

INTEGRAL UNIVERSITY, LUCKNOW

INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

BACHELOR OF MEDICAL RADIOLOGICAL IMAGING SCIENCES (BMRIS)

SYLLABUS

YEAR/ SEMESTER: II/III



Integral University, Lucknow Department of Paramedical Sciences Study and Evaluation Scheme

Program: BMRIS Semester-III

	Trogram 25 mil												
S. N.	Course	Course Title	Type of		Period P r./week/			Evaluation Scheme		Sub. Total	C 3!4	Total Credits	
	code	604100 11010	Paper	L	T	P	CT	TA	Total	ESE	Total	010010	Creuits
	THEORIES												
1	RS201	Conventional Radiographic Techniques-II	Core	3	1	0	40	20	60	40	100	3:1:0	4
2	RS202	Radiographic Positioning-I	Core	3	1	0	40	20	60	40	100	3:1:0	4
3	RS203	Radiation Protection and Quality Assurance	Core	2	1	0	40	20	60	40	100	2:1:0	3
4	RS204	Fundamental of Microbiology & Immunology	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	ES101	Environmental Studies	Core	2	1	0	40	20	60	40	100	2:1:0	3
					PRACTI	CAL							
1	RS205	Conventional Radiographic Techniques- II Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
2	RS206	Radiographic Positioning -I Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
3	RS207	Radiation Protection and Quality Assurance-Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
4	RS208	Fundamentals of Microbiology & Immunology-Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
	Total 12 05 12 360 180 540 360 900 25 25												25

S.	Course		Type			At	tributes				United Nation Sustainable
N.	Course code	Course Title	of Paper	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	Development Goal (SDGs)
		THEORIES									
1	RS201	Conventional Radiographic Techniques-II	Core	√	√	V			\checkmark	V	3,4
2	RS202	Radiographic Positioning-I	Core	√	√	√	V		\checkmark	$\sqrt{}$	3,4
3	RS203	Radiation Protection and Quality Assurance	Core	√	√	√	V		\checkmark	$\sqrt{}$	3,4
4	RS204	Fundamental of Microbiology & Immunology	Core	V	√	V	V		$\sqrt{}$	$\sqrt{}$	3,4
5	ES101	Environmental Studies	Core					√			3,4,11,16
		PRACTICAL									
1	RS205	Conventional Radiographic Techniques- II Lab	Core	√	√	√			$\sqrt{}$	$\sqrt{}$	3,4
2	RS206	Radiographic Positioning -I Lab	Core	V	√	√	V		$\sqrt{}$		3,4
3	RS207	Radiation Protection and Quality Assurance-Lab	Core	V	V	V	V		V	V	3,4
4	RS208	Fundamentals of Microbiology & Immunology-Lab	Core	√	√	√	V		$\sqrt{}$	√	3,4

L: Lecture T: Tutorials P: Practical CT: Class Test TA: Teacher Assessment ESE: End Semester Examination,

AE= Ability enhancement, DSE- Discipline Specific Elective, Sessional Total: Class Test + Teacher Assessment

Subject Total: Sessional Total + End Semester Examination (ESE)



Effective from Sessio	Effective from Session: 2024-25												
Course Code	RS201	Title of the Course	CONVENTIONAL RADIOGRAPHIC TECHNIQUES- II	L	T	P	C						
Year	II	Semester	IV	3	1	0	4						
Pre-Requisite	Nil	Nil Co-requisite Nil											
Course Objectives		The main objective is too aware the student about the conventional technique of radio imaging technique like (manual image processing & fluoroscopy / dynamic imaging) along with the image formation, developing and reading.											

	Course Outcomes							
CO1	Students will be able to learn about portable, Mobile and C-Arm machines of radiology.							
CO2	idents will be able to learn about fluoroscopy equipment.							
CO3	Students will be able to learn about X-ray and fluoroscopy tables.							
CO4	Students will be able to learn about tomography equipment.							
CO5	Students will be able to learn about cranial and dental radiography.							

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	PORTABLE & MOBILE EQUIPMENTS	 Portable X-Ray Equipments its mains requirements and application. Mobile X-Ray Equipments, Technical factors, its Cable connections, Capacitor discharge mobile equipment. X-Ray Equipments for the Operating Theatre. 	6	CO1
2	FLUOROSCOPY EQUIPMENTS	 Construction & Working principles of Image Intensifier. Direct Fluoroscopy. Viewing the Intensified image. Recording the intensified Image. Digital fluoroscopy. 	6	CO2
3	FLUORO /RADIOGRAPHY TABLES	 Introduction of fluoroscopic / radiographic table and its general features. The serial changer. The spot film devices. 	6	CO3
4	TOMOGRAPHIC EQUIPMENT	 Principles of Tomography. Various types of Tomographic movement. Equipment for Tomography. 	6	CO4
5	EQUIPMENT FOR CRANIAL AND DENTAL RADIOGRAPHY	 The skull table. General Dental X-ray equipment. Dental anatomy Dental radiography 	6	CO5

Reference Books:

- 1. Curry TS, Dowdey JE, Murry RC. Christensen's physics of diagnostic cardiology. Lippincott Williams & Wilkins; 1990.
- 2. Brant WE, Helms CA, editors. Fundamentals of diagnostic radiology. Lippincott Williams & Wilkins; 2012 Mar20.
- 3. Curry TS, Dowdey JE, Murray RC. Introduction to the physics of diagnostic radiology.
- 4. Adam A, Dixon AK, Gillard JH, Schaefer-Prokop C, Grainger RG, Allison DJ. Grainger & Allison's Diagnostic Radiology E-Book. Elsevier Health Sciences.
- 5. D N and M O Chesney- X ray equipments for student radiographers- Thirdedition
- 6. Burgener FA, Kormano M. Differential diagnosis in conventional radiology

e-Learning Source:

- 1 https://youtu.be/R2-GB65Wa5w
- 2 https://youtu.be/JDYG-JEl6kI
- 3 https://youtu.be/IhjbvEnlRrM

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO
CO	101	102	103	104	103	100	107	100	10)	1010	1011	1012	1501	1502	1505	1504	150
CO1	3	3	3	3	2	2	3	3	3	3	3	2	3	2	3	2	2
CO2	2	3	2	3	3	3	3	3	2	3	3	3	2	3	3	3	3
CO3	3	2	3	2	3	2	3	3	2	2	3	3	2	3	3	3	3
CO4	2	3	2	3	3	3	2	3	3	2	2	3	2	3	3	2	3
CO5	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3	2

Course Code	Course Title		Attributes S										
RS201	CONVENTIONAL RADIOGRAPHIC	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.				
	TECHNIQUES- II	√	√	√	√		√	√	3,4				



Effective from Sessio	Effective from Session: 2024-25												
Course Code	RS202	Title of the Course	RADIOGRAPHIC POSITIONING-I	L	T	P	C						
Year	I	Semester	II	3	1	0	4						
Pre-Requisite	Nil	Co-requisite	Nil										
Course Objectives	The objective is to learn basic and special projections for the better and delineation diagnosis of the disease condit different anatomical structure.												

