

CURRICULUM



DIPLOMA IN MEDICAL RADIO DIAGNOSIS (DMRD) DEPARTMENT OF RADIOLOGY

**Peoples University of Medical & Health Sciences,
Nawabshah, Sindh**

CURRICULUM

FOR

D.M.R.D

(Diploma in Medical Radio Diagnosis)



CURRICULUM

Diploma in Medical Radio Diagnosis (DMRD) DMRD (Part-I) and (Part II)

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INTRODUCTION

The deficiency of duly qualified Radiologists in Pakistan exists since its inception. Very few Medical Institutions are offering postgraduate courses in Radiology. Recognizing the need for Qualified Radiologists two year diploma in Medical radio diagnosis (DMRD) was introduced. All other Diplomas were of one year duration and D.M.R.D being two years course, soon earned recognition from P.M.D.C as a level II Diploma.

The curriculum of D.M.R.D has recently been reviewed and updated to encompass more extensive training modules and techniques in this rapidly growing field. Moreover, more extensive training modules, teaching methodologies and better evaluation tools are being used to produce competent Radiologists.

The DMRD is started at Nawabshah from June 2013.

GENERAL OBJECTIVES

At the end of D.M.R.D course all the candidate should be able to:

- Comprehend the principles of Physics used in Radiodiagnosis.
- Apply the principles of physics for better understanding of radiological, sonographic CT, Radioisotope and MRI images.
- Assess and compare different imaging techniques and evaluate the best for a particular examination.
- Conduct the community, regional and subject based research to help the Clinicians and Epidemiologists.
- Help various Medical Boards by authentic and professional opinions (rotation based postings of postgraduate students)
- Teach radiological sciences at undergraduate and post graduate levels. (discussion on X-ray, CT, Radioisotope and MRI films as well as Ultrasound Imaging including Doppler)

TEACHING PLAN OF D.M.R.D (PART I)

(SESSIONS 2015-2016)

D.M.R.D (part I)

9th months course

D.M.R.D Part II

Fifteen months course

TEACHING PLAN OF DMRD (PART- I)

(SESSION 2013– 2013)

Subject: Radiological physics

Date of start of session	January 2013
Date of end of session	December 2013
Duration of each class session	1 hour 30 minutes

Daily discussion and Teaching position and procedures.

COURSE CONTENTS

DMRD (PART I) 6 MONTHS COURSE

1. Modern physics. (in brief)
2. Production and detection of electromagnetic radiations.
3. X-ray Production.
4. Radiographic film and properties and screen.
5. Basic physics and physics of diagnostic radiology.
6. Interaction with matter.
7. Conventional and Digital Radiography.
8. Radiation Hazards and protection.
9. Fluoroscopy and image intensifier.
10. Computed tomography (CT Scanning).
11. Mammography.
12. Nuclear medicine.
13. Imaging with Ultrasound including Doppler Ultrasound.
14. Magnetic resonance imaging (MRI).
15. Quality Control and assurance in Radiography, CT scanning Ultrasound and MRI.
16. Contrast Media Introduction.
17. Radioactivity.
18. Nuclear Imaging.
19. Radiographic positioning (training in part I, examination will be conducted in part II).
20. Radiological and Cross Sectional Anatomy.

SESSION WISE DISTRIBUTION OF COURSE WORK

S.No	Topics	Session
A	INTRODUCTION	01
B	BASIC PHYSICS	03
C	<u>MODERN PHYSICS,</u> <ul style="list-style-type: none"> • Electromagnetic spectrum • Hydrogen spectra • Binding energy and its properties • Natural and artificial radio activity • Law of radioactive decay • Half life and Mean life • Radio isotopes and their uses • Nuclear force, nuclear (atomic) energy 	13
E	<u>X-RAY</u> <ul style="list-style-type: none"> • Production and detection of x-ray • Modern x-ray tube and generators • Bremstrahlung and characteristic radiation • Interaction of x-ray and y-rays with matter • Attenuation and absorption, linear attenuation coefficient, half value layer • Effects of x-rays and y-rays (chemicals) • Physico-chemical and physical effects, luminescence, fluorescence, (phosphorescence, thermoluminescence) Intensifying and Fluoroscopic screens • Radiographic films and its properties, characteristic curve • Sharpness and un-sharpness. • Scattered radiations and Grids • Cassettes and Screens 	16

