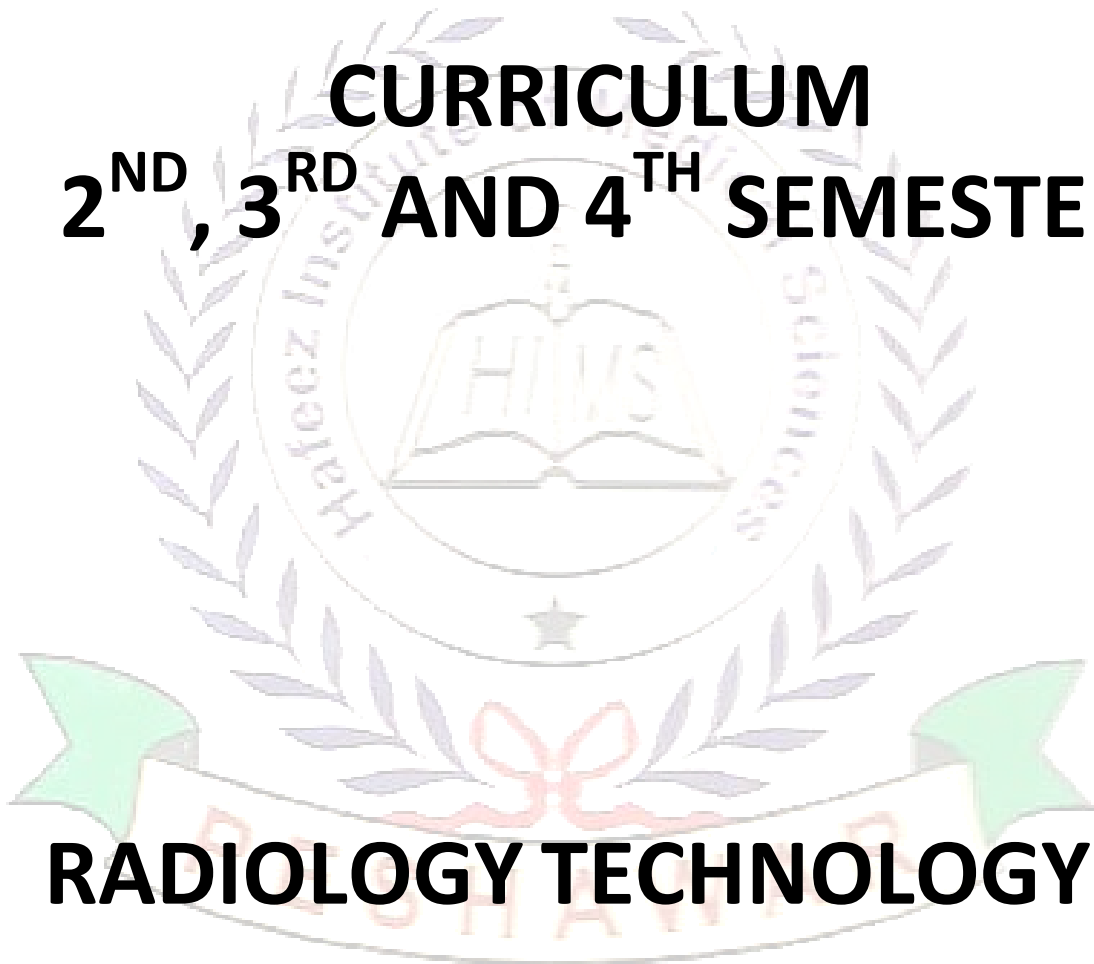


رَبِّی زِدْنِی عِلْمًا

CURRICULUM
2ND, 3RD AND 4TH SEMESTER



RADIOLOGY TECHNOLOGY

HAFEEZ INSTITUTE OF MEDICAL SCIENCES, PESHAWAR

2ND SEMESTER

PHYSICS FOR RADIOLOGY TECHNICIANS

2ND SEMESTER

Concepts of radiation

Fundamentals of physics (related to radio physics)

The atom

Electromagnetic radiation

Electricity and magnets

Electromagnetism

Radiographic imaging (Introduction only) X-

Ray production

X-Ray Emission

X-Ray interaction with matter

Radiographic Films

Processing the latent image

RADIOLOGICAL PROCEDURE

General (introduction)

Intravenous contrast media

Gastro intestinal tract ----- Barium swallow, Ba meal, Ba Follw through, Ba Enema

Biliary tract and pancrease----- Cholecystography , Cholangiograim, ERCP

Urinary Tract----- Nephrogram, Uretherogram, Cystogram.

RADIOLOGICAL POSITIONING AND RELEVANT ANATOMY

Upper limb

The Shoulder

Lower Limb

Hip

Vertebral Column

Bones of thorax

RADIOLOGICAL PHYSICS

2. Concepts of Radiation

- Nature of our surroundings
- Source of ionizing radiation
- Discovery of X-Rays
- Development of modern radiology
- Radiation injury
- Radiation protection.