	Course Outcomes
CO1	Student will be able to know about the Anatomical Landmarks used for Radiography.
CO2	Student will be able to perform Radiographic projection of Skull.
CO3	Student will be able to perform Radiographic projection of Neck.
CO4	Student will be able to perform Radiographic projection of Thoracic region.
CO5	Student will be able to perform Radiographic projection of Abdomen.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	ANATOMICAL TERMINOLOGY	1. Anatomical land marks, postural variations, erect and horizontal technique, respiratory movement and diaphragm level, region densities, preparations and immobilization of patient, positioning terminology identification system.	8	CO1
2	SKULL PROJECTIONS	 Cranial bones and facial bones Related radiological anatomy Basic & special projections Cranium, Skull, Sella turcica, Mastoids, Optic foramina and Orbits, Nasal bone, TM joint, Facial bone, Zygomatic arches, Mandible, Para nasal sinuses 	8	CO2
3	NECK PROJECTIONS	 Related radiological anatomy Positioning- AP, Lateral, Soft Tissue Neck (STN) 	8	CO3
4	THORAX PROJECTIONS	 Related radiological anatomy Chest X-ray –AP, PA, Lateral, B/L Oblique, Decubitus, Apicogram, Lordotic projection. Ribs AP & Oblique Sternum PA, Oblique & B/L Sternoclavicular joint projections 	8	CO4
5	ABDOMEN PROJECTIONS	 Abdomen related Radiological Anatomy. Basic & special projection Basic: AP supine (KUB) Special: PA prone, lateral Decubitus, Erect AP, Dorsal Decubitus, Lateral Acute abdomen: three-way series 	8	CO5

Reference Books:

- 1. Whitley AS, Jefferson G, Holmes K, Sloane C, Anderson C, Hoadley G. Clark's.
- 2. Positioning in Radiography 13E. CRC Press; 2015 Jul 28
- 3. Bontrager KL, Lampugnano J. Textbook of Radiographic Positioning and Related.
- 4. Anatomy-E-Book. Elsevier Health Sciences; 2013 Aug 7.
- 5. Bontrager KL, Lampugnano J. Bontrager's Handbook of Radiographic Positioning.
- 6. Techniques-E-BOOK. Elsevier Health Sciences; 2017 Feb 10.

e-Learning Source:

- 1. https://radiopaedia.org/articles/skull-radiography
- 2. https://radiopaedia.org/cases/normal-soft-tissue-neck-lateral-radiograph
- 3. https://radiopaedia.org/articles/abdomen-ap-supine-view-1

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	102	103	104	103	100	107	100	10)	1010	1011	1012	1501	1302	1505	1504
CO1	3	2	1	3	3	3	3	2	3	3	3	3	3	2	3	3
CO2	3	2	1	3	3	3	3	2	3	3	3	3	3	2	3	3
CO3	3	2	1	3	3	3	3	2	3	3	3	3	2	3	2	2
CO4	3	2	1	3	3	3	3	2	3	3	3	3	2	2	2	3
CO5	3	2	1	3	3	3	3	2	3	3	3	3	3	3	3	2

Course Code	Course Title		Attributes S										
RS202	RADIOGRAPHIC POSITIONING-I	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.				
		1	1	1	I		ſ	I	3,4				



Effective from Session	n: 2024-25									
Course Code	RS203	Title of the Course	RADIATION PROTECTION AND	L	T	P	C			
			QUALITYASSURANCE				1			
Year	II	Semester	III	2	1	0	3			
Pre-Requisite	Nil	Co-requisite	Nil							
Course Objectives		objective is to learn the aim, objective, philosophy and principle of radiation protection to protect oneself from the ogical effects of radiation and monitoring radiation exposure.								

	Course Outcomes: After the successful course completion, learners will develop following attributes:
CO1	Student will have knowledge on Radiation, Units & Quantities of radiation and Principle of Radiation Protection.
CO2	Student will have knowledge on Radiation Monitoring & Radiobiology.
CO3	Student will have knowledge on Quality control and assessment of equipment installed in radio department.
CO4	Student will have knowledge about care and maintenance of equipments in radiology department.
CO5	Student will have knowledge on Role of Radiographer in QA & QC of equipments.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INTRODUCTION TO RADIATION PROTECTION, UNITS& QUANTITIES	 Introduction to Radiation Protection, Units & Quantities- Primary, secondary radiation, need for radiation protection, Exposure, absorbed dose, absorbed dose equivalent, Effective dose, air KERMA, Radiation weighting factor, Tissue weighting factor, MPD. Aim & Principle of Radiation Protection- Concept of ALARA, Cardinal Principle, ICR Regulation, Radiation Protection in: Radiography, CT, Fluoroscopy, Mammography, Ward radiography, radiation shielding. 	6	CO1
2	RADIATION MONITORING & RADIOBIOLOGY	 Radiation monitoring: Personnel – Film badge, TLD, OSLD, pocket dosimeter, AreaMonitoring Devices. Radiobiology: Radiolysis of water, Direct & Indirect effects of radiation, Stochastic, Deterministic effects, Somatic, Genetic effects, dose relationship, Antenatal exposure. 10-day rule, 14-day rule, 28-day rule, structural shielding, workload, use factor, occupancyfactor. 		CO2
3	QUALITY CONTROL AND ASSESSMENT IN RADIOLOGY	1. Quality Control and Assessment in Radiology: Quality Assurance and quality control of Modern Radiological and Imaging Equipment, which includes Digital Radiography, Computed Radiography, CT scan, MRI Scan, Ultrasonography and Tele radiology and PACS.	6	CO3
4	CARE & MAINTENANCE OF DIAGNOSTIC EQUIPMENTS	1. Care and maintenance of diagnostic equipment: General principles and preventive maintenance for routine - daily, Weekly, monthly, quarterly, annually: care in use, special care of mobile equipment.	6	CO4
5	ROLE OF RADIOGRAPHER IN PLANNING, QA & RADIATION PROTECTION	 Role of Radiographer in Planning, QA & Radiation Protection: Role of technologist in radiology department - Personnel and area monitoring. ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection. NABH guidelines, AERB guidelines, PNDT Act and guidelines. 	6	CO5

Reference Books:

- 1. Sherer MA, Visconti PJ, Ritenour ER, Haynes K. Radiation Protection in Medical Radiography-E-Book. Elsevier Health Sciences; 2014Mar12.
- 2. Brandon AN, Hill DR. Selected list of books and journals in allied health. Bulletin of the Medical Library Association, 1996.
- 3. Long BW, Frank ED, Ehrlich RA. Radiography Essentials for Limited Practice-E-Book. Elsevier Health Sciences; 2016 Sep6
- 4. Durrani SA, IlicR, editors. Radon measurements by etched track detectors: applications in radiation protection, earth sciences and the environment. World scientific
- 5. Turner JE. Atoms, radiation, and radiation protection. John Wiley & Sons; 2008Jan8
- 6. Radiation protection in medical radiography by Mary Alice, Paula J Visconti et.al.

e-Learning Source:

- 1. https://en.wikipedia.org/wiki/Radiation-protection
- 2. https://youtu.be/mvjYRGjrKHc
- 3. https://www.slideshare.net/RubiSapkota/radiation-protection-and-personnel-monitoring-devices

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	2	3	3	3	3	3	3	2	2	3	3
CO2	2	3	3	3	3	3	3	3	2	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	3	3	2	2	3	3	2	2	2	3
CO4	3	3	2	3	2	3	2	3	3	2	3	3	3	3	2	2
CO5	2	3	3	3	2	3	2	3	2	2	2	3	2	3	2	3

			1111110	ites to DD Gs							
Course Code	Course Title		Attributes								
RS203	RADIATION PROTECTION	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.		
	AND QUALITY		$\sqrt{}$	√				$\sqrt{}$	3,4		



Effective from Session	: 2024-25						
Course Code	RS204	Title of the Course	FUNDAMENTAL OF MICROBIOLOGY	L	T	P	C
			& IMMUNOLOGY				
Year	II	Semester	III	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	This subject gives	a general insight into	the history, basics of microbiology, sterilization and br	anche	s of Mi	crobiol	ogy.

	Course Outcomes
CO1	This course makes the students to know about Microscopy & Biomedical waste management.
CO2	This course makes the students to know about general safety in Microbiology Lab & Sterilization
CO3	This course makes the students to know antiseptics & disinfectants.
CO4	This course makes the students to know about antigens & antibodies of immune system.
CO5	This course makes the students to know about branches of Microbiology.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	MICROSCOPY & BIOMEDICAL WASTE MANAGEMENT IN THE LAB	 Microscopy: Study of compound microscope – magnification, numerical aperture, resolution and components of microscope. Biomedical waste management in a Medical Microbiology laboratory: Types of the waste generated, Segregation, Treatment, Disposal 	6	CO1
2	GENERAL SAFETYAND STERILIZATION	 General safety measures used in Microbiology laboratory, Sterilization and disinfection: Various physical methods of sterilization heat, UV radiation, ionizing radiation, filtration, characters affecting sterilization, auto clave control and sterilization indicators. 	6	CO2
3	ANTISEPTIC AND DISINFECTANTS	 Antiseptics & Disinfectants: Definition, types and properties, mode of action, use, qualities of good disinfectants Chemical disinfectants – phenol and its compounds, alcohol, halogen, heavy metals and quaternary ammonium compounds, aldehyde, gaseous compound use and abuse of disinfectants. precautions while using the disinfectants 	6	CO3
4	IMMUNE SYSTEM, ANTIGEN & ANTIBODY	 General concepts of the immune system Antigens and haptens: Properties, foreignness, molecular size, heterogeneity, B and T cell epitopes; T dependent and T independent antigens Antibodies: Historical perspective of antibody structure; structure, function and properties of the antibodies; different classes, subclasses and biological activities of antibodies. 	6	CO4
5	INTRODUCTION TO VARIOUS MICRO ORGANISM AND THEIR FEATURES	 Introduction to Bacteriology, Virology, Parasitology, Helminthology, Fungi & Protozoa. Brief Discussion on - Structure, life cycle, types, infection caused, diagnosis and treatment by- Common Viruses, Bacteria, Parasites & Helminth. 	6	CO5

