KHYBER MEDICAL UNIVERSITY

RADIOLOGY TECHNOLOGY CURRICULUM

STUDY GUIDE SEMESTER 5

16 Weeks Activity Planner

2024-25

CENTRAL CURRICULUM & ASSESSMENT COMMITTE FOR NURSING,
REHABILITATION SCIENCES & ALLIED HEALTH SCIENCES

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Team for TOS Development

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Vision & Mission

Khyber Medical University (KMU) Vision:

Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

Khyber Medical University (KMU) Mission:

Khyber Medical University aims to promote professional competence through learning and innovation for providing comprehensive quality health care to the nation.

Institute of Paramedical Sciences Peshawar (IPMS-PESH) Mission:

To produce allied health professionals who excel in their skills, research, compassionate care, and community involvement, thereby enhancing the healthcare system

Program Introduction

The BS Radiology Technology program at Khyber Medical University is a comprehensive four-year undergraduate degree designed to equip students with the knowledge, skills, and competencies required to become competent radiologic technologists. Radiology technology is a vital healthcare profession that focuses on the diagnosis and treatment of diseases using medical imaging modalities such as X-ray, CT, MRI, and ultrasound.

Radiologic technologists work closely with patients, healthcare providers, and other medical professionals to provide high-quality images and patient care. This program is structured to provide students with a strong foundation in the sciences and specialized training in radiologic technology.

Students will learn about the principles of radiation physics, radiobiology, patient assessment, and the latest techniques and technologies used in medical imaging. Throughout the four-year program, students will participate in clinical rotations and internships at top-tier hospitals and healthcare facilities, where they will gain hands-on experience in patient care and develop the skills necessary to work effectively in a fast-paced healthcare environment.

Upon completion of the program, graduates will be eligible to take the American Registry of Radiologic Technologists (ARRT) certification exam and will be qualified to work as registered technologists in radiography, CT, MRI, mammography, or other specialized imaging modalities.

Objectives

By the end of the BS Radiology Degree, the students will be able to:

Cognitive Domain

1. Explain the principles of radiation physics, radiobiology and imaging modalities.
2. Interpret pertinent clinical information to select appropriate imaging procedures and protocols for pediatric, neonatal and adult patients.
3. Identify potential expanded roles for radiologic technologists by examining professional behavior, ethics, and the history of the field.
4. Discuss the current professional and clinical roles in radiologic technology.
5. Apply knowledge of the field to address current or future needs related to clinical practice, administration, education, and/or research.

Psychomotor Domain

1. Demonstrate proficiency in operating radiologic equipment, including X-ray, CT, MRI, ultrasound and other imaging modalities
2. Perform patient assessments and provide quality care during imaging procedures, ensuring patient safety and comfort.
3. Work collaboratively with inter-professional teams to deliver effective, patient-centered care.
4. Develop the skills necessary to work efficiently in a fast-paced healthcare environment.

Affective Domain

1. Exhibit professional behavior and adhere to ethical values in the delivery of clinical radiography.
2. Incorporate an evidence-based approach to patient care by identifying and accessing appropriate literature and assessing relevant medical research.
3. Demonstrate leadership skills in the radiology profession, healthcare, and the community.
4. Engage in continuous learning and professional development to stay current with the latest advancements in the field of radiology.
5. Provide compassionate and patient-centered care that respects the dignity and autonomy of each individual

Sixth Semester Subjects for BS Radiology Technology

S. No	Subjects	Duration
1	RAD-610Computed Tomography(CT) 4 (2+2)	16 weeks
2	RAD-611 Mammography & Special Radiological Techniques 3 (2+1)	16 weeks
3	RAD-612 Magnetic Resonance Imaging (MRI) 4 (2+2)	16 weeks
4	SUR-608 General Surgery 3 (2+1)	16 weeks
5	RAD-613 Interventional Radiology 3 (2+1)	16 weeks
6	RAD-614 Clinical Medicine-II 2(1+1)	16 weeks

RAD-610 Computed Tomography(CT) 4 (2+2)

Course Description

This course covers key concepts in CT imaging, including axial anatomy, CT principles, system components, image reconstruction, and quality. It explores different CT generations, patient care, whole-body CT imaging, multislice spiral CT, and radiation safety. The course also addresses IV procedures, contrast agents, clinical applications, artifacts, and bone densitometry, with a focus on DEXA technology, quality control, and statistical interpretation of results. Students will gain practical knowledge for performing and interpreting CT and DEXA scans in clinical settings.

LEARNING OBJECTIVES

Cognitive Domain

By the end of this course, students should be able to:

- Identify axial anatomy in CT images.
- Explain principles and instruments of CT imaging.
- Describe CT scanner generations and their differences.
- Identify CT operation principles and components.
- Evaluate image quality, including reconstruction methods.

Psychomotor Domain

By the end of this course, students should be able to:

- Identify anatomical structures in axial CT images.
- Operate CT scanners and adjust settings for different protocols.
- Position patients correctly for CT imaging.
- Administer IV contrast agents safely.

Affective Domain

By the end of this course, students should be able to:

- Demonstrate professionalism in patient care.
- Apply radiation safety practices.
- Exhibit confidence in CT and DEXA procedures.
- Collaborate effectively with the healthcare team.
- Commit to continuous learning and development.

TABLE OF SPECIFICATIONS

S.No	Weeks	Content	Learning Outcome	Domain			MIT's	Time/ Hours	Assessment	No of Items
				C	P	A				
TOPIC: CT IMAGES OF AXIAL ANATOMY										
1	Week-1	Axial plane, CT slices	Describe axial anatomy in CT images.	C2			Interactive Lecture /SDG	2	MCQs/SEQs	3
2		Orientation, Localization, Clinical applications	Explain the significance of axial anatomy for image interpretation.	C3						
3		Skull, vertebrae, heart, lungs, liver, kidneys, pelvis, muscles and blood vessels	Identify anatomical landmarks in CT images.	C1						
4		Resolution, Slice Thickness, Contrast, Artifacts	Compute the relationship between axial anatomy and image clarity.	C3						
5		Videos/Charts/ Models	Identify key anatomical landmarks in a CT scan.		P4		Demo	2	OSPE	1
6		SOP'S Compliance	Show respect and professionalism in positioning patients.			A4	Role play			
TOPIC: PRINCIPLES & INSTRUMENTS OF CT										
7	Week-2	X-ray generation, Detection, reconstruction, cross-sectional Imaging	Describe the basic principles of CT technology.	C2			Interactive Lecture /SDG	2	MCQs	3
8		X-ray tube, detectors, gantry, patient table, computer/workst	Explain the role of various CT instruments in image acquisition.	C3						

		ation								
9		Positioning x-ray tube, rotation data collection, display	Extend the operation of the CT scanner and components.	C2						
		Detector Array, Control Console, Computer System, Power Supply	Identify CT system components and their specific functions.	C1						
10		Videos/Charts/ Models	Demonstrate the correct setup and operation of a CT scanner, including identifying and handling key system components and instruments used in image acquisition.		P4		Demo	2	OSPE	1
11		SOP'S Compliance	Ensure patient safety when handling CT instruments.			A 4	Role play			
TOPIC: GENERATIONS OF CT										
12	Week-3	Invention, CT scanners, Dual-energy CT and photon	Discuss the evolution of CT technology.	C1			Interacti ve Lecture /SDG	2	MCQs	4
13		First Generations to seventh, Stationary detectors, Multiple detectors, single detector	Identify the different CT generations and their technological advances.	C3						
		First Generations to seventh, Faster scans,	Understand the advancements in scan speed and resolution with each generation.	C2						
		First Generations to seventh	Relate how CT generations influence image quality and clinical outcomes.	C4						
14		Videos/Charts/Mod els	Demonstrate CT scan procedures reflecting different CT generations to compare image quality and resolution.		P4		Demo	2	OSPE	1
15		SOP'S Compliance	Ensure safe operation of the CT machine with awareness.			A 4	Role play			

TOPIC: PRINCIPLES OF OPERATION										
16	Week-4	Principle, scanning, Reconstruction	Explain the basic principles of CT operation.	C1			Interactive Lecture /SDG	2	MCQs	4
17		Function, detectors, Types, Relationship	Understand the role of the scanner's X-ray tube and detector.	C2						
18		Reconstruction, Algorithms, methods, Importance	Discuss the importance of image reconstruction in CT.	C3						
		Settings, Detector and type, factors, Scanning	Identify factors influencing CT image quality.	C1						
19		Videos/Charts/Models	Operate the CT scanner to perform image acquisition and initiate basic image reconstruction.		P4		Demo	2	OSPE	1
20		SOP'S Compliance	Show confidence in operating CT systems			A4	Role play			
TOPIC: SYSTEM COMPONENTS										
21	Week-5	X-ray Tube, Detectors, Gantry, Imaging System, Control Console	Identify the major components of a CT system.	C2			Interactive Lecture /SDG	2	MCQs	4
		X-ray Tube, Detectors, Gantry, Imaging System, Control Console	Describe the function of each component in a CT system.	C2						
		Radiation, processes, rotation,	Identify the components how it work together to form an image.	C2						
22		Quality, Computer System, Control Console	Relate component quality to overall CT image quality.	C3						
23		Videos/Charts/Models	Identify and handle major CT components, demonstrating how they function together during image acquisition.		P4		Demo	2	OSPE	1
24		SOP'S Compliance	Ensure patient positioning according to procedure.			A4	Role play			
TOPIC: IMAGE CHARACTERISTICS & RECONSTRUCTION										

c	Week-6	Collection, conversion, interpolation and filtering, processing	Illustrate the process of CT image reconstruction.	C3			Interactive Lecture /SDG	2	MCQs	4
26		Slice thickness, Iterative Reconstruction	Explain the role of reconstruction algorithms in image quality.	C2						
		Quality, Filtered Back Projection (FBP) Iterative Reconstruction	Discuss the impact of reconstruction techniques on spatial resolution.	C2						
27		Detection, scan	Relate image quality to patient outcomes.	C2						
28		Videos/Charts/Models	Demonstrate CT image reconstruction, adjusting algorithms to optimize image quality and spatial resolution.		P4		Demo	2	OSPE	1
		SOP'S Compliance	Demonstrate image processing on the CT workstation			A4	Role Play			
TOPIC: IMAGE QUALITY										
29	Week-7	Resolution, applications, importance	Define spatial resolution and its importance in CT.	C1						4
30		Parameters, Quality, Factors, Algorithms	Discuss the factors that influence image quality.	C2			Interactive Lecture /SDG	2	MCQs	
31		Resolution, **Noise, Balancing**	Correlate relationship between contrast resolution and noise.	C3						
32		Uniformity, Linearity, Accuracy	Relate image uniformity and linearity to diagnostic accuracy.	C2						
33		Videos/Charts/Models	Adjust CT scan settings to optimize spatial and contrast resolution, minimizing noise for improved image uniformity and diagnostic accuracy.		P 4		Video/Radiographs	2	OSPE	1
34		SOP'S Compliance	Apply optimal settings for image quality enhancement.			A4	Role play			
TOPIC: PATIENT CARE & PREPARATION										
35		Identification, Instructions, Positioning, History	Discuss preparing patients for CT procedures.	C2				2	MCQs	4
		Safety, Monitoring,	Understand patient safety measures during							

