammography (Credits-01)

Anatomy and Physiology of the breast, Physics for mammography, Basic principles and terminology, Equipment and Accessories, Image recording system, Basic projections, positioning of the patient and exposure factors, Supplementary projections, Breast biopsy and localization, Radiation protection, Other methods of breast imaging, Quality Assurance, Epidemiology of Breast Cancer.

Mid semester -20% -P End semesters -80% -T

RD 2102 Special Techniques of Plain Radiography (Credits-02)

Special projections for Upper limb, Lower limb, Spine, Chest, Skull, PNS and Mandible.

Mid semester -20% -T End semesters -40%- T, 40% - P

RD 2103 Care of Patient II - Radiography (Credits-02)

Surgical asepsis and the role of Radiographer, Medical emergencies in diagnostic imaging, Trauma and mobile radiography, Care of patients during special contrast study examinations, CT, MRI, Nuclear Imaging, Pharmacology for radiographers, Psychology of illness, Vital Signs.

Mid semester -20% -T End semesters -80%- T

RD 2104 Radiation Protection – II for Diagnostic Radiographers (Credits-02)

Establishment of an occupational public and medical exposure control programme, Safe transport of radiation sources, Safe management of radioactive wastes, Factors affecting doses (in X-rays, CT, Fluoroscopy & Mammography), Methods of dose reduction (guidelines & recommendations with emphasis on patient protection), Patient dose estimation for exposure to X-ray, Protective Shielding and designing of diagnostic radiology & Nuclear Medicine facilities, Safety Aspects of MRI, Radiation protection through Quality Assurance of machines (QC testing of X-ray, dark room procedures), Radiation survey instruments, Instruments used for patient dose estimation.

Mid semester -20% - T End semesters -80%- T

SECOND YEAR SECOND SEMESTER

RA 2201 Computed Tomography-II (Credits-02)

Technique of CT, Brain, chest, abdomen and pelvis, spine, extremities, Respiratory system (HRCT) Lungs and mediastinum, Gastro Intestinal System (Larynx, Pharynx, Oesophagus), CT (enteroclysis, colonography), Urinary system (CTU stone and contrast CTU), Reproductive system, Cardiovascular system (Coronary CT, CTA), Endocrine System (Pituitary gland, adrenal glands & thyroid glands), Central Nervous System (orbits, cranial nerves, PNS), Vertebral column (3D reconstruction), Lymphatic System Paediatric CT.

Assignments-20% End semesters -80%- T

RD 2201 Techniques of Fluoroscopy and Contrast Studies (Credits-02)

Introduction to contrast media, Techniques used in investigating Gastrointestinal system Urinary system, Reproductive system, Vascular system and Hepato biliary system.

Assignments-20% End semesters -80%- T

RD 2202 Practice of Basic Techniques of Plain Radiography (Credits-04)

Basic Techniques of Upper limb, Lower limb, Vertebral column, Chest, Skull and Abdomen

Assignments-40% End semesters -60%- P

**RD 2203 Applied Anatomy in Plain Radiography, Mammography & Contrast Studies
(Credits-01)**

Radiographic anatomy of Basic and special techniques of skull, spine, abdomen chest, upper limb and lower limb, Mammography projections, Contrast studies of, GIT, urinary, hepatobiliary, cardiovascular, respiratory and reproductive systems.

Mid semester -30% End semesters -70%- P

RD 2204 Practice of Imaging Principles (Credits-02)

Designing of a dark room, Dark room equipment/ Radiographic Processing Practice (Cycle time, capacity, feed section, Developer section, Fixer section Washing section / drying section, Replenishments, Auto processors for special film Care and maintenance of auto processor), Radiographic Image artifacts, Film Storage (Storage areas, Storage conditions, Stock control, Ordering).

Mid semester -25% End semesters -75%- P

RD 2205 Quality Assurance in Diagnostic Radiography (Credits-02)

Quality System, Quality Assurance and Quality Control Radiographic, Quality control reproducibility, Light beam diaphragm, Grid alignment, Image Recording, Processor Quality Control, Dark room safelight and light leakage test, Screen film contact testing, Screen cleaning, Quality control for Conventional Tomography, Quality control for Fluoroscopy System.

Assignments-25% End semesters -75%- T

RD 2207 Digital Radiography (Credits-01)

Digital Radiography and its components, Digital Image, Viewing the digital image, Digital display quality control and artifacts.

Mid semester -25% End semesters -75%- T

RD 2206 Magnetic Resonance Imaging-1 (Credits-02)

Basic Physics, Basic Principles of MRI, MR Instruments/Hardware, Safety Aspects of MRI, MR pulse sequences.

Mid semester -25% End semesters -75%- T

THIRD YEAR FIRST SEMESTER

RD 3101 Dental Radiography (Credits-02)

IOPA, Occlusal, Bite wing techniques, OPG, Cephalogram, Other extra oral radiograph.

Mid semester -30% End semesters -40%- T, 30%-P

RD3102 Practice of Special Techniques of Plain Radiography (Credits-02)

Wrist, shoulder Y view, Lower limb, Knee, Spine, Cervical spine, Dorsal spine, Lumbar spine, Chest, Skull, Cranium bones, Facial bones.