Reference Books:

- 1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8thedition, University Press Publication.
- 2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013)
- 3. Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication.
- 4. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
- 5. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education.
- 6. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8thedition, University Press Publication.

e-Learning Source:

- 1. https://youtu.be/pB26B2CXi2U
- 2. https://www.britannica.com/technology/microscope
- 3. https://www.webmd.com/a-to-z-guides/difference-between-disinfectants-antiseptics

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	102	100	10.	100	100	10,	100	10)	1010	1011	1012	1501	1002	1000	150.
CO1	3	3	3	3	2	2	3	3	3	3	3	3	2	2	3	3
CO2	2	3	3	3	3	3	3	3	2	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	3	3	2	2	3	3	2	2	2	3
CO4	3	3	2	3	2	3	2	3	3	2	3	3	3	3	2	2
CO5	2	3	3	3	2	3	2	3	2	2	2	3	2	3	2	3

Course Code	Course Title			Att	ributes				SDGs
	FUNDAMENTAL	Employability	Entrepreneurship	Skill	Gender	Environment &	Human	Professional	No.
RS204		Employability	Entrepreneursinp	Development	Equality	Sustainability	Value	Ethics	
	OF	√	√	√	√		√	√	3,4
	MICROBIOLOGY								,
	& IMMUNOLOGY								



Effective from Session	n: 2018-19						
Course Code	ES101	Title of the Course	ENVIRONMENTAL STUDIES	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives		t will have awareness of	our environment in general, natural resources, ecosystems, environment	onmen	tal p	olluti	on

	Course Outcomes
CO1	To study about the Environment and the ECO system.
CO2	To study about the Natural Resources.
CO3	To study about Biodiversity and Conservation
CO4	To study Environmental pollution, its policies and practices
CO5	To study Human Population and Environmental Ethics.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INTRODUCTION TO ENVIRONMENT AND ECOSYSTEMS	 Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession. 	6	CO1
2	NATURAL RESOURCES	 Eerogy Resources: Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies. 	6	CO2
3	AND	 Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services. 	6	CO3
4	ENVIRONMENTAL POLLUTION, POLICIES AND PRACTICES	 Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment. Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts. 	6	CO4
5	HUMAN POPULATION AND THE ENVIRONMENT	1. Human population growth: Impacts on environment, human health and welfare, Resettlementand rehabilitation of project-affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	6	CO5

Reference Books:

- 1. Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2. Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3. Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill.
- 4. Clark R.S. Marine Pollution, Clanderon Press Oxford (TB).
- 5. Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai
- 6. De. A.K. Environmental chemistry Willey Eastern Limited.
- 7. Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment &security, Stockholm Env, Institute, Oxford Univ, Press 473p.
- 8. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay

e-Learning Source:

- 1. https://www.vedantu.com/biology/difference-between-environment-and-ecosystem
- 2. https://en.wikipedia.org/wiki/Natural resource
- 3. https://en.wikipedia.org/wiki/Biodiversity

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	102	103	104	103	100	107	100	10)	1010	1011	1012	1501	1502	1505	1504
CO1	3	3	3	3	3	3	3	3	3	3	2	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	2	3	3	3	2	3	2	2	3	2	3	2	3	2	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3

Course Code	Course Title		Attributes									
ES101	ENVIRONMENTAL	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.			
	STUDIES					√			3,4, 11			



Effective from Sessio	n: 2024-25						
Course Code	RS205	Title of the Course	CONVENTIONAL RADIOGRAPHIC TECHNIQUES-II LAB	L	T	' P	C
Year	II	Semester	IV	0	0	2	1
Pre-Requisite	NIL	Co-requisite	Nil				
Course Objectives		g & fluoroscopy / dyn	the student about conventional technique of radio imaging technique like (a amic imaging) along with image formation, developing and reading and also				

	Course Outcomes
CO1	Students will be able to learn about portable, Mobile and C-Arm machines of radiology.
CO2	Students will be able to learn about fluoroscopy.
CO3	Students will be able to learn about X-ray and fluoroscopy tables.
CO4	Students will be able to learn about tomography equipment.
CO5	Students will be able to learn about cranial and dental radiography.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	PORTABLE & MOBILE EQUIPMENT	1. Portable & Mobile Equipment	4	CO1
2	FLUOROSCOPY EQUIPMENT	2. Fluoroscopy Equipment	4	CO2
3	FLUOROSCOPIC/ RADIOGRAPHIC TABLES	3. Fluoroscopic / Radiographic Tables	4	CO3
4	TOMOGRAPHIC EQUIPMENT	4. Tomographic Equipment	4	CO4
5	CRANIAL AND DENTAL RADIOGRAPHY	5. Equipment for Cranial and Dental Radiography6. Dental Radiography	4	CO5

Reference Books:

- 1. Curry TS, Dowdey JE, Murry RC. Christensen's physics of diagnostic cardiology. Lippincott Williams & Wilkins; 1990.
- 2. Brant WE, Helms CA, editors. Fundamentals of diagnostic radiology. Lippincott Williams & Wilkins; 2012 Mar20.
- 3. Curry TS, Dowdey JE, Murray RC. Introduction to the physics of diagnostic radiology.
- 4. Adam A, Dixon AK, Gillard JH, Schaefer-Prokop C, Grainger RG, Allison DJ. Grainger & Allison's Diagnostic Radiology E-Book. Elsevier Health Sciences.
- 5. D N and M O Chesney- X ray equipments for student radiographers- Thirdedition
- 6. Burgener FA, Kormano M. Differential diagnosis in conventional radiology

e-Learning Source:

- 1. https://youtu.be/R2-GB65Wa5w
- 2. https://youtu.be/JDYG-JEl6kl
- 3. https://youtu.be/IhjbvEnlRrM

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	2	3	3	3	3	3	2	3	2	3	2
CO2	2	3	2	3	3	3	3	3	2	3	3	3	2	3	3	3
CO3	3	2	3	2	3	2	3	3	2	2	3	3	2	3	3	3
CO4	2	3	2	3	3	3	2	3	3	2	2	3	2	3	3	2
CO5	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3

Course Code	Course Title	Attributes									
RS205	CONVENTIONAL RADIOGRAPHIC	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.		
	TECHNIQUES-II LAB	√	\checkmark	√	V		√	V	3,4		

Effective from Session	Effective from Session: 2024-25													
Course Code RS206 Title of the Course RADIOGRAPHIC POSITIONING- I LAB L T P														
Year	I	Semester	II	0	0	2	1							
Pre-Requisite	Nil	Co-requisite	Nil											
Course Objectives	Demonstra	emonstration of various positioning of Skull, Neck, Thorax and abdomen												

	Course Outcomes: After the successful course completion, learners will develop following attributes:
CO1	Student will be able to perform Radiography of Skull.
CO2	Student will be able to perform Radiography of Skull with special projections.
CO3	Student will be able to perform Radiography of PNS and Facial bones.
CO4	Student will be able to perform Radiography of STN & Chest.
CO5	Student will be able to perform Radiography of Chest special views.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO	
	SKULL	1. Demonstration of Skull AP view.	4		
1	PROJECTION- I	2. Demonstration of Skull PA view.	4	CO1	
_		3. Demonstration of Skull Town's view.			
2	SKULL PROJECTION- II	4. Demonstration of Skull Lateral & Sella Turcica view.	4	CO2	
	PROJECTION-II	5. Demonstration of Skull SMV Projection.			
_		6. Demonstration of PNS Open and Close mouth views.			
3	SKULL PROJECTION III	7. Demonstration of Facial Projections.	4	CO3	
	PROJECTION- III	8. Demonstration of TMJ projection.			
		9. Demonstration of STN projection.			
4	CHEST PROJECTION- I	10. Demonstration of Chest PA view.	4	CO4	
•	PROJECTION-1	11. Demonstration of Chest AP view.			
_		12. Demonstration of Chest Lateral view.			
5	CHEST PROJECTION- II	1.3. Demonstration of Chest Oblique view.		4	CO5
	r ROJECTION- II	14. Demonstration of Lordotic view.			