F	<p><u>FLUOROSCOPY AND IMAGE INTENSIFIER</u></p> <ul style="list-style-type: none"> • Advantages and limitations of Fluoroscopy • Principles and construction of Image Intensifier • Video and Digital Imaging 	3
G	<p><u>MAMMOGRAPHY</u></p> <ul style="list-style-type: none"> • Dedicated mammography equipment, kvp, mAs, characteristic radiation, cassettes & screens • Compression, advantages and risks. • 	2
H	<p><u>NUCLEAR MEDICINE</u></p> <ul style="list-style-type: none"> • Properties of radioisotopes, short lived isotopes, technetium generators. • Physical, biological and effective half life. • Scintillation detector and photomultiplier tube, study of physiological function e.g thyroid renal and cardiac. • Hematological studies, volumetric studies, organ visualization, scanners. • Principle and construction of Gamma camera, collimation, SPECT (single photon emission computed tomography) PET (positron emission tomography) Scanning • Use of Computers, Resolution (axial, lateral and temporal) • Absorbed dose. • Nuclear Detectors and Counters • Ionization Chamber and G.M Counter. 	14
I	<p><u>C.T SCAN</u></p> <p>Computed Tomography, principle and equipment (all generations) X-ray beam, detectors (solid state, gas filled) collimation, sensitivity and efficiency CT numbers, pixels and voxels, resolution and contrast, spiral (helical) CT scanner.</p>	

J	<p><u>RADIATION PROJECTION</u></p> <p>Biological effects of radiations ,stochastic and non-stochastic effects, dose response curves, early and delayed effects ,radiation dosimetry ,radiation units, Roentgen, RAD, Gray, Rem, Sievert, radiation dose received in radiography, fluoroscopy, mammography ,CT scanning, and nuclear medicine, maximum permissible levels. Basic principles of radiations protection, time, distance, shielding, primary and secondary barriers, ALARA principle, protection against external radiation exposure, protection against internal radiation exposure, departmental and area monitoring survey meters, personnel monitoring, film badge, pocket dosimeters, TLD, planning of a radiology department, permissible radiation doses</p>	08
k	<p><u>ULTRA SOUND AND COLOR DOPPLER</u></p> <p>Ultrasound, production and detection, piezoelectric effect, Ultra sonic transducer, properties of ultra sound wave equation, frequency, wave length and speed of U/S. passage of ultrasound through matter, scattering, absorption. reflection, refraction, transmission, acoustic, impedance, focused, transducer, curvilinear transducer, U/S pulse, converging and diverging beams, pulse length, repetition frequency, intensity and intensity level, Bell and decible, attenuation of U/S, linear attenuation, co-efficient modes of display ,echo-ranging, A-mode, B-mode, Real time scanning, Gray scale, sector scan, Doppler effect, Doppler shift, speed and direction of moving objects of human body, pulse Doppler, continuous wave color Doppler, power Doppler. Effects of ultrasound on living tissue, cavitations, heating, sterilization of medical products, physiotherapy, possible hazards of U/S</p>	08
L	<p><u>MRI (Magnetic Resonance Imaging)</u></p> <p>Principle, theory and construction of MRI equipment, Nuclear dipole, nuclear magnetism, external magneti field, superconducting magnets, Net magnetization resonance, nuclear spin moment, Radio-frequency transmitters and receivers, excitation and relaxation times, lattice relaxation time (T), Tissue lattice relaxation time, T2 image reconstructions, T1 and T2 weighted images, contrast and resolution in MRI, advantages and disadvantages, limitations, benefits and risks of MRI.</p>	05

M	<u>QUALITY CONTROL</u> Quality control in radiography, CT scanning, Mammography, Ultrasonography, and MRI.	02
N	<u>CLASS TEST</u>	06
	The following topics will b taught by Doctors and other Faculty Members.	
1	<u>RADIOGRAPHIC POSITIONING</u> Skull Mastoid P.N.S Temporomandibular joint Shoulder joint Chest Spine Pelvis Knee Joint Abdomen Elbow Wrist Ankle Hip joint Hand	10
2	Cross sectional Anatomy	10
3	Contrast Media	04

D.M.R.D (Part-I) and (Part-II)

SUMMARY OF EXAMINATION SCHEDULE

The examination of DMRD (Part-1) would consist of Three Components.

1. Theory	200 Marks
2. Practical	100 Marks
3. Viva voce	100 Marks

There would be two theory papers.

<u>TYPE</u>	<u>NUMBER OF QUESTIONS</u>	<u>TOTAL MARKS</u>
1. MCQ's (Single best)	75	100
2. Short essay	10	100

Pass % age would be 50% in each paper and 55% in aggregate.

