MODULE DESCRIPTION FORM

Module Information					
Module Title	Medical Physics			**Module Delivery**	
Module Type	Basic			☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	MDER121				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		1	**Semester of Delivery**		2
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	MS.c Hassan Kamil saqban		**e-mail**	hsnkmil1998@gmail.com	
Module Leader's Acad. Title		MSC	**Module Leader's Qualification**		MSC
Module Tutor	MS.c Hassan Kamil saqban		**e-mail**	hsnkmil1998@gmail.com	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Modu e Aims, Learning Outcomes and Indicative Contents

Module Aims	Develop Problem-Solving and Theoretical Understanding: Apply physics principles and techniques to solve problems and deepen understanding of fundamental theories. Master Newtonian Mechanics: Understand and apply Newton's laws to analyze the motion of simple systems. Explore Electromagnetic Waves and Optics: Gain knowledge of electromagnetic waves, optical systems, Huygens' principle, interference, diffraction, polarization, and optical instruments (camera, eye, compound microscope), with practical applications in medicine. Understand Sound and Its Applications: Study the basics of sound, wave production, properties, Doppler effect, shock waves, and medical applications (stethoscope, ultrasound). Explore Fluid Mechanics: Understand pressure, density, Pascal's principle, hydraulic systems, Archimedes' principle, and blood pressure measurement. Study Thermodynamics and Modern Physics: Learn about temperature, heat, heat flow, thermal conductivity, real gases, transport phenomena, and optionally, modern physics topics (atomic physics, X-rays, radioactivity, nuclear physics, and medical applications).		
Module Learning Outcomes	Knowledge	A2	A2.1 Recall fundamental concepts of mechanics, including motion in one and two dimensions, velocity, acceleration, and Newton's laws. A2.2 Interpret physical quantities such as force, energy, momentum, and fluid parameters, and explain their relationships in different physical systems. A2.3 Describe the principles of statics, torque, equilibrium, fluid mechanics, and optical systems, including lenses and mirrors. A2.4 Solve problems related to motion, forces, work and energy, fluid dynamics (continuity and Bernoulli equations), and geometrical optics. A2.5 Design simple physical and biomedical models involving fluid flow, optical imaging systems, or radiation applications. A2.6 Analyze complex physical systems, including viscous flow in the circulatory system, image formation in optical systems, and radiation interactions with matter.

		A3	A3.1 Recognize laboratory instruments used in physics experiments, such as stopwatches, motion sensors, optical benches, fluid apparatus, and radiation detectors. A3.2 Explain experimental observations related to motion, forces, fluid behavior, optical imaging, and radiation phenomena. A3.3 Measure physical quantities including velocity, acceleration, force, pressure, flow rate, focal length, and radiation intensity using appropriate instruments. A3.4 Apply physical principles to perform experiments involving mechanics, fluid flow, optics, and radiation measurements. A3.5 Examine experimental results to determine system parameters such as friction coefficients, viscosity, focal length, and half-life.
	Skills	B1	B1.1 Communicate effectively B1.2 Students will have developed problem solving and reasoning abilities that will serve them well in many important petroleum engineering aspects as well as their lives.
		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	C2.1 Recognize professional and ethical responsibility. C2.2 Adhere and respect diversity.
	1.		

Indicative Contents	This course provides a comprehensive introduction to physics, covering a wide range of topics. Key areas include: Mechanics: Forces, motion, and the laws of motion. Electromagnetism: Electromagnetic waves, light, and optics. Sound: Sound waves, properties, and applications. Fluids: Pressure, density, and fluid dynamics. Thermodynamics: Temperature, heat, and heat transfer. Modern Physics: Atomic physics, X-rays, radioactivity, and nuclear physics. The course will delve into the fundamental principles of these topics and their applications in various fields, including medicine and engineering.

Learning and Teaching Strategies	
Strategies	Assessment is based on hand-in assignments, written exam, Case study, Quizzes, home works, Practical testing, and Online testing.

Student Workload (SWL)			
Structured SWL (h/sem)	37	**Structured SWL (h/w)**	2.7
Unstructured SWL (h/sem)	63	**Unstructured SWL (h/w)**	1.58
Total SWL (h/sem)	100		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	Continuous	A2
	Assignments	2	10% (10)	Continuous	A2 A3
	Projects / Lab.	1	10% (10)	15	A3
	Report	2	10% (10)	Continuous	A2 A3
Summative assessment	Midterm Exam	3 hr	10% (10)	7	A2 A3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered	LOS
Week 1	Motion on a straight line, measurements, velocity, acceleration, falling objects.	A2-1, B1.1, C2-1
Week 2	Motion in two dimensions, vectors, velocity and acceleration in 2D.	A2-2, B2.1, C2-3
Week 3	Newton's laws of motion, force, weight, density, equilibrium, friction.	A2-3, A3-2, A2-4 C2-1
Week 4	Statics, torque, equilibrium of rigid bodies, center of gravity, stability, levers.	A2-2,A2-5 A3-1 A3-4
Week 5	Work and energy, work, kinetic energy, potential energy, power.	A2-4, A2-3, A3-1, B2.2
Week 6	Mechanics of non-viscous fluids, Archimedes' principle, continuity equation, Bernoulli's equation.	A2-1, B1.1, C2-1
Week 7	Mid-term Exam	A2-2, B2.1, C2-3
Week 8	Viscous fluids, viscosity, flow in the circulatory system, flow resistance.	A2-3, A3-2, C2-1
Week 9	Mirrors, lenses, and imaging systems, power of a lens, the human eye, optical defects.	A2-2, A3-1
Week 10	Nuclear physics, radioactivity, half-life.	A2-4, A2-3, A3-1, B2.2
Week 11	Ionizing radiation, interaction of radiation with matter, radiation units	A2-1, B1.1, C2-1
Week 12	Mid-term Exam	A2-2,A3-1 B2.1, C2-3
Week 13	Advanced topics in radiation physics, such as radiation therapy or nuclear medicine.	A2-3, A3-2, C2-1
Week 14	Medical applications of nuclear physics.	A2-2, A3-3
Week 15	**final Exam**	A2 A3

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered	LOS
Week 1	Lab 1: Forces	A3
Week 2	Lab 2: Refractive index of glass, by real and apparent depth using a traveling microscope,	A3
Week 3	Lab 3: Acceleration of free fall by mean of the Simple pendulum	A3
Week 4	Lab 4: The surface tension of water by the pull of microscope slide.	A3
Week 5	Lab 5: Refractive index of water, by real and apparent depth using a traveling microscope.	A3
Week 6	Lab 6: Determination of (g) by an oscillating liquid in to a U-tube .	A3

Week 7	Lab 7: Spiral spring	A3

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	**Medical Physics**	**Yes**
Recommended Texts	**Physics in Biology and Medicine**	**Yes**
Websites	https://eng.alayen.edu.iq//colleges/e/42	

Grading Scheme مخطط انذرجاث				
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 انمعالجت)	(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.