	Week-8	Control	CT scanning.				Interactive Lecture /SDG			
36		Instruction, Concerns, Reassurance, Consent	Explain the role of communication in preparing patients for CT.	C2						
		Anxiety, Comfort, Environment: Temperature, noise	Discuss the importance of patient comfort during CT imaging.	C2						
37		Videos/Charts/Models	Prepare patients for CT procedures, ensuring safety, comfort, and clear communication throughout the process.		P 4		Demo/ Video	2	OSPE	1
			Position patients correctly for CT imaging.							
TOPIC: WHOLE BODY CT IMAGING (AXIAL)										
38	Week-9	Preparation, Setup, Administration, Processing	Describe the procedure for whole-body CT imaging.	C2			Interactive Lecture /SDG	2	MCQs	3
39		Positioning, Selection,Acquisition,Data Processing	Identify the key steps in performing an axial CT scan.	C3						
		Assessment, Staging, Imaging, Planning	Discuss the clinical applications of whole-body CT.	C2						
40		Thickness, Settings, Contrast, view, speed	Relate imaging parameters to patient anatomy and pathology.	C2						
41		Videos/Charts/Models	Perform a whole-body CT scan, adjusting imaging parameters based on patient anatomy and pathology.		P 4		Demo/ Video	2	OSPE	1
42		SOP'S Compliance	Position patients correctly for whole-body CT.			A4	Role play			
TOPIC: MULTISLICE SPIRAL CT IMAGING PRINCIPLES										
43			Identify principles behind multislice spiral CT.	C2			Interactive Lecture	2	MCQs	3
44			Explain how multislice technology improves imaging speed and quality.	C2						

	Week-10		Discuss the advantages of spiral CT in clinical practice.	C2			/SDG			
30			Relate multi-slice CT applications to specific clinical needs.	C3						
31		Videos/Charts/Models	Operate a multislice spiral CT scanner, adjusting settings to improve imaging speed and quality for specific clinical needs.		P 4		Demo/ Video	2	OSPE	1
32		SOP'S Compliance	Adjust settings to optimize multislice spiral CT images.			A4	Role play			
TOPIC: ASSESSMENT & MONITORING										
33	Week-11	Technology, Spiral CT	Explain how to monitor patients during CT procedures.	C3			Interactive Lecture/SDG	2	MCQs	3
		Speed, Quality, Slices, converges	Discuss the importance of vital sign monitoring during CT.	C2						
		Imaging, Data Acquisition, Capabilities, Scan Time	Identify signs of patient distress or complications during scanning.	C1						
34		Trauma Imagin, Cardiovascular Imaging, Oncology Pulmonary Imaging, Abdominal Imaging	Identification of responses to patient emergencies during CT.	C2						
			Monitor patient vital signs during CT procedures and respond appropriately to signs of distress or emergencies.		P4			2	OSPE	1
36		SOP'S Compliance	Demonstrate patient monitoring during CT imaging.			A4	Role Play			
TOPIC: IV PROCEDURES & CONTRAST AGENTS										
37		Purpose, accuracy, types and effect, resolution	Explain the role of contrast agents in CT imaging.	C3			Interactive Lecture/	2	MCQs	4
38		agents, oral contrast, contrast agent, intravenous	Discuss the different types of contrast agents used in CT.	C2						

	Week-12	contrast					SDG			
39		Screening, dosing, methods, timing	Identify the protocols for administering contrast agents.	C2						
40										
41		Cardiovascular CT, Abdominal CT, Oncology Imaging, Pediatric Imaging, Renal Impairment	Relate contrast agent choice to the type of CT scan and patient condition.	C2						
42		Videos/Charts/Models	Administer contrast agents during CT scans, selecting the appropriate type based on the scan and patient condition.		P 4		Demo/ Video	2	OSPE	1
43		SOP'S Compliance	Demonstrate proper IV contrast administration techniques.			A4	Role play			
TOPIC: RADIATION SAFETY										
44	Week-13	Justification, optimization, limitation, equipment, communication	Discuss radiation safety principles in CT.	C2			Interactive Lecture/SDG	2	MCQs	2
45		Exposure, adjustment, scan, protocols, positioning technology	Identify methods to reduce radiation dose to patients.	C2						
46		Videos/Charts/Models	Apply radiation safety protocols during CT scanning to minimize patient exposure while maintaining image quality.		P4		Demo/ Video	2	OSPE	1
47		SOP'S Compliance	Implement radiation safety measures during CT imaging.			A4	Role play			
TOPIC: CLINICAL APPLICATIONS OF CT										
48		trauma, oncology, neurology, cardiology, abdomen, pelvis	Describe the clinical applications of CT in diagnosing various conditions.	C2			Interactive Lecture/SDG	2	MCQs	4
49	Week-	trauma, oncology,	Identify the role of CT in trauma, oncology,	C2						

	14	neurology, cardiology, abdomen, pelvis,	neurology, and cardiology.							
50		advantages, limitation oncology, neurology, cardiology	Discuss the advantages and limitations of CT for specific clinical applications.	C2						
51		advantages, limitation oncology, neurology, cardiology	Relate how CT imaging impacts patient outcomes in various clinical scenarios.	C2						
52		Videos/Charts/Models	Perform CT scans for specific clinical applications (trauma, oncology, neurology, cardiology), adjusting protocols to optimize diagnostic outcomes.		P 4		Demo/ Video	2	OSPE	
53		SOP'S Compliance	Show ethical awareness in clinical decision-making regarding CT usage.			A4	Role play			
TOPIC: ARTIFACTS IN CT IMAGING										
54	Week-15	Artifacts, causes, diagnosis	Define what constitutes artifacts in CT images.	C2			Interactive Lecture/ SDG	2	MCQs	4
55		motion Artifacts, hardening, effects, aliasing,	Identify common types of artifacts in CT and their causes.	C2						
		blurring, distortion details, false positive negative,	Discuss the effect of artifacts on image quality and diagnostic accuracy.	C2						
		detector, maintenance, control	Recognize common artifacts.	C2						
		detector, reconstruction, count,	Explain the relationship between scanner calibration and artifact occurrence.	C3						
		Detector	Relate technical improvements to artifact	C4						

		Technology, Iterative Reconstruction, Higher Slice Counts, Dual-Energy CT	reduction in modern CT scanners.							
		Videos/Charts/Models			P4		Demo/ Video	2	OSPE	
56		SOP'S Compliance	Show attention to detail in interpreting CT images with artifacts			A4	Role Play			
TOPIC: BONE DENSITOMETRY AND DEXA										
57	Week-16	Bone Densitometry, DEXA (Dual-Energy X-ray Absorptiometry), significance	Explain the role of bone densitometry and the significance of DEXA in assessing bone health.	C3			Interactive Lecture/ SDG	2	MCQs	3
58		DEXA (Dual-Energy X-ray Absorptiometry), QCT (Quantitative Computed Tomography), comparison application	Compare different bone densitometry techniques (e.g., DEXA vs QCT) in terms of their clinical applications.	C2						
		Principle of DEXA, Bone Mineral Density (BMD), Osteoporosis Diagnosis, role in treatment	Discuss how DEXA technology works and its role in diagnosing conditions such as osteoporosis.	C2						
		Calibration, positioning, technique, testing consistency, reproducibility	Describe the importance of quality control in DEXA scanning to ensure the accuracy of results.	C2						
		T score, z score, risk, application	Analyze the statistical methods used in interpreting DEXA results and apply them to clinical practice.	C4						

60		Videos/Charts/ Models	Perform a DEXA scan, ensuring accurate quality control and interpreting results for bone health assessment.				Demo/ Video	2	OSPE	1
61		SOP'S Compliance	Show professionalism and empathy when performing bone densitometry, DEXA and quality control on patients.				Role play			

Recommended Books:

1: Radiological science for technologists by Stewart C. Bushong 7th edition published by Mosby, Inc: A Harcourt health company
2: Computed Tomography: Principles, Design, Artifacts, and Recent Advances, Second Edition (SPIE Press Monograph Vol. PM188) by Jiang Hsieh
3: Computed Tomography by Willi A. Kalender

ASSESSMENT BREAKDOWN

S.No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	**CT Images of Axial Anatomy**	4	1	Interactive
2	**Principles & Instruments of CT**	4	1	Interactive
3	**Generations of CT**	5	1	Interactive
4	**Principles of Operation**	5	1	Static
5	**System components**	5	1	Static
6	**Image Characteristics & Reconstruction**	5	1	Static and Interactive
7	**Image Quality**	5	1	Static
8	**Patient Care & Preparation**	5	1	Static
9	**Whole Body CT Imaging (Axial)**	4	1	Static and Interactive
10	**Multislice Spiral CT Imaging Principles**	4	1	Interactive
11	**Assessment & Monitoring**	4	1	Interactive
12	**IV Procedures & Contrast Agents**	5	1	Static and Interactive
13	**Radiation Safety**	3	1	Interactive
14	**Clinical Applications of CT**	4	1	Interactive
15	**Artifacts in CT Imaging**	4	1	Static and Interactive
16	**Bone Densitometry and DEXA**	4	1	Interactive
Total	**16**	**70**	**16**	**16**

RAD-611 Mammography & Special Radiological Techniques 3(2+1)

Course Description

This course provides an in-depth study of mammography and specialized radiological imaging techniques used for diagnostic and interventional purposes. Students will gain knowledge of breast anatomy, pathology, and the principles of mammographic imaging, including positioning, compression, quality control, and radiation safety. The course also covers advanced imaging procedures such as digital breast tomosynthesis, ductography, galactography, stereotactic-guided biopsy, as well as other special techniques including sialography, myelography, arthrography, and hysterosalpingography (HSG). Emphasis is placed on clinical indications, patient preparation, procedural protocols, and post-procedural care, with integration of technical competence, ethical practice, and patient-centered communication.

LEARNING OBJECTIVES

Cognitive Domain

By the end of this course, students should be able to:

1. Explain the principles, indications, and contraindications of mammography and various special radiological procedures.
2. Describe the anatomy and common pathologies of the breast and other body systems involved in special imaging techniques.
3. Discuss image acquisition techniques, positioning protocols, and quality assurance measures in mammography and special procedures.

Psychomotor Domain

By the end of this course, students should be able to:

1. Perform standard mammographic views and special projections using proper positioning, compression, and exposure techniques.
2. Assist in the execution of special radiological procedures such as HSG, myelography, sialography, and arthrography, adhering to proper aseptic and radiation safety protocols.
3. Conduct quality control tests in mammography to ensure optimal image quality and equipment performance.

Affective Domain

By the end of this course, students should be able to:

1. Respect patient dignity, privacy, and informed consent throughout all imaging processes.
2. Adhere to ethical standards and legal requirements related to women's imaging and special techniques.
3. Collaborate effectively with radiologists, technologists, and healthcare providers to deliver high-quality, patient-centered care.

TABLE OF SPECIFICATIONS

S.No	Weeks	Content	Learning Outcome	Domain			MIT's	Time/ Hours	Assessment	No of Items
				C	P	A				
TOPIC: BASICS FOR MAMMOGRAPHY										
1	Week-1	Mammography	Discuss Mammography.	C2			Interactive Lecture/SGD	2	MCQs	3
2		Soft tissue radiography	Discuss the fundamental principles of soft tissue radiography and its applications in medical imaging.	C2						
3		Basis of Mammography	Describe the basic components and technical considerations involved in mammography.	C2						
4		Risk factors of Breast Cancer	Describe the risk factors associated with breast cancer, including genetic predisposition, family history, and lifestyle factors.	C2						
6		Videos/Charts/Models	Demonstrate basic components involved in mammography through video.		P4		Demo	1	OSCE	1
7		SOP's Compliance	Comply to SOPs for Mammography.			A4	Practical Demonstration			
TOPIC: BREAST ANATOMY AND TYPES OF MAMMOGRAPHY										
8	Week-2	Breast Architecture	Describe the architectural components of the breast.	C2			Interactive Lecture/SGD	2	MCQs	3
9		Different tissues of Breast	Explain the differences between the various tissues of the breast.	C3						
10		KVP and mAs for Breast tissues	Discuss the optimal kilovoltage (kVp) and milliamperage-second (mAs) settings for mammography of different breast tissue types.	C2						
11		Types of Mammography	Explain the indications and advantages of various types of mammographic techniques.	C3						
13		Videos/Charts/Models	Video demonstration of architecture components of the Breast.		P4		Demo	1	OSCE	1
14		SOP's Compliance	Independently identify different criteria for different types of Mammography			A4	Video Demonstration			
TOPIC: MAMMOGRAPHIC IMAGING SYSTEM										
15	Week-3	High Voltage generation	Explain the principle of high-voltage generation in an X-ray tube.	C3			Interactive Lecture/SGD	2	MCQs	5
16		Step up transformer and voltage rectification	Discuss the role of the step-up transformer and voltage rectification in x-ray generators.	C2						
17		Target filter composition	Describe the composition and function of target filters in X-ray tubes.	C2						

