Physics (2)	Code & No:	PHY 125
	Credits:	3(2,2,1)
	Pre-requisite:	PHY104
	Co-requisite:	None
	Level:	4

Course Description:

This course includes the following topics: Electric fields, Coulomb's law, Gauss' Law, electric potential, capacitance and dielectric, currents and resistance, electrical energy and power, direct current circuits, Kirchhoff's rules, magnetic fields, motion of charged particle in a magnetic field, sources of the magnetic field, Faraday's law of induction, Ampere's law, mutual inductance, alternating current circuits, the RLC series circuit(a resistor, an inductor, and a capacitor connected in series), resonance in RLC series circuit, Electromagnetic waves.

Course Aims:

1. Knowledge of the basic concepts and principles of physics.
2. Understand the concepts and principles of Electricity and Magnetism.
3. Analyze the physical problem and can express it in a mathematical equation.
4. Apply the basic principles of physics in solving problems in a structured process.
5. Ability to measure physical quantities, design and work with standard instruments.

Student Outcomes (SOs):

☒(a) An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline

☒(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution

☐(c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs

☐(d) An ability to function effectively on teams to accomplish a common goal

☐(e) An understanding of professional, ethical, legal, security and social issues and responsibilities

☐(f) An ability to communicate effectively with a range of audiences

☐(g) An ability to analyze the local and global impact of computing on individuals, organizations, and society

☐(h) Recognition of the need for and an ability to engage in continuing professional development

☒(i) An ability to use current techniques, skills, and tools necessary for computing practice.

☐(j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. [CS]

☐(k) An ability to apply design and development principles in the construction of software systems of varying complexity. [CS]

☐(j) An ability to use and apply current technical concepts and practices in the core information technologies of human computer interaction, information management, programming, networking, and web systems and technologies. [IT]

☐(k) An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation, and administration of computer-based systems. [IT]

☐(l) An ability to effectively integrate IT-based solutions into the user environment. [IT]

☐(m) An understanding of best practices and standards and their application. [IT]

☐(n) An ability to assist in the creation of an effective project plan. [IT]

Course Learning Outcomes (CLOs):

The student is expected to be able to:

1. Gain the knowledge of the basic concepts of Electricity and Magnetism
2. Understand the concepts and principles of Electricity and Magnetism
3. Analyze the physical problem and learn to express it in a mathematical equation
4. Apply the basic principles of physics in solving problems in a structured process.
5. Gain ability to measure physical quantities, design and work with standard instruments.

SOs and CLOs Mapping:

CLO/SO	a	b	c	d	e	f	g	h	i	j	k	l	m	n
CLO1	√													
CLO2	√													
CLO3		√												
CLO4		√												
CLO5									√					

No.	Topics	Weeks	Teaching hours
1	Overview of fundamental aspects of Physics and in particular static and current electricity.	1	3
2	Statement of Coulomb's laws and its equation and solution to the problems.	1	3
3	Electric field and equation and analysis of problems on force between charges and electric field due to charge.	1	3
4	Study on electric field lines for positive and negative charge, electric potential and solution to problems.	1	3
5	Gauss's law or Gauss Theorem and its equations. Solution to the problems.	1	3
6	An introduction and a brief over view of capacitance and dielectric materials.	1	3
7	Study on Ohm's law and relation between current and resistance and solution to the problems. Calculation of electrical energy and power.	2	6
8	Study of DC circuits, Kirchhoff's rules and illustrations.	1	3
9	Study on magnetic fields, motion of charged particle in a magnetic field, sources of the magnetic field and solution to the problems. Faraday's law of induction (statement, equation and problems).	2	6
10	State and explanation of Ampere's law, Definition of mutual inductance. Explanation of alternating current circuits.	1	3
11	The RLC series circuit (a resistor, an inductor, and a capacitor connected in series and parallel), resonance in RLC series circuit.	1	3
12	Electromagnetic waves: Changing Electric fields produce magnetic Fields, Maxwell's Equations, Production of Electromagnetic waves, Light as a Electromagnetic Wave and the electromagnetic Spectrum.	1	3

	Total	**14**	**42**

Textbook:

- Physics, 6th Edition, Douglas C. Giancoli, Pearson New International Edition, 2014.

Essential references:

- Physics for Scientists & Engineers & Modren physics, 9th Edition, Raymond A. serway and John W.Jewett, Thomson Brooks/ Cole ©2014.
- Fundamentals of Physics, 10th Edition, Halliday & Resnick, Jearl Walker, Wiley ©2014.