Reference Books:

- 1. Whitley AS, Jefferson G, Holmes K, Sloane C, Anderson C, Hoadley G. Clark's Positioning in Radiography 13E. CRC Press; 2015 Jul 28.
- 2. Bontrager KL, Lampignano J. Textbook of Radiographic Positioning and Related Anatomy-E-Book. Elsevier Health Sciences; 2013 Aug 7.
- 3. Bontrager KL, Lampignano J. Bontrager's Handbook of Radiographic Positioning and Techniques-E-BOOK. Elsevier Health Sciences; 2017 Feb 10.
- 4. Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.

e-Learning Source:

- 1. https://radiopaedia.org/articles/skull-radiography
- 2. https://radiopaedia.org/cases/normal-soft-tissue-neck-lateral-radiograph
- $3.\,\underline{https://radiopaedia.org/articles/abdomen-ap-supine-view-1}$

					C	ourse A	rticulat	ion Ma	trix: (M	lapping o	of COs w	ith POs a	and PSOs			
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	FOI	FO2	103	FO4	103	100	FO7	100	F 0 9	FOIU	FOII	FUIZ	1301	F3O2	F3O3	F304
CO1	2	3	3	2	1	2	3	2	1	1	3	2	2	3	3	2
CO2	1	3	2	2	2	3	2	3	2	3	2	3	2	2	3	3
CO3	2	3	2	2	3	2	3	2	1	1	2	3	2	1	3	2
CO4	1	3	2	1	3	3	2	3	3	2	2	1	2	2	3	3
CO5	2	3	2	1	3	2	3	2	1	2	3	2	2	1	3	3

Course Code	Course Title		Attributes									
RS206	RADIOGRAPHIC POSITIONING- I LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.			
	POSITIONING-TLAB	1	I	I	I		1	I	3,4			



Effective from Session	Effective from Session: 2024-25												
Course Code	RS207	Title of the Course	RADIATION PROTECTION AND QUALITY ASSURANCE-LAB	L	T	P	С						
Year	II	Semester	III	0	0	4	2						
Pre-Requisite	Nil	Co-requisite	Nil										
Course Objectives		The objective is to learn the aim, objective, philosophy and principle of radiation protection to protect oneself from the biological effects of radiation and monitoring radiation exposure.											

	Course Outcomes
CO1	Student will have knowledge on Radiation Protection in Radiography.
CO2	Student will have knowledge on principle of Radiation Protection.
CO3	Student will have knowledge on Radiation Monitoring.
CO4	Student will have knowledge about care and maintenance in radiology.
CO5	Student will have knowledge about QA & QC in Radiology.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INTRO TO RADIATION PROTECTION & UNITS	1.Introduction to Radiation Protection, Units & Quantities	8	CO1
2	PRINCIPLE OF RADIATION PROTECTION	2.Aim & Principle of Radiation Protection	8	CO2
3	RADIATION MONITORING	3.Radiation monitoring	8	CO3
4	ROLE OF RADIOGRAPHER IN QC & QA	4.Quality Control and Assessment in Radiology	8	CO4
5	ROLE OF RADIOGRAPHER IN CARE AND MAINTENANCE	5.Care and maintenance of diagnostic equipment-6.Role of Radiographer in Planning, QA & Radiation Protection	8	CO5

Reference Books:

- 1. Brandon AN, Hill DR. Selected list of books and journals in allied health. Bulletin of the Medical Library Association.1996
- 2. Sherer MA, Visconti PJ, Ritenour ER, Haynes K. Radiation Protection in Medical Radiography-E-Book. Elsevier Health Sciences; 2014 Mar12.
- 3. Long BW, Frank ED, Ehrlich RA. Radiography Essentials for Limited Practice-E-Book. Elsevier Health Sciences; 2016 Sep6
- 4. Durrani SA, Ilic R, editors. Radon measurements by etched track detectors: applications in radiation protection, earth sciences and the environment. World scientific.
- 5. Turner JE. Atoms, radiation, and radiation protection. John Wiley & Sons; 2008Jan8
- 6. www.AERB.com (Guidelines and Details of Quality Control in Radiology).

e-Learning Source:

- https://en.wikipedia.org/wiki/Radiation_protection
- https://youtu.be/mvjYRGjrKHc
 https://www.slideshare.net/RubiSapkota/radiation-protection-and-personnel-monitoring-devices

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO CO	PO1 PO2 PO3 PO4 PO3					PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	2	3	3	3	3	3	3	2	2	3	3
CO2	2	3	3	3	3	3	3	3	2	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	3	3	2	2	3	3	2	2	2	3
CO4	3	3	2	3	2	3	2	3	3	2	3	3	3	3	2	2
CO5	2	3	3	3	2	3	2	3	2	2	2	3	2	3	2	3

			Attibu	itts & BDGs						_
Course Code	Course Title			Att	ributes				SDGs	1
D.G.0.5	RADIATION PROTECTION AND	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.	
RS207	QUALITY ASSURANCE- LAB		V	V	V		V	√	3,4	



Effective from Sessi	on: 2024-25						
Course Code	RS208	Title of the Course	FUNDAMENTAL OF MICROBIOLOGY & IMMUNOLOGY-LAB	L	T	P	C
Year	II	Semester	III	0	0	4	2
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	equipmen	nt used in microbiology a	sight into the history, and basics of microbiology and imparts knowled and formulated to impart basic aspects of immunity, antigens, antibodies, with their utility in laboratory diagnosis of human diseases.			out t	he

	Course Outcomes									
CO1	Student will be able to demonstrate microscope, glassware & Autoclave.									
CO2	Student will be able to demonstrate hot air oven, Gram staining & ZN staining.									
CO3	Student will be able to perform Indian ink staining, hanging drop method & demonstration of capsule.									
CO4	Student will be able to demonstrate bacterial spores and agglutination reactions & RA test.									
CO5	Student will be able to perform, Widal, RPR & CRP test.									

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	MICROSCOPE,	Demonstration of Microscope and its parts		
	GLASSWARE&	2. Demonstration of glassware used in microbiology.	8	CO1
	AUTOCLAVE	3. Demonstration of autoclave and sterilization of glass wares.		
2	HOT AIR OVEN&	1. Demonstration of Hot air oven and sterilization of glass wares.		
	ACID FAST AND	2. To perform Gram staining	8	CO1
	GRAM STAINING	3. To perform Acid-fast staining (Zeihl Neelsen staining)		
3	INK STAINING,	1. To perform Indian ink staining		
	HANGING DROP	2. To perform the Hanging drop method	8	CO2
	METHOD	3. Demonstration of capsule		
4	BACTERIAL	1. Staining of bacterial spores		
	STAINING &	2. To demonstrate agglutination reaction.	8	CO2
	BLOOD TEST	3. To perform the RA test		
5		1. To perform the WIDAL test		
	BLOOD TEST	2. To perform an RPR test.	8	CO3
		3. To perform the CRP test		

Reference Books:

- 1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
- 2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology.11thedition Wiley- Blackwell Scientific Publication, Oxford.
- 3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
- 4. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
- Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.
- Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley BlackwellPublication.

e-Learning Source:

- 1. https://youtu.be/vvFDypILkTA
- https://youtu.be/sxa46xKfIOY
 https://www.metropolisindia.com/blog/preventive-healthcare/widal-test-introduction-principle-procedure-preparation-price

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	.01 102 103 104 103 10		100	107	100	10)	1010	1011	1012	1501	1502	1303	1504		
CO1	3	3	3	3	2	2	3	3	3	3	3	3	2	2	3	3
CO2	2	3	3	3	3	3	3	3	2	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	3	3	2	2	3	3	2	2	2	3
CO4	3	3	2	3	2	3	2	3	3	2	3	3	3	3	2	2
CO5	2	3	3	3	2	3	2	3	2	2	2	3	2	3	2	3

