PHYS C280: CALCULUS BASED PHYSICS: ELECTRICITY AND MAGNETISM

Item	Value
Curriculum Committee Approval Date	03/06/2009
Top Code	190200 - Physics, General
Units	4 Total Units
Hours	108 Total Hours (Lecture Hours 54; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	• Area 5A Physical Sciences (CB1)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5A Physical Science (5A) • Cal-GETC 5C Laboratory Activity (5C)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5A Physical Science (5A) • IGETC 5C Laboratory Activity (5C)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B1 Physical Science (B1) • CSU B3 Laboratory Activity (B3)

Course Description

Continuation of PHYS C185. The course covers electricity and magnetism. Topics include electric fields, Gauss's Law, electric potential, capacitance and dielectrics, current and resistance, direct current circuits, magnetic fields, sources of the magnetic fields, Faraday's Law, inductance, alternating current circuits, and electromagnetic waves. PREREQUISITE: MATH C185 and PHYS C185. Transfer Credit: CSU; UC: Credit Limitation: PHYS C120, PHYS C125 and PHYS C185, PHYS C280 combined: maximum credit, 1 series. C-ID: PHYS 210.**C-ID:** PHYS 210.

Course Level Student Learning Outcome(s)

1. Demonstrate problem solving skills for the electric and magnetic fields for a given charge and current distribution.
2. Demonstrate problem solving skills for the currents, voltages, and power dissipation in DC and AC Circuits.
3. Demonstrate problem solving skills for the transmission and propagation of light waves.

Course Objectives

- 1. State the basic principles of electromagnetism, define important scientific terms in these areas, and give an explanation of how they apply to real-world situations.
- 2. Use calculus to solve problems involving the laws of electromagnetism.
- 3. Conduct simple experiments using standard scientific methods, evaluate the resulting data, and construct a scientific conclusion in a formal written report.

Lecture Content

ELECTRICITY Electric Fields Gauss s Law Electric Potential Capacitance and Dielectrics Current and Resistance Direct Current Circuits MAGNETISM Magnetic Fields Sources of the Magnetic Fields Faraday s Law Inductance Alternating Current Circuits and Electromagnetic Waves

Lab Content

Collect data with appropriate sensors and significant figures. Analyze data in graphical form. Perform experiments involving voltage, current and resistance in DC Circuits. Perform experiments involving voltage, current, resistance and inductance in RC Circuits.

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Instructional Techniques

A variety of instructional techniques will be employed to encompass different student learning styles. These may include, but are not limited to, lecture, discussion, and small group activities. Instructional will be supplemented, where appropriate, by PowerPoint presentations, videos, simulations, and other electronic resources and technologies

Reading Assignments

Students will complete reading assignments from the textbook as well as any supplemental reading based upon handouts, Internet resources, and assignments from the Coastline Library.

Writing Assignments

Lab Reports, Quiz and Test questions, and Discussions will require the student to demonstrate and communicate a qualitative understanding of scientific concepts.

Out-of-class Assignments

Outside of the classroom, students will do the required reading, study for quizzes and exams, and conduct research, where applicable, to prepare for discussions.

Demonstration of Critical Thinking

Students will demonstrate critical thinking through written work such as lab reports as well as active participation in class discussions.

Required Writing, Problem Solving, Skills Demonstration

Problem-Solving will be emphasized in the class through homework assignments, quiz and test questions, and testing predictions based on simulations and hands-on experiments. Writing skills will be demonstrated by essay questions and lab reports.

Eligible Disciplines

Physics/Astronomy: Master's degree in physics, astronomy, or astrophysics OR bachelor's degree in physics or astronomy AND master's degree in engineering, mathematics, meteorology, or geophysics OR the equivalent. Master's degree required. Physics/Astronomy: Master's degree in physics, astronomy, or astrophysics OR bachelor's degree in physics or astronomy AND master's degree in engineering, mathematics, meteorology, or geophysics OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Ling, S.J., Moebs, B, Sanny, J.. University Physics Volume 2, 1 ed. OpenSTAX, 2024

Other Resources

1. Coastline Library