MODULE DESCRIPTION FORM

Module Information					
Module Title	**Electricity and magnetism**			**Module Delivery**	
Module Type	**basic**			☒ **Theory** ☐**Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**MPH201**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level		1	**Semester of Delivery**		2
Administering Department		Medical Physics	**College**	College of Sciences	
Module Leader	Ahmed Mousa Jaafar		**e-mail**	ahmed.mo@uowa.edu.iq	
Module Leader's Acad. Title		Assistant Dr.	**Module Leader's Qualification**		Ph.D.
Module Tutor	Assist.Lec. Alhanoof Salam Shakir		**e-mail**	alhanoof.salam@uowa.edu.iq	
Peer Reviewer Name		Assist.Lec.Saja Basim Ali	**e-mail**	Saja.b@uowa.edu.iq	
Scientific Committee Approval Date		2025-4-19	**Version Number**		V 1.0

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

Department Head Approval

Dean of the College Approval

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	The course aims to provide students with information and skills in static electricity and magnetism necessary for the undergraduate level. Potentially qualifying undergraduate studies in the physical sciences, building a strong background for those who will continue to study materials related to the applications of static electricity and magnetism.
Module Learning Outcomes	1. Recognizing the Charges at rest: Electrostatics Charges in motion: Electric current. 2. Explaining COULOMBS LAW AND ELECTRIC FIELDS 3.. Explaining CURRENT, RESISTANCS. 4 . Discussing the reaction and involvement of atoms in electric circuits. 5. Describing electrical power, charge, and current. 6. Defining Ohm's law. 7 .Explaining the LENZ S LAW 8. Identifying the basic circuit elements and their applications. 9. Discussing the Magnetism force in magnetic field. 10. Discussing the magnetic moment , magnetic field.
Indicative Contents	DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis. AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor, use of Bode plots, use of differential equations and their solutions. Time response (natural and step responses. Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilization, voltage reference, power supplies

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 (hr/sem)	87	**Structured SWL (h/w)**	9
Unstructured SWL (hr/sem)	110	**Unstructured SWL (h/w)**	31
Total SWL (hr/sem)	**197 + 3 final = 200**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	20% (4)	2,4,5,6,9	1,2,3,6
	Projects	1	4% (4)	8	6,8,9
	Online Assig.	2	6% (3)	3,7	3,7,9
	Reports	10	10% (1)	15	4,5
Summative assessment	**Midterm Exam**	1 hr.	10% (10)	7	
	Final Exam	3 hr.	50% (50)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Charges at rest: Electrostatics.
Week 2	Charges in motion: Electric currents.
Week 3	COULOMBS LAW AND ELECTRIC FIELDS.
Week 4	POTNTIAL, CURRENT.
Week 5	RESISTANCS.
Week 6	OHMS LAW.
Week 7	Med- term exam
Week 8	RESISTANCE; SIMPLE CIRCUTS.
Week 9	KIRCHHOFF S LAWS EQUIVALENT.
Week 10	Magnetism.
Week 11	IN MAGNETIC FIELDS.
Week 12	MAGNETIC MOMENT, SOURCES OF MAGNETIC FLUX FORCES.
Week 13	LENZ S LAW.
Week 14	MAGNETIC FIELD
Week 15	Final exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	EXP 1: Capacitive Reactance in the AC Circuit
Week 2	EXP 2: Study of Self-Inductance and Inductive Reactance in Alternating Current Circuits
Week 3	EXP 3: Capacitor Charging
Week 4	EXP 4: Earth's Magnetic Field
Week 5	EXP 5: Determination of the Internal Resistance and Maximum Power of a Cell
Week 6	Discussion for the project 1
Week 7	EXP 6: Discussion for the experiments (1-5)
Week8	EXP 7: Mapping the Electric Field
Week9	EXP 8: Determination of the Resistance of Resistors in Parallel Connection
Week10	EXP 9: Slide-Wire Wheatstone Bridge
Week11	EXP 10: LCR Series Resonant Circuit
Week12	Discussion for the experiments (6-9)
Week13	Discussion for the project Project 2
Week14	Discussion for the project 3
Week15	Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Schaum's outlines of theory and problems of college physics More Physics: electric charges and fields – electromagnetism	No
Recommended Texts	Electronics basics books	No
Websites	https://books-library.net/free-32056793-download	

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	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.