

Course Specification

(2025)

1. Basic Information

Course Title (according to the bylaw)	MRI Technology I			
Course Code (according to the bylaw)	TRMI 401			
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 – 1 st Semester			
Academic Program	Technology of Radiology and Medical Imaging			
Institute	High Technology Institute of Applied Health Sciences			
Academy	Nile Delta for sciences			
Name of Course Coordinator	Dr. Amira Atef, doctor lecturer of Biology Radiation Science			

	Institute of High Technology Institute of Applied Health Science
Course Specification Approval Date	Department Council No. 2, date: (21 – 09 – 2024)
Course Specification Approval (Attach the decision/minutes of the department /committee/council)	9/2024 /

2. Course Overview (Brief summary of scientific content)

This course focuses on magnetic resonance imaging also known as MRI the dynamic of spins in a magnetic field. To described leading to the essential notions of magnetic resonance (MR) excitation and relaxation. Additionally it discusses the basic mechanisms of image reconstruction MRI .students learn how existing physical principle transcend into bio-imaging and establish at important link into life sciences .illustrating the contributions physics can make to life sciences practical examples illustrate the respective imaging modality, its use ,premise and limitations , and biological safety will be touched upon .

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:	
Co de	Text	Code	Text
PO s1.1.3 PO s1.1.4 PO s1.2.1	Understand the - comprehensive knowledge of nuclear physics, plain X-ray, ultrasound, CT, MRI, contrast media, bone densitometry,	CLOs.1	-Tell about introduction classical theory and quantum
	interventional and .cardiovascular techniques	CLOs.2	-Define what motion in the atom and magnetic moment of the hydrogen nucleus
		CLOs.3	-Describes what is Alignment
	Interpret anatomical - structure, pathological findings and imaging data utilizing radiological .information systems	CLOs.4	-Understand the of precession and precessional
		CLOs.4	-Recognize about excitation and relaxation and pulse timing
		CLOs.5	Show gyromagnetic ratio
			- Tell about draw in sequences of sequences of MRI

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:	
Co de	Text	Code	Text
PO s1.3 .1	Contribute to continuous quality management and .improvement		-Operate suggestions for MRI radiology devices used for case diagnosis
		CLOs10	-practice scientific methods apply for MRI
		CLOs11	-Apply Fourier transform analysis of complex wave from MRI signal
		CLOs12 CLOs13	.-Construct sequences of MRI
		CLOs14	. -illustrate How can I make an excitation of one clip in the human body? Use three different plans in MRI
	Exhibit appropriate -	CLOs15	-Influences and interacts well with others in

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:	
Co de	Text	Code	Text
POs2.1.1	professional behaviors and relationships in all aspects of medical imaging .practice		
POs2.1.3	Practice in an ethical and professional manner consistent with relevant legislation and regulatory requirements in medical imaging	CLOs16	the workplace (-High efficiency in problem-solving procedures at the individual or institutional level.
POs2.1.4	Collaborate with other - health practitioners (physician, patient, .families,...)	CLOs17	-Attention to detail
POs3.1.1	Perform, maintain and - evaluate routine and advanced diagnostic imaging procedures (x-ray,		

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:	
Co de	Text	Code	Text
PO s3.1 .1.4	ultrasound and nuclear medicine)		

Apply standard

4. Teaching and Learning Methods

1. Interactive Lectures
2. Discussion and brain storming
3. Case study
4. Self-Directed Learning (SDL)
5. Practical Learning

Course Schedule

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	3	2	2	-	-
2	classical theory and quantum/atomic structure	3	2	1	1	-
3	MOTION IN THE ATOM/ Spinning proton/the hydrogen nuclei/the magnetic moment of the hydrogen nucleus	3	2	2	-	-
4	Alignment/protons align with field / what is B ₀ ?	3	2	2	1	-
5	NET magnetic vector (NMV)/precession and precessional (Larmor) /precession what does the Larmor equation tell us?	3	2	2	1	-
6	Mid-Term Exam					
7	Precessional phase/ Resonance/ The results of resonance	3	2	1	1	-

	classical theory					
	Fourier laws					
8		3	2	1	1	-
9	The results of resonance- quantum theory / energy transfer during excitation/ MR-signal/ generation of the signal	3	2	2	-	-
10	pulse timing parameters/ a basic pulse sequence I	3	2	1	1	-
11	pulse timing parameters/ a basic pulse sequence II	3	2	1	1	
12	gyromagnetic ratio /Photography steps for certain slice/image reconstruction I	3	2	2	-	-
13	MRI sequences/Draw in sequences I	3	2	1	1	-
14	MRI sequences/Draw in sequences II	3	2	1	1	
15	pulse timing parameter/TE and TR	3	2	2	-	-
14	Practical Exam					

15	Final Written Exam
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Methods of students' assessment

No .	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1 written (Semester work)	-	-	-
2	Mid- term	6	10	6.6%
3	Final Written Exam	15	100	66.6%
4	Final Practical/Clinical/... Exam	14	30	20%
5	Final Oral Exam	-	-	-
6	Assignments / Project /Portfolio/ Logbook	6	10	6.6%
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 resource	The main (essential) reference for the course (must be written in full according to the scientific documentation method)	Catherine. W, John. T. MRI in practice, fifth edition. Anglia Ruskin university.2019
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s (books, scientific references, etc.) *	Other References	Brain M Dale, Mark A Brown, Richard C Semeika. MRI Basic principles and applications fifth edition.2015 https://www.amazon.com
	Electronic Sources (Links must be added)	Knowledge bank: https://www.ekb.eg/ar
	Learning Platforms (Links must be added)	Bislms.mans.edu.eg https://bislms.mans.edu.eg/moodle2025/course/index.php?categoryid=9
	Other (to be mentioned)	-
Supportive facilities & equipment for teaching and learning *	Devices/Instruments	Computer- boards and projectors
	Supplies	-
	Electronic Programs	Ibn al-Haytham program
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

*** 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

Dr/Amira Atef

Name and Signature

Program Coordinator

Dr/Amira Atef