3. Fundamental of Physics

- Review of mathematics
- Units of measurement
- Mechanics
- Heat

4. The Atom

- Discovery
- Combination of atoms
- Fundamental particles
- Atomic structure (Fundamental Particles)
- Radio activity
- Ionizing radiation

5. Electromagnetic Radiation

- Photons (radio logically important photons)
- Magnetism

6. Electromagnetism

- Electromagnetic effect
- Electromagnetic induction
- Electric generators motors
- Translbrmers
- Rectification

7. Radiographle Imaging

- X-Ray Machine
- X-Ray Tube
- Operation console
- High Voltage section

8. X-Ray Production

- Electron target interaction
- X-Ray Emission Spectrum
- Factors affecting the X-Ray emission spectrum

9. X-Ray Emissions

- X-Ray Quality

10. X-Ray Interaction with Matter

- Five basic interaction
- Differential absorption
- Contrast examination

11. Radiographic Film

- Film construction
- Formation of latent image
- Types of films
- Handling and storage of films

12. Processing the latent image

- Evolution of film processing
- Processing chemistry
- Automatic processing
- Alternative processing method

METHOD OF TEACHING:-

- Lectures
- Demonstrations
- Practical Work

ATTENDANCE:

Every student has to attend 80% of the classes.

READING & EVALUATION

There shall be 3 monthly tests of 20 Marks each which shall be counted in the comprehensive exam in the end of semester passing marks shall be 60%.

RECOMMENDED BOOKS:

1. Radiological Science for technologist (Stewari C ,Bushong)
2. Techniques in diagnostic radiology (G.H White House B.S Worthingtop)
3. A Guide to radiological procedures (Stephenchampmanand)
4. Atlas of radiological Anatomy
5. Atlas of C.T/M.R.C Crossectional anatomy.

3rd SEMESTER

1. Intensifying Screens
2. Beam restriction devices
3. The grid
4. Radiographic quality
5. Radiographic exposure
6. Select plan film procedure
7. Mammography
8. Fluoroscopy
9. Introduction to computer science
10. Digital X-Ray imaging
11. Computed tomography
12. Quality control

RADIOLOGICAL PROCEDURE

- Reproductive system
- Respiratory system
- Arteriography
- Venography
- Angiocardiography

RADIOLOGICAL POSITIONING & RELEVANT ANATOMY

- The skull
- Temporal bones
- Paranasal sinuses
- Fascial bones
- Dental radiography
- Skeletal system survey
- Respiratory system & heart.

RADIOLOGICAL PHYSICS

1. Intensifying Screens:

- Screen Construction
- Luminescence
- Screen characteristic
- Screen film combination
- Care of screen

2. Beam Restricting Devices:

- Production of Scattered Radiation
- Control of scattered radiation

3. The Grid:

- Control of scatter radiation
- Characteristics of Grid construction
- Measuring Grid performance
- Types of Grid
- Grid Selection

4. Radiographic Quality:

- Film Factors
- Geometric Factors
- Subject Factors
- Consideration for improved Radiographic Quality

5. Radiographic Exposure:

- Kilovolts peaks
- Milliamps
- Exposure Time
- Milliampere Seconds
- Image Characteristics

6. Select Plan Film Procedures:

- Tomography
- Sterco Radiography
- Magnification Radiography

7. Mammography:

- Basic for Mammography
- X-ray Apparatus
- Image Receptors
- Xero Radiographic Process
- Conclusion

8. Fluoroscopy:

- Visual Consideration
- Practical Fluoscopic Technique
- Image Intensification
- Fluoroscopic Image Monitoring

9. Introduction to Computer Science:

- History of Computer Science
- Anatomy of a Computer
- Computer Soft Ware
- Processing Method

10. Digital X-Ray Imaging:

- Digital Imaging
- Digital Flouroscopy
- Digital Radiography

11. Computed Tomography:

- Principles of Operation
- Operational Modes
- System Component
- Image Characteristics

12. Quality Control:

- Radiographic System
- Special X-Ray System
- Photographic Procedures
- Art Defects.

RADIOLOGICAL PROCEDURES

Reproductive System:

- Hystrosalpingoraphy
- Gynaecography
- Vesiculography

Respiratory System:

- Nasopharyngography
- Larynogography
- Bronchography
- Percutaneous Lung Biopsy.

Anteriography:

- Hend, neck arteriography
- Arteriography of the lower lemb
- Codiac oxis, superior mesenteric, Inferior mesenteric arteriography
- Renal Arteriography
- Vascular Dilation
- Vascular Occlusion
- Pulmonary Arteriography.

Venography:

A. Central Venography

- Superior Venacava Cavography
- Inferior Vanacave Cavography
- Pelvic Venography
- Ascending Lumbar Venography
- Intraossues Vanography
- Portal Venography
- Transhepatic Portal Venous Catheterization
- Selective retrograde venography
- Renal Venography
- Adrenal Venography
- Hepatic Venography
- Internal Ingular Venography
- Orbital Venography

B. Peripheral Venography:

- Lower Limb
- Upper Limb

Angiocardiology:

- Equipment for an Angiography room
- Introduction to Catheter Technique
- Pharmaco Angiography
- Coronary Arteriography
- Ascending Aortography
- Traslumber Aortography

METHOD OF TEACHING

- Lectures
- Demonstrations
- Practical Work

ATTENDANCE

Every Student has to attend 90% of the classes.

READING & EVALUATION

There shall be 3-monthly tests of 20 marks each which shall be include in the comprehensive exam in the end of semester .Passing marks be 60%.

RECOMMENDED BOOKS

1. Radiological Science for technologist (Stewart C.Bushong)
2. Techniques in diagnostic radiology (G.H White House B.S Worthington)
3. A guide to Radiological Procedures (Stephenchampanand)
4. Radiological Positioning (Kitty Clark)
5. Atlas of radiological anatomy
6. Atlas of AC.T/M.R Crosseetional Anatomy.

4th SEMESTER

PHYSICS FOR RADIOLOGY TECHNICIANS

1. Physical Principals of MRI.
2. Equipment with images.
3. Physical principles of ultrasounds.
4. Diagnostic Ultrasounds.
5. Principles of Radiobiology.
6. Molecular & cellular radiobiology.
7. Early & late effects of radiation.
8. Health Physics.
9. Design for radiological image facilities.
10. Design for radiological protection.
11. Radiation protection procedures.

RADIOLOGICAL PROCEDURE

1. Lymph nodes & lymphatic.
2. Central nervous system.
3. Dacrocystography.
4. Arthrography.
5. Sialography.

RADIOLOGICAL POSITIONING & RELEVANT ANATOMY

1. The abdominal & pelvic cavity.
2. Foreign Bodies.
3. Ward Radiography.
4. Theater Radiography.
5. Tomography.
6. Macro radiography.
7. Sterco radiography

RADIOLOGICAL PHYSICS

1. Physical Principles of MRI.

- Why MRI
- Fundamental Concepts
- NMR Parameters
- MRI Versus C.T
- Imaging Principles

2. MR Equipment with Images

- Imaging Magnets
- Secondary Coils
- MR Images
- Biology Hazards

3. Physical Principles of Ultrasounds

- Diagnostic Ultrasound
- Acoustic Intensity & Power
- Acoustic Reflection
- Acoustic Absorption & attenuation.

4. Diagnostic Ultrasounds, Instrumentation and Operation

- Ultrasound Transducer.
- Ultrasonic Beam
- Operation Modes
- Biologic Effect

5. Fundamental Principles of Radiology

- From molecules to human
- Human Biology
- Physical Factors affecting Radio Sensitivity
- Biologic Factors affecting Radio Sensitivity
- Radiation dose / response relationships

6. Molecular & Cellular Radio Biology

- Irradiation of Macromolecules
- Radiolysis of Water
- Cell survival Kinetics
- Target Theory

7. Early Effects of Radiation

- Acute Radiation lethality
- Local Tissue Damage
- Haemologic Effects
- Cytogenetic Effect

8. Late Effects of Radiation

- Local Tissue Effects
- Life Span Shortening

- Risk Estimation
- Radiation induced Malignancy
- Total Risk of Malignancy
- Radiation in Pregnancy

9. Health Physics

- Cardinal Principles of Radiation Protection
- Maximum Permissible Dose
- X-Ray in Pregnancy

10. Design of Radiologic Imaging Facilities

- Designing Team
- Departmental Activity
- Location of X-Ray Deptt
- Place Layout
- Construction Consideration

11. Design of Radiation Protection

- Design of X-Ray Apparatus
- Design of Protective Basins
- Radiation detection & Measurement

12. Radiation Protection Procedures

- Occupational Exposure
- Patient Dose
- Reduction of Occupational Exposure
- Reduction of un- Necessary Patient Dose.

RADIOLOGICAL PROCEDURES

1. Lymph Glands & Lymphatic

- Lymphography

2. Arthrography

- General Points
- Double Contrast Knee Arthrography
- Hip Arthrography
- Double Contrast Shoulder Arthrography
- Elbow Arthrography
- Wrist Arthrography
- Ankle Arthrography

3. Central Nervous System

- Contrast Media for Myelography
- Lateral Cervical Puncture
- Cisternal Puncture
- Myelography with Water
- Soluble Contrast Media

- Air Encephalography
- Ventriculography
- Special techniques for demonstration of the internal auditory meatus
- Air Myelography
- Myelogram Cisternography
- Water Soluble Cisternography
- Cholangiography

4. Dacryocystography

5. Sialography

METHOD OF TEACHING

1. Lectures
2. Demonstration
3. Practical Work

ATTENDANCE

Every student has to attend 90% of the Classes.

GRADING & EVALUATION

There shall be 30-monthly tests of 20 marks each which shall be counted in the comprehensive exam in the end of semester. Passing marks shall be 60%.

RECOMMENDED BOOKS

1. Radiological Science for technologist (Stewart C Bushong)
2. Techniques in diagnostic radiology (G.H White House B.S Worthington)
3. A guide to radiological Procedures (Stephen Chapman)
4. Radiological Positioning (Kitty Clark)
5. Atlas of Radiological Anatomy
6. Atlas of A.C.T/M.R Cross-sectional Anatomy