PHYS C285: CALCULUS BASED PHYSICS: MODERN PHYSICS

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
Grading Policy	Standard Letter (S)
Local General Education (GE)	• CL Option 1 Natural 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

This course covers thermodynamics, light, optics, and modern physics. Topics include heat transfer and the kinetic theory of gases, geometric optics, wave optics, an introduction to relativity, an introduction to quantum mechanics and quantum theory, and the structure of matter. PREREQUISITE: MATH C185 and PHYS C185. Transfer Credit: CSU; UC. C-ID: PHYS 215.**C-ID:** PHYS 215.

Course Level Student Learning Outcome(s)

1. Solve problems involving thermodynamics and the kinetic theory of gases.
2. Solve problems related to optics.
3. Solve problems related to special relativity and quantum mechanics.

Course Objectives

- 1. Solve problems involving thermodynamics and the kinetic theory of gases.
- 2. Solve problems in geometric and wave optics.
- 3. Solve problems in quantum mechanics and special relativity.
- 4. Solve problems related to nuclear structure and particle physics.

Lecture Content

HEAT and TEMPERATURE Temperature Scales Kinetic Theory of Gases Thermodynamics and Heat Transfer LIGHT and OPTICS: Nature of Light and Laws of Geometric Optics Image Formation Interference of Light Waves Diffraction Patterns and Polarization MODERN PHYSICS: Relativity Introduction to Quantum Physics Quantum Mechanics Atomic Physics Molecules and Solids Nuclear Structure Applications of Nuclear Physics Particle Physics and Cosmology

Lab Content

Collect data with appropriate sensors and significant figures. Analyze data in graphical form. Perform experiments involving geometric and wave optics. Perform experiments involving thermodynamics and heat transfer. Perform experiments involving quantum phenomena.

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: 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 Ling, S.J.; Sanny, J.; Moebs, B. University Physics Volume 2, 1st ed. OpenSTAX, 2024 Rationale: - 2. Required Ling, S.J.; Sanny, J.; Moebs, B. University Physics Volume 3, 1st ed. OpenSTAX, 2024

Other Resources

1. Coastline Library