Rawalpindi Medical University

Curriculum

Diploma in Medical Radio-Diagnosis

2022

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History of Rawalpindi Medical University

Rawalpindi Medical College was established in Faisalabad on 18th March 1974 and later shifted to Rawalpindi on 5th November 1974. The founder principal of RMC, Prof. Abdul Latif, worked hard to establish the institution. Holy Family Hospital, Benazir Bhutto Hospital and DHQ Hospital Rawalpindi are the associated teaching hospitals with Rawalpindi Medical University. The Department of Medical Education and the institute of Allied health sciences was established in 2007 as well as new teaching block Holy family hospital Rawalpindi.

First Rawalian Principal, Prof. Mohammad Umar after taking over the office in 2013 restructured the undergraduate training program by establishing purpose-built Department of Medical Education (DME), upgraded student libraries, Cafeteria, student section, Hostels. The beautiful RMC park was also dedicated to Rawalian. The Rawalian facilitation center is another addition in the college to facilitate the students, parents and relatives of Rawalian working nationally and internationally. Arranging historical meeting to develop consensus on national guidelines for the undergraduate training headed by chairman HEC, President PMDC, Vice chancellor UHS and all the principals of medical colleges is another credit to RMC in his tenure.

Regarding patient care projects, worth mentioning are, State of the art center for Liver and Digestive diseases (CLD), Multi Organ Failure Centre (MOF), Medical ICU, Department of Infectious diseases (DID), Department of Emergency and Critical care (DEC) and up gradation of the affiliated hospitals.

Since 1974 more than 8600 students have graduated and are serving nationally and internationally. RMC is privileged to claim top positions in university examination several times. Best of the best graduate in UHS is also a Rawalian.

Academic programs of the college are accredited by UHS, CPSP and PMDC. The College got full recognition by General Medical Council UK, American specialty boards and internship programs with different universities abroad and WHO.

Foreword

Rawalpindi Medical University (RMU) Rawalpindi started as Rawalpindi Medical College on 18th March 1974. It was awarded university status in May 2017 by the president of Pakistan. Since then, it is functioning with the vision to explicitly address academic and research needs in the field of health sciences and allied disciplines and to uplift their existing level to bring them on a par with the international standards.

The mission of the University is to develop an intellectual nexus `to provide excellence and innovation in medical education and research in order to;

- Impart knowledge and skills to health care providers to enhance their competence in providing community oriented and multi -disciplinary patient -centered care
- Train and produce researchers and specialists in basic and clinical medical sciences
- Establish and maintain continuing professional development programs for the faculty
- Provide trained professionals and scientists/researchers for the field of Electro Medical/Bio -Medical disciplines
- Assure quality in health education and research at all levels

A university is the zenith of knowledge that imparts quality education and awards degrees for extensive educational attainments in various disciplines which results in development of intellectual community. Protection of traditional knowledge, making exploration about it and obtaining deep understanding of modern technology and research techniques are some of the responsibilities of any university.

RMU is running a number of courses in the field of health sciences in Rawalpindi. The list extends from undergraduate level courses up to the doctorate level both in basic, clinical and allied health sciences.

Since its inception, certain vital tasks were taken into serious consideration by RMU, for instance, curricula development and their up-gradation were among the most important ones besides introduction of contemporary educational programs. RMU has revised and finalized curricula for undergraduate Medical Education and Allied Health Sciences. Being the Vice Chancellor of a public sector health university, I believe, it is my duty to remain vigilant and committed to the cause of improvement of the conventional medical and allied health sciences' curricula on regular basis. This will help produce technically sound professionals with advanced knowledge and skills.

This document precisely briefs the details of updated curriculum for Diploma in Medical and Diagnostic Radiology (DMRD) as prepared by the Experts' Committee. I am pleased to acknowledge the efforts made by Professor and Dean Pediatrics Rai Muhammad Asghar, contributions made by him will go a long way in the education and training of doctors in this field.

I hope, this course will be able to meet the needs of latest trends in Pediatrics and will certainly produce competent mid-level specialists in the field, which is the main objective of this programme.

Aims And Objectives of the Course

Aim

The aim of 2 years Diploma in Medical and Diagnostic Radiology (DMRD) is to equip medical graduates with relevant professional knowledge, skills and ethical values to enable them to apply their acquired expertise at primary and secondary health care organizations as non-academic consultants.

Objectives

At the end of training in DMRD, a trainee doctor should be able to:

1. Take a comprehensive and pertinent history of patients coming for radiological investigations
2. Perform routine radiological clinical procedures under supervision.
3. Take proper informed consent before commencing any investigative procedure and ensuring confidentiality and appropriate environment for procedures and investigative processes involving unusual exposure
4. Explain all procedures to patients or to their relatives in patient's preferred language in elective and emergency situations in keeping principles of good communication skills, empathy and empowerment to patients
5. Satisfactorily address fears, concerns and expectations of the patients
6. Exhibit emotional maturity and stability, integrity, ethical values and professional approach, sense of responsibility in day-to-day professional activities
7. Act as an independent specialist at Community/Tehsil and Headquarter Hospital
8. Show initiative and become lifelong self-directed learners tapping on resources including clinical material, faculty, internet and on-line learning programmes and library
9. Maintain follow-up of patients at appropriate intervals, recognizing new developments and/or complications and offering sensible management protocols.

Specific Learning Objectives

Following competencies will be expected from a student completing 2 years' course in DMRD, student should be able to:

1. Interpret common radiological findings in a scientific manner while keeping in mind the logical reasoning and a clear understanding of their impact on human mind and body
2. Perform recommended conventional radiological procedures with expertise
3. Perform upper abdominal, upper abdominal/kidney, female/male pelvic and obstetrical ultrasound
4. Identify common pathologies occurring in the upper abdomen, pelvis (male & female) on ultrasound
5. Interpret Computed Tomography (CT) results
6. Decide when to use and not to use contrast in CT
7. Perform and interpret various common fluoroscopic procedures.
8. Manage anaphylactic shock may result due to any contrast media

Nomenclature and Duration

Nomenclature of the Proposed Course:

The name of diploma course should be retained as DMRD. This name has been recognized and established for the last many decades worldwide. The duration of courses should be two years structured training in a recognized department under an approved supervisor.

Course Title:

DMRD (Diploma in Medical and Diagnostic Radiology)

Training Centers:

Departments of Radiology RMU & Allied Hospitals

(Holy Family Hospital, Benazir Bhutto Hospital and DHQ Hospital, Rawalpindi)

(Accredited by RMU, Rawalpindi

Course Duration and Scheme of the Course:

Total Duration: 2 years structured training (Part-I 12 months, Part II 12 months) in a recognized department under the guidance of an approved supervisor

Eligibility Criteria for Admission

Documents Required for the Admission

1. Completed DMRD application form
2. Copy of MBBS degree with mark sheets of professional examinations and certificate of number of attempts in professional examinations
3. Copy of PMC registration certificate
4. Three latest passport size photographs
5. Reference letters from two consultants, with whom the applicant has worked
6. Certificates of completion of required experience

General Requirements

Candidates eligible for admission should have:

- MBBS or equivalent qualification
- Completion of one year of House Job
- Valid PMC registration

Special Requirements:

1. Securing pass percentage in the entry test as determined by the RMU
2. Qualifying the interview successfully
3. Having up to the mark credentials as per RMU rules (no. of attempts in each professional, any gold medals or distinctions, relevant work experience, research experience in a recognized institution, any research article published in a National or International Journal)

Registration and Enrollment

- Total number of students enrolled for the course must not exceed 5 per unit
- Candidates selected for the courses will be registered with relevant supervisors and enrolled with RMU, Rawalpindi

Training Pathways and Rotations

Year of Training	Rotations		
Year 1	11 months radiology	4 weeks -Nuclear medicine	
Year 2	9 months general radiology	2 months- cross sectional CT	1 month - MRI

Details of DMRD Course

The aim of the curriculum Content is to produce well-trained competent clinical radiologists.

