PHYS C185: CALCULUS BASED PHYSICS: MECHANICS

Item	Value
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

The Physics C185, C280, and C285 sequence is required for science and engineering majors who need calculus-based physics. Topics include the kinematics and dynamics of translational and rotational motion of objects, conservation laws, Hooke's Law, simple harmonic motion, wave motion, fluid statics, and dynamics. PREREQUISITE: MATH C180. ADVISORY: MATH C185. Transfer Credit: CSU; UC: Credit Limitations: PHYS C120, PHYS C125 and PHYS C185, PHYS C280 combined: maximum credit, 1 series; No credit for PHYS C110, PHYS C110L or PHYS C140, CHEM C140 if taken after PHYS C120 or PHYS C185. C-ID: PHYS 205.**C-ID:** PHYS 205.

Course Level Student Learning Outcome(s)

1. Analyze and solve problems involving Newton's Laws of Motion.
2. Analyze and solve problems involving energy and momentum transfer.
3. Analyze and solve problems related to simple harmonic motion and waves.

Course Objectives

- 1. Analyze and solve physical problems related to the kinematics and dynamics of objects that are acted upon by multiple forces.
- 2. Analyze and solve physical problems involving energy and momentum transfer.
- 3. Analyze and solve problems involving fluid statics and dynamics.
- 4. Analyze and solve problems related to simple harmonic motion and waves.
- 5. Perform experiments using laboratory equipment and simulations, analyze the resulting data, and present the results in a scientific report.

Lecture Content

MECHANICS: Physics and Measurements - Units and Dimensional Analysis Motion in One Dimension - Kinematics and Free-fall Vectors, Vector Addition and Vector Products Motion in Two and Three Dimensions. Particle Dynamics and Newton's Laws Work and Energy, Conservation of Energy, Power Conservation of Momentum, Collisions Kinematics and Dynamics of rotating objects, Angular Momentum, Conservation of Angular Momentum Static Equilibrium Universal Gravitation Fluid Statics and Dynamics - Archimedes and Bernoulli's Principles OSCILLATIONS, WAVES, and SOUND Oscillatory Motion Wave Motion Sound Waves Superposition and Standing Waves

Lab Content

Collect data with appropriate sensors and significant figures. Analyze data in graphical form. Perform experiments involving positions, velocities, accelerations and forces. Perform experiments involving buoyancy and fluid mechanics. Perform experiments involving oscillators and simple harmonic motion.

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.

Textbooks Resources

1. Required Young, H.; Freedman, R. University Physics with Modern Physics, 15th ed. Pearson, 2020 Rationale: - 2. Required Ling, S.J.; Sanny, J.; Moebs, B. University Physics Volume 1, 1 ed. OpenSTAX, 2020

Other Resources

1. Coastline Library