**Course Prefix and Number:** <u>PHY 242</u>     **Credits:** <u>4</u>

**Course Title: University Prerequisite: PHY 241** with a grade of C or better and MTH 26 with a grade of C or better
**II of II. Lecture 3 hour. Laboratory 3 hours. Total 6 hours per week 4 credits.**

### General Course Purpose:

PHY 242 is the second semester of a two-semester calculus-based introductory physics with laboratory sequence.  It provides the student with a broad understanding of the general concepts and principles of the physical universe, and prepares the student for advanced study in physical sciences and engineering through development of skills in problem solving, critical thinking and quantitative reasoning, and an understanding of the methods of scientific inquiry and experiments.

### Course Prerequisites and Co-requisites:

PHY 241 with a grade of C or better and MTH 264 with a grade of C or better

**Student Learning Outcomes:**
Upon completing the course, the student will be able to:

Mechanical Waves and Sound
- Define periodic mechanical waves and describe different types of mechanical waves including sound waves
- Represent sinusoidal waves using a mathematical expression

- Define and calculate electric flux
- Explain the importance of Gauss's law
- Apply Gauss's law to find the electric field due to uniform distribution of charges along a line, on a surface etc.
- Discuss implication of Gauss's law on the distribution of charges on a conductor
- Define and calculate electric potential energy and electric potential
- Explain properties of equipotential lines (surfaces) and their relationship with electric field lines
- Calculate the electric field and potential due to a uniform distribution of charges on a straight line, on a ring, on a disk and other standard geometric shape
- Discuss electric dipole and calculate the torque experienced and electric potential energy stored by an electric dipole under the influence of an external electric field
- Describe capacitors and their role in electrical system
- Determine the equivalent capacitance of capacitors connected in series and in parallel
- Describe the role of dielectric material in a capacitor
- Calculate energy stored in a capacitor

Ohm's Law and DC Circuits
- Define electric current and current density
- State Ohm's law and define resistance and resistivity of materials
- Analyze simple circuits and define power dissipated through a resistor
- Discuss underlying rules and calculate equivalent resistance of series and parallel combinations of resistors
- State and apply Kirchhoff's rules to analyze multiloop circuits
- Correctly connect voltage and current measuring devices in a circuit
- Discuss and analyze R-C circuit

Magnetism
- Describe the properties of magnets and magnetic fields
- Define the magnetic flux and application of Gauss's law for magnetic flux
- Describe the motion of a charged particle when placed in electric and magnetic field and applications
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