A. Physics:

Introduction:

General properties of radiation and matter, fundamentals of nuclear physics and radioactivity. Structure of the atom. Definition of atomic number, mass number nuclide, isotope and electron volt.

Electromagnetic Radiation:

Spectrum, general properties, wave and quantum theories.

Radioactivity:

Exponential decay, specific activity, physical biological and effective half- life, properties of radioactive materials, radioactive decay schemes, units of activity, half-life, properties of radiations 0 alpha, beta, gamma, basic knowledge of reactors.

Production of X-Rays:

Principles, essential components of X-ray tubes, continuous spectra, characteristic radiation, Factors controlling the nature of X-ray emission.

Tube Rating:

Stationary and rotating anodes, heat capacity, methods of cooling, effect of focal spot size, exposure time, voltage wave form, multiple exposures, failing load operation, exposure timers, automatic exposure control

Interaction:

Interaction of x-rays and gamma rays with matter and their effects on the irradiated materials. Interaction processes and their relative importance for various materials and at different radiation energies. Attenuation, absorption scatter, exponential law, attenuation coefficients, half – value thickness. Homogenous and heterogeneous radiation contrast.

Effect:

Heat, excitation, ionization range of secondary electrons, chemical, photographic, fluorescent, phosphorescent, thermos luminescent.

Measurement of X-Ray and Gamma Rays:

Quantity: ionization, TLD, and photographic dosimetry.

Exposure: absorbed dose, and the relationship between them and radiation energy

Exposure and exposure rate meters. Geiger – Muller and scintillation detectors

Radionuclide detection measurement. Counting statistics

Quality: radiation, beam energy, mean, effective and peak energy, half value thickness and filtration

Interaction of X-Rays with the patient:

Attenuation in various body tissues, high voltage radiography, mammography enhancement by contrast media.

Geometric factors: magnification, distortion, positioning geometric and movement unharness, obliteration, micro- radiography, beam limitation, focal spot size.

The Radiological Imaging:

Image quality: description and meaning, resolution, noise, definition and contrast.

The Image Receptor:

Intensifying screens: construction, physical principles and applications. X ray film: structure and operation, characteristic curve, density, speed, contrast, latitude, processing and the dark room, auto9matic x-ray film processor, function, principles, construction, advantages and disadvantages, handing and storage, labeling and identification. Design and care of cassettes. Display and perception of the radiographic image.

Image intensities construction, operation, brightness gain, optical couplings, TV systems.

Recording media: 35 mm cine film, 100mm or 60 mm spot film, video tape / disc.

Electrostatic processes: xeroradiography.

Scattered Radiation:

Effect and control scatter: beam limitation, compression, grid construction and operation.

Radiographic subtraction technique. tomography (conventional): principles, layer thickness.

Digital fluoroscopic systems: data collection, storage and display including digital subtraction techniques, implication of digital storage media.

Radiation Protection:

Biological effects of radiation, risks of somatic and genetic effects. Objectives of radiation protection. Recommendations of I.C.R.P. concepts of dose equivalent quality factors, detriment, limitations annual limits of intake, radiological protection regulations. Relevant codes of practice. Dose control by design and by operation in diagnostic x-ray procedures and nuclear medicine for both staff and patients. Doses received in diagnostic procedures, population, somatic and genetic dose, risk estimates, benefits, personnel monitoring.

Quality Assurance:

Methods of assessing image quality and their relationship to specifications of system performance. Methods of monitoring equipment performance.

