PHYS G125: ALGEBRA BASED PHYSICS: ELECTRICITY/ MAGNETISM

Item	Value
Curriculum Committee Approval Date	10/19/2021
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
Grading Policy	Standard Letter (S)
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

This course is an algebra/trigonometry based study of electricity, magnetism, light, and modern physics. Topics include electric charges and fields, DC circuits, magnetic fields, electromagnetic induction, reflection, refraction, interference of light, quantum theory, matter waves, radioactivity, and nuclear reactions. PREREQUISITE: PHYS G120. Transfer Credit: CSU; UC: Credit Limitation: PHYS G120, PHYS G125 and PHYS G185, PHYS G280, PHYS G285 combined: maximum credit, 1 series - deduct credit for duplication of topics C-ID: PHYS 110, 100S. **C-ID:** PHYS 110, 100S.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Solve problems involving electromagnetic theory.
3. Solve problems involving circuit theory.
4. Solve problems involving nuclear physics.
5. Solve problems involving geometrical optics.

Course Objectives

- 1. Apply Coulombs Law to solve problems involving electromagnetic theory.
- 2. Explain electric potential energy and use it to solve problems.
- 3. Employ Ohms Law and Kirchhoffs Laws to solve problems involving DC circuits.
- 4. Define a magnetic field and use it predict the force on an electric charge.
- 5. Describe light as an electromagnetic wave.
- 6. Use the ray model of light, reflection, and Snells Law to solve problems.
- 7. Recall the postulates of the special theory of relativity and use them to solve problems.
- 8. Explain the phenomena that led to the quantum theory and use the principles deduced from these phenomena to solve problems.
- 9. Describe the structure of the nucleus, recall the types of radioactive decay, use conservation laws to balance nuclear reactions, and calculate half-lives and rates of decay.

Lecture Content

Electricity Charge and Matter Conductors and Insulators Coulombs Law Electric Fields and Lines of Force Gausss Law Electric Potential and Capacitors Current Electricity Current and Potential Difference Ohms Law Simple DC Circuits Resistors in series and parallel Multiloop Circuits Kirchhoffs Laws Electromagnetism Properties of Magnets Magnetic Fields Magnetic Forces and Torques Induced EMF Light Nature and Propagation of Light Speed of Light Geometrical Optics Reflection Refraction (Snells Law) Lenses Mirrors Wave Optics (Physical Optics) Interference Diffraction Polarization Spectra Modern Physics Special Relativity Quantum Theory Atomic Physics Nuclear Physics

Lab Content

Collect data with appropriate sensors and to the correct number of significant figures. Analyze data in graphical form. Perform statistical error analysis. Perform experiments involving electric and magnetic fields. Perform experiments involving electrical circuits. Perform experiments involving mirrors and lenses. Perform experiments analyzing radioactive decay.

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)

Reading Assignments

Textbook and instructor prepared materials. Students are encouraged to read current popular scientific articles found in newspapers and magazines and to watch scientific programs on television.

Writing Assignments

Students are expected to maintain lab notebooks that contain an analysis of each experiment and to write lab reports.

Out-of-class Assignments

Homework questions that emphasize problem solving.

Demonstration of Critical Thinking

Students will demonstrate the ability to think critically by analyzing given physical situations (reading word problems and interpreting them), applying the basic laws of physics toward the solution of such problems,

deducing valid conclusions from their results, and then explaining these results in terms of non-mathematical ideas. From data collected in the lab students will be able to verify and "discover" the basic laws of physics and use graphs to predict the results of other experiments. Students will then take these ideas and write a lab report that describes the results of thier work, as well as answering questions related to the performance of the experiment.

Required Writing, Problem Solving, Skills Demonstration

Students are given regular homework assignments and examinations that stress problem solving skills. The laboratory portion of the course gives students practice in making measurements and using equipment, and proficiency is determined by lab exams in which each student is expected to demonstrate the ability to use a piece of equipment to the instructor. Additionally, students are expected to maintain lab notebooks that contain calculations and an analysis of each experiment.

Eligible Disciplines

Physics/Astronomy: Masters degree in physics, astronomy, or astrophysics OR bachelors degree in physics or astronomy AND masters degree in engineering, mathematics, meteorology, or geophysics OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Giancoli, D.C.. Physics: Principles with Applications, 7th ed. Boston: Pearson, 2014 Rationale: (Legacy text) Legacy Textbook Transfer Data: (Legacy text)

Manuals Resources

1. Stein, K.M.. Instructor Prepared Materials, Golden West College , 03-07-2020