

KHYBER PAKHTUNKHWA MIDICAL FACULTY PESHAWAR

CURRICULUM

2nd, 3rd, & 4th Semester

DIPLOMA COURSE

RADIOLOGY TECHNOLOGY



Bungalow No.86/D-5 Abdara Road University Town,
Peshawar.

Phone No.091-9216008 Fax No 091-9218630

Website: www.kpmf.edu.pk Email: info@kpmf.edu.pk

2nd Semester

PHYSICS FOR RADIOLOGY TECHNICIANS.

- Concept 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, Barium **Ba, ballow through Ba Eneima**
- Biliary tract and pancreas ----- cholecystography, Cholangiografin, ERCP
- Urinary tract ----- nephrogram, Uretherogram, Cystogram

Paper A Radio physics –I

Paper B Radiological Procedures-I

RADIOLOGICAL POSITIONING & RELEVANT ANATOMY

- Upper Limb
- The Shoulder
- Lower Limb
- Hip
- Vertebral Column
- Bones of Thorax

RADIOLOGICAL PHYSICS

Concepts of Radiation:

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

Fundamental of Physics:

- Review of Mathematics
- Units of Measurement
- Mechanics
- Heat

The Atom

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

Electromagnetic Radiation:

- Photons (radio logically important photons)
- -----
- Magnetism

Electromagnetism:

- Electromagnetic effect
- Electromagnetic Induction
- Electric Generators Motors
- Transformers
- Rectification

Radiographic Imaging:

- X-Ray Machine
- X-Ray Tube
- Operation Console
- High voltage section

X-Ray Production:

- Electron target, interaction
- X-Ray Emission Spectrum
- Factors effecting the X-Ray emission spectrum
- X-Ray emission
- X-Ray quality

X-Ray Interaction with Matter:

- Five basic Interaction
- Deferential Absorption
- Contrast Examination

Radiographic Film:

- Film Construction
- Formation of latent image
- Types of Films
- Handling and storage of Films

Processing of 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

Grading & 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:

- ✓ Radiological science for technologist (Stewart C.Bushong)
- ✓ Techniques in diagnostic radiology (G.H White House B.S Worthington)
- ✓ A Guide to radiological procedures (Stephen Champman and)
- ✓ Radiological positioning (Kitty Clark)
- ✓ Atlas of radiological anatomy
- ✓ Atlas of C.T/M.R Crosssectional anatomy

3rd Semester

PHYSICS FOR RADIOLOGY TECHNICIANS.

Paper A Radio Physics –II

Paper B Radiological Procedures-II

- Intensifying Screens
- Beam restriction devices
- The Grid
- Radiographic quality
- Radiographic exposure
- Select plan film procedure
- Mammography
- Fluoroscopy
- Introduction to Computer Science
- Digital X-Ray imaging
- Computed Tomography
- Quality Control

RADIOLOGICAL PROCEDURE

- Reproductive System
- Respiratory System
- Arteriography
- Venography
- Angiocardiology

RADIOLOGICAL POSTIONING & RELEVANT ANATOMY

- The Skull
- Temporal Bones
- Para nasal Sinuses
- Facial 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 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 Packs
- Milliamps
- Exposure Time
- Mill ampere Seconds
- Image Characteristics

6. **Select Plane Film Procedures:**

- Tomography
- Stereo Radiography
- Magnification Radiography

7. Mammography:

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

8. Fluoroscopy:

- Visual Consideration
- Practical Fluoroscopic 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 Fluoroscopy
- Digital Radiography

11. Computed Tomography

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

12. Quality Control:

- Radiographic Systems
- Special X-Ray Systems
- Photographic Procedures
- Art defects

RADIOLOGICAL PROCEDURES

Reproductive System:

- Hystrosalpingography
- Gynaecography
- Vesiculography

Respiratory System:

- Nasopharyngography
- Larynogography
- Bronchography
- Percutaneous lung biopsy

Anteriography:

- Head, Neck arteriography
- Arteriography of the lower limb
- Coeliac axis, superior mesenteric, inferior mesenteric arteriography
- Renal arteriography
- Vascular dilatation
- Vascular occlusion
- Pulmonary arteriography

Vanography:

A central Venography

- Superior Venacava Cavography

- Inferior Vena Cava Cavography
- Pelvic Venography
- Ascending lumbar Venography
- Intracranial Venography
- Portal Venography
- Transhepatic portal venous catheterization
- Selective retrograde Venography
- Renal Venography
- Adrenal Venography
- Hepatic Venography
- Internal Jugular Venography
- Orbital Venography
- Peripheral Venography:
 - Lower Limb
 - Upper Limb

Angiocardiography:

- Equipment for an angiography room
- Introduction for Catheter Technique
- Pharmacologic angiography
- Coronary arteriography
- Translumbar aortography

Methods of Teaching:

- Lectures
- Demonstrations
- Practical Work

Attendance:

- Every student has to attend 90% of the classes

Grading & Evaluation:

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Recommended Books:

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- ✓ Techniques in diagnostic radiology (G. H White House, BS Worthington)
- ✓ A guide to radiological procedures (Stephen Chapman)
- ✓ Radiological Positioning (Kitty Clark)
- ✓ Atlas of radiological anatomy
- ✓ Atlas of A.C.T/M.R Crosssectional anatomy

4th Semester

Paper A Radio Physics III

Paper B Radiological Procedures III

PHYSICS FOR RADIOLOGY TECHNICIANS

1. Physical Principles 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 POSITIOINING & RELEVANT ANATOMY

1. The Abdominal & Pelvic cavity
2. Foreign Bodies
3. Ward Radiography
4. Theater Radiography
5. Tomography
6. Macro Radiography
7. Stereo Radiography

RADIOLOGICAL PHYSICS

1. Physical Principles of MRI:

- Why MRI
- Fundamental Concepts
- NMR Parameters
- MRI Versus CT
- Imaging Principles

2. MR Equipments with Images:

- Imaging Managements
- 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 & Operation:

- Ultrasound Transducer
- Ultrasonic Beam
- Operation Mode
- Biologic effect

5. Fundamental Principles of Radiobiology:

- From Molecules of Humans
- Human Biology
- Physical Factors effecting Radio Sensitivity
- Biologic factors affecting radiosensitivity
- 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 or 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, Projection
- Maximum permissible Dose
- X-Ray in Pregnancy

10. Design Radiologic Imaging Facilities:

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

- Construction Consideration

11. **Design for Radiation Protection:**

- Design of X-Ray Apparatus
- Design of Protective Bassins
- Radiation detection & measurement

12. **Radiation Protection Procedure.**

- Occupational Exposure
- Patent dose
- Reduction of Occupational Exposure
- Reduction of Un-necessary Patent 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 Meatography
- Myodil Cisternography

- Water Soluble Cisternography
 - Lumbo Discography
 - Ch. Emomdiolysis
4. Dacryocystography
 5. Sialography

Method of Teaching:

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- Demonstrations
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