18		Focal spot size	Discuss the factors that affect focal spot size in mammographic imaging systems.	C2						
19		Stationary and rotationary Anode	Describe the differences between stationary and rotating anodes in X-ray tubes.	C2						
20		Factors affecting focal spot	Discuss the factors that impact focal spot size including heat loading, X-ray beam quality and different types of anodes.	C2						
21		Videos/Charts/Models	Video demonstration of Mammographic imaging system.		P4		Demo	1	OSCE	1
22		SOP's Compliance	Adopt how to care and handle mammographic imaging system			A4	Practical Demonstration			
TOPIC: MAMMOGRAPHIC SYSTEM										
21	Week-4	Filtration	Explain the purpose of filtration in mammographic imaging systems.	C3			Interactive Lecture/SGD	2	MCQs	4
22		Types of filters	Explain the different types of filters used in mammographic imaging systems.	C3						
23		Anode heel effects	Describe anode heel effect in mammography.	C2						
		Compression	Explain compression in mammography.	C3						
24		Importance of Compression	Discuss the importance of compression in mammographic imaging systems.	C2						
25		Videos/Charts/Models	Demonstrate different types of filters through videos and charts.		P4		Demo	1	OSCE	3
26		SOP's Compliance	Comply to SOPs for Mammographic Imaging system.			A4	Practical Demonstration			
TOPIC: IMAGING SYSTEM										
27	Week-5	Grids	Explain the purpose and function of grids in mammographic imaging systems.	C3			Interactive Lecture/SGD	1	MCQs	4
28		Pros and Cons of Grids	Explain the advantages and limitations of using grids in mammography.	C3						
29		Automatic Exposure control	Describe the principles of automatic exposure control (AEC) in mammographic imaging systems.	C2						
30		Magnification Mammography	Discuss the indications and techniques for magnification mammography.	C2						
33		Videos/Charts/Models	Video demonstration of magnification mammography.		P4		Demo	1	OSCE	2
34		SOP's Compliance	Adopt how to care and handle different components of magnification mammography.			A4	Practical Demonstration			
TOPIC: SCREEN FILM MAMMOGRAPHY										
37	Week-6	Components of SFM	Describe the components of a screen-film mammography (SFM) system.	C2			Interactive Lecture/SGD	2	MCQs	4

38		Process of image formation	Explain the process of image formation in SFM.	C3						
39		Factors affecting Image	Discuss the factors that affect image quality in SFM.	C2						
40		Advantages and limitations of SFM	Describe the advantages and limitations of SFM.	C2						
41		Videos/Charts/Models	Demonstrate different components screen film mammography through videos.		P4		Demo	1	OSCE	1
42		SOP's Compliance	Adopt how to care and handle different components of scream film mammography.			A4	Practical Demonstration			
TOPIC: DIGITAL MAMMOGRAPHY										
43	Week-7	Components of DM	Describe the components of a digital mammography (DM) system.	C2			Interactive Lecture/SGD	2	MCQs	4
44		Process of image formation	Explain the process of image formation in DM, including the direct or indirect conversion of X-rays to electrical signals.	C3						
		Factors affecting Image	Discuss the factors affecting the image formation in case of DM.	C2						
		Advantages of DM	Describe the advantages of DM, including better image contrast and detail, increased dynamic range, and the ability to use image processing algorithms and CAD systems.	C2						
		Limitations of DM	Explain the limitations of DM, including higher radiation dose, maintenance needs, and challenges in interpreting images due to artifacts.	C3						
48		Videos/Charts/Models	Demonstrate different components of digital mammography through videos.		P4		Demo	1	OSCE	2
49		SOP's Compliance	Adopt how to care and handle different components of digital mammography.			A4	Practical Demonstration			
TOPIC: BASICS OF MAMMOGRAPHY										
53	Week-8	Recommended projections	Describe the recommended projections for mammography along with additional and supplementary projections.	C2			Interactive Lecture/SGD	2	MCQs	5
54		positioning terminologies	Explain the positioning terminologies used in mammography.	C3						
55		Film identification	Discuss the importance of proper film identification in mammography and its importance.	C2						
56		Imagining parameters	Describe the imaging parameters that affect image quality in mammography.	C2						
57		Radiation projection	Explain the radiation protection measures that should be taken during mammography.	C3						
58		Videos/Charts/Models	Demonstrate recommended projections for Mammography through videos and charts.		P4		Demo	1	OSCE	2
59		SOP's Compliance	Independently identify different imaging parameters.			A4	Practical Demonstration			
TOPIC: RADIOLOGICAL CONSIDERATIONS										

60	Week-9	Lesion Characteristics	Describe the characteristic features of benign and malignant breast lesions on mammograph.	C2			Interactive Lecture/SGD	2	MCQs	8
61		Lesion diagnosis	Explain the diagnostic criteria for common breast lesions.	C3						
62		Therapy related changes	Discuss the therapy-related changes that can be observed on mammography.	C2						
		Other Techniques	Describe the role of other imaging techniques, such as ultrasound and MRI, in the evaluation of breast lesion.	C2						
63			Explain the importance of biopsy and histopathological examination in the definitive diagnosis of breast lesions.	C3						
66		Videos/Charts/Models	Demonstrate referral criteria for Mammography through videos.		P4		Demo	1	OSCE	4
67		SOP's Compliance	Comply to SOPs for Radiological considerations of Mammography.			A4	Practical Demonstration			
TOPIC: BASIC RADIOLOGICAL PROJECTIONS										
68	Week-10	45- degree Medio lateral	Describe the positioning and technique for the 45-degree mediolateral (ML) view.	C2			Interactive Lecture/SGD	2	MCQs	5
70		Cardio Caudal	Explain the purpose and technique of the craniocaudal (CC) view.	C3						
		Extended Crania Caudal Laterally Rotated	Discuss the indications and technique for the extended craniocaudal (ECC) laterally rotated view.	C2						
		Extended Crania Caudal Medially Rotated	Describe the positioning and technique for the extended craniocaudal (ECC) medially rotated view.	C2						
		Radiological Conversations of all views	Explain the importance of proper positioning and technique in achieving high-quality images with these specialized views.	C3						
76		Videos/Charts/Models	Demonstrate basic radiological projection through videos and charts.		P4		Demo	1	OSCE	2
77		SOP's Compliance	Independently identify different basic radiological projections.			A4	Practical Demonstration			
TOPIC: SUPPLEMENTARY RADIOLOGICAL PROJECTIONS										
82	Week-11	Extended crania caudal projections	Describe the technique and positioning for the extended craniocaudal (ECC) projection.	C2			Interactive Lecture/SGD	2	MCQs	5
83		Lateral projections including Medio lateral and latero-medial	Explain the difference between the mediolateral (ML) and lateromedial (LM) projections.	C3						
			Discuss the importance of the ML and LM projections in mammography, including their use in evaluating the lateral aspect of the breast and medial aspects.	C2						
84		Axillary tail	Describe the technique and positioning for the axillary tail projection.	C2						
85		Clinical significance of axillary tail	Explain the clinical significance of imaging the axillary tail.	C3						
86		Videos/Charts/Models	Demonstrate supplementary radiological projection through videos and charts.		P4		Demo	1	OSCE	2

87		SOP's Compliance	Independently identify different supplementary radiological projections.			A4	Practical Demonstration			
TOPIC: ADDITIONAL RADIOLOGICAL PROJECTIONS										
88	Week-12	Localized projection	Describe the technique and positioning for localized projections.	C2			Interactive Lecture/SGD	2	MCQs	4
89		Purpose of magnified projections	Explain the purpose and benefits of magnified projections in mammography.	C3						
90		Difference between full magnified and paddle magnified projection technique	Discuss the difference between full-field magnified projections and paddle magnified projections.	C2						
			Describe the technique and positioning for paddle magnified projections.	C2						
91		Clinical Significance of magnified projections	Explain the clinical significance of magnified projections in mammography.	C3						
94		Videos/Charts/Models	Demonstrate additional radiological projection through videos and charts.		P4		Demo	1	OSCE	1
95		SOP's Compliance	Independently identify different additional radiological projections.			A4	Practical Demonstration			
TOPIC: STEREOTACTIC NEEDLE PROCEDURES AND BREAST IMPLANTS										
96	Week-13	Stereotactic needle Principles and Equipment's	Describe the principles and equipment used in stereotactic needle procedures.	C2			Interactive Lecture/SGD	2	MCQs	5
97			Explain the technique and indications for stereotactic needle biopsy.	C3						
98		Marker localizations	Discuss the purpose and procedure for marker localization.	C2						
99		Breast implants	Describe the types and imaging characteristics of breast implants.	C2						
103		Videos/Charts/Models	Demonstrate stereotactic needle procedure and breast implants through videos.		P4		Demo	1	OSCE	2
104		SOP's Compliance	Comply to the SOPs of stereotactic needle procedure.			A4	Practical Demonstration			
TOPIC: CORE BIOPSY AND SPECIMEN TISSUE RADIOGRAPHY										
105	Week-14	Technique and indications for core biopsy	Describe the technique and indications for core needle biopsy.	C2			Interactive Lecture/SGD	2	MCQs	5
106		Importance of specimen radiography	Explain the importance of specimen radiography in core biopsy.	C3						
107		Different types of specimen radiography	Discuss the different types of specimen radiography.	C2						
112		Videos/Charts/Models	Demonstrate core biopsy through videos.		P4		Demo	1	OSCE	2
113		SOP's Compliance	Adopt how to care and handle core biopsy procedure.			A4	Practical Demonstration			

TOPIC: MAMMOGRAPHIC QUALITY CONTROL										
114	Week-15	Role of radiologist	Describe the roles and responsibilities of the radiologist in the quality control team.	C2			Interactive Lecture/SGD	2	MCQs	3
115		Contribution of medical physicist	Explain the contributions of the medical physicist to the quality control team.	C3						
116		Importance of Mammographer	Discuss the importance of the mammographer's role in the quality control team.	C2						
117		Collective and team work	Describe the collaborative efforts of the quality control team in maintaining high-quality mammography.	C2						
121		Videos/Charts/Models	Video demonstration of Mammographic quality control.		P4		Demo	1	OSCE	1
122		SOP's Compliance	Adopt how to care and handle mammographic quality control.			A4	Practical Demonstration			
TOPIC: SCREEN FILM AND DIGITAL QUALITY CONTROL										
124	Week-16	Daily QC task for SFM	Describe the daily quality control tasks for screen-film mammography.	C2			Interactive Lecture/SGD	2	MCQs	3
125		Weekly QC for DM	Explain the weekly quality control tasks for digital mammography.	C3						
126		Monthly QC for both	Discuss the monthly quality control tasks for both screen-film and digital mammography.	C2						
127		Semi-annual QC	Describe the semi-annual quality control tasks.	C2						
128		Annual QC task	Explain the annual quality control tasks.	C3						
130		Videos/Charts/Models	Video demonstration of screen film and digital quality control.		P4		Demo	1	OSCE	1
131		SOP's Compliance	Adopt how to care and control screen film and digital quality control system.			A4	Practical Demonstration			

Recommended Books:
1. Radiological science for technologists by Stewart C. Bushong 7th edition published by Mosby, Inc: A Harcourt health company 2. Teaching Atlas of Mammography by Laszlo Tabar 3. CLARK'S Positioning in Radiography By Clark,12th edition

ASSESSMENT BREAKDOWN				
S.No	**Topics**	**No of MCQ**	**No of OSPE / OSCE Stations**	**Static / Interactive**
1	Basics for Mammography	3	1	Static
2	Breast Anatomy and types of Mammography	3	1	Static and Interactive
3	Mammographic Imaging System	5	1	Interactive
4	Mammographic System	4	1	Static
5	Imaging System	4	1	Static
6	Screen Film Mammography	4	1	Static and Interactive
7	Digital Mammography	4	1	Static
8	Basics of Mammography	5	1	Interactive
9	Radiological Considerations	8	1	Static and Interactive
10	Basic Radiological Projections	5	1	Static
11	Supplementary Radiological Projections	5	1	Static
12	Additional radiological projections	4	1	Static
13	Stereotactic Needle Procedures and Breast Implants	5	1	Interactive
14	Core Biopsy and Specimen Tissue Radiography	5	1	Static and Interactive
15	Mammographic Quality Control	3	1	Static
16	Screen Film and Digital Quality Control	3	1	Static
Total	**16**	**70**	**14**	**14**

RAD-612 Magnetic Resonance Imaging (MRI) 4 (2+2)

Course Description

This course provides comprehensive training in Magnetic Resonance Imaging (MRI), equipping students with the essential knowledge and technical skills required for MR technologists. Students will learn about MRI's role as a non-invasive diagnostic tool, techniques to enhance image quality, and strategies to reduce procedure times. The course emphasizes MRI safety, with thorough screening processes for patients.
Key topics include the fundamentals of MRI, electricity and magnetism, nuclear magnetism equilibrium, radio frequency, pulse sequences, MRI parameters, relaxation times, T1 and T2 weighted images, Fourier transformation, imaging systems, MRI hardware, primary and secondary MRI magnets, image formation, digital imaging, spatial frequency domain, MRI images, spin echo imaging, chemical shift, magnetization transfer, gradient echo imaging, faster imaging techniques, MR contrast media, and sequences and artifacts.

