

Course Specification

(2025)

1. Basic Information

Course Title (according to the bylaw)	Radiation Techniques I			
Course Code (according to the bylaw)	TRMI 402			
Department/s participating in delivery of the course	Technology of Radiology and Medical Imaging			
Number of credit hours of the course (according to the bylaw)	Theoretical	Practical	Other (specify)	Total
	2	2	-	3
Course Type	Compulsory			
Academic level at which the course is taught	Level 4 – 1st Semester			
Academic Program	Technology of Radiology and Medical Imaging			
Institute	High Technology Institute of Applied Health Science			
Academy	Nile Delta for sciences			
Name of Course Coordinator	Prof.DR. Emad El-Shorbagy			

	Prof. of Radiodiagnosis, National Liver Institute Menoufiya University, Egypt
Course Specification Approval Date	Department Council No. 2, date: (2024 - 09 - 21)
Course Specification Approval (Attach the decision/minutes of the department /committee/council)	9/2024 /

2. Course Overview (Brief summary of scientific content)

This course will provide the students with the fundamentals of radiation physics and radiobiology. Students will be trained to deal with machines of radiation safely and effectively. Basics of radiation technologies are illustrated including preparation of radiation sessions under supervision of the radiotherapist. patient observation during sessions and doctor notifications when detecting problems Some basic knowledge of diseases treated with radiation will be introduced.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (ARS)

Program Outcomes(POs = sub-competences) (ARS) (according to the matrix in the program specs)		Course Learning Outcomes (CLOs) Upon completion of the course, the student will be able to:	
Cod e	Text	Code	Text
POs. 3.	Study human anatomy and pathology to understand the	CLOs.1.	Identify anatomical and pathological characteristics of colon neoplastic lesions using simulation data.

	physiological basis of the images.	CLOs.2.	Relate pathological understanding to patient setup and imaging in radiation therapy planning.
POs. 5.	Gain knowledge of the hazards of radioactive substances and radiation, and radiation protection.	CLOs.3.	Explain radiation types, interactions with tissue, and risks associated with ionizing radiation
		CLOs.4.	Apply basic radiation protection principles in simulation and treatment planning environments.
POs. 9.	Understand mathematical and physics principles to grasp the fundamental properties of radiation and accurately orient patients for X-rays, 3-D CT imaging, ultrasounds, and MRI.	CLOs.5.	Describe key concepts in radiation physics including energy deposition, LET, and dose calculations.
		CLOs.6.	Compare simulation techniques in CT and MRI in relation to radiation use and patient alignment.
POs. 4.	Troubleshoot technical errors and artifacts	CLOs.7.	Identify common image artifacts or simulation setup errors during CT/MRI simulation
		CLOs.8.	Analyze causes of technical errors in radiation planning and suggest appropriate corrective actions.
POs. 6.	Adapt to new technologies and advancements in medical imaging	CLOs.9.	Evaluate the integration of advanced simulation techniques (e.g., MRI-based planning) into clinical workflows.
		CLOs.10.	Assess the clinical advantages of emerging radiation techniques and technologies
POs. 4.	Operate and manage effectively the different medical imaging	CLOs.11.	Set up and operate CT and MRI simulation systems for radiation planning.
		CLOs.12.	Follow clinical protocols and safety measures

	equipment and practice the professional fieldwork	2.	during simulation and planning procedures
POs. 6.	Master both general and specialized radiographic procedures	CLOs.1 3.	Perform basic simulation tasks including patient preparation, positioning, and image acquisition.
		CLOs.1 4.	Assist in specialized simulation procedures involving complex anatomical regions or pathologies.
POs. 8.	Apply quality assurance and quality control principles as part of an awareness of the need for quality management systems	CLOs.1 5.	Apply basic QA principles in radiation simulation (phantom checks, setup verification)
		CLOs.1 6.	Evaluate simulation images for accuracy and alignment to ensure reliable treatment planning.
POs. 1.	Communicate effectively & develop collaborative relationships with all health members.	CLOs.1 7.	Communicate clearly with radiation oncologists, simulation staff, and technologists during planning procedures.
		CLOs.1 8.	Participate in team-based decision-making during simulation sessions for accurate treatment alignment.
POs. 4.	Adjust to new technologies and methods.	CLOs.1 9.	Demonstrate adaptability when using updated simulation platforms or workflow systems
		CLOs.2 0.	Integrate newly developed protocols in CT/MRI simulation into daily practice with minimal guidance.

4. Teaching and Learning Methods

1. Interactive Lectures. Interactive Lectures.
2. Discussion and brain storming.
3. Asynchronous learning.
4. Case study /problem solving.
5. Self-Directed Learning (SDL).
6. Research and presentations, Assignment and reports.

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/)	Training (Practical/ Clinical/)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Introduction to Radiation physics	3	2	2	-	-
2	Radiobiology	3	2	1	1	-
3	Colon neoplastic lesions	3	2	2	-	-
4	CT Simulation (preparation)	3	2	1	1	-
5	Biological effects 1	3	2	2	-	-
6	Mid-Term Exam	-	-	-	-	-
7	Radiation protection	3	2	2	-	-
8	Biological effects 2	3	2	2	-	-
9	MRI Simulation	3	2	1	1	-
10	LET	3	2	2	-	-
11	Image-Guided Radiation Therapy (IGRT)	3	2	2	-	-
12	Dosimetry and Radiation Dose Calculation I	3	2	2	-	-

13	Dosimetry and Radiation Dose Calculation II					
14	Radiation-Induced Injuries and Tissue Response I	3	2	1	1	-
15	Radiation-Induced Injuries and Tissue Response II	3	2	1	1	-
16	Practical Exam	-	-	-	-	-
17	Final Written Exam	-	-	-	-	-

Course Schedule

5. Methods of students' assessment

No .	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Semester work)	-	-	-
2	Exam 2 (Semester work)	6	20	13.3%
3	Assignments	10	10	6.6%
4	Final Practical Exam	16	45	30%
5	Final Written Exam	17	75	50%
6	Final Oral Exam	-	-	-
7	Field training	-	-	-
8	Other (Mention)	-	-	-

*** The methods mentioned are examples, the organization may add and/or delete**

6. Learning Resources and Supportive Facilities *

*	Learning resources (books, scientific references, etc.) *	The main (essential) reference for the course (must be written in full according to the scientific documentation method)	Principles and Practice of Radiation Therapy - Charles M. Washington & Dennis T. Leaver
		Other References	Radiation Therapy Techniques - Michael D. Mills
		Electronic Sources (Links must be added)	Radiopaedia.org , the peer-reviewed collaborative radiology resource Knowledge bank: https://www.ekb.eg/ar
		Learning Platforms (Links must be added)	BISLMS: Log in to the site
		Other (to be mentioned)	-
	Supportive facilities & equipment for teaching and learning *	Devices/Instruments	Computers, Boards and Projectors
		Supplies	-
		Electronic Programs	Ibn Al-Haytham Program
		Skill Labs/ Simulators	-
		Virtual Labs	-
		Other (to be mentioned)	Computers, Boards and Projectors

The list mentioned is an example, the institution may add and/or delete depending on the nature of the course

Name and Signature

Course Coordinator

Prof.DR. Emad El-Shorbagy

Name and Signature

Head of the department council

DR. Amira Atef