B. Clinical Radiology:

Breast:

- Knowledge of breast anatomy pathology and clinical practice relevant to clinical radiology
- Understanding of the radiographic techniques employed in diagnostic mammography
- Understanding of the principles of current practice in breast imaging and breast cancer screening.
- Awareness of the proper application of other image techniques to this specialty (e.g. ultrasound)
- Mammographic reporting of common breast disease
- Participating in mammographic reporting sessions screening and symptomatic)
- Participation in breast assessment clinics
- Observations of breast biopsy and localization

Cardiac:

- Knowledge of cardiac anatomy, and clinical practice relevant to clinical radiology
- Knowledge of the manifestations of cardiac disease demonstrated by conventional radiography
- Familiarity with the application of the following techniques: Radionuclide investigations
- Reporting plain radiographs performed to show cardiac disease
- Supervising and reporting radionuclide investigations, computed tomography and / or performed to show cardiac disease

Chest:

- Knowledge of respiratory anatomy and clinical practice relevant to clinical radiology
- Knowledge of the manifestations of thoracic disease demonstrated by conventional radiography and C.T.
- Knowledge of the application of radionuclide investigations to chest pathology with particular reference to radionuclide lung scintigrams.
- Reporting of plain radiographs performed to show chest disease
- Observing reporting radionuclide lung scintigrams
- Observing and reporting computed tomography of the chest, including high – resolution examinations and C.T. pulmonary angiography

Gastrointestinal (Including Liver, Pancreas and Spleen):

- Knowledge of gastrointestinal anatomy and clinically relevant to clinical radiology.
- Knowledge of the radiological manifestations of disease within the abdomen on conventional radiography, contrast studies, Ultrasound, C.T. radionuclide investigations.
- Knowledge of the applications, contraindications and complications of relevant interventional procedures.
- Reporting plain radiographs performed to show gastrointestinal disease
- Performing and reporting the following contrast examinations: Swallow and meal examinations, - small bowel, studies – enema examinations
- Performing and reporting transabdominal ultrasound of the gastrointestinal system and abdominal viscera.
- Observing and reporting computed tomography of the abdomen
- Observing Ultrasound – guided biopsy and drainage
- Performing and reporting the following contrast medium studies: Cholangiography (Tube) , -

sonogram, - stoma gram, GI video studies
- Experience of the current application of radionuclide investigations to the gastrointestinal tract in the following areas: Liver, - biliary system, - gastrointestinal bleeding (including Meckel's diverticulum), - abscess localization, - assessment of inflammatory bowel disease

Head and Neck Imaging:

- Knowledge of head and neck anatomy and clinical practice relevant to clinical radiology.
- Knowledge of the manifestations of ENT disease as demonstrated by conventional radiography, relevant contrast examinations, ultrasound, C.T.
- Awareness of the application of ultrasound with particular reference to the thyroid and salivary glands and other neck structures
- Awareness of the application of radionuclide investigations with particular reference to the thyroid and parathyroids glands.
- Reporting plain radiographs performed to show ENT / dental disease
- Performing and reporting relevant contrast examination (e.g. barium studies including video swallows, sialography and dacrocystography)
- Performing and reporting ultrasound of the neck (including the thyroid, parathyroid and salivary glands)
- Supervising and reporting computed tomography of the head and neck for ENT problems
- Supervising reporting computed tomography for orbital problems
- Reporting radionuclide thyroid investigations
- Observation or experience in performing ultrasound of the eye
- Observing and reporting computed tomography of congenital anomalies of the ear
- Observing radionuclide parathyroid investigations.

Musculoskeletal Including Trauma:

- Knowledge of musculoskeletal anatomy and clinical practice relevant to clinical radiology
- Knowledge of normal variants of normal anatomy, which may mimic trauma.
- Knowledge of the manifestations of musculoskeletal disease and trauma as demonstrated by conventional radiography, C.T., contrast examinations, radionuclide investigations and ultrasound.
- Reporting plain radiographs relevant to the diagnosis of disorders of the musculoskeletal system including trauma.
- Reporting radionuclide investigations of the musculoskeletal system, particularly skeletal scintigrams.
- Supervising and reporting computed tomography of the musculoskeletal system
- Performing and reporting ultrasound of the musculoskeletal system.
- Supervising C.T. of trauma patients

Neuroradiology:

- Knowledge of neuroanatomy and clinical practice relevant to neuroradiology
- Knowledge of the manifestations of CNS disease as demonstrated on conventional radiography, C.T.
- Reporting plain radiographs in the investigation of neurological disorders
- Observing and reporting cranial and spinal computed tomography
- Observation and reporting of cerebral angiograms

- Observation of carotid ultrasound including Doppler.
- Experience in CT angiography to image the cerebral vascular system.
- Performing and reporting cerebral angiography
- Performing and reporting transcranial ultrasound

Obstetrics and Gynecology:

- Knowledge of obstetric and gynecological anatomy and clinical practice relevant to clinical radiology
- Knowledge of the physiological changes affecting imaging of the female reproductive organs
- Knowledge of the changes in fetal anatomy during gestation and the imaging appearances of fetal abnormality
- Reporting plain radiographs performed to show obstetric and gynecological disorders.
- Performing and reporting transabdominal and endovaginally ultrasound in gynecological disorder.
- Observing and reporting computed tomography in gynecological disorders.
- Performing and reporting hysterosalpingography
- Performing and reporting transabdominal and endovaginally ultrasound in obstetrics

Oncology:

- Knowledge of clinical practice relevant to clinical radiology
- Familiarity with tumor staging nomenclature
- Familiarity with the application of ultrasound, radionuclide investigations, computed tomography in oncological staging, and monitoring the response of tumors to therapy.
- Familiarity with the radiological manifestations of complications which may occur in tumor management.
- Reporting plain radiographs performed to assess tumor
- Performing and reporting ultrasound, C.T. and radionuclide investigations in oncological staging and monitoring the response of tumor therapy.
- Familiarity with the practical application of PET imaging in tumor staging and management

Pediatric:

- Knowledge of pediatric anatomy and clinical practice relevant to clinical radiology
- Knowledge of disease entities specific to the pediatric age group and their clinical manifestations relevant to clinical radiology.
- Knowledge of disease entities specific to the pediatric age group and their manifestations as demonstrated on conventional radiography, ultrasound, contrast studies, CT and radionuclide investigations
- Reporting plain radiographs performed in the investigation of pediatric disorders including trauma.
- Performing and reporting ultrasound in the pediatric age group in the following areas: Transabdominal, - transcranial
- Performing and reporting routine fluoroscopic procedures in the pediatric age group particularly: Contrast studies of the urinary tract, Contrast studies of the gastrointestinal system.
- Observing and reporting computed tomography.
- Observing and reporting radionuclide investigations in the pediatric age group
- The management of suspected non – accidental injury (NAI)
- Performing and reporting ultrasound in the pediatric age group in the following areas: Musculoskeletal, - chest

Ur- Radiology:

- Knowledge of urinary tract anatomy and clinical practice relevant clinical radiology
- Knowledge of the manifestations of urological disease as demonstrated on conventional radiography, ultrasound, C.T.
- Familiarity with the current application of radionuclide investigations for imaging the following: Kidney, - renal function, - vescio-ureteric reflux
- Reporting plain radiographs performed to show urinary disease.
- Performing and reporting the following contrast studies: Intravenous urogram, - retrograde pyelo-ureterography, - loopogram, - nephrostogram, - ascending urethrogram, - micturating cysto-urethrogram.
- Performing and reporting transabdominal ultrasound to image the urinary tract
- Observing and reporting computed tomography of the urinary tract
- Reporting radionuclide investigations of the urinary tract in the following areas; Kidney, - renal function, -vesico-reteric reflux
- Experience of antegrade –urethrography
- Urodynamics

Vascular and vascular intervention:

- Knowledge of vascular anatomy and clinical practice relevant to clinical radiology.
- Familiarity with appropriate applications of the following techniques: Ultrasound (including Doppler), Computed tomography and C.T. angiography
- Reporting plain radiographs relevant to cardiovascular disease
- Performing the following techniques:
- Ultrasound (including Doppler),- venous and arterial
- Observing and reporting CT examination of the vascular system (CTA) including image manipulation
- CT Pulmonary angiography

