Ministry of Higher Education and Scientific Research - Iraq
Al-Nahrain University
College of Science
Department of Medical Physics

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Health Physics			**Module Delivery**	
Module Type	S			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	REQ1217				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Medical Physics Sciences Department		**College**	College of Science	
Module Leader	Dr. Ibrahim Karim Abbas		**e-mail**	Ibrahim.karim@nahrainuniv.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Module Reviewer			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		
Lab. Staff.					

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The main objectives of this course are to provide students with the foundational scientific principles that connect physics with its applications in health and medicine. These six key objectives are: • To understand the relationship between fundamental physics concepts and their applications in the medical and health fields. • To identify the types of ionizing and non-ionizing radiation and their effects on biological tissues. • To acquire the necessary knowledge about diagnostic and therapeutic medical devices based on physical principles, such as X-ray imaging, MRI, and ultrasound. • To apply radiation protection principles to ensure the safety of patients and staff in healthcare facilities. • To understand fluid physics and its applications in blood circulation, as well as the physics of sound and its uses in medical ultrasound. • To learn about radiation therapy techniques used in cancer treatment and how to calculate radiation doses.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- **Analyze and interpret** the physical principles behind the operation of major medical devices. - **Evaluate** the health risks associated with exposure to different types of radiation and **apply** appropriate protective measures. - **Connect** physics concepts to health-related problems, providing them with a solid foundation for working in a medical or healthcare environment.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - **Focus on Practical Applications:** Theoretical concepts are presented with practical examples from real-world medical scenarios to highlight their importance. - **Use of Diagrams and Illustrations:** To simplify complex concepts related to the physics of medical devices and the effects of radiation. - **Exercises and Applied Problems:** Students are provided with exercises to solve computational problems related to radiation doses, device efficiency, and fluid mechanics. - **Participation in Discussions:** Students are encouraged to ask questions and discuss modern developments in medical devices and radiation therapy.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The learning strategies for this course blend theory and practice to foster deep understanding. They include Problem-Based Learning, where real medical cases are used to apply physical principles, and Collaborative Learning, which

	encourages students to work together in groups. The course also integrates Simulation-Based Learning using specialized software to mimic medical devices and radiation physics, alongside Self-Directed Learning that allows students to explore topics of personal interest.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	Continuous	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	Continuous	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	Continuous	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Health Physics and the Role of the Medical Physicist
Week 2	Ionizing Radiation: Types, Properties, and Interactions with Matter
Week 3	Fundamentals of Dosimetry
Week 4	Radiation Detection Instruments: Principles and Applications
Week 5	Radiation Protection: Principles and Regulations
Week 6	Diagnostic Medical Imaging with X-rays

Week 7	Computed Tomography (CT) Scanning: Principles and Applications
Week 8	**Mid exam**
Week 9	Nuclear Medicine and Positron Emission Tomography (PET) Scanning
Week 10	Magnetic Resonance Imaging (MRI): Physical Principles and Applications
Week 11	Ultrasound Imaging
Week 12	Radiation Therapy: Principles and Techniques
Week 13	Laser Physics and its Applications in Medicine
Week 14	Radioactive Waste Management and Radiological Emergencies
Week 15	**final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	
Week 2-3	
Week 3-4	
Week 4-5	
Week 5-6	
Week 6-7	
Week 7-8	
Week 8-9	
Week 9-10	
Week 10-11	
Week 11-12	
Week 12-13	
Week 13-14	
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Health Physics, Fourth Edition, Herman Cember and Thomas E. Johnson. 2009.	No (Available as an e-book)
Recommended Texts	Introduction to Health Physics: Fourth Edition, Parham Alaei. 2008.	No (Available as an e-book)
Websites		

APPENDIX:

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.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي