COURSE OUTLINE
Electricity and Magnetism– Fall 2021
PHYS-221

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COURSE OBJECTIVES

The course is a first introduction to Electricity and Magnetism. It will review static and dynamic electric and magnetic fields, as well as their inter-relationships. The objectives of this course are to tease out the laws of electromagnetism from our everyday experience by specific examples of how electromagnetic phenomena manifest themselves. Electromagnetic forces quite literally dominate our everyday experience. Because of the strength of electromagnetic forces, any small imbalance in net electric charge gives rise to enormous forces that act to try to erase that imbalance. Physical models will be presented throughout the course, with a sprinkling of exercises and in-class demonstrations.

LEARNING OUTCOMES

At the conclusion of this course, students should be able to:

1. understand and model electric and magnetic interactions in free space and homogenous matter,
2. write down the Maxwell equations with a clear understanding of their meaning,
3. sketch and solve simple problems involving distributions of charges and currents

The overall goal is to use the scientific method to come to understand the enormous variety of electromagnetic phenomena in terms of laws.

COURSE OUTLINES

Electrostatics, magnetostatics, electric current, laws of magnetism, Maxwell's Equations, electromagnetic energy and electromagnetic wave equations, Laboratory.

Course Materials:

Text: Introduction to Electrodynamics by David J. Griffiths

Optional text:

1. Physics for Scientists and Engineers by Serway/Jewett.
2. Matter and Interactions by Chabay and Sherwood.
3. University physics with modern physics, Hugh d. roger a. freedman,
4. Fundamentals of physics, 7th edition, international student version, by david halliday, Robert resnick, jearl walker.
5. Fundamentals of physic, david halliday, Robert Resnick and Krane.

Course grading: Your final grade will be based on the following:

Assignments + Quizzes + Project	40%
Midterm Test	30%
Final Examination	30%
	100%

Attendance:
Students are required to attend all the lectures and Lab sessions. Those students whose attendance falls below 70 % in theory and 70% in lab work will not be allowed to sit in the final examination.

Online Methods and Resources:

- Each Video lecture will be delivered online as well through bigbluebutton and its recording will be available on Moodle.
- All lecture slides and relevant material will also be shared through Moodle.
- All the assignments, quizzes and exams will be uploaded and conducted on Moodle.
- WhatsApp group for the course will help you to ask any query during the semester.
- Online advising will be available by appointments through email or WhatsApp.

Syllabus and Tentative schedule:

Week	Learning Activity	Quiz-Assignments
1	Electric Charges, Coulomb Force Law	Pre knowledge quiz
2	The Electric Field, Lines of force	Assignments 1
3	Gauss' Law and its applications	Quiz 1
4	Electric Potential, Work & Energy	
5	Electric fields in matter, capacitors and dielectrics	Assignment 2
6	Electric Power Circuits	Quiz 2
7	Production and Properties of magnetic fields	Mid term exam;

8	Ampere's Law, Law of Biot & Savart, Faraday's Law	
9	Electromagnetic Induction	Assignment 3
10	Magnetic properties of matter	Quiz 3
11	Magnetic materials	
12	Inductance and circuit oscillations, Alternating Current	
13	Electromagnetic Waves	Presentations of team based project Assignment 4
14	Maxwell's Equations	Quiz 4