North South University

Department of Mathematics and Physics

Course Code: PHY 108
Course Name: Physics II
Term: Spring 2019

Instructor: Swomitra Palit, PhD (swomitra.palit@northsouth.edu)
Office Location: SAC 1061
Preferred Forms of Communication:

- Email, Response time: 24 hours or less
- Outside of class, you are encouraged to come to office hours for help on any aspect of the course

COURSE INFORMATION

Textbook Required:
David Halliday, Robert Resnick, and Jearl Walker, Fundamentals of Physics (10th ed., 2013), John Wiley & Sons, Inc., New York, NY

A note on reading the textbook:
You do not need read the chapter in fine detail; you should just do enough to know what are the major concepts, equations, and laws you are required to understand to answer problems. After we cover a chapter in class, you can re-read the chapter and pick up on the things you missed/didn't understand the first time through. Bear in mind that the textbook now fills the role of much of the traditional lecture.

Critical Performance Statement:
By the end of this course, students will have demonstrated the ability to analyze a variety of phenomenon in electromagnetism such as electric charges and their interaction with electric and magnetic fields as well as current, inductors, capacitors, and electrical properties of circuits.

Course/Subject Description:
Students analyze Coulomb's law, Gauss' law, Kirchhoff's laws, Ampere's law, Ohm's law, Faraday's Law, Lenz's law and energy theorems as well as their applications to a variety of phenomena including static charges, currents and magnetic fields, circuits, power, induction, coils, and solenoids. Students participate in interactive lectures and are evaluated by assignments, quizzes, and exams. This course has a separate mandatory laboratory session every week as PHY 108L.

Method(s) of Instruction:
Multiple methods of delivery are anticipated: Classroom lectures, Discussions and/or presentations, Interactive simulations.

Content Outline by Module:

MODULE 1:
Electric Charge
Coulomb's Law
Electric field
Electric field lines
Electric field due to a point charge, electric dipole, line of charge and charged disk
Movement of charge in an electric field

MODULE 2:
Flux
Gauss' Law
Application of Gauss' Law: Cylindrical, spherical and planar symmetry

MODULE 3:
Electric potential energy and electric potential
Equipotential surface
Calculating potential from the field
Potential due to a point charge and a group of point charges
Potential due to continuous charge distribution
Conductors in electrostatic equilibrium

MODULE 4:
Capacitance
Capacitors in series and in parallel
Energy stored in an electric field
Capacitors with dielectric

MODULE 5:
Electric current, resistance and Ohm's law
Resistors in series and parallel
Power in electric circuits
Kirchhoff's laws and solving circuits
RC circuits

MODULE 6:
Magnetic fields
Hall effect
Biot-savart law
Torque on a current loop
Magnetic dipole moment
Magnetic field due to a current
Force between two parallel currents
Ampere's law
Solenoid

MODULE 7:
Faraday's law of induction

Lenz's law
Induction and energy transfer
Induced electric field
Inductors and inductance
Self-induction
Energy stored in a magnetic field
Mutual induction
LR circuit

MODULE 8:
LC circuit
Maxwell's equations

Actual Contact Hours:
Lecture - 3 Hours/week, Laboratory - 3 Hours / week.

Method(s) evaluation of student performance:

Quiz / assignment / attendance	**20%**
Midterm Exams (2)	**40%**
Final Exam	**40%**

Learning Outcomes:

CO - 1 Calculate electrical quantities such as electric force, electric field, electric flux and electric potential of distributions of electric charge and different combination of electric charges using Coulomb law and Gauss' law.

CO – 2 Compute capacitance and resistance of simple capacitors and resistors as well as series, parallel and series-parallel arrangements of capacitors and resistors.

CO – 3 Analyze Ohm's and Kirchhoff's laws by evaluating electric current and power in simple DC circuits involving resistors and batteries.

CO - 4 Analyze the effect of magnetic fields on the motion of an electric charge, as well as the force and torque on a current carrying wire in a magnetic field.

CO – 5 Calculate the magnetic field due to currents in wires, coils, and solenoids using Biot-Savart law and Ampere's law.

CO – 6 Apply Faraday's law of induction and Lenz's law to analyze induced emf and current as well as the phenomenon of self-induction and mutual induction.

Rationale for the Course:
Physics II provides students with essential concepts and techniques from electricity and magnetism for core engineering science courses.

Pre-Requisites:
Physics I (PHY 107) and Calculus II (MAT 130)

Mapping of Course Outcomes

	Course Outcomes (CO)	Bloom's taxonomy domain/level (C: *Cognitive* P: *Psychomotor* A: *Affective*)	Delivery methods and activities	Assessment tools
CO - 1	Calculate electrical quantities such as electric force, electric field, electric flux and electric potential of distributions of electric charge and different combination of electric charges using Coulomb law and Gauss' law.	C2, C3, P2	Lecture, Interactive simulations and Discussion	Quiz, Assignment, and Midterm Exam
CO - 2	Compute capacitance and resistance of simple capacitors and resistors as well as series, parallel and series-parallel arrangements of capacitors and resistors.	C2, C3, P2	Lecture and discussion	Quiz, Midterm exam, and Assignment
CO - 3	Analyze Ohm's and Kirchhoff's laws by evaluating electric current and power in simple DC circuits involving resistors and batteries.	C4, P2	Lecture, Interactive simulation and Discussion	Quiz and Midterm Exam,
CO - 4	Analyze the effect of magnetic fields on the motion of an electric charge, as well as the force and torque on a current carrying wire in a magnetic field.	C4, P2	Lecture, Interactive simulation and discussion	Quiz and Assignment
CO - 5	Calculate the magnetic field due to currents in wires, coils, and solenoids using Biot- Savart law and Ampere's law.	C2, C3, P2	Lecture and discussion	Quiz and Assignment
CO - 6	Apply Faraday's law of induction and Lenz's law to analyze induced emf and current as well as the phenomenon of self- induction and mutual induction.	C3, P2	Lecture, Interactive simulation, and discussion	Final Exam