SYLLABUS
PART I
EDISON COMMUNITY COLLEGE
PHY 242S SCIENCE AND ENGINEERING PHYSICS II
5 CREDIT HOURS

COURSE DESCRIPTION

Continuation of PHY 241S. This course explores the calculus-based approach to topics in electricity and magnetism, modern physics, and optics. Includes three hours of lecture and four hours of lab each week. Prerequisite: PHY 241S. Lab fee.

COURSE GOALS

The student will:

Bloom's Level		Gen Ed Outcomes
3	1. Use Coulomb's Law to find the force between two or more point charges.	1, 3
3	2. Calculate electric field strength.	3
3	3. Determine the torque acting on a dipole.	3
3	4. Calculate charge and field strength using Gauss' Law.	3
2	5. Find the electric potential difference between two points.	3
3	6. Solve problems using the relationships among resistance, potential difference, electric current, current density, electric field, resistivity, and the physical dimensions of a conductor.	3
4	7. Analyze single and multiple loop direct current circuits consisting of resistances and sources of electromotive force.	1, 3
3	8. Use Kirchhoff's loop equation in a single loop containing capacitance and resistance or inductance and resistance to establish the current in the circuit as a function of time.	1, 3
3	9. Calculate the force acting on an electric charge moving in a magnetic field.	3
2	10. Find the force acting on a current carrying wire in a magnetic field and the torque acting on a current loop in a magnetic field.	3
3	11. Apply Faraday's Law and Lenz's Law.	3
3	12. Use graphs, phasor diagrams, and calculations to determine unknown quantities in an alternating current circuit.	1, 3
3	13. Use Snell's Law in problems involving refraction.	1, 3
3	14. Apply the mirror equation to problems involving a single spherical mirror.	1, 3
3	15. Use the lensmaker's equation to solve problems involving a single thin lens.	3
3	16. Calculate the locations of amplitude minima and maxima for interfering light rays.	3
3	17. Relate the index of refraction and thickness of a thin film to the minimum and maximum intensity of reflected and transmitted light.	1
3	18. Use Huygen's Principle to explain how light from a single slit can produce interference fringes.	1
3	19. Solve diffraction grating problems.	3
5	20. Explain the photoelectric effect, its implications, and the photon model of light.	1
1	21. Recognize that the Debroglie standing wave of a confined particle requires energy quantization	1

5	22. Express the wave function as the descriptor of particles in quantum physics	1, 3
3	23. Develop the Bohr's stationary-state model of the atom	1, 3
3	24. Use the Bohr model to explain discrete spectra and the observed differences between absorption and emission spectra.	1, 3
2	25. Discuss the wave function through pictorial and graphical exercises	1
2	26. Interpret the Schrodinger equation as the 'law' of quantum mechanics	1
3	27. Determine wave function and energy levels	1, 3
2	28. Interpret the quantum-mechanical solution of the hydrogen atom	1
2	29. Comprehend the basis for the shell model of atoms	1
2	30. Differentiate between the emission and absorption of light.	1
2	31. Describe the lifetimes of excited states and their exponential decay.	1

CORE VALUES

The Core Values are a set of principles which guide in creating educational programs and environments at Edison. They include communication, ethics, critical thinking, human diversity, inquiry/respect for learning, and interpersonal skills/teamwork. The goals, objectives, and activities in this course will introduce/reinforce these Core Values whenever appropriate.

TOPIC OUTLINE

1. Electric Charge
2. Electric Fields
3. Gauss' Law
4. Electric Potential
5. Capacitance
6. Current and Resistance
7. Circuits
8. Magnetic Fields
9. Magnetic Fields Due to Currents
10. Induction and Inductance
11. Magnetism of Matter; Maxwell's Laws
12. Electromagnetic Oscillations and Alternating Current
13. Electromagnetic Waves
14. Images
15. Interference
16. Diffraction
17. Polarization
18. Quantum physics
19. Atomic physics
20. Nuclear physics