C. Behavioral Sciences

1. Bio-Psycho-Social (BPS) Model of Health Care
2. Use of Non-medicinal Interventions in Clinical Practice
    - Communication Skills
    - Counseling
    - Informational Skills
3. Crisis Intervention/Disaster Management
4. Conflict Resolution
5. Breaking Bad News
6. Medical Ethics, Professionalism and Doctor-Patient Relationship
    - Hippocratic Oath
    - Four Pillars of Medical Ethics (Autonomy, Beneficence, Non-maleficence and justice)
    - Informed Consent and Confidentiality
    - Ethical Dilemmas in a Doctor’s Life

D. Introduction to Biostatistics and Research

1. Introduction to Bio-Statistics
2. Introduction to Bio- Medical Research
3. Why research is important?
4. What research to do?
    - Selecting a Field for Research
    - Drivers for Health Research
    - Participation in National and International Research
    - Participation in Pharmaceutical Company Research
    - Where do research ideas come from?
    - Criteria for a good research topic
5. Ethics in Health Research
6. Writing a Scientific Paper
7. Making a Scientific Presentation
8. Searching the Literature

Recognition/Equivalence of the Diploma and Institution

After two years training course and passing exit examination, candidate should be given status of mid-level specialist equivalent to any other similar qualification.

Methods of Instruction/Course Conduction

As a policy, active participation of students at all levels will be encouraged.

Following teaching modalities will be employed:

1. Lectures
2. Seminar Presentation and Journal Club Presentations
3. Group Discussions
4. CT reporting sessions
5. Clinic-pathological conferences
7. Skill teaching in OPD, emergency and ward settings
8. Self-study, assignments and use of internet
10. OPD & Follow up clinics

In addition to the conventional teaching methodologies following interactive strategies will also be introduced to improve both communication and clinical skills in the upcoming consultants:

Monthly Student Meetings

Each affiliated medical college approved to conduct training for DMRD will provide a room for student meetings/discussions such as:

a. Journal Club Meeting

b. Core Curriculum Meetings

c. Skill Development

a. Journal Club Meeting

Two hours per month should be allocated to the presentation and discussion of a recent journal article related to Radiology. The article should be critically evaluated and its applicable results should be highlighted, which can be incorporated in clinical practice. Record of all such articles should be maintained in the student's log book.

b. Core Curriculum Meetings

All the core topics of DMRD should be thoroughly discussed during these sessions. The duration of each session should be at least two hours once a month. It should be chaired by the chief student (elected by the students of the relevant diploma). Each student should be given an opportunity to brainstorm all topics included in the course and to generate new ideas regarding the improvement of the course structure

c. Skill Development

Two hours twice a month should be assigned for learning and practicing clinical skills.

List of skills to be learnt during these sessions is as follows:

1. Communication skills
3. Practical Skills i.e., use of relevant radiological equipment
4. Presentation Skills: Power-point, lectures, small group discussions, article presentation etc.
5. Research and Scientific Writing
6. Reporting of Radiological Emergencies in Primary Care

Log Book

The trainees must maintain a log book and get it signed regularly by the supervisor. A complete and duly certified log book should be part of the requirement to sit for DMRD examination. Log book should include adequate number of diagnostic procedures, routine and emergency cases of patients, case presentations in CPCs, journal club meetings and literature review.

Proposed Format of Log Book is as follows:

Candidate's Name: _____

Roll No. _____

Procedures:

1. X-Rays
2. Mammography
3. Fluoroscopic procedures
4. Ultrasounds
5. Antenatal ultrasound
6. Doppler ultrasounds
7. Ct scans
8. Interventional procedures observed
9. Emergency cases

OPD Cases

Sr.#	Date	Name of Patient	Age	Sex	Admission No	Findings	Diagnosis /Dd	Supervisor's Signature (Name/Stamp)
1								
2								

Emergency Cases

Sr.#	Date	Name of Patient	Age	Sex	Admission No	Findings	Diagnosis /Dd	Supervisor's Signature (Name/Stamp)
1								
2								