			Attibu	ites & SDGS									
Course Code	Course Title		Attributes										
RS208	FUNDAMENTAL OF MICROBIOLOGY &	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.				
	IMMUNOLOGY-LAB	√	√	√	√		√	√	3,4	Ī			



INTEGRAL UNIVERSITY, LUCKNOW

INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

BACHELOR MEDICAL RADIOLOGICALIMAGING SCIENCES (BMRIS)

SYLLABUS

YEAR/ SEMESTER: II/IV



Integral University, Lucknow Department of Paramedical Sciences Study and Evaluation Scheme

Program: BMRIS Semester-IV

S.	Course	Course Title	Type of Paper	hr/w	riod Per reek/se			Evalu	ation Sc	heme	Sub. Total	Credit	Total
N.	code	Course Title	orraper	L	T	P	CT	TA	Total	ESE		Credit	Credits
				THE	EORIES								
1	RS209 Radiographic Positioning- II												
2	RS210	Special Radiographic Procedures	Core	2	1	0	40	20	60	40	100	2:1:0	3
3	RS211	Basics of USG and Mammography	Core	2	1	0	40	20	60	40	100	2:1:0	3
4	RS212	Basics of CT Scan	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	RS213	Orientation in Clinical Sciences-I	Core	2	1	0	40	20	60	40	100	2:1:0	3
				PRA	CTICAL								
1	RS214	Radiographic Positioning- II Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
2	RS215	Special Radiographic Procedures- Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
3	RS216	Basics of CT Scan-Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
4	4 RS217 Hospital Posting Core				0	16	40	20	60	40	100	0:0:8	8
		Total		11	05	24	360	180	540	360	900	28	28

S.	Course		Туре			Att	tributes				United Nation Sustainable
N.	code	Course Title	of Paper	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	Development Goal (SDGs)
TH	IEORIES										
1	RS209	Radiographic Positioning- II	Core	√	√	1	V		V	√	3,4
2	RS210			√	√	1	V		V	√	3,4
3	RS211	Basics of USG and Mammography	Core	√	√	√	V		V	√	3,4
4	RS212	Basics of CT Scan	Core	√	√	√	V		√	\checkmark	3,4
5	RS213	Orientation in Clinical Sciences-I	Core	√	√	$\sqrt{}$	V	$\sqrt{}$	√	$\sqrt{}$	3,4
PR/	CTICAL										
1	RS214	Radiographic Positioning- II Lab	Core	√	√	√	V		V	√	3,4
2	RS215	Special Radiographic Procedures- Lab	Core	√	√	√	V		V	√	3,4
3	RS216	Basics of CT Scan-Lab	Core	√	√	1	V		V	√	3,4
4	RS217	Hospital Posting	Core	√	√	V	V		V	V	3,4

L: Lecture T: Tutorials P: Practical CT: Class Test TA: Teacher Assessment ESE: End Semester Examination,

AE= Ability enhancement, DSE- Discipline Specific Elective, Sessional Total: Class Test + Teacher Assessment

Subject Total: Sessional Total + End Semester Examination (ESE)



Effective from Session: 2024	1-25											
Course Code	RS209	Title of the Course	RADIOGRAPHIC POSITIONING- II	L	T	P	C					
Year	II	Semester	III	3	1	0	4					
Pre-Requisite	Nil	Co-requisite	Nil									
Course Objectives	The objective is to learn basic and special projections for the better delineation diagnosis of the disease conditions of different anatomical structures (Upper and Lower Extremities, Shoulder Joint, Pelvis Griddle, Whole Spine).											

	Course Outcomes								
CO1	Students will be able to learn about Basic and special projection- Related radiological anatomy Upper Extremity and Femur.								
CO2	Students will be able to learn Basic and special projections-Related radiological anatomy of Shoulder Girdle.								
CO3	Students will be able to learn Basic and special projections of Pelvic girdle.								
CO4	Students will be able to learn Related radiological anatomy and Basic views of whole spine.								
CO5	Students will be able to learn Positioning, care and radiation protection while handling babies.								

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	PROJECTIONS OF UPPER & LOWER EXTREMITY	 Basic and special projection- Related radiological anatomy. Finger-PA, LAT, OBLIQUE- Hand-PA, LAT- Wrist joint-PA, LAT, Ulnar deviation - Forearm-AP, LAT. Elbow joint-AP, LAT- Humerus-AP, LA. Femur-AP, LAT- Knee joint- AP, LAT- Patella-SKYLINE VIEW-Tibia-AP, LAT-Ankle joint-AP, LAT, MORTIS VIEW- Foot –AP, LAT. 	8	CO1
2	PROJECTIONS OF SHOULDER GIRDLE	 Basic and special projections-Related radiological anatomy. Shoulder-AP, AXIAL Clavicle -AP, AP AXIAL Scapula-AP, OBLIQUE, Y VIEW 	8	CO2
3	PROJECTIONS OF PELVIC GIRDLE & PROXIMAL FEMUR	 Basic & special projections- Related radiological anatomy Pelvic girdle: AP pelvis, Frog lateral (modified cleaves method), AP axial for pelvic outlet (tayelor method), AP axial for pelvic inlet (modified linienfield method), Posterior oblique-acetabulum (judet method) Hip and proximal femur: AP unilateral hip, Axio-lateral, infero-superior (danelius – miller method), Unilateral frog leg (modified cleaves method), Modified axiolateral (Clements-Nakayama method) Sacrio-iliac joints: AP, posterior oblique's 	8	CO3
4	PROJECTIONS OF	 1. Cervical spine: Related radiological anatomy a. Basic views, AP open mouth, AP axial, Oblique, Lateral, Erect, Trauma lateral (horizontal beam), Swimmer's view) b. Special views: Lateral- hyperflexion and hyperextension AP (Fuchs method) or PA (Judd method), AP wagging jaw (ottonello method), AP axial (pillars). 	8	CO4
5	PAEDIATRIC RADIOGRAPHY	1. Positioning, and radiation protection while handling babies.	8	CO5

Reference Books:

- 1. Whitley AS, Jefferson G, Holmes K, Sloane C, Anderson C, Hoadley G. Clark's Positioning in Radiography 13E. CRC Press; 2015 Jul 28.
- 2. Bontrager KL, Lampignano J. Textbook of Radiographic Positioning and Related Anatomy-E-Book. Elsevier Health Sciences; 2013 Aug7.
- 3. Bontrager KL, Lampignano J. Bontrager's Handbook of Radiographic Positioning and Techniques-E-BOOK. Elsevier Health Sciences; 2017 4. FrankED, LongBW, SmithBJ.Merrill's Atlasof Radiographic Positioning and Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.

e-Learning Source:

- 1. https://www.slideshare.net/InfoUtilRT/upper-extremity-anatomy-positioning
- 2. https://youtu.be/LlStHhk5e9w

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO- PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3
CO3	3	2	3	3	3	2	3	2	2	3	2	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

			Attribu	tes & SDGs									
Course Code	Course Title		Attributes										
RS209	RADIOGRAPHIC	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.				
	POSITIONING- II		V	√			V		3.4				



Effective from Sessio	n: 2024-25		•										
Course Code	RS210	Title of the Course	ne Course SPECIAL RADIOGRAPHIC PROCEDURES I										
Year	II	II Semester IV											
Pre-Requisite	Nil	Co-requisite	Nil										
Course Objectives	The objective is to l and its safety aspect.	The objective is to learn contrast-imaging techniques under the guidance of fluoroscopy, the administration of contrast media											

	Course Outcomes
CO1	Students will be able to learn about Contrast media used in Radiology and their reactions along with management.
CO2	Students will be able to learn about the barium procedures of the GIT.
CO3	Students will be able to learn about the procedures of the Urinary system and HSG.
CO4	Students will be able to learn about Nervous system and hepatobiliary procedures.
CO5	Students will be able to learn about Sialography, DCG, Sinogram, FNAC and Biopsy.

