

Course Specification

(2025)

1. Basic Information

Course Title (according to the bylaw)	MRI Technology II			
Course Code (according to the bylaw)	TRMI 407			
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 – 2 nd 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 MR .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 .

Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/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 1.1.3	Understand the . comprehensive	CLOs1	-Discuss introduction about imaging weighting and contrast and variable

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 1.1.4	knowledge of nuclear physics, plain X-ray, ultrasound, CT, MRI, contrast media, bone densitometry, interventional and cardiovascular techniques .		which effect on image contrast in MRI
		CLOs2	-Describe the factor that affect image contrast in diagnostic imaging
		CLOs3	-Understand MRI physics parameters
	Interpret anatomical - structure, pathological findings and imaging data utilizing radiological .information systems	CLOs4	
		CLOs5	-Define T1,T2 , PD, Flair,Stir,Fat suppression ,FA
		CLOs6	-State about MR-angiography, MR-venography and MRI in brain tumors
		CLOs7	-List contraindication for MRI and indication for MRI . Recorded deferent artifact which happen ---during MRI image and

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:	
Code	Text	Code	Text
			effect on quality of image
POs 1.2.1 POs 1.2.2 POs 1.3.1	Use computers and - software in medical imaging effectively Apply statistical skills and evidence based practice in imaging data manipulation and analysis	CLOs8 CLOs9 CLOs10 CLOs11 CLOs12 CLOs13 CLOs14	-Compare between Intrinsic and extrinsic contrast parameter -Compare between Spin echo, inversion recovery and gradient echo -MRI scan parameters that determine the characteristics and image quality of MRI scan images. -Distinguish what are we looking for in flair imaging and in stir imaging -Explain the importance of FOV, slice thickness, space plan and phase FOV. Analyze of the causes of artifact occurrence

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 1.3.2	Contribute to continuous quality management and .improvement Apply quality control - measures to ensure test accuracy and reliability		Assess how were MRI signals built up
POs 2.1.1	Exhibit appropriate - professional behaviors and relationships in all	CLOs15 CLOs16	-apply T1,T2 and PD to make contrast in image

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 2.1.2	aspects of medical imaging practice Ensure confidentiality, - privacy of patients' information, comfort, preparation and ethical standards in all radiology .procedures	CLOs17 CLOs18	-Employ TI parameter with inversion recovery sequences only but not employ in spin echo -.construct T1, T2 with spin echo sequences and flair, stair with inversion recovery sequences and construct T2* with gradient echo
	POs 2.1.3	CLOs19 CLOs20 CLOs21	practice making adjustments to - gradient echo sequences to obtain a susceptibility weighted image to clarify the image more accurately Use MRI in brain tumors, mri - venography and MR angiography Apply various examinations - using magnetic resonance imaging, such as MRI knee and MRI brain

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 2.1.4	consistent with relevant legislation and regulatory requirements in medical imaging		Explanation and solution of - artifact
	Collaborate with other - health practitioners (physician, patient, families,...)		

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 3.1.1	Perform, maintain and - evaluate routine and advanced diagnostic imaging procedures (x-ray, ultrasound and nuclear medicine)	CLOs22 CLOs23 CLOs24	-Influences and interacts well with others in the workplace - High efficiency in problem-solving procedures at the individual or institutional level. - Attention to detail

3. 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/ indication for MR image/contraindication for MRI	3	2	2	-	-
2	Image weighting and contrast/how can I do tissue contrast	3	2	1	1	-
3	MRI physics parameters	3	2	2	-	-
4	What are three plane of mri/ Fov, phase Fov ,frequencies direction and TR	3	2	2	-	-
5	Artifacts in magnetic	3	2	2	-	-
6	Mid-Term Exam					
7	Wrist MRI Protocol and Planning	3	2	2	-	-
8	MRI Knee/MR venography	3	2	1	1	-

	Lumbar Spine MRI	3	2	2	-	-
9	(Protocols and Planning)/MR angiography					
10	MRI Brain/ MRI in brain tumors	3	2	2	-	-
11	T1 recovery in fat /T1 recovery in water/ T2 recovery in water/saturation with a short TR/ no saturation with a long TR(I)	3	2	1	1	-
12	T1 recovery in fat /T1 recovery in water/ T2 recovery in water/saturation with a short TR/ no saturation with a long TR(II)	3	2	2	-	-
13	-T2 contrast/T2 contrast generation/PROTON DENSITY CONTRAST(I)	3	2	2	-	-
14	-T2 contrast/T2 contrast generation/PROTON	3	2	2	-	-

	DENSITY CONTRAST (II)					
15	Artifacts in magnetic	3	2	2	-	-
15	Practical Exam					
16	Final Written Exam					

4. Methods of students' assessment

No .	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Semester work)	-	-	-
2	Mid- term	6	10	6.6%
3	Final Written Exam	17	100	66.6%
4	Final Practical/Clinical/... Exam	16	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**

5. 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)	Brian M Dale, Mark A Brown, Richard C Semelka. MRI: Basic principles and applications, 5th edition. 2015
	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	-
	Supplies	Computer- boards and projectors
	Electronic Programs	-
	Skill Labs/ Simulators	Ibn al-Haytham program
	Virtual Labs	-
	Other (to be mentioned)	-

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*** 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