LEARNING OBJECTIVES

Cognitive Domain

By the end of this course, students should be able to:
1. Discuss nuclear magnetic equilibrium, define radiofrequency and pulse sequences, describe the steps in MRI image formation.
2. Explain magnetization and MR signal generation, and apply Fourier transformation in MRI.
3. Explain primary and secondary MRI magnets.
4. Differentiate between MRI images and spin echo imaging, and discuss faster imaging techniques and MR contrast media.

Psychomotor Domain

By the end of this course, students should be able to**:**
1. Demonstrate practical skills such as setting up and calibrating MRI equipment, measuring relaxation times, acquiring T1 and T2 weighted images.
2. Performing Fourier transformation, assembling MRI hardware components, and implementing digital imaging techniques.
3. Perform gradient echo imaging, apply faster imaging techniques, and administer MR contrast media. Identifying and correcting artifacts in MRI images

Affective Domain

By the end of this course, students should be able to:
1. Appreciate the importance of safety in MRI, value the accuracy in MRI procedures, recognize the importance of precision in measurements, and understand the significance of mathematical concepts in MRI.
2. Value the significance of proper hardware assembly, appreciate the technology behind MRI magnets, recognize the complexity of image formation, and understand Patient care in administering contrast media**.**

TABLE OF SPECIFICATIONS

S.No	Weeks	Content	Learning Outcome	Domain			MIT's	Time/ Hours	Assessment	No of Items
				C	P	A				
TOPIC: ELECTRICITY , MAGNETISM AND TYPE OF MAGNETS										
1	Week-1	Electricity, Magnetism and type of magnets ,	Describe Electricity, Magnetism and type of magnets.	C2			Interactive Lecture /SDG	2	MCQs/SEQs	6
2		Magnetic field homogeneity ,	Explain Nuclear Magnetic Equilibrium and process involved in magnetism.	C3						
3		Radiofrequency coil	Define radiofrequency.	C1						
4		shielding, Gradients	Explain gradients and radiofrequency coil in MRI.	C3						
5		Videos/Charts/Models	Demonstrate the different component of MRI Machine		P4		Demo	2	OSPE	1
6		SOP'S Compliance	Identify the different component of MRI Machine independently			A4	Role play			
TOPIC:MRI SAFETY AND RELATED ISSUES										
7	Week-2	MRI Bio effects,	Discuss the MR biogenic effects	C2			Interactive Lecture /SDG	2	MCQs	10
8		Safety related issues	Explain the safety related issues in MRI	C3						
9		MRI Precautions, contraindications	Describe the precautions and contraindications for MRI .	C2						
10		Videos/Charts/Models	Demonstrate how to ensure MRI safety for MRI scanning.		P4		Demo	2	OSPE	1
11		SOP'S Compliance	Adopt MRI safety role and precautions for scanning independently.			A4	Role play			
TOPIC: MRI SCANNING PARMETER AND IMAGING CHARACTERISTIC										
12	Week-3	K-space Scanning	Define k-space.	C1			Interactive Lecture /SDG	2	MCQs	10
13		Scanning parameter	Explain Mri scanning parameter and imaging characteristics	C3						
		MR image characteristic	Describe imaging characteristics	C2						
14		Videos/Charts/Models	Demonstrate MRI scanning parameter setting.		P4		Demo	2	OSPE	1
15		SOP'S Compliance	Adopt how to set MRI Scanning parameter independently			A4	Role play			
TOPIC:MRI CONTRAST MEDIA										
16		MRI Contrast Media.	Define MRI contrast media	C1			Interactive Lecture /SDG	2	MCQs	6
17		types of contrast	Describe various types of contrast media	C2						
18		Mechanism of contrast enhancement,	Explain the mechanism of contrast enhancement ,	C3						

19	Week-4	Videos/Charts/Models	Demonstrate through video MRI contrast and their uses		P4		Demo	2	OSPE	1
20		SOP'S Compliance	Adopt how to handle IV line and contrast agents independently			A4	Role play			
TOPIC:ADVERSE REACTION OF CONTRAST MEDIA										
21	Week-5	Adverse Reaction of contrast	Discuss the adverse reaction of contrast	C2			Interactive Lecture /SDG	2	MCQs	6
22		Role of MRI contrast	Explain the Role of MRI contrast media.	C3						
23		Videos/Charts/Models	Demonstrate the different adverse reaction of MRI contrast media by video		P4		Demo	2	OSPE	1
24		SOP'S Compliance	Adopt how to handle adverse reaction of contrast during scan			A4	Role play			
TOPIC: Longitudinal Magnetization and Transverse Magnetization										
25	Week-6	Longitudinal Magnetization , Transverse Magnetization	Explain longitudinal and transverse magnetization	C3			Interactive Lecture /SDG	2	MCQs	6
26		MR Signal	Discuss MR signal.	C2						
27		Localization of the Signal	Describe the localization of signal .	C2						
28		Videos/Charts/Models	Demonstrate the longitudinal & transvers magnetization by video		P4		Demo	2	OSPE	1
TOPIC:LONGITUDINAL & TRANSVERSE RELAXATIONS										
29	Week-7	T1, T2 Relaxations	Define T1 & T2 relaxation	C1						
30		longitudinal &transverse relaxation	Describe longitudinal & transverse relaxation	C2			Interactive Lecture /SDG	2	MCQs	5
31		Image Weighting	Explain T1W & T2W imaging	C3						
32		PD imaging	Discuss PD imaging	C2						
33		Videos/Charts/Models	Demonstrate T1W & T2W image		P4		Video/Radio graphs	2	OSPE	1
34		SOP'S Compliance	Identify the T1W & T2W Image independently			A4	Role play			
TOPIC: SEQUENCES-I BASIC PRINCIPLES AND CLASSIFICATION										
35		Sequences Basic Principles and Classification	Discuss basic principle of sequences & classification	C2			Interactive			

36	Week-8	Spin Echo (SE) Pulse Sequence,	Describe spine echo sequence (SES)	C2			Lecture /SDG	2	MCQs	2
37		Videos/Charts/Models	Demonstrate the different sequence setup		P4		Demo/ Video	2	OSPE	1
38	Week-9	Gradient Echo (GRE) Sequence	Discuss the Gradient echo sequence (GRE)	C2			Interactive Lecture /SDG	2	MCQs	2
39		Inversion Recovery(IR) Sequence	Explain inversion recovery sequence	C3						
40		Echo Planar Imaging (EPI)	Discuss the echo planer imaging	C2						
41		Videos/Charts/Models	Demonstrate the different sequence setup		P4		Demo/ Video	2	OSPE	1
42		SOP'S Compliance	Identify the sequences independently			A4	Role play			
TOPIC: SEQUENCES-II BASIC PRINCIPLES AND CLASSIFICATION										
43	Week-10	Fat Suppression	Describe Fat suppression and their type	C2			Interactive Lecture /SDG	2	MCQs	3
44		Parallel Imaging	Discuss parallel imaging	C2						
30		Respiratory Compensation Techniques	Explain respiratory compensation technique	C3						
31		Videos/Charts/Models	Demonstrate how to perform fat suppression		P4		Demo/ Video	2	OSPE	1
32		SOP'S Compliance	Adopt how to perform the Respiratory Compensation Techniques independently			A4	Role play			
TOPIC: SEQUENCES-II BASIC PRINCIPLES AND CLASSIFICATION										
33	Week-11	Gradient Moment Rephasing(GMR), Magnetization Transfer	Explain chemical shift and magnetization transfer	C3			Interactive Lecture/SDG	2	MCQs	1
34		Keyhole Imaging	Discuss the keyhole imaging	C2						
36		SOP'S Compliance	Adopt how to perform saturation band				Role play	2	OSPE	1
TOPIC: SEQUENCES AND THEIR UESES										
37		Sequences	Explain T1W & T2w sequence	C3			Interactive Lecture/SDG	2	MCQs	2
38		T1- Weighted , T2-Weighted								
39		T2* Weighted	Discuss T2* Weighted Sequences	C2						

40	Week-12	Sequences								
41		Cartilage Sensitive Sequences	Describe Cartilage Sensitive Sequences	C2						
42		Videos/Charts/Models	Demonstrate cartilages Sensitive sequence		P4		Demo/ Video	2	OSPE	1
43		SOP'S Compliance	Identify cartilages sensitive sequence independently			A4	Role play			
TOPIC: SEQUENCES AND THEIR UESES										
44	Week-13	Faster Imaging Techniques	Describe faster imaging techniques	C2			Interactive Lecture/SDG	2	MCQs	2
45		Their Applications	Describe their applications	C2						
46		Videos/Charts/Models	Demonstrate the faster imaging techniques		P4		Demo/ Video	2	OSPE	1
47		SOP'S Compliance	Identify the need for faster imaging techniques			A4	Role play			
TOPIC: MRI ARTEFACTS AND THEIR CORRECTIVE MEASURES										
48	Week-14	Ghosts/Motion	Discuss motion /ghost artifact	C2			Interactive Lecture/SDG	2	MCQs	3
49		Aliasing/Wraparound	Describe aliasing/wraparound artifacts	C2						
50		Chemical Shift Related Artifacts	Describe Chemical Shift Related Artifacts	C2						
51		Truncation Artifact	Discuss Truncation Artifact	C2						
52		Videos/Charts/Models	Demonstrate different artifacts in MRI		P4		Demo/ Video	2	OSPE	
53		SOP'S Compliance	Identify different artifacts in MRI radioghraph independently			A4	Role play			
TOPIC: MRI ARTEFACTS AND THEIR CORRECTIVE MEASURES										
54	Week-15	Magnetic Susceptibiliy Artifact,	Describe Magnetic Susceptibiliy Artifact,	C2			Interactive Lecture/SDG	2	MCQs	3
55		Straight Lines and Zipper Artifacts	Describe Straight Lines and Zipper Artifacts	C2						
56										
TOPIC: MRI ARTEFACTS AND THEIR CORRECTIVE MEASURES										
57	Week-16	Shading Artifacts,	Describe Shading Artifacts	C2			Interactive Lecture/SDG	2	MCQs	3
58		Cross Excitation and Cross Talk ,	Describe Cross Excitation and Cross Talk	C2						
59		Parallel Imaging Artifact,	Describe Parallel Imaging Artifact	C2						
60		Videos/Charts/Models	Identify and correct artifacts in MRI images				Demo/ Video	2	OSPE	2

61		SOP'S Compliance	Recognize the impact of artifacts on diagnosis				Role play			

Recommended Books:

1. MRI Made Easy (for Beginners) by Govind B. Chavhan, Published by Jaypee Brothers Medical Publishers, New Delhi
2. Handbook of MRI Technique by Catherine Westbrook
3. Rad Tech's Guide to MRI: Basic Physics, Instrumentation, and Quality Control by William H. Faulkner Jr. (Author)

ASSESSMENT BREAKDOWN

S.No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	Electricity, Magnetism and type of magnets	6	1	Interactive
2	MRI safety and related issues	10	1	Interactive
3	MRI Scanning parameter and imaging characteristic	10	1	Interactive
4	MRI contrast media	6	1	Static
5	Adverse reaction of contrast media	6	1	Static
6	Longitudinal Magnetization and Transverse Magnetization	6	1	Static and Interactive
7	LONGITUDINAL & TRANSVERSE RELAXATIONS	5	1	Static
8	Sequences-I Basic Principles and Classification	2	1	Static
9	Sequences-I Basic Principles and Classification	2	1	Static and Interactive
10	Sequences-II Basic Principles and Classification	3	1	Interactive
11	Sequences-II Basic Principles and Classification	1	1	Interactive
12	Sequences and their uses	2	1	Static and Interactive
13	Sequences and their uses	2	1	Interactive
14	Magnetic Resonance Imaging Artifacts	3	1	Interactive
15	Magnetic Resonance Imaging Artifacts	3	1	Static and Interactive
16	Magnetic Resonance Imaging Artifacts	3	1	Interactive
Total	**16**	**70**	**16**	**16**

SUR-608 General Surgery 3 (2+1)

Course Description

This course provides a comprehensive introduction to the principles and practices of general surgery. It covers foundational surgical knowledge including terminology, disease processes, diagnostic strategies, operative techniques, and perioperative management across multiple organ systems. Students will explore a variety of surgical approaches ranging from traditional open surgery to minimally invasive procedure and assess their clinical indications and outcomes.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to:

1. Define key surgical terms, disease processes, and operative techniques across different organ systems.
2. Describe and explain diagnostic pathways, surgical procedures, and pre-/post-operative management strategies.
3. Analyze clinical presentations, interpret findings, and evaluate appropriate surgical interventions for common conditions.
4. Differentiate between types of surgical techniques (e.g., minimally invasive vs open surgery) and their indications.

Psychomotor Domain

By the end of this course, students should be able to:

1. Demonstrate proper aseptic techniques including scrubbing, gowning, and donning personal protective equipment (PPE).
2. Perform basic clinical procedures such as specimen handling, wound care, diagnostic tests, and the simulated surgical interventions.
3. Use surgical tools and perform essential tasks under supervision, including catheterization, drain placement, and basic procedural steps (e.g., biopsy, hernia repair).
4. Practice techniques for managing surgical emergencies, including fracture immobilization and airway protection.

Affective Domain

By the end of this course, students should be able to:

1. Promote and uphold adherence to SOPs for the patient safety, hygiene, surgical sterility, and ethical practices.
2. Demonstrate respect, empathy, and professionalism when interacting with patients, colleagues, and surgical teams.
3. Value the role of communication and ethical responsibility in obtaining consent, managing complications, and delivering holistic care.
4. Commit to maintaining personal discipline and teamwork in high-stakes surgical environments.

TABLE OF SPECIFICATIONS

S.No	Weeks	Content	Learning Outcome	Domain			MIT's	Time/ Hours	Assessment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO GENERAL SURGERY										
1	Week-1	Overview of Surgery	Define key surgical terms and types of surgery	C1			Interactive Lecture/ SGDs	2	MCQs	4
2		Surgical Procedures components	Explain preoperative, intraoperative, and postoperative care components	C2			Case-Based Discussion			
3		Minimally Invasive vs. Open Surgery	Differentiate between minimally invasive and open surgical procedures	C4						
4		Practical Performance	Demonstrate the donning of PPE's according to SOPs		P4		Demo		OSPE/OSCE	0.5
5		SOPs Compliance	Adhere to SOPs for perioperative hygiene and sterile dress code to ensure the patient safety			A3	Role Play			
TOPIC: ASEPTIC TECHNIQUES & HISTORY TAKING										
6	Week-2	Aseptic Techniques	Explain Aseptic Technique.	C2			Interactive Lectures/ SGDs	2	MCQs	4
7		Scrubbing and Gowning	Describe scrubbing, gowning, and gloving procedures	C2						
8		History Taking	Identify components of history taking	C4			Case-Based Discussion			
9		Practical Performance	Demonstrate surgical scrubbing technique according to guidelines		P4		Demo/ Role Play		OSPE/OSCE	0.5
10		SOPs Compliance	Follow SOPs for hygiene and sterile techniques to ensure the patient safety			A3	Group Discussion/ Role Play			
TOPIC: BIOPSY										
11	Week-3	Introduction to Biopsy	Define biopsy and types.	C1			Interactive Lectures/ SGDs	2	MCQs	5
12		Indications and Procedure	Describe biopsy procedure, including specimen handling	C2						
13		Aspiration and Core Biopsy	Identify indications and techniques for aspiration and core biopsy.	C4			SGD			

14		Practical Performance	Demonstrate correct specimen handling and preservation Under Supervision.		P3		Demo	1	OSPE/OSCE	1
15		SOPs Compliance	Follow SOPs for managing complications post-biopsy			A3	Group Discussion			
TOPIC: HYDROCEPHALUS										
16	Week-4	Hydrocephalus	Define hydrocephalus its causes, types, and symptoms.	C1			Interactive Lectures/ SGDs	2	MCQs	5
17		CSF Pathway	Describe the CSF pathway and its function in the brain.	C2						
		Diagnosis	Identify symptoms of hydrocephalus in different age groups.	C4			Case-Based Discussion			
18		Practical Performance	Observe the ventriculostomy procedure Under Supervision.		P2		Video Demonstration	1	OSPE/OSCE	1
19		SOPs Compliance	Follow SOPs for managing shunt malfunction			A3	Group Discussion			
TOPIC: ESOPHAGUS DISEASE & GASTRITIS										
20	Week-5	Esophagus Disease	Define common esophageal diseases and their symptoms.	C1			Interactive Lectures/ SGDs	2	MCQs	5
21		Congenital Anomalies	Describe congenital esophageal anomalies like atresia, fistula, and stenosis	C2			Case-Based Discussion			
22		Gastritis	Identify the causes and pathophysiology of acute and chronic gastritis	C4			SGD			
23		Practical Performance	Demonstrate the diagnosis and management of foreign body on the simulated Patient.		P3		Demo	1	OSPE/OSCE	1
24		SOPs Compliance	Follow SOPs for managing acute gastritis caused by NSAIDs, alcohol, and stress.			A3	Role Play			
TOPIC: APPENDICITIS & CHOLECYSTITIS										
25	Week-6	Appendicitis	Explain appendicitis, its symptoms, causes, and pathophysiology	C2			Interactive Lectures/ SGDs	2	MCQs	4
26		Appendicitis Diagnosis and Management	Describe the diagnostic methods and management strategies for acute appendicitis	C2			Case Studies			
		Cholecystitis	Explain the causes, pathophysiology, and treatment options for cholecystitis	C3			Group Discussion			
27		Practical Performance	Demonstrate the clinical diagnosis of appendicitis and cholecystitis on the simulated Patient Under Supervision.		P3		Simulation and Demo	1	OSPE/OSCE	0.5

28		SOPs Compliance	Follow SOPs for post-operative care			A3	Role Play			
TOPIC: SPLEENOMEGALY & HERNIA										
29	Week-7	Splenomegaly	Explain splenomegaly its causes, symptoms, and diagnostic methods	C2			Interactive Lectures/ Case-Based Discussion	2	MCQs	6
30		Splenectomy	Describe splenectomy and its indications.	C2						
31		Hernia	Explain the different types of hernias and their clinical presentation	C3						
32		Practical Performance	Observe techniques for hernioplasty, herniorrhaphy, and mesh repair Procedures Under Supervision.		P2		Video Demonstration	1	OSPE/OSCE	1
33		SOPs Compliance	Follow SOPs for Post-operative care after Splenectomy and Hernia repair			A1	Role play			
TOPIC: HYDRONEPHROSIS AND URINARY SYMPTOMS & INVESTIGATIONS										
34	Week-8	Hydronephrosis	Define hydronephrosis, its causes, symptoms, and diagnostic methods	C1			Interactive Lectures/ SGDs	2	MCQs	6
35		Hydronephrosis Treatment	Describe PCN, nephrectomy, and pyeloplasty	C2			Demo			
36		Urinary Symptoms	Explain common urinary symptoms (hematuria, pain, bladder dysfunction).	C3			Case-Based Discussion			
37		Practical Performance	Interpret the investigation reports for urinary system disease diagnosis. (microscopic, Culture ultrasound, CT, IVU).		P4		Video Demonstration	1	OSPE/OSCE	1
38		SOPs Compliance	Follow SOPs for performing imaging to diagnose urinary tract conditions.			A3	Simulation			
TOPIC: CONGENITAL ANOMALIES OF KIDNEY AND URETER										
39	Week-9	Congenital Anomalies	Describe congenital anomalies of kidneys and congenital cystic disease	C2			Interactive Lectures/SGD	2	MCQs	5
40		Abnormalities of Renal Pelvis and Ureter	Explain congenital abnormalities of renal pelvis and ureter, including duplication, mega ureter, and ureterocele.	C3						
41		Practical Performance	Observe the surgical approach for treating congenital renal anomalies Under Supervision.		P1		Demo	1	OSPE/OSCE	1
42		SOPs Compliance	Adhere to SOPs for performing while performing surgery for treating congenital anomalies.			A3	Role Play			
TOPIC: TUMORS OF THE KIDNEY AND URINARY TRACT & URETHRAL STRICTURE										

43	Week-10	Renal & Urothelial Tumors	Describe renal and urothelial tumors	C2			Interactive Lectures/ SGDs	2	MCQs	4
44		Urethral Stricture	Describe the causes, clinical presentation, and complications of urethral stricture.	C2						
45		Diagnosis of Urethral Stricture	Analyze investigations in evaluating urethral stricture.	C4			SGD			
46		Practical Performance	Observe nephrectomy, urethroplasty, and dilatation procedures Under Supervision.		P2		Video Demonstration	1	OSPE/OSCE	1
47		SOPs Compliance	Adhere to SOPs in diagnostic and treatment procedures to ensure the patient safety.			A2	Role Play			
TOPIC: VARICOCELE & HYDROCELE										
48	Week-11	Varicocele	Define varicocele and describe its causes and clinical presentation.	C1			Interactive Lectures/ SGDs	2	MCQs	4
49		Hydrocele	Describe the types, causes, and symptoms of hydrocele.	C2						
		Diagnosis of Varicocele & Hydrocele	Differentiate between grades of varicocele and analyze diagnostic tools for both conditions	C3			Interactive Lecture/SGD			
50		Practical Performance	Observe varicocelectomy, embolization, and hydrocelectomy Procedures Under Supervision.		P2		Video Demonstration	1	OSPE/OSCE	1
51		SOPs Compliance	Adhere to SOPs in the diagnosis and treatment of scrotal swellings to ensure the patient safety.			A2	Role Play			
TOPIC: FRACTURES AND DISLOCATIONS										
52	Week-12	Types and Causes of Fractures	Define and classify different types of fractures and their causes.	C1			Interactive Lectures/ SGDs	2	MCQs	4
53										
54		Types and Mechanisms of Dislocations	Describe the types, mechanisms, and common deformities associated with dislocations.	C2						
		Diagnostic Tools and Management Principles	Analyze radiological findings and outline principles of managing fractures and dislocations.	C4			Task based Learning			
55		Practical Performance	Observe the basic steps of closed and immobilization of Fracture Bone Under Supervision.		P3		Demo		OSPE/OSCE	1
56		SOPs Compliance	Adhere to SOPs in the assessment, reduction, and immobilization of orthopedic injuries			A2	Role Play			
57										
58										
TOPIC: ARTERIAL DISEASE										
59	Week-13	Peripheral Vascular Disorders	Define arterial structure and identify causes of peripheral arterial disorders.	C1			Interactive Lectures/ SGDs	2	MCQs	4
60		Arteriosclerosis and Arterial Insufficiency	Describe the types, risk factors, and symptoms of arteriosclerosis and arterial insufficiency.	C2						