Unit No.	Title of the Unit	Cont ent of Unit	Contact Hrs.	Mapped CO	
1	CONTRAST MEDIA	 Contrast Media- Application, types, safety aspects & administration, Reaction to contrastmedia and management of contrast reactions. 	6	CO1	
2	BARIUM PROCEDURES	 Barium swallow, Barium meal Barium meal follow-through (BMFT) Barium enema 	6	CO2	
3	PROCEDURE OF URINARY & FEMALE REPRODUCTIVE SYSTEM	1. Intravenous program (IVU). 2. Micturating Cystourethrogram (MCU). 3. According Urethrogram (ASU)/PGU			
4	PROCEDURE OF NERVOUS & HEPATOBILIARY SYSTEM	 Myelography ERCP/ PTBD PTC, T-tube cholangiography 	6	CO4	
5	OTHER SPECIAL PROCEDURES	 Sialography, Dacrocystography, Sinogram, Fistulogram, FNAC Biopsy 	6	CO5	

- 1. Lakhkar B N, Banavali S, Shetty C. Radiological quiz-head and neck. Indian Journal of Radiology and Imaging.
- 2. Snopek AM. Fundamentals of Special Radiographic Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.
- 3. Davies SG, Chapman S. Aids to radiological differential diagnosis. Elsevier Health Sciences; 2013 Nov 20.
- 4. Krishnamurthy, Medical Radiographic Technique & Darkroom Practice

e-Learning Source:

- 1. https://youtu.be/IYfL-V2C9Uw
- 2. https://youtu.be/zYl2G2Z_T7M
- 3. https://youtu.be/JQW9RilqUaw

					Cours	se Artic	ulation	Matrix	: (Марр	oing of C	Os with I	POs and l	PSOs)			
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	102	103	104	103	100	107	100	10)	1010	1011	1012	1501	1502	1505	1504
CO1	3	3	3	3	2	2	3	3	3	3	3	2	3	2	3	2
CO2	2	3	2	3	3	3	3	3	2	3	3	3	2	3	3	3
CO3	3	2	3	2	3	2	3	3	2	2	3	3	2	3	3	3
CO4	2	3	2	3	3	3	2	3	3	2	2	3	2	3	3	2
CO5	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3

			11111100	ites & DD Gs					
Course Code	Course Title					SDGs			
RS210	SPECIAL RADIOGRAPHIC	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
RS210	PROCEDURES	√	√	√	√		√	√	3,4



Effective from Sessio	n: 2018-19		•									
Course Code	RS211	Title of the Course	BASICS OF USG AND MAMMOGRAPHY	L	T	P	C					
Year	II	Semester	IV	2	1	0	3					
Pre-Requisite	Nil	Co-requisite	Nil									
Course Objectives	The objective is to learn basic knowledge of ultrasound and Donnler equipment for various imaging and equipment used for											

	Course Outcomes								
CO1	Students will be able to learn about Sound and Ultrasound Imaging.								
CO2	Students will be able to learn about USG equipment, Transducers and Piezoelectric crystals.								
CO3	Students will be able to learn about USG Display Modes.								
CO4	Students will be able to learn about Doppler USG and Mammography.								
CO5	Students will be able to learn about Clinical aspects of Mammography.								

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INTRODUCTION TO USG	 Sound, Ultrasound, History of ultrasound, Attenuation, Echoes, Basic principle of Ultrasound imaging, Advantages and disadvantages. 	6	CO1
2	INSTRUMENTATION OF USG	 Controls of Ultrasound Equipment, USG probes, Coupling agent, Cathode ray tube, Image display, USG contrast agent. Piezoelectric Effect- Definition, Types of elements, Properties. Transducers: Construction and operation, Types of transducers. 	6	CO2
3	USG DISPLAY MODES	 USG Display modes: A mode, B mode, M mode, TM mode. Gray scale imaging Beam focusing, Resolution 	6	CO3
4		 Principle, Doppler Effect, Colour Doppler, Continuous wave Doppler, Pulsed wave Doppler. USG Bio effects. Introduction of Mammography: Breast -radiological anatomy, Mammography Equipment and Basic views in Mammography. 	6	CO4
5	MAMMOGRAPHY TECHNIQUES	1. Scanning protocol, Indication, Patient preparation, image quality and artifacts in Mammography, Sonomammography.	6	CO5

Reference Books:

- 1. Zwiebel WJ, Sohaey R. Introduction to ultrasound. WB Saunders Company;1998.
- 2. Hagen-Ansert SL. Textbook of diagnostic ultrasonography. Mosby Elsevier;2006.
- 3. Basics of Ultrasonography for Radiographers and Technologists-Latestedition
- 4. Tucker AK, Ng YY. Textbook of mammography. Churchill Livingstone; 2001.
- 5. Wentz G, Parsons WC. Mammography for radiologic technologists. McGraw-Hill, Health Professions Division; 1997

e-Learning Source:

- https://medlineplus.gov/lab-tests/sonogram
- https://www.radiologyinfo.org/en/info/mammo https://en.wikipedia.org/wiki/Doppler_ultrasonography

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	2	3	3	3	3	3	2	2	2	3	3
CO2	2	3	2	2	3	3	3	3	2	3	3	2	2	3	3	3
CO3	3	2	3	2	3	2	3	3	2	2	3	3	2	3	3	3
CO4	2	3	2	3	3	3	2	3	3	2	3	3	2	3	3	2
CO5	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3

Course Code	Course Title		Attributes								
RS211	BASICS OF USG AND	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.		
	MAMMOGRAPHY	√	√	√	√		√	√	3,4		



Effective from Sessio	Effective from Session: 2024-25											
Course Code	RS212	Title of the Course	BASICS OF COMPUTED TOMOGRAPHY	L	T	P	C					
Year	II	Semester	IV	2	1	0	3					
Pre-Requisite	Nil	Co-requisite	Nil									
Course Objectives	The objective is to in	The objective is to induce idea on cross sectional imaging of different anatomical area along with the pathologies.										

	Course Outcomes							
CO1	Students will be able to learn about CT scan and its generations.							
CO2	Students will be able to learn about instruments of CT scan.							
CO3	Students will be able to learn about Image reconstruction, Image quality and CT number.							
CO4	Students will be able to learn about CT artifacts.							
CO5	Students will be able to learn about Clinical aspects and post processing technique of CT scan.							

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	AND GENERATIONS	 History, Advantage and Disadvantages of CT, Basic principle of CT. Generations of Computed Tomography- 1st generation, 2nd generation, 3rd generation, Slip ring technology, 4th generation, Electron beam CT, Dual Source CT, Flat Panel Detector CT Single and Multi-slice Technology. 	6	CO1
2	INSTRUMENTATION	 CT scanner gantry, Detectors & Data Acquisition System, Generator, Computerand image processing. System Image display system, storage, recording and communication system, CTcontrol console, Options and accessories for CT systems 	6	CO2
3	IMAGE RECONSTRUCTION, DISPLAY AND QUALITY	 Image Reconstruction- Basic principle, Reconstruction algorithms, Image reconstruction from projections, Types of data reconstruction. Image Display and Image Quality Image formation and representation, Image processing, Pixel and voxel, CT number Window level and window width, Qualities, Resolution, Contrast, Sharpness, Noise properties in CT. 	6	CO3
4	CT ARTEFACTS	1. CT Artefacts- Classification, Types, Causes, Remedies	6	CO4
5	DIAGNOSTIC ASPECTS AND POSTPROCESSING TECHNIQUES	 Diagnostic aspects of CT and post Processing Techniques HRCT, Isotropic imaging, Patient management, Patient preparation, positioning, Technologist role, Protocols for whole body imaging Clinical applications of CT, 2D & 3D imaging, MPR, SSD, Volume Rendering, BMD. 	6	CO5

Reference Books:

- 1. Zwiebel WJ, Sohaey R. Introduction to ultrasound. WB Saunders Company;1998.
- 2. Hagen-Ansert SL. Textbook of diagnostic ultrasonography. Mosby Elsevier;2006.
- 3. Basics of Ultrasonography for Radiographers and Technologists-Latestedition
- 4. Tucker AK, Ng YY. Textbook of mammography. Churchill Livingstone; 2001.
- 5. Wentz G, Parsons WC. Mammography for radiologic technologists. McGraw-Hill, Health Professions Division; 1997

e-Learning Source:

- https://www.slideshare.net/shreyacathe/ct-scan-62017319
 https://www.slideshare.net/ganesahyogananthem/ct-artifact
 https://en.wikipedia.org/wiki/High-resolution_computed_tomography

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	102	103	104	103	100	107	100	10)	1010	1011	1012	1501	1502	1503	1504
CO1	3	3	3	3	2	2	3	3	3	3	3	2	2	2	3	3
CO2	2	3	2	2	3	3	3	3	2	3	3	2	2	3	3	3
CO3	3	2	3	2	3	2	3	3	2	2	3	3	2	3	3	3
CO4	2	3	2	3	3	3	2	3	3	2	3	3	2	3	3	2
CO5	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3

Course Code	Course Title		Attributes								
D.C.2.1.2	BASICS OF	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.		
RS212	COMPUTER TOMOGRAPHY	√	√	√	√	Sustamaonity	√alue	\(\forall \)	3,4		



Effective from Sessi	Effective from Session: 2024-25												
Course Code	RS213	Title of the Course	ORIENTATION IN CLINICAL SCIENCES-I	L	T	P	C						
Year	II	Semester	IV	2	1	0	3						
Pre-Requisite	Nil	Co-requisite	Nil										
Course Objectives		The objective is to learn basic pathological conditions related to cardiology, surgery, nephrology, orthopedic, gastrolog neurology and general medicine for the diagnosis.											

