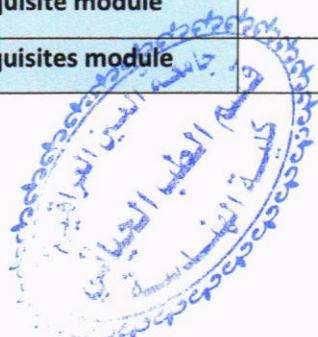


MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Medical Equipment II		Module Delivery
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☒ Seminar
Module Code	MDER324		
ECTS Credits	7		
SWL (hr/sem)	175		
Module Level	3	Semester of Delivery	6
Administering Department	Biomedical Engineering department	College	College of engineering
Module Leader	MSC Muntadher Hasan		e-mail: Muntadhar.HassanNaeema@alayen.edu.iq
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	
Module Tutor	Eng mazuana malak		e-mail: Mazuana_malak@alayen.edu.iq
Peer Reviewer Name		e-mail	E-mail
Scientific Committee Approval Date		Version Number	1.0

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		Semester	
Co-requisites module		Semester	



Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. General Medical Instrumentation Block Diagram. 2. Physics of the MRI. 3. Physics of the Nuclear Medicine Imaging. 4. Advanced Techniques and processing of Building the Data in MRI. 5. Measurements and other useful tools in manipulating medical image in both NMI and MRI.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge	A2	A2-1: Recognize the main components of MRI systems and nuclear medicine imaging devices such as gamma cameras, SPECT, and PET systems. A2-2: Explain the physical principles of Nuclear Magnetic Resonance (NMR), magnetization processes, radiofrequency interactions, and nuclear medicine imaging principles. A2-3: Apply the fundamental concepts of MRI and nuclear medicine in understanding the operation of medical imaging systems and their clinical applications.
		A3	A3-1: Measure key parameters related to magnetic fields, radiofrequency signals, and radiation levels used in medical imaging technologies. A3-2 : Analyze image reconstruction techniques and evaluate the biological effects and safety considerations associated with MRI and radioactive materials in medical applications.
	Skills	B1	B1.1 Function efficiently as an individual B1.2 Function as a member of multidisciplinary and multicultural teams
		B2	B2.1 Communicate effectively – graphically with a range of audiences using contemporary tools. B2.2 Communicate verbally and in writing with a range of audiences using contemporary tools.
	Ethics	C2	C1-1: Commit to quality standards. C1-2: Adhere to deadlines. C1-3: Strive for continuous improvement.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A -MRI the hardware, magnet types, RF coils, magnetization, Radioisotopes in Medical Diagnosis, Physics of Radioactivity, Principles of NMR Imaging System, Image		

	Reconstruction Techniques, Basic MRI Components, Biological Effects of NMR Imaging, Gamma Camera. [30 hrs] <u>Part B – Nuclear Medicine</u> Principles of NMI, Physics of radioactivity, Radioisotopes used in Medicine and Manufacturing, Gamma-ray Detector and Instruments in (NMI), Hardware Components of an NMI, ECT , SPECT and PET. [30 hrs] <u>Lab</u> Introduction to MRI hardware, Nuclear Medicine imaging. [30 hrs] <u>Exams</u> Mid term Exams [2 hrs] Lab Final Exam [4 hrs] Preparation for Exams [20 hrs] <u>Seminars.</u> [4 hrs] <u>Field Visits</u> [5 hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, seminars, Practical testing and Online testing.
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Student Workload (SWL)

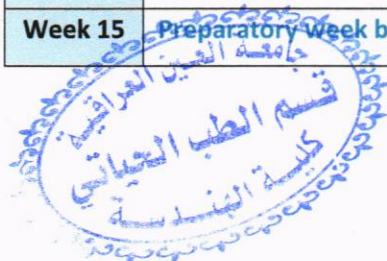
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.46
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		



Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	7% (7)	3, 5, 10	A2-1.A2-2
	Assignments	3	7% (7)	2,4, 12	
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	5% (10)	13	
	Seminar	1	6% (7)	14	
Summative assessment	Midterm Exam	3 hr	10% (10)	7	A2-1
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)		
المنهاج الاسبوعي النظري		
	Material Covered	LOs
Week 1	MRI- the hardware	A2-1, B1.1, C1-1
Week 2	magnet types	A2-1, B2.1, C1-3
Week 3	RF coils	A2-1, A3-2, C1-1
Week 4	magnetization	A2-1, A3-1
Week 5	Principles of NMR Imaging System	A2
Week 6	Mid-term Exam I	A2-1, A2-3, A3-2, B2.2
Week 7	Image Reconstruction Techniques	A2-1, A3-1, C1-2
Week 8	Basic MRI Components	A2-1, A3-1
Week 9	Biological Effects of NMR Imaging	A2-2, B2.2, C1-3
Week 10	Nuclear Medicine- Principles of NMI	A2-2, B2.1, C1-1
Week 11	Physics of Radioactivity	A2,A3
Week 12	Radioisotopes used in Medicine	A2-1, A2-3, A3-2, B1.2, C1-3
Week 13	Gamma Camera, Detector and Instruments in (NMI)	A2-2, A3-2, B1.1
Week 14	Hardware Components of an NMI, ECT, SPECT and PET	A2-2, A3-2, C1-2
Week 15	Preparatory week before the final Exam	A2,A3



Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered	LOs
Week 1	Lab 1: Introduction to MRI- the hardware	A3
Week 2	Lab 2: RF coils	A3
Week 3	Lab 3: Basic MRI Components	A3
Week 4	Lab 4: Types of Magnets	A3
Week 5	Lab 5: Nuclear Medicine Imaging	A3
Week 6	Lab 6: Detectors and Instruments in (NMI)	A3
Week 7	Lab7: Hardware Components of an NMI	A3
Week 8	Lab 8: Gamma Camera	A3
Week 9	Lab 9: PET	A3
Week 10	Lab 10: ECT	A3
Week 11	Lab 11: SPECT	A3
Week 12	Lab 12: Seminars	A3
Week 13	Lab 13: Seminars	A3
Week 14	Lab 14: Lab Revision	A3
Week 15	Lab 15: Lab Final Exam	A3

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. The Biomedical Engineering Handbook, By Josef D. Bronzino. 2. Biomedical Technology and Devices Handbook, By James Moore, George Zouridakis.	Yes
Recommended Texts	Medical Imaging Physics, By William R. Hendee, E. Russell Ritenour	No
Websites	https://eng.alayen.edu.iq//colleges/e/42	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