Case Presented

Sr.#	Date	Name of Patient	Age	Sex	Admission No	Findings	Diagnosis /Dd	Supervisor's Signature (Name/Stamp)
1								
2								

Seminar / Journal Club Presentation

Sr.#	Date	Name of Patient	Age	Sex	Admission No	Findings	Diagnosis /Dd	Supervisor's Signature (Name/Stamp)
1								
2								

Evaluation Record

(Excellent, Good, Adequate, Inadequate, Poor)

Sr.#	Date	Name of Patient	Age	Sex	Admission No	Findings	Diagnosis /Dd	Supervisor's Signature (Name/Stamp)
1								
2								

Literature Review

Students will be assigned a clinical problem most commonly encountered in the relevant specialty and will be specifically trained to review literature in the relevant field and write a '**Statistical Analysis of a disease'**

Comprising of:

- Topic
- Introduction
- Discussion of the reviewed literature
- Conclusion
- References

Assessment

1 Purpose of Assessment:

Assessments can be described as *helping* learning or *testing* learning - referred to as formative and summative respectively. There is a link between the two; some assessments are purely formative others are explicitly summative with a feedback element while others provide formative feedback while contributing to summative assessment as in Continuous Internal Assessment (CIA).

The purposes of formative assessment are to:

- assess trainees' actual performance in the workplace.
- enhance learning by enabling trainees to receive immediate feedback, understand their own performance and identify areas for development.
- drive learning and enhance the training process by making it clear what is required of trainees and motivating them to ensure they receive suitable training and experience.
- enable supervisors to reflect on trainee needs in order to tailor their approach accordingly.

The purposes of summative assessment are to:

- provide robust, summative evidence that trainees are meeting the curriculum requirements during the training programme.
- ensure that trainees possess the essential underlying knowledge required for their specialty.
- identify trainees who should be advised to consider changes of career direction.
- provide information for the quality assurance of the curriculum.

2 **Assessment Methods**:

Workplace-Based Assessment (WBA):

a) Case Based Discussion (CBD)
b) Clinical Evaluation Exercise (CEX) / CEX for Consent (CEX(C)
c) Direct Observation of Procedural Skills (DOPS)
d) Procedure Based Assessment (PBA)
e) Logbook

Written/Oral Assessments:

a) MCQ:
b) Short-answer questions
c) Objective Structured Clinical Examination (OSCE)

The OSCE stations will be of two types:

l. Observed /Interactive

II. Unobserved / Static.

d) Viva Voce

360-Degree Evaluation / Internal Assessment:

Student-Centered Integrated Assessment

It views students as decision-makers in need of information about their own performance. Integrated Assessment is meant to give students responsibility for deciding what to evaluate, as well as how to evaluate it, encourages students to **'own'** the evaluation and to use it as a basis for self-improvement. Therefore, it tends to be growth-oriented, student -controlled, collaborative, dynamic, contextualized, informal, flexible and action-oriented.

In the proposed curriculum, it will be based on:

- Self-Assessment by the student
- Peer Assessment
- Informal Internal Assessment by the Faculty

Self-Assessment by the Student

Each student will be provided with a pre-designed self-assessment form to evaluate his/her level of comfort and competency in dealing with different relevant clinical situations. It will be the responsibility of the student to correctly identify his/her areas of weakness and to take appropriate measures to address those weaknesses.

Peer Assessment

The students will also be expected to evaluate their peers after the monthly small group meeting. These should be followed by constructive feedback according to the prescribed guidelines and should be non-judgmental in nature. This will enable students to become good mentors in future.

Informal Internal Assessment by the Faculty

There will be no formal allocation of marks for the component of internal assessment so that students are willing to confront their weaknesses rather than hiding them from their instructors.

It will include:
a. Punctuality
b. Ward work
c. Monthly assessment (written tests to indicate particular areas of weaknesses)
d. Participation in interactive sessions

Formative Assessment

Will help to improve the existing instructional methods and the curriculum in use

Feedback to the faculty by the students:

After every three months students will be providing written feedback regarding their course components and teaching methods. This will help to identify strengths and weaknesses of the relevant course, faculty members and to ascertain areas for further improvement

Summative Assessment

It will be carried out at the end of the programme to empirically evaluate **cognitive, psychomotor**
And **affective domains** in order to award diplomas for successful completion of courses.