Continuous Assessment-20% End semesters -80%- P

RD 3103 Applied Imaging in Plain Radiography, Mammography & Contrast Studies (Credits-02)

Imaging in: Respiratory system pathology, Gastrointestinal tract pathology, Genitourinary tract pathology, Central nervous system pathology, Muscular-skeletal system pathology, Cardiovascular system pathology, Paediatric pathology, mammography.

Mid semester -20% End semesters -80%- T

RD 3104 Common Diseases of Man for Diagnostic Radiographers (Credits-01)

Overview of common diseases in man; Chest diseases, Cardiovascular diseases, Diseases of the liver, Diseases of the gastrointestinal tract, Diseases of the joints, Diseases of the central nervous system, Diseases of the kidneys.

Mid semester -25% End semesters -75%- T

RD 3105 Magnetic Resonance Imaging – II (Credits-02)

Fast pulse sequences: TSE, FLAIR, FIR, GRASE, Spoiled GRE, STIR, Advanced MR protocols, Functional MRI, Volume imaging, MR Spectroscopy, MR Angiography, Noble gas imaging, MRCP, paediatric imaging, Breast imaging, Chemical shift imaging, Patient preparation for MRI scans: Introduction to planes of the body (sagittal, coronal and transaxial), Techniques of MRI : brain, spine, chest, abdomen, upper extremity and lower extremity.

Mid semester -20% End semesters -50%-T 30%- P

RD 3106 Miscellaneous Imaging Techniques (Credits-01)

Deviations from the routine positioning of trauma and unconscious patients, Trauma tomography (foreign bodies), Skeletal survey, Imaging of soft tissues, Forensic radiography, Macro radiography, Bone densitometry, In ward radiography, Theatre radiography, Xeroradiography.

Mid semester -25% End semesters -75%- T

RD 3107 Practice of Magnetic Resonance Imaging –I (Credits-01)

Cross sectional imaging of MRI, Head, Neck, Chest, Breast, Abdomen, Pelvis, Temporomandibular joint, Upper limb, Lower limb, Whole spine and MR Angiography

Assessment-25% End semesters -75%- P

RD 3108 Care of Patient under Special Circumstances (Credits-02)

Age-specific care, care of impaired hearing, deafness patient, care of patient with burns and other common hazards, care of isolated patient, care of cardiac problems patient, care of patient with respiratory problems, care of shock, burn extremity fracture patient, care of anxious child, care of agitated or confused patient, care of head injury patient, care of spinal cord injured patient, care of patient with drainage tube, patient with communicable diseases.

Mid semester -25% End semesters -75%- T

THIRD YEAR SECOND SEMESTER

RD 3201 Applied Anatomy in CT & MRI (Credits-02)

CT: Brain, Para nasal sinuses, Pituitary, Orbits, temporal bone, Abdomen & Pelvis, Chest, Musculo skeletal system, Angiography, MRI: Brain, Spine, Para nasal sinuses, Pituitary, Orbits, temporal bone, Musculo skeletal system, Abdomen & Pelvis, Angiography, Breast, MRCP.

Mid semester -20% End semesters -80%- T

RD 3202 Practice of Fluoroscopy & Contrast Studies (Credits-02)

Drugs used in radiology, Contrast studies on the Gastrointestinal system, Urinary system, Reproductive system, Vascular system and Hepato biliary system.

Assessment-20% End semesters -40%- P 40%- T

RD 3203 Paediatric imaging (Credits-02)

Paediatric Radiology & Applications, Understanding the psychology, Consent and immobilization, Sedation and anaesthesia, Administration of contrast media, skeletal trauma, orthopaedics, Chest and upper respiratory tract, Abdomen, Neonates, Radiation protection, Non accidental injuries.

Mid semester -20% End semesters -80%-T

RD 3204 Maintenance of Radiography Equipment (Credits-02)

Health safety and necessity of maintenance, Maintenance of : X-ray generators & high tension cables, X-ray tube and its components, Fluoroscopy equipment, Mobile radiography equipment, C-Arm equipment Films, intensifying screens & cassettes, processors, manual & automatic.

Assessment-20% End semesters -80%-T

RD 3205 Practice of Computed Tomography- 1 (Credits-02)

Cross sectional CT imaging of: Head (brain, orbits, TM joints, paranasal sinuses), Neck, Chest (plain & contrast, routine & HRCT), Coronary artery, Abdomen (including CTU), Pelvis

Assessment-25% End semesters -75%- P

RD 3206 In-Service Training-I Radiography (Credits-06)

Plain radiography, fluoroscopy and contrast studies, darkroom procedure and film processing, mobile radiography, dental radiography, trauma radiography.

