University Physics II

Class
PHYS 2426
A course for engineering and science majors. Electrostatics, electricity, magnetism, and light. Three hours lecture and three hours lab per week
Course Learning Objectives

When this course is completed, the student will have learned:

a. The basic property and concepts of charge including quantization of charge, conservation of charge, properties of charges in conductors, and insulators and Coulombs Law.
b. The concept of electric fields and how to calculate electric fields and field lines, due to a point charge, a dipole, line charge, and charge disk using calculus.
c. To apply the concept of Gauss' Law to analyze and solve various charge configurations using surface integrals and various symmetries including, cylindrical, planar and spherical.
d. The concept of electric potential and electric potential energy. Analyze and calculate potential form the electric field due to point charge, groups of charges, dipole, continuous charge distribution, and a charged insulated conductor.
e. The concept of capacitance and how to analyze and calculate capacitance for capacitors in series and in parallel as well as the energy stored in the electric field with and without a dielectric.
f. The concepts current, current density and their relationship to resistance, resistivity and voltage. These concepts will be applied to conductors, semiconductors, and superconductors.
g. The concept of basic circuits and calculations related to those circuits including work energy, emf, single loop and multiloop circuits, potential differences between two points in a circuit, and RC circuits.
h. The concept of magnetic fields and understand the relationship between magnetic fields and, Hall effect, cyclotrons, synchrotrons, circulating charges, magnetic forces on current carrying wires and loops.
i. The concept of magnet field created by currents and how to calculate field due to a current, the force between parallel currents. How to use Ampere's Law and calculus to calculate magnetic fields for various current geometries for solenoids and toroids.
j. The concept of induction, inductance, self inductance mutual inductance and energy storage in magnetic field and how to calculate these using Faraday's Law of Induction, Lenz's Law using basic calculus.
k. Maxwell's equations are used to explain magnetism and the electron, magnetic materials, diamagnetism, paramagnetism, and ferromagnetism.
l. The basic properties of electromagnetic waves including energy transport, Poynting vector, radiation pressure, polarization reflection, refraction, internal reflection, and polarization by reflection.
m. How images are formed by various mirrors and thin lens including plane and spherical mirrors and thin spherical lens.
n. How light interacts including Young's Interference , coherence, double slit interference, interference of thin films, and Michelson's Interferometer
o. Diffraction by a single slit, by a circular aperture, diffraction gradients, dispersion and resolving power, and X-Ray diffraction.

Required Textbooks
Matter and Interactions 4th edition by Chabay and Sherwood

Lab Text

None. Lab handouts will be provided

Disabilities

ADA Statement:

Any student with a documented disability (e.g. learning, psychiatric, vision, hearing, etc.) may contact the Office on the Weatherford College Weatherford Campus to request reasonable accommodations. *Phone:* 817-598-6350 *Office Location:* Office Number 118 in the Student Services Building, upper floor. *Physical Address:* Weatherford College 225 College Park Drive Weatherford, TX.

Academic Integrity
Academic Integrity is fundamental to the educational mission of Weatherford College, and the College expects its students to maintain high standards of personal and scholarly conduct. Academic dishonesty of any kind will not be tolerated. Academic dishonesty includes, but is not limited to, cheating on an examination or other academic work, plagiarism, collusion, and the abuse of resource materials including unauthorized use of Generative AI. Departments may adopt discipline specific guidelines on Generative AI usage approved by the instructional dean. Any student who is demonstrated to have engaged in any of these activities will be subject to immediate disciplinary action in accordance with institutional procedures.

Lab Fee
$24.00