Table of specification for multiple choice questions (one best answer type)

Total questions	75
Total marks	100

Title	LEVEL			NO. Of Questions	%age
	C-1	C-2	C-3		
Basic mathematics	4	03	00	07	9%
Basic Physics	6	04	00	10	13%
Modern physics	6	4	00	10	13%
Radiological physics	18	12	05	35	47%
Radiation Protection	07	04	02	13	18%
TOTAL	41	27	07	75	100%

TRAINING SCHEDULES

DMRD (PART-II) 5 MONTHS COURSE

- 6 Months X-ray Conventional + special procedures
- 3 Months Ultrasound training
- 2 Months C.T Scan Training
- 2 Months MRI Training
- 1 Month Mammography training
- 1 Month Nuclear Medicine (Rotation)

COURSE CONTENTS

1. General rules for the Diagnostic Techniques
2. Observation.
3. Assessment & Reporting
4. Performance of Radiographic Procedures under Supervision
5. Independent Performance
- 6.

GENERAL RADIOGRAPHY

01- PLAIN RADIOGRAPHY

1. Chest
2. KUB
3. Abdomen
4. Spine
5. Joints and bones
6. Skull
7. PNS
8. Trauma
9. Emergency X-ray

02- PROCEDURE WITH CONTRAST MEDIA

1. G.I Studies
2. IVU
3. T-Tube Cholangiography
4. PTC
5. Sinogram
6. Fistulogram
7. Urethrogram (Antegrade & Retrograde)
8. MCUG
9. Pyelography (Antegrade & Retrograde)
10. Hysterosalpingography.
11. Sialography
12. Ductography
13. Dacrocystography
14. Venography
15. Angiography

A. DIAGNOSTIC ULTRASOUND

1. Brain
2. Abdomen
3. Pelvis
4. Chest
5. Small parts
 - a. Eye
 - b. Neck
 - c. Breast
 - d. Scrotum
 - e. Musculoskeletal
6. Color Doppler Imaging
7. Interventional procedures
 - a. Aspiration
 - b. Biopsy
 - c. Drainage tube insertion

B. CT SCAN

- a. Brain
- b. PNS
- c. Chest
- d. Abdomen
- e. Pelvis
- f. Bone & joints
- g. Spine
- h. Interventional procedures (Biopsies)
- i. C.T Myelography

C. MRI.

- j. Brain
- k. PNS
- l. Chest
- m. Abdomen
- n. Pelvis
- o. Bone & joints
- p. Spine
- q. Interventional procedures (Biopsies)

D. MAMMOGRAPHY

E. NUCLEAR MEDICINE

- a. Thyroid
- b. Renal System
- c. Hepatobiliary system
- d. Spleen
- e. Chest
- f. G.I tract

D.M.R.D (PART-II)

SUMMARY OF EXAMINATION SCHEDULE

The examination of DMRD (part-II) would consist of three components.

1.Theory	200 Marks
2.Practical	100 Marks
3.Viva voce	100 Marks

There would be two theory papers.

<u>TYPE</u>	<u>No. of questions</u>	<u>Total marks</u>
3. MCQs (Single best)	75	100
4.Short essay	10	100

Pass % age would be 50% in each paper and 55% in aggregate.

Table of specification for multiple choice questions(one best answer type)

Total questions	75
Total Marks	100

S.No	TITLE	PERCENTAGE	NO.OF QUESTIONS
01	Chest	20%	15
02	GIT	20%	15
03	CNS + Skull + Spine	20%	15
04	Urogenital system	16%	12
05	Bones + joints	16%	12
06	ENT + Eye + Dental + Soft tissues	04%	03
07	CVS	04%	03
	Miscellaneous		

TEACHING STAFF AND FACILITIES AVAILABLE

TEACHING STAFF

1. Professor	01
2. Associate Professor	00
3. Assistant Professor	02
4. Senior lecturers	00

FACILITIES

1. Over head Project	01
2. Multimedia	01
3. Seminar room including	01
1. Library	Nil
2. Museum	Nil
3. Computer	Two
4. Internet	Nil

EQUIPMENTS

1. X-Ray Machines	05
2. Ultrasound Gray scale	03 (one with endocavitary probe)
3. Mammography Machines	00
4. CT Scan	02
5. Digital radiographic machine	02
6. MRI	01
7. Doppler Ultrasound	02

LOG BOOK

The log is to be maintained by all trainees preparing for DMRD. Trainees are advised to make the required entries on the day of the event and must be signed at the end of the day by supervisor, or authorized senior faculty member.

COMPETENCY LEVEL KEY:

1. Observer status
2. Assistant status
3. Performed under supervision
4. Performed independently

ACADEMIC ACTIVITIES OF A TRAINEE.

1. Small group discussion
2. Case presentation
3. CPC in department and at PUMHS Nawabshah
4. Journal club
5. Monthly MCQs and short essays questions tests