Eligibility To Appear in Final Examination

-Only those candidates will be eligible to take final examination who have passed Part 1 examination (after one year of education) and have completed two years of structured/supervised training programme.

-Students who have completed their log books and hold certificates of 75% attendance should be allowed to sit for the exam

- Application for the final examination can be made with recommendation of the supervisor

- Only those candidates who qualify in theory will be called for clinical examination

DMRD Examination

1st Year in Training Assessment

Topics included

1. Physics
2. Radiological Anatomy
3. Radiological procedures
4. Nuclear Medicine
5. Radiological positioning
6. Emergency Radiology

Components of the 1st Year in Training Assessment

MCQ Paper	100	One Best Type
Total Marks	100 Marks	

Final Assessment

Topics included in paper 1 and 2

1. Chest Radiology
2. CVS Radiology
3. Gastrointestinal Radiology
4. Hepatobiliary Radiology
5. Musculoskeletal Radiology
6. Breast Radiology
7. Central nervous system
8. Pediatric radiology
9. Genitourinary Radiology

Final Assessment

Theory

Paper I

	100 Marks	**3 Hours**
10 SEQs (No Choice)	100 Marks	

Paper II

Paper II	**100 Marks**	**3 Hours**
100 MCQs	100 Marks	

The candidate who passes in theory papers, will be eligible to appear in the clinical & viva voce.

OSCE **90 Marks**

10 stations each carrying 9 marks of 10 minutes duration; each evaluating performance-based assessment with five of them interactive

VIVA **90 Marks**

9 stations 10 marks each

Components of the Final Assessment

Theory paper 1	100 marks
Theory paper 2	100 marks
Clinical/Oral	180 marks
Log Book	20 marks
Total Marks	400

A panel of four examiners from Radiology (Two internal and two external) will be appointed for practical examination.

Each component of practical examination will be assessed by two examiners, awarding marks simultaneously and independently. The final score awarded will be an average score, as agreed by both examiners.

Pass Percentage and Other Regulations Regarding Examination

-Criterion referenced assessment principles will be used

-20 marks for the log book will be included in the OSCE component

-60 % marks will be a pass score in each component.

Each candidate must pass in every component separately.

-Candidate failing in any one component will have to re-sit the entire examination

-A maximum of 5 attempts to sit for the examination will be allowed, to be availed within 3 calendar years of the first attempt. Re-admission in DMRD course is not permissible under any circumstances

-The results will be announced according to the rules and regulations set by the Examination Branch of RMU Rawalpindi

1st Year in Training Assessment 100 MCQs		Final Assessment				
		Paper 1 **10 SEQs (100 marks)**	**Paper 2** **100 MCQs (100 marks)**	**OSCE** **(90marks)**	**VIVA** **(90marks)**	**LOG BOOK** **20 marks**
Radiological physics	40		--	9 slides of 10 marks each=90 (70% static stations 30% interactive stations)	9 station of 10 marks each	
Radiological anatomy	20		--			
Nuclear medicine	10		--			
Radiological procedures	15		--			
Emergency Radiology	15					
chest & CVS	--	2	20			
GIT & hepatobiliary	--	2	25			
genitourinary	--	2	20			
musculoskeletal	--	2	20			
Breast	--	1	5			
CNS and spine	--	1	10			

Recommended Books

1. Ryan S. ***Anatomy for Diagnostic Imaging.*** 2nd ed. Saunders;2004.
2. Bushing S. C. ***Radiological Science for Technologists Physics, Biology and Protection.*** 8th ed. Mosby;2004.
3. Chapman S. and Nakienly R. ***A Guide to Radiological Procedures***. 4th ed. Baillier Tindall, Jaypee Brothers; 2001.
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The End