		Diagnostic & Surgical Management	Analyze diagnostic techniques and surgical interventions for arterial obstruction	C4			Case-Based Discussion			
61		Practical Performance	Observe the Management of Arterial disease Under Supervision.		P2		Video Demonstration		OSPE/OSCE	1
62		SOPs Compliance	Adhere to SOPs during diagnosis and treatment of arterial disease			A2	Role Play			
TOPIC: ANEURYSM										
63	Week-14	Pathophysiology of Aneurysm	Define aneurysm and describe its pathophysiology and common sites.	C1			Interactive Lectures/ SGDs	2	MCQs	4
		Types and Clinical Features	Describe types of aneurysms (saccular, fusiform, dissecting) and their clinical manifestations.	C2						
		Diagnosis and Medical Management	Analyze diagnostic techniques and compare treatment options for aneurysm and arterial embolism	C4			Case-Based Discussion			
64		Practical Performance	Observe aneurysm repair procedures Under Supervision.		P2		Demo		OSPE/OSCE	1
65		SOPs Compliance	Adhere to SOPs in diagnosis, medication administration, and surgical care			A2	Role Play			
TOPIC: VENOUS DISEASE										
66	Week-15	Types and Causes	Define venous disorders and identify common causes including Virchow's triad.	C1			Interactive Lecture/ SGDs	2	MCQs	4
67		Clinical Features and Complications	Describe the signs, symptoms, and complications of DVT, varicose veins, and venous insufficiency.	C2			Case-Based Discussion			
68		Diagnosis and Treatment	Analyze diagnostic tools and evaluate surgical and pharmacologic interventions.	C4						
69		Practical Performance	Observe procedures of vein ligation, ablation, and thrombectomy procedures Under Supervision.		P2		Video Demonstration		OSPE/OSCE	1
70		SOPs Compliance	Value the role of SOPs in the prevention, diagnosis, and treatment of venous diseases to ensure the patient safety.			A3	Simulation			
TOPIC: INTERVENTIONAL RADIOLOGY (IR)										
71		Introduction and Scope of IR	Define interventional radiology and describe its scope and basic imaging modalities.	C1			Interactive Lectures/ SGDs		MCQs	3
72		IR Procedures and Indications	Describe common interventional radiology procedures such as angioplasty, embolization, stenting, and thrombolysis.	C2						

73	Week-16	Practical Performance	Observe the use of image-guided equipment and catheter-based techniques in IR Procedures Under Supervision.		P2		Demo		OSPE/OSCE	0.5
74		SOPs Compliance	Promote Compliance with SOPs during interventional radiology procedures to enhance the patient safety and procedural accuracy.			A3	Role Play			

Recommended Books:

1. Nancy Marie Phillips, 11thedition.Berry Kohn's Operating Room Technique.
2. 25th Edition. Bailey and love's short practice of surgery
3. **Abdul Wahab Dogar,** 2nd Edition. *A Comprehensive Approach to the Principles of Systemic Surgery.*

ASSESSMENT BREAKDOWN				
S.No	**Topics**	**No of MCQ**	**No of OSPE / OSCE Stations**	**Static / Interactive**
1	Introduction to Surgery	4	0	Interactive
2	Aseptic Techniques & History Taking	4	1	Interactive
3	Biopsy	5	1	Static
4	Hydrocephalus	5	1	Static
5	Esophagus Disease & Gastritis	5	1	Interactive
6	Appendicitis & Cholecystitis	6	1	Interactive
7	Splenomegaly & Hernia	5	1	Static
8	Hydronephrosis and Urinary Symptoms & Investigations	6	1	Interactive
9	Congenital Anomalies of Kidney and Ureter	3	1	Interactive
10	Tumors of the Kidney and Urinary Tract & Urethral Stricture	4	1	Interactive
11	Varicocele & Hydrocele	4	1	Interactive
12	Fractures and Dislocations	4	1	Interactive
13	Arterial Disease	4	1	Interactive
14	Aneurysm	4	0	Interactive
15	Venous Disease	4	1	Interactive
16	Interventional Radiology (IR)	3	1	Interactive
Total	Total	70	14	

RAD-613 Interventional Radiology 3(2+1)

Course Description

This course provides a comprehensive introduction to interventional radiology, focusing on image-guided diagnostic and therapeutic procedures. Students will learn the principles, indications, techniques, and clinical applications of minimally invasive procedures performed under radiological guidance. The course covers a wide range of body systems, emphasizing vascular, hepatobiliary, genitourinary, musculoskeletal, and oncologic interventions. Emphasis will be placed on the integration of anatomical knowledge, imaging modalities (e.g., fluoroscopy, ultrasound, CT, MRI), patient safety, and clinical decision-making to enhance procedural accuracy and improve patient outcomes.

LEARNING OBJECTIVES

Cognitive Domain

By the end of this course, students should be able to:

1. Explain the basic principles and clinical indications of common interventional radiology (IR) procedures.
2. Discuss the roles of various imaging modalities in guiding interventional procedures and monitoring outcomes.
3. Evaluate the benefits, risks, and contraindications of interventional radiological techniques in comparison to traditional surgical options.

Psychomotor Domain

By the end of this course, students should be able to:

1. Demonstrate appropriate technique in assisting or simulating basic interventional procedures such as vascular access, drainage catheter placement, or biopsy under supervision or simulated settings.
2. Identify and label anatomical landmarks and pathological targets on radiological images during interventional planning.
3. Apply radiation safety principles and aseptic techniques during procedural simulations or observations.

Affective Domain

By the end of this course, students should be able to:

1. Respect patient privacy, informed consent, and comfort during IR planning and interventions.
2. Work collaboratively with the interventional team, including radiologists, nurses, and technologists, to ensure optimal patient care.
3. Reflect on the impact of interventional radiology on patient outcomes and the evolving role of minimally invasive therapy in clinical practice.

TABLE OF SPECIFICATION

S.No	Weeks	Content	Learning Outcome	Domain			MIT's	Time/ Hours	Assessment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO INTERVENTIONAL RADIOLOGY										
1	Week-1	Intro and Background	Describe the historical background of interventional radiology.	C2			Interactive Lecture/SGD	1	MCQs	4
2		Vascular IR procedure	Discuss the various vascular interventional radiology procedures.	C2						
3		Non-Vascular IR procedure	Explain the principles and techniques of non-vascular interventional procedures.	C3						
4		IR oncology	Describe the role of interventional radiology in oncology.	C2						
5		Musculoskeletal IR	Discuss the applications of interventional radiology in musculoskeletal disorders.	C2						
6		Videos/Charts/Models	Video demonstration of historical development of Interventional Radiology.		P4		Demo	1	OSCE	2
7		SOP's Compliance	Comply to the SOPs of Interventional Radiology.			A4	Practical Demonstration			
TOPIC: BASIC PRINCIPLES OF INTERVENTIONAL RADIOLOGY										
8	Week-2 &3	Access sites in IR	Discuss the importance of selecting the appropriate access site in interventional radiology.	C2			Interactive Lecture/SGD	1	MCQs	12
9		Needles used in IR	Describe the different types of needles used in interventional radiology.	C2						
10		Guidewires, its selection and Construction	Explain the role of guidewires in interventional radiology procedures.	C3						
11			Discuss the factors affecting selection of a guidewire in interventional radiology.	C2						
12			Describe the construction of a guidewire and the importance of its different components.	C2						
		Catheter and it's properties	Explain the properties and characteristics of catheters used in interventional radiology.	C3						
		Classification of Catheters	Discuss the classification of catheters used in interventional radiology.	C2						
		Contrast Media in IR	Describe the types and characteristics of contrast media used in interventional radiology.	C2						

		Patient care in IR	Explain the importance of patient care in interventional radiology.	C3						
		Selinger technique	Discuss the Selinger technique, including the use of a guidewire and catheter.	C2						
		Complications of an IR procedure	Describe the potential complications of interventional radiology procedures.	C2						
13		Videos/Charts/Models	Demonstrate Sedinger technique through videos and charts.		P4		Demo	1	OSCE	5
14		SOP's Compliance	Independently Identify Needles, Catheters and guidewires used in IR procedures.			A4	Video Demonstration			
TOPIC: INTERVENTIONAL RADIOLOGY SUITE										
21	Week-4	Purpose of IR suite	Discuss the purpose of an interventional radiology (IR) suite.	C2			Interactive Lecture/SGD	1	MCQs	6
22		Suite requirements	Describe the requirements for an IR suite.	C2						
23		Control room of IR suite	Explain the role of the control room in an IR suite.	C33						
		Preparation room	Discuss the importance of a preparation room in an IR suite.	C2						
		Recovery/Monitoring Room	Describe the functions of a recovery/monitoring room in an IR suite.	C2						
		Waiting room	Explain the purpose of a waiting room in an IR suite.	C3						
25		Videos/Charts/Models	Demonstration of Interventional radiology suite through videos and charts.		P4		Demo	1	OSCE	2
26		SOP's Compliance	Comply to the SOPs of Interventional Radiology Suite.			A4	Practical Demonstration			
TOPIC: IR SUITE, TEAM AND IT'S EQUIPMENT										
27	Week-5	IR team	Discuss the composition and roles of the IR team.	C2			Interactive Lecture/SGD	1	MCQs	2
28		Equipment of IR suite	Describe the essential equipment found in an IR suite.	C2						
29		Imaging modalities in IR suite	Explain the different imaging modalities used in an IR suite.	C3						
30		Advantages and Limitations	Explain advantages and limitations of each modality.	C3						
33		Videos/Charts/Models	Video demonstration of different Modalities used in IR.		P4		Demo	1	OSCE	
34		SOP's Compliance	Independently Identify different modalities used in IR suite.			A4	Practical Demonstration			

TOPIC: IR DISORDERS										
37	Week-6	Vascular disorders	Discuss the role of IR in the diagnosis and treatment of vascular disorders.	C2			Interactive Lecture/SGD	1	MCQs	8
38		Oncologic Disorders	Describe the various interventional radiology techniques used in oncology.	C2						
39		Neurologic Disorders	Explain the treatment and management of neurological disorders using IR techniques.	C3						
40		Spinal disorders	Discuss the role of IR in the diagnosis and treatment of spinal disorders.	C2						
		Hepatobiliary Disorders	Describe the various IR procedures used to treat hepatobiliary disorders.	C2						
		Kidney Disorders	Explain the role of IR in the treatment and management of kidney disorders.	C3						
41		Videos/Charts/Models	Demonstrate different IR disorders through videos and charts.		P4		Demo	1	OSCE	3
42		SOP's Compliance	Comply to the SOPs of IR disorders.			A4	Practical Demonstration			
TOPIC: IR ANGIOGRAPHY										
43	Week-7	History of angiography	Describe the historical development of angiography.	C2			Interactive Lecture/SGD	1	MCQs	4
44		Indications and Contraindications	Discuss the indications and contraindications for angiography.	C2						
45		Patient preparation	Explain the importance of patient preparation for angiography.	C3						
46		Equipment for angiography	Describe the equipment required for angiography.	C2						
		Technique and Complications	Discuss the technique of angiography and its potential complications.	C2						
		Coronary Angiography	Describe the role of coronary angiography as an example of the above.	C2						
48		Videos/Charts/Models	Demonstrate different steps of IR angiography.		P4		Demo	1	OSCE	2
49		SOP's Compliance	Independently identify patient preparation and equipment used in IR Angiography.			A4	Practical Demonstration			
TOPIC IR EMBOLIZATION										
53	Week-8	History of angiography	Discuss the historical development of embolization.	C2			Interactive Lecture/SGD	1	MCQs	4
54		Indications and Contraindications	Describe the indications and contraindications for embolization.	C2						