Assessment-60% End semesters -40%- P

FOURTH YEAR FIRST SEMESTER

RD 4101 Practice of Quality Assurance in Radiography (Credits-02)

Acceptance Testing, Routine performance, Error correction, X-ray tube Quality control (Filament, Collimation, Focal spot size, kVp correction, Light beam diaphragm alignment, Grid, alignment, Exposure timer accuracy, Exposure linearity & reproducibility), Image Recording system: Films and Cassettes (Screen contact testing, Screen cleaning etc), Processor Quality Control (Processor Sensitometer, Processor Cleaning, Processor Maintenance, Processor Quality control test, Dark room safelight and light leakage test), Quality control for Fluoroscopy (Exposure rate, Spot-film Exposure, Automatic Exposure System)

Assessment-20% Assignment-20% End semesters -60%- P

RD4102 Practice of Computed Tomography- II (Credits-02)

CT examinations of :Head and brain, orbits, PNS, Temporomandibular joint neck, Chest, (Routine and HRCT), Abdomen (Plain & triple phase study), Cardiovascular system, Urinary system (CTU), Vertebral column (3D reconstruction), Extremities (shoulder joint, elbow joint, wrist joint, hip joint, knee joint, ankle), Paediatric CT.

Assessment-20% End semesters -80%- P

RD4103 Applied Imaging in CT & MRI (Credits-02)

CT (brain, pituitary, orbits, ENT, temporal bone), CT (spine), CT (chest), CT (abdomen and pelvis, including CT Urography, CT liver dual phase and CT enteroclysis), CT (musculo skeletal system), CT (cardiovascular system and CT Angiography), MRI (brain, orbits), MRI (spine), MRI (musculo skeletal system), MRI (thorax), MRI (abdomen and pelvis), Cardiac MRI and MR Angiography, MR Cholangio Pancreatography, MRI breast.

Mid semester -20% End semesters -80%- P

RD4104 Quality Assurance in CT & MRI (Credits-02)

Quality Assurance in CT: (Noise and uniformity, Linearity, Spatial resolution, Contrast resolution, Slice thickness, Couch incrimination, Laser localizer, Patient dose, Processor quality control-processor cleaning, maintenance and monitoring), Quality assurance of MRI: (Magnetic field stability, Signal-to-noise ratio, Artifact inspection, Phase stability, Magnetic field homogeneity, Signal-to-noise ratio, orthogonal plane, Image uniformity, Processor sensitometry).

Mid semester -20% End semesters -80%- T

**RD4105 Principles of Radiation Dosimetry & Application in Radiography
(Credits-02)**

Principles of radiation dosimetry (Interactions and energy deposition by ionizing radiation in matter; concepts, Quantities and units in radiological physics, Principles and methods of radiation dosimetry), Applications in radiography (calibration in diagnostic equipments, measurement of scattered radiation, measurement of dose to patient, dose to radiation workers, measurements in case of accident).

Mid semester -20% End semesters -80%- T

FOURTH YEAR SECOND SEMESTER

RD 4201 C-Arm and Theatre Radiography (for male student) (Credits-02)

Revision on principle of C-Arm and fluoroscopy unit, Preparation for theatre radiography, Procedures of Hepato biliary system (per operative cholangiogram), Urinary system (Nephrostomy, Retrograde pyelography, Nephrolithotomy, Lithotomy, lithotripsy), Orthopaedic surgeries, Cardiovascular surgeries.

Assignment-25% End semesters -50%- T, 25%- P

RD 4202 Practice of Mammography (females only) (Credits-02)

Demonstration of mammography unit, Image recording system, other accessories and processor, Basic mammographic projections, other specialised mammographic projections, Localization biopsies, processing the image, Evaluation criteria for various mammographic projections, Identify the processing and handling artifacts.

Assesment-20% End semesters -80%- P

RD 4203 In-Service Training-II Radiography (Credits-05)

Radionuclide imaging, CT, MRI, Mammography, Theatre radiography.

Assesment-50% End semesters -50%- P

RD 4204 Practice of Magnetic Resonance Imaging - II (Credits-02)

MRI scanning for: Skull, Spine, Thorax, Abdomen and pelvis, Paediatric MRI, MR Angiography and extremities.

Assesment-30% End semesters -70%- P

RD 4205 Practice of Nuclear Imaging (Credits-02)

Introduction to Clinical Nuclear Medicine imaging, Computers in Nuclear Medicine, Data acquisition, processing, and storage of data. Applied imaging in nuclear medicine – IMAGING OF: Musculo-skeletal system, Genito urinary tract, Respiratory tract, Cardio-vascular system, Gastrointestinal tract, Endocrine system, Lympho reticular system, Central nervous system, Special imaging techniques: Tumour imaging, Infection and inflammation imaging, PET Imaging.

Assesment-30% End semesters -70%- P

RA 4201 Research Project and Presentation (Credits-06)

Problem identification and project formulation, Search and retrieve information required such as conducting literature surveys, Identification and optimal utilization of available resources, Project execution, socio-economic, ethical and safety evaluation when applicable, Data analysis, Scientific report writing and presentation.

Assessment Percentage Mark/ Percentage Mark Range

Project proposal	15%
Project Proposal Presentation	15%
Viva	20%
Dissertation evaluation	30%
Final presentation	20%

