	Ministry of Higher Education and Scientific Research - Iraq Al-Mustaqbal University College for engineering and technology Department of Biomedical Engineering	

MODULE DESCRIPTOR FORM

Module Information

Module Title	**MEDICAL PHYSICS**	**Module Delivery**	
Module Type	**BASIC**	✓ **Theory** ✓ **Lecture** ✓ **Tutorial** ✓ **Practical** ✓ **Seminar**	
Module Code	**UOMU0101023**		
ECTS Credits	**7**		
SWL (hr/sem)	**100**		
Module Level	**UGI**	**Semester of Delivery**	**2**
Administering Department	**Department of Biomedical Engineering**	**College**	**Engineering College**
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval	**13/6/2023**	**Version Number**	**1.0**

Relation With Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	Students learn general Introduction about Medical Physics. As well how light, X-rays, radiopharmaceuticals, ultrasound, magnetic fields, and other energy probes are generated and how they interact with tissues and detectors to produce useful image contrast. Practical issues such as beam generation, dose limitations, patient motion, spatial resolution and dynamic range limitations, and cost-effectiveness will be addressed. Emphasis is placed upon diagnostic radiological imaging physics, including the planar X-ray, digital subtraction angiography mammography, computed tomography, nuclear medicine, ultrasound, and magnetic resonance imaging modalities.
Module Learning Outcomes	**On successful completion of this module the student will be able to:** 1. Apply integrative knowledge of the physical principles underpinning Medical Physics. 2. Describe the biological effects of radiation. 3. Critically evaluate the principles and legislation relating to radiation safety. 4. Appraise the underlying principles of medical physics technologies applied in clinical care. 5. Critically evaluate the role of medical physics in the patient pathway. 6. Identify X-ray imaging and technology, including computed tomography. 7. Identify Basis of magnetic resonance imaging and technology. 8. Identify Basis of ultrasound imaging and technology. 9. The student acquires knowledge Image quality and IT in medical physics and Image quality and IT in medical physics 10. The student acquires knowledge about Use of lasers, UV and IR in medicine
Indicative Contents	

	Indicative content includes the following. Introduction to medical physics and Biological effect of ionising radiation. [5 hrs]. Light and optics. [5 hrs] Radiation risk and public perception. [5 hrs] Radiation safety regulations. [5 hrs] Ionising radiation – interactions, quantities. [10 hrs] Basis of x-ray imaging and technology, including computed tomography. [10 hrs] Basis of nuclear medicine imaging and technology. [5 hrs] Basis of radiotherapy. [5 hrs] Basis of magnetic resonance imaging and technology. [5 hrs] Basis of ultrasound imaging and technology. [10 hrs] Use of lasers, UV and IR in medicine. [7 hrs] Image quality and IT in medical physics. [8 hrs]
Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	80	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 6 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	2hr	50% (50)	14	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to medical physics.
Week 2	Light and Optics with essential laws.
Week 3	Biological effect of ionising radiation.
Week 4	Radiation risk and public perception.
Week 5	Radiation safety regulations.
Week 6	Ionising radiation – interactions, quantities.
Week 7	Basis of x-ray imaging and technology, including computed tomography.
Week 8	Basis of x-ray imaging and technology, including computed tomography.
Week 9	Basis of nuclear medicine imaging and technology.
Week 10	Basis of radiotherapy.
Week 11	Basis of magnetic resonance imaging and technology.
Week 12	Basis of ultrasound imaging and technology.
Week 13	Use of lasers, UV and IR in medicine.
Week 14	Image quality and IT in medical physics.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Tooley, M. A. (2000). Medical physics and biomedical engineering. Physiological Measurement, 21(4), 549-549.	No
Recommended Texts	1- Mls 314 Lecture Note, Medical Physics, Lecturer: Dr. Y. Ajiboye. 2- Stacy, R. W. (1955). Essentials of biological and medical physics. McGraw-Hill Book.. 3- Podgoršak, E. B. (2006). Radiation physics for medical physicists (Vol. 1). Berlin: Springer.	No
Websites	1- Flower, M. A. (Ed.). (2012). Webb's physics of medical imaging. CRC press. 2- Johnson, T. E., & Birky, B. K. (2012). Health physics and radiological health. Lippincott Williams & Wilkins.	

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APPENDIX

GRADING SCHEME				
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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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.