55		Patient preparation	Explain the importance of patient preparation for embolization.	C3						
56		Equipment for Embolization	Describe the equipment required for embolization.	C2						
		Types and Classification	Discuss the types and classification of embolic agents.	C2						
57		Technique and Complications	Discuss the types and classification of embolic agents.	C2						
58		Videos/Charts/Models	Demonstrate different steps of IR Embolization through videos and charts.		P4		Demo	1	OSCE	1
59		SOP's Compliance	Independently identify patient preparation and equipment used in Embolization.			A4	Practical Demonstration			
TOPIC: IR THROMBOLYSIS										
60	Week-9	History of Thrombolysis	Describe the historical development of thrombolysis.	C2			Interactive Lecture/SGD	1	MCQs	4
61		Indications and Contraindications	Discuss the indications and contraindications for thrombolysis.	C2						
62		Patient preparation	Describe the importance of patient preparation for thrombolysis.	C2						
63		Equipment for Thrombolysis	Discuss the equipment required for thrombolysis	C2						
64		Types and Classification	Explain the types and classification of thrombolytic agents.	C3						
65		Technique and Complications	Describe the technique and l complications of IR thrombolysis.	C2						
66		Videos/Charts/Models	Demonstrate different steps of IR thrombolysis.		P4		Demo	1	OSCE	1
67		SOP's Compliance	Independently identify patient preparation and equipment used in IR Thrombolysis in IR procedure.			A4	Practical Demonstration			
TOPIC: IR DIALYSIS										
68	Week-10	History of Dialysis	Describe the historical development of dialysis.	C2			Interactive Lecture/SGD	1	MCQs	2
70		Indications and Contraindications	Discuss the indications and contraindications for dialysis.	C2						
		Patient preparation	Describe the importance of patient preparation for dialysis.	C2						
		Equipment for Dialysis	Discuss the equipment required for dialysis.	C2						
		Types of Dialysis	Explain the types and classification of dialysis.	C3						

71		Technique and Complications	Describe the technique of dialysis along with its potential complications.	C2						
76		Videos/Charts/Models	Demonstrate different steps of IR dialysis.		P4		Demo	1	OSCE	1
77		SOP's Compliance	Comply to the SOPs of IR Dialysis.			A4	Practical Demonstration			
TOPIC: DRAIN INSERTIONS										
82	Week-11 & 12	History of Drains	Describe the historical development of drain insertions.	C2			Interactive Lecture/SGD	1	MCQs	8
83		Indications and Contraindications	Discuss the indications and contraindications for drain insertions.	C2						
		Patient preparation	Describe the importance of patient preparation for drain insertions.	C2						
		Equipment for Drains	Discuss the equipment required for drain insertions.	C2						
84		Types of Drain tubes	Explain the different types of drain insertions.	C3						
		Classification of insertion sites	Discuss the classification of drains on the basis of its insertion approach.	C2						
85		Technique and Complications	Describe the technique of drain insertions along with its potential complications.	C2						
86		Videos/Charts/Models	Video demonstration of different types of Drain insertions in IR procedures.		P4		Demo	1	OSCE	4
87		SOP's Compliance	Comply to the SOPs of Drain insertion of IR procedure.			A4	Practical Demonstration			
TOPIC: TRANS JUGULAR INTRAHEPATIC PORTOSYSTEMIC SHUNT										
96	Week-13	History of TIPS	Describe the historical development of Trans jugular Intrahepatic Portosystemic Shunt (TIPS).	C2			Interactive Lecture/SGD	1	MCQs	5
97		Indications and Contraindications	Discuss the indications and contraindications for TIPS.	C2						
98		Therapeutic Applications	Discuss therapeutic applications of TIPS.	C2						
99		Patient preparation	Describe the patient preparation for TIPS.	C2						
100		Equipment for TIPS	Discuss the equipment required for TIPS.	C2						
101		Technique and Complications	Explain the technique of TIPS.	C3						
			Describe the potential complications of TIPS.	C2						

		Post-car and follow-ups	Discuss the post-procedure care and follow-up for TIPS patients.	C2						
103		Videos/Charts/Models	Video demonstration of different steps of IR TIPS procedure.		P4		Demo	1	OSCE	1
104		SOP's Compliance	Independently identify different steps of TIPS procedure in IR.			A4	Practical Demonstration			
TOPICS: TRANSCATHETER ARTERIAL CHEMOEMBOLIZATION										
105	Week-14 & 15	History of TACE.	Describe the historical development of Transcatheter Arterial Chemoembolization (TACE).	C2			Interactive Lecture/SGD	1	MCQs	6
		Indications and Contraindications	Discuss the indications and contraindications for TACE.	C2						
106		Therapeutic Applications	Discuss therapeutic applications of TACE.	C2						
107		Patient preparation	Describe the patient preparation for TACE.	C2						
108		Equipment for TACE	Discuss the equipment required for TACE.	C2						
109		Technique and Complications	Explain the technique of TACE	C3						
110			Describe the potential complications of TACE.	C2						
111		Post-car and follow-ups	Discuss the post-procedure care and follow-up for TACE patients.	C2						
112		Videos/Charts/Models	Demonstrate TACE procedure through videos and charts.		P4		Demo	1	OSCE	2
113		SOP's Compliance	Independently identify different steps of TACE procedure in IR.			A4	Practical Demonstration			
TOPIC: BIOPSY										
124	Week-16	History of Biopsy	Describe the historical development of biopsy.	C2			Interactive Lecture/SGD	1	MCQs	5
125		Indications and Contraindications	Discuss the indications and contraindications for biopsy.	C2						
126		Patient preparation	Describe the patient preparation for biopsy.	C2						
127		Equipment for Biopsy	Discuss the equipment required for biopsy.	C2						
128		Technique and Complications	Explain the different types of biopsy techniques along with its potential complications.	C3						
129		Post-car and follow-ups	Discuss the post-biopsy care and follow-up for patients.	C2						

130		Videos/Charts/Models	Demonstrate different types of Biopsies through videos.		P4		Demo	1	OSCE	2
131		SOP's Compliance	Comply to the SOPs of Biopsy in IR procedure.			A4	Practical Demonstration			

Recommended Books:

1. Advanced Radiographic and Angiographic Procedures: With an Introduction to Specialized Imaging. Patrick A. Apfel, Marianne Rita Tortorici. F A Davis Co., 2010
2. Abrams' Angiography: Vascular and Interventional Radiology. Herbert L. Abrams (Editor), Stanley Baum (Editor) and Michael J. Pentecost (Editor) Little Brown and Co., 2005.

ASSESSMENT BREAKDOWN

S.No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	**Introduction To interventional Radiology**	4	1	Static
2	**Basic Principles of Interventional Radiology**	12	1	Static and Interactive
3			1	Interactive
4	**Interventional Radiology Suite**	6	1	Static
5	**IR Suite, Team and It's Equipment**	2	1	Static
6	**IR Disorders**	8	1	Interactive
7	**IR Angiography**	4	1	Static
8	**IR Embolization**	4	1	Static
9	**IR Thrombolysis**	4	1	Static
10	**IR Dialysis**	2	1	Static and Interactive
11	**Drain Insertions**	8	1	Interactive
12			1	Static
13	**Trans jugular Intrahepatic Portosystemic Shunt**	5	1	Static
14	**Transcatheter Arterial Chemoembolization**	6	1	Static and Interactive
15			1	Interactive
16	**Biopsy**	5	1	Static and Interactive
Total	**16**	**70**	**14**	**14**

RAD-614 Clinical Medicine-II 2(1+1)

Course Description

This course provides an in-depth study of the clinical presentation, investigation, and management of various diseases and conditions. Students will learn to correlate clinical symptoms with physical examination findings and laboratory results, and develop skills in formulating differential diagnoses and management plans. The course will cover a range of topics, including the basics of patient assessment, alimentary canal liver & biliary system the joints & bones , and neurological systems. Emphasis will be placed on the integration of clinical information with investigative findings to facilitate accurate diagnosis and effective patient care.

LEARNING OBJECTIVES

Cognitive Domain

By the end of this course, students should be able to:

1. Describe the clinical presentation and pathophysiology of diseases affecting the alimentary canal, liver and biliary system, joints and bones, and neurological system.
2. Discuss the investigative approaches, including laboratory and imaging studies, relevant to diagnosing disorders in these systems.
3. Explain the underlying disease mechanisms and their impact on organ function and clinical symptoms across the alimentary, hepatobiliary, mu and neurological systems.

Psychomotor Domain

By the end of this course, students should be able to:

1. Perform systematic clinical examinations of the alimentary canal, hepatobiliary system, musculoskeletal system, and nervous system to elicit relevant signs.
2. Accurately obtain and record patient history related to gastrointestinal, hepatic, joint, bone, and neurological disorders.
3. Identify key clinical signs and correlate them with likely underlying pathologies during physical examinations.

Affective Domain

By the end of this course, students should be able to:

1. Maintain a critical and reflective approach to clinical assessment and diagnosis, recognizing the limitations and variability of clinical findings and investigations.
2. Collaborate effectively with peers, supervisors, and other healthcare professionals to support patient-centered care.

3. Uphold ethical and professional standards in clinical documentation, communication, and decision-making.

TABLE OF SPECIFICATION

S.No	Weeks	Content	Learning Outcome	Domain			MIT's	Time/ Hours	Assessment	No of Items
				C	P	A				
Topic: DISEASES OF ALIMENTARY CANAL										
1	Week-1	Endoscopy	Discuss the role of endoscopy in diagnosing and monitoring gastrointestinal diseases.	C2			Interactive Lecture/SGD	2	MCQs	4
2		Imaging modalities	Describe the different types of imaging tests ,used to investigate gastrointestinal diseases.	C2						
3		Dysphagia	Discuss the pathophysiology of dysphagia along with common sign and symptoms.	C2						
		Investigation	Explain the role of radiological investigations in diagnosing dysphagia.	C3						
		Dyspepsia pathophysiology	Discuss the pathophysiology and common signs and symptoms of dyspepsia	C2						
		Radiological investigation	Explain the role of radiological investigations in diagnosing dyspepsia	C3						
6		Videos /Charts/Models	Demonstrate upper GI endoscopic procedure through video.		P4		Demo	1	OSCE	2
7		SOP's Compliance	Comply with SOPS of upper GI procedures.			A4	Practical Demonstration			
Topic: GESTORESOPHAGEAL REFLUX DISEASE & VOMITING										
8	Week-2	GERD	Discuss the pathophysiology of gastroesophageal reflux disease (GERD)	C2			Interactive Lecture/SGD	2	MCQs	4
9		Sign and symptoms	Describe the common signs and symptoms of GERD	C2						
		Investigations	Explain the role of radiological investigations, in diagnosing GERD	C3						
10		Vomiting	Discuss the physiological mechanisms that control vomiting	C2						
11		Causes	Explain the various causes of vomiting,	C3						
13		Videos /Charts/Models	Demonstrate the characteristic findings of GERD through radiographs or charts.		P4		Demo	1	OSCE	2
14		SOP's Compliance	Comply with SOPs for radiation safety during fluoroscopic procedure.			A4	Video Demonstration			
Topic: PEPTIC ULCER ,TUMORS OF STOMACH & SMALL INTESTINE										
15	Week-3	Peptic ulcers	Discuss the pathophysiology of peptic ulcers along with it's common signs and symptoms	C2			Interactive Lecture/SGD	2	MCQs	5
16		Radiological investigation	Explain the role of radiological investigations, in diagnosing peptic ulcers.	C3						
17		Gastric tumors	Discuss the classification and types of gastric tumors.	C2						
18		Clinical presentation	Describe the clinical presentation and symptoms of gastric tumors.	C2						
19		Endoscopy	Explain the role of endoscopy and biopsy in diagnosing gastric tumors	C3						
		Small intestine tumors	Discuss the types of small intestine tumors.	C2						

20		Radiological investigation	Explain the role of imaging studies, such as computed tomography (CT) scans, magnetic resonance imaging (MRI), and endoscopy, in diagnosing small intestine tumors.	C3						
21		Videos /Charts/Models	Demonstrate the characteristic findings of peptic ulcers through charts and radiographs.		P4		Demo	1	OSCE	2
22		SOP's Compliance	Adopt proper safety measures when caring for patients with gastric tumors.			A4	Practical Demonstration			
Topic: DISEASES OF LIVER & BILIARY SYSTEM										
21	Week-4	Investigations	Discuss the role of liver function tests (LFTs) and imaging modalities in the initial evaluation of liver disease.	C2			Interactive Lecture/SGD	1	MCQs	4
22		Hepatomegaly	Discuss the pathophysiology of hepatomegaly	C2						
23		Causes	Explain the different causes of hepatomegaly.	C3						
		Radiological investigation	Discuss the diagnostic tests used to evaluate hepatomegaly	C2						
25		Videos /Charts/Models	Demonstrate the normal anatomical structures of liver on ultrasound images.		P4		Demo	1	OSCE	2
26		SOP's Compliance	Adopt how to care and handle imaging modalities			A4	Practical Demonstration			
Topic: ASCITES & SPLENOMEGALY										
27	Week-5	Ascites	Describe the pathophysiology of ascites.	C2			Interactive Lecture/SGD	1	MCQs	4
28		Causes	Explain the different causes of ascites	C3						
29		Radiological investigation	Discuss the diagnostic tests used to evaluate ascites	C2						
		Splenomegaly	Explain the different causes of splenomegaly.	C3						
30		Radiological investigation	Discuss the diagnostic tests used to evaluate splenomegaly	C2						
33		Videos /Charts/Models	Demonstrate the paracentesis procedure through video.		P4		Demo	1	OSCE	3
34		SOP's Compliance	Comply with the SOPS for the paracentesis procedure.			A4	Practical Demonstration			
Topic: LIVER ABSCESS & PORTAL HYPERTENSION										
37	Week-6	Liver abscess	Explain the different types and pathogenesis of liver abscess.	C3			Interactive Lecture/SGD			5
38		Radiological investigation	Discuss the diagnostic tests used to evaluate liver abscess	C2						
39		Portal hypertension	Describe the common causes and clinical presentation of portal hypertension.	C2						
40		Radiological investigation	Discuss the diagnostic tests used to evaluate portal hypertension.	C2						
41		Videos /Charts/Models	Demonstrate the characteristic features of liver abscess on ultrasound images.		P4		Demo	1	OSCE	3
42		SOP's Compliance	Adopt how to care and handle radiographic images.			A4	Practical Demonstration			
Topic: GALLSTONES & CHOLECYSTITIS										
43	Week-7	Gallstones	Discuss the epidemiology and risk factors for gallstone formation.	C2			Interactive Lecture/SGD	2	MCQs	4

44		Characteristic features	Describe he characteristic features and compositions of gallstones	C2						
		Radiological investigation	Explain the role of radiological investigations used to evaluate gallstones	C3						
		Cholecystitis	Discuss the pathophysiology of cholecystitis	C2						
		Investigations	Discuss the diagnostic tests used to evaluate cholecystitis	C2						
48		Videos /Charts/Models	Demonstrate the characteristic findings of gallstones through radiographs and charts		P4		Demo	1	OSCE	2
49		SOP's Compliance	Comply with SOPs for radiation safety during radiographic procedures.			A4	Practical Demonstration			
Topic: LIVER TUMORS & HEPATIC NODULES										
53	Week-8	Liver tumors	Describe the types of liver tumors	C2			Interactive Lecture/SGD			3
54		Causes	Explain the common causes and risk factors for developing liver tumors.	C3						
55		Radiological investigation	Describe the role of imaging modalities used to evaluate liver tumor	C2						
56		Investigations	Explain the diagnostic approach to hepatic nodules.	C3						
57		Imaging characteristics	Describe the imaging characteristics of hepatic nodules on various imaging modalities.	C2						
58		Videos /Charts/Models	Demonstrate characterization of hepatic nodules on CT images		P4		Demo	1	OSCE	2
59		SOP's Compliance	Adopt proper safety measures when caring for patients with liver tumors.			A4	Practical Demonstration			
Topic: DISEASES OF THE JOINTS & BONES										
60	Week-9	Radiological investigation	Describe the role of radiological investigations, in the diagnosis and evaluation of bone diseases	C2			Interactive Lecture/SGD	2	MCQs	4
61		Joint pain	Discuss the different types of joint pain,	C2						
62		Causes	Describe the various causes of joint pain	C2						
63		Investigations	Explain the diagnostic tests and procedures used to evaluate joint pain	C3						
64		Back pain	Discuss the anatomy of the spine and the different structures that can contribute to back pain.	C2						
65		Types	Describe the different types of back pain.	C2						
66		Videos /Charts/Models	Demonstrate physical examination techniques for evaluating bone diseases through video.		P4		Demo	1	OSCE	2
67		SOP's Compliance	Independently identify the normal anatomical structures of joints on radiographs.			A4	Practical Demonstration			
Topic: RHEUMATOID ARTHRITIS										
68	Week-10	Pathophysiology	Discuss the pathophysiology of rheumatoid arthritis	C2			Interactive Lecture/SGD	2	MCQs	5
		Causes and risk factors	Discuss the causes and risk factors of rheumatoid arthritis	C2						
70		Clinical presentation	Describe the clinical presentation of rheumatoid arthritis	C2						
71		Radiological investigation	Explain the radiological investigations used to diagnose and monitor rheumatoid arthritis.	C3						
76		Videos /Charts/Models	Demonstrate the characteristic findings of rheumatoid arthritis through radiographs or charts		P4		Demo	1	OSCE	3
77		SOP's Compliance	Independently identify characteristic features of rheumatoid arthritis on radiographs.			A4	Practical Demonstration			

Topic: INFECTIVE ARTHRITIS & OSTEOARTHRITIS										
82	Week-11	Infective arthritis	Explain the different types of infective arthritis	C3			Interactive Lecture/SGD			5
83		Pathophysiology	Discuss the pathogenesis and clinical features of infective arthritis	C2						
		Osteoarthritis	Discuss the pathophysiology of osteoarthritis,	C2						
84		Stages	Describe the different stages of osteoarthritis	C2						
85		Radiological investigation	Discuss the radiological investigations used to diagnose and monitor osteoarthritis	C2						
86		Videos /Charts/Models	Demonstrate different stages of osteoarthritis on radiographs or charts.		P4		Demo	1	OSCE	
87		SOP's Compliance	Independently identify characteristic boney changes of osteoarthritis on radiographs.			A4	Practical Demonstration			
Topic: OSTEOPOROSIS & PAGET'S DISEASE										
88	Week-12	Osteoporosis	Describe the risk factors for developing osteoporosis	C2			Interactive Lecture/SGD	2	MCQs	8
89		Clinical features	Explain the clinical presentation of osteoporosis	C3						
90		Investigations	Discuss the diagnostic tests used to diagnose osteoporosis	C2						
91		Paget's disease	Describe the clinical presentation of Paget's disease	C2						
92		Investigations	Discuss the diagnostic tests used to diagnose Paget's disease	C2						
94		Videos /Charts/Models	Demonstrate dual-energy X-ray absorptiometry (DXA) scan through video.		P4		Demo	1	OSCE	5
95		SOP's Compliance	Comply to SOPs of DEXA scan.			A4	Practical Demonstration			
Topic: RICKETS & OSTEOMALACIA										
96	Week-13	Pathophysiology	Discuss the pathophysiology of rickets and osteomalacia,	C2			Interactive Lecture/SGD	2	MCQs	6
97		Rickets clinical features	Describe the clinical presentation of rickets in children	C2						
98		Clinical features	Explain the clinical presentation of osteomalacia in adults,	C3						
99		Investigations	Describe imaging tests used to diagnose rickets and osteomalacia.	C2						
103		Videos /Charts/Models	Demonstrate the characteristic findings of osteomalacia through radiographs or charts.		P4		Demo	1	OSCE	4
104		SOP's Compliance	Adopt how to care and handle different components of x-ray imaging system			A4	Practical Demonstration			
Topic: INVESTIGATION OF NEUROLOGICAL DISORDERS										
105	Week-14	Radiological investigation	Describe the different types of neuroimaging tests used to investigate neurological diseases,	C2			Interactive Lecture/SGD	2	MCQs	4
106		EEG and EMG	Explain the principles and applications of electroencephalography (EEG) and electromyography (EMG) in the diagnosis of neurological diseases	C3						
107		CSF	Describe the different types of cerebrospinal fluid (CSF) tests used to investigate neurological disease	C2						
108		Hydrocephalus types	Discuss the different types of hydrocephalus.	C2						

109		Pathophysiology	Describe the pathophysiology and clinical features of hydrocephalus	C2						
110		Investigations	Discuss the diagnostic tests and procedures used to diagnose hydrocephalus.	C2						
112		Videos /Charts/Models	Demonstrate characteristic features of hydrocephalus on radiographic images.		P4		Demo	1	OSCE	2
113		SOP's Compliance	Comply with SOPs of EEG procedure.			A4	Practical Demonstration			
Topic: MENINGITIS										
114	Week-15	Types	Discuss the different types of meningitis	C2			Interactive Lecture/SGD	2	MCQs	5
115		Causes	Explain the causes of meningitis	C3						
116		Clinical features	Describe the clinical features of meningitis	C2						
117		Investigations	Explain the diagnostic tests and procedures used to diagnose meningitis	C3						
121		Videos /Charts/Models	Demonstrate CSF aspiration technique through vedio.		P4		Demo	1	OSCE	3
122		SOP's Compliance	Independently identify the characteristic sign of meningitis on CT images			A4	Practical Demonstration			
Topic: DISTURBANCE IN VISUAL SYSTEM & INTRACRANIAL TUMORS										
124	Week-16	Visual acuity	Describe the various disorders that affect visual acuity	C2			Interactive Lecture/SGD	2	MCQs	4
125		Field of vision	Discuss the various conditions that affect the field of vision	C2						
126		Pupil disorder	Explain the different types of pupil disorders	C3						
128		Characteristic features	Describe the types and characteristic features of intracranial neoplasms.	C2						
129		Investigations	Explain the diagnostic tests and procedures used to evaluate intracranial neoplasms,	C3						
130		Videos /Charts/Models	Demonstrate characteristic features of intracranial neoplasm on radiographs and charts		P4		Demo	1	OSCE	2
131		SOP's Compliance	Adopt how to care and handle CT images			A4	Practical Demonstration			

Recommended Books:
1. Davidson's Principles and Practice of Medicine, 21st edition
2. Kumar and Clark's Clinical Medicine (Kumar, Kumar and Clark's Clinical Medicine), 8th edition
3. Medical diagnosis & Management (Mohammad Inam Danish),9th edition

ASSESSMENT BREAKDOWN				
S.No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
S.No	**Topics**	**No of MCQ**	**No of OSPE / OSCE Stations**	**Static / Interactive**
1	Diseases of alimentary canal	4	1	Static
2	Gestoresophageal reflux disease & vomiting	4	1	Static and Interactive
3	Peptic ulcer ,tumors of stomach & small intestine	5	1	Interactive
4	Diseases of liver & biliary system	4	1	Static
5	Ascites & splenomegaly	4	1	Static
6	Liver abscess & portal hypertension	5	1	Static and Interactive
7	Gallstones & cholecystitis	4	1	Static
8	Liver tumors & hepatic nodules	3	1	Interactive
9	Diseases of the joints & bones	4	1	Static and Interactive
10	Rheumatoid arthritis	5	1	Static
11	Infective arthritis & osteoarthritis	5	1	Static
12	Osteoporosis & Paget's disease	8	1	Static
13	Rickets & osteomalacia	6	1	Interactive
14	Investigation of neurological disorders	4	1	Static and Interactive
15	Meningitis	5	1	Static
16	Disturbance in visual system & intracranial tumors	4	1	Static
Total	**16**	**70**	**14**	**14**

THE END