	Course Outcomes
CO1	Students will be able to learn about disease of circular and respiratory system.
CO2	Students will be able to learn about pathological conditions of GIT.
CO3	Students will be able to learn about disease of the Urinary system.
CO4	Students will be able to learn about Pathologies of skeletal system.
CO5	Students will be able to learn about some common pathologies of human body.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	PATHOLOGY OF HEART AND RESPIRATORY	 Pericarditis, Valvular diseases, Rheumatic Heart Disease, Heart failure. Bronchitis, Emphysema, Pneumonia, Tuberculosis, Pleura effusion, Pneumothorax. 	6	CO1
2	PATHOLOGY OF GIT	Aclasia cardia, Peptic ulcer, Intestinal obstruction, Ulcerative colitis, Pancreatitis, Portal Hypertension, Ascites, Cholecystitis, Appendicitis	6	CO2
3	PATHOLOGY OF URINARY SYSTEM	2. Haematuria, UTI, Hydronephrosis, Horseshoe Kidney, Hydrocele, Glomerulonephritis, Urinary calculi, Polycystic Kidney disease, Renal failure	6	CO3
4	PATHOLOGICAL CONDITIONS OF THE SKELETAL SYSTEM	 Fracture, Type Mechanism, Healing, Delayed Union, Non- complication, Mal-Union Injuries of the shoulder girdle, Dislocation of the shoulder Dislocation of Hip Fracture of Femur Acute & chronic osteoarthritis Rheumatoid arthritis, Paget's Disease, Ankylosing spondylitis, Club foot, Bone Tumour-Benign & Malignant 	6	CO4
5	OTHER PATHOLOGY	Cholelithiasis, Peritonitis, Benign Hypertrophy prostate	6	CO5

Reference Books:

- 1. Lakhkar B N, Banavali S, Shetty C. Radiological quiz-head and neck. Indian Journal of Radiology and Imaging.
- 2. Snopek AM. Fundamentals of Special Radiographic Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.
- 3. Davies SG, Chapman S. Aids to radiological differential diagnosis. Elsevier Health Sciences; 2013 Nov 20.
- 4. Krishnamurthy, Medical Radiographic Technique & Darkroom Practice.

e-Learning Source:

- 1. https://www.mayoclinic.org/diseases-conditions/hydronephrosis/cdc-20397563
- 2. https://medlineplus.gov/heartfailure.html
- 3. https://medlineplus.gov/fractures.html#:~:text=Patient%20Handouts-,Summary,cause%20weakening%20of%20the%20bones

					Cou	ırse Ar	ticulati	on Matr	ix: (Map	ping of C	Os with	POs and	PSOs)			
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	2 2	103	104	103	100	107	100	10)	1010	1011	1012	1501	1502	1505	1304
CO1	3	3	3	3	2	2	3	3	3	3	3	2	2	2	3	3
CO2	2	3	2	2	3	3	3	3	2	3	3	2	2	3	3	3
CO3	3	2	3	2	3	2	3	3	2	2	3	3	2	3	3	3
CO4	2	3	2	3	3	3	2	3	3	2	3	3	2	3	3	2
CO5	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3

Course Code	Course Title			Att	tributes				SDGs
RS213	ORIENTATION IN	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
	CLINICAL SCIENCES-I			√					3,4, 11



Effective from Session: 2	2024-25						
Course Code	RS214	L	T	P	C		
Year	II	Semester	III	0	0	4	2
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	,		ecial projections for the better delineation diagnosis of the			ditions	of

	Course Outcomes
CO1	Students will be able to learn about Basic and special projection- Related radiological anatomy a. Finger, Hand, & Wrist joint.
CO2	Students will be able to learn Basic and special projections-Related radiological anatomy, Forearm, Elbow, Humerus & Femur.
CO3	Students will be able to learn Knee, Patella, Tibia & ankle joint.
CO4	Students will be able to learn Pelvis & Foot Radiography.
CO5	Students will be able to learn Positioning, care and radiation protection while handling babies & Spine Radiography.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	HAND & WRIST	1. Demonstration of Finger -PA, LAT, OBLIQUE.		
	RADIOGRAPHY	2. Demonstration of Hand-PA, LAT.	8	CO1
	KADIOGKAIIII	3. Demonstration of Wrist joint-PA, LAT.		
2	UPPER	1. Demonstration of Forearm-AP, LAT.		
	EXTREMITY &	2. Demonstration of Elbow joint-AP, LAT- Humerus-AP, LA.	8	CO2
	FEMUR	3. Demonstration of Femur-AP, LAT.	0	CO2
	RADIOGRAPHY			
3	LOWER	1. Demonstration of the Knee joint- AP, LAT, Patella-SKYLINE VIEW		
	EXTREMITY	2. Demonstration of Tibia-AP, LAT.	8	CO3
	RADIOGRAPHY	3. Demonstration of Ankle joint-AP, LAT, MORTIS VIEW.		
4	PELVIS & FOOT	1. Demonstration of Foot –AP, LAT.	8	CO4
	RADIOGRAPHY	2. Demonstration of Basic & special projections of Pelvic girdle and proximal femur.	0	CO4
5	SPINE &	1. Demonstration of Basic & special projections of the Cervical spine		
	PEDIATRIC	2. Demonstration of Basic & special projections of Lumbar spine & sacrum	8	CO5
	RADIOGRAPHY	3. Demonstration of Pediatric radiography.		

Reference Books:

- 1 Whitley AS, Jefferson G, Holmes K, Sloane C, Anderson C, Hoadley G. Clark's Positioningin Radiography 13E. CRC Press; 2015 Jul 28.
- 2 Bontrager KL, Lampignano J. Textbook of Radiographic Positioning and Related Anatomy-E-Book. Elsevier Health Sciences; 2013 Aug 7.
- 3 Bontrager KL, Lampignano J. Bontrager's Handbook of Radiographic Positioning and Techniques-E-BOOK. Elsevier Health Sciences; 2017 Feb 10.
- 4 Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.

e-Learning Source:

- 1. https://www.slideshare.net/InfoUtilRT/upper-extremity-anatomy-positioning
- 2. https://youtu.be/LlStHhk5e9w
- 3. https://youtu.be/C2Ud4EwZVQM

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	102	103		100	100	107	100	10)	1010	1011	1012	1501	1502	1503	1501
CO1	3	3	3	3	3	3	3	3	3	3	2	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	2	3	3	3	2	3	2	2	3	2	3	2	3	2	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3

I	Course Code	Course Title			Att	ributes				SDGs
Ī	RS214	RADIOGRAPHIC POSITIONING- PART II	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
	K3214	LAB	V	√	√	√		V	√	3,4



Effective from Session	: 2024-25		·				
Course Code	RS215	Title of the Course	SPECIAL RADIOGRAPHIC PROCEDURES- LAB	L	T	P	C
Year	III	Semester	IV	0	0	2	1
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The objective is to lits safety aspect.	learn contrast-imaging te	echniques under the guidance of fluoroscopy, administration	of con	itrast m	edia an	d

	Course Outcomes
CO1	Students will be able to learn about Contrast media used in Radiology and their reactions along with management.
CO2	Students will be able to learn about the barium procedures of the GIT.
CO3	Students will be able to learn about the procedures of the Urinary system and HSG.
CO4	Students will be able to learn about Nervous system and hepatobiliary System.
CO5	Students will be able to learn about Sialography, DCG, Sinogram, FNAC and Biopsy procedures.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	CONTRAST MEDIA	Contrast media used in Radiology.	4	CO1
2	BARIUM PROCEDURES	2. Demonstration of Barium Studies.	6	CO2
3	PROCEDURE OF URINARY & FEMALE REPRODUCTIVE SYSTEM	3. Demonstration of Procedures of Urinary System	4	CO3
4	PROCEDURE OF NERVOUS & HEPATOBILIARY SYSTEM	4. Demonstration of HSG, Myelography & Sialography	4	CO4
5	OTHER SPECIAL PROCEDURES	5. Demonstration of FNAC & Biopsy	2	CO5

Reference Books:

- 1. Lakhkar B N, Banavali S, Shetty C. Radiological quiz-head and neck. Indian Journal of Radiology and Imaging.
- Snopek AM. Fundamentals of Special Radiographic Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.
 Davies SG, Chapman S. Aids to radiological differential diagnosis. Elsevier Health Sciences; 2013 Nov 20.
- 4. Krishnamurthy, Medical Radiographic Technique & Darkroom Practice

e-Learning Source:

- https://youtu.be/IYfL-V2C9Uw
- 2. https://youtu.be/zYl2G2Z_T7M
- https://youtu.be/JQW9RilqUaw

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO	101	102	103	104	103	100	107	108	10)	1010	1011	1012	1501	1502	1505	1504
CO1	3	3	3	3	2	2	3	3	3	3	3	2	3	2	3	2
CO2	2	3	2	3	3	3	3	3	2	3	3	3	2	3	3	3
CO3	3	2	3	2	3	2	3	3	2	2	3	3	2	3	3	3
CO4	2	3	2	3	3	3	2	3	3	2	2	3	2	3	3	2
CO5	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2	3

Course Code	Course Title			Att	ributes				SDGs
RS215	SPECIAL RADIOGRAPHIC	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
	PROCEDURES- LAB	√	√	√	√		√	√	3,4



Effective from Session:	2024-25										
Course Code	RS216	Title of the Course	BASICS OF COMPUTED TOMOGRAPHY- LAB	L	T	P	C				
Year	II	Semester	IV	0	0	2	1				
Pre-Requisite	Nil	Co-requisite	Nil								
Course Objectives	The objective	e objective is to induce idea on cross sectional imaging of different anatomical area along with the pathologies.									

	Course Outcomes: After the successful course completion, learners will develop the following attributes:
CO1	Students will be able to learn about CT scan non-contrast procedures.
CO2	Students will be able to learn about patient preparation and positioning in CT scans.
CO3	Students will be able to learn about radiation protection during CT scan.
CO4	Students will be able to learn about care of patient and management during contrast CT scans.
CO5	Students will be able to learn about post procedure techniques and care of patients after contrast CT scan.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	NON-CONTRAST CT SCAN	1. Patient preparation, patient positioning, performing all non-contrast CT procedures.	4	CO1
2	CECT SCAN	2. Patient preparation, patient positioning, performing all contrast computed tomography procedures.	4	CO2
3	TRAUMA CT PROCEDURES	3. Patient preparation, patient positioning, performing all Trauma CT procedures.	4	CO3
4	PATIENT CARE IN CT SCAN	4. Radiation protection and care of patient during procedures including contrast mediaManagement in CT.	4	CO4
5	CT POST PROCESSING TECHNIQUES	5. Various post processing techniques and evaluation of image quality and clinical findings. Post procedural care of the patient.	4	CO5

Reference Books:

- 1. Seeram E. Computed Tomography-E-Book: Physical Principles, Clinical.
- 2. Applications and Quality Control. Elsevier Health Sciences; 2015 Sep 2.
- 3. Seeram E. Computed tomography: physical principles and recent technical advances.
- 4. Journal of Medical Imaging and Radiation Sciences. 2010.
- 5. Kak AC, Slaney M. Principles of computerized tomographic imaging. Society for Industrial and Applied Mathematics; 2001 Jan 1.
- 6. Hsieh J. Computed tomography: principles, design, artifacts, and recent advances.
- 7. SPIE press; 2003.
- 8. Shaw CC, editor. Cone beam computed tomography. Taylor & Francis; 2014 Feb 14.

e-Learning Source:

- https://www.slideshare.net/shreyacathe/ct-scan-62017319 https://www.slideshare.net/ganesahyogananthem/ct-artifact
- https://en.wikipedia.org/wiki/High-resolution computed tomography

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)													
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO															
CO1	3	3	3	3	2	2	3	3	3	3	3	2	2	2	3
CO2	2	3	2	2	3	3	3	3	2	3	3	2	2	3	3
CO3	3	2	3	2	3	2	3	3	2	2	3	3	2	3	3
CO4	2	3	2	3	3	3	2	3	3	2	3	3	2	3	3
CO5	2	3	3	3	2	3	2	3	2	3	2	3	2	3	2

Course Code	Course Title		Attributes							
RS216	BASICS OF COMPUTED	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.	
	TOMOGRAPHY- LAB	√	√	√	√		√	V	3,4	Ī



Effective from Session:	2024-25		•								
Course Code	RS217	Title of the Course	HOSPITAL POSTING	L	T	P	С				
Year	II	Semester	IV	0	0	16	8				
Pre-Requisite	Nil	Co-requisite	Nil								
Course Objectives	The obje	objective of the hospital posting is to learn about patient handling, radiation protection and procedures done in the									

	Course Outcomes: After the successful course completion, learners will develop the following attributes:
CO1	Students will be able to learn how to deal with a patient during examination in the Radiology department.
CO2	Students will be able to learn how to perform X-Ray Examinations.
CO3	Students will be able to learn how to perform contrast studies along with their preparation and management.
CO4	Students will be able to learn how to perform ward mobile radiography on critically ill patients.
CO5	Students will be able to learn how to perform CT scans, MRI, Fluoroscopy and Mammography.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	CLINICAL POSTING	Students shall be deputed to various labs of the Radiology department wherein they shall undergo practical training of handling patients, collection and processing of data, samples, radiograph, & probable diagnosis. Identification of patient's particulars based on CR number, Lab Number. Process of performing various tests in different lab, like CT labs, USG Labs, MRI Lab, X-ray lab. Each student is required to maintain a logbook of the various posting. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 100.	160	CO1, CO2, CO3, CO4, CO5

Reference Books:

- 1. Seeram E. Computed Tomography-E-Book: Physical Principles, Clinical.
- 2. Applications and Quality Control. Elsevier Health Sciences; 2015 Sep 2.
- 3. Lakhkar B N, Banavali S, Shetty C. Radiological quiz-head and neck. Indian Journal of Radiology and Imaging.
- 4. Snopek AM. Fundamentals of Special Radiographic Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.
- 5. Curry TS, Dowdey JE, Murry RC. Christensen's physics of diagnostic cardiology. Lippincott Williams & Wilkins; 1990.
- 6. Brant WE, Helms CA, editors. Fundamentals of diagnostic radiology. Lippincott Williams & Wilkins; 2012 Mar20.
- 7. Zwiebel WJ, Sohaey R. Introduction to ultrasound. WB Saunders Company;1998.
- 8. Hagen-Ansert SL. Textbook of diagnostic ultrasonography. Mosby Elsevier;2006.

e-Learning Source:

- 1. https://en.wikipedia.org/wiki/High-resolution_computed_tomography
- 2. https://youtu.be/IhjbvEnlRrM
- 3. https://en.wikipedia.org/wiki/Doppler_ultrasonography

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)														
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	3	2	2	1	2	1	1	1	1	3	1	2	3	3	2
CO2	1	3	2	2	2	1	3	2	1	3	3	2	2	2	3	3
CO3	2	3	3	2	2	3	1	2	1	1	3	2	2	3	3	3
CO4	1	3	2	1	3	1	3	3	1	3	3	3	2	1	3	2
CO5	2	3	1	1	1	1	2	1	1	2	3	1	2	2	3	2

				12002100						
ſ	Course Code	Course Title	Attributes S							
RS217		HOSPITAL POSTING	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
			V	√	V	√		V	√	3,4