

College of San Mateo
Official Course Outline

1. **COURSE ID:** PHYS 211 **TITLE:** General Physics I-Calculus Supplement

Units: 1.0 units **Hours/Semester:** 16.0-18.0 Lecture hours; and 32.0-36.0 Homework hours

Method of Grading: Letter Grade Only

Prerequisite: Completion of or concurrent enrollment in MATH 242 or MATH 252; Completion of or concurrent enrollment in PHYS 210.

2. **COURSE DESIGNATION:**

Degree Credit

Transfer credit: CSU; UC

3. **COURSE DESCRIPTIONS:**

Catalog Description:

Application of calculus to topics in PHYS 210. Primarily intended for majors requiring one year of calculus-based physics.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**

Upon successful completion of this course, a student will meet the following outcomes:

1. Identify mechanics and thermodynamics problems that should be solved using differential calculus and correctly solve them.
2. Identify mechanics and thermodynamics problems that should be solved using integral calculus and correctly solve them.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**

Upon successful completion of this course, a student will be able to:

1. Solve kinematics problems in one and two dimensions using differential calculus.
2. Solve kinematics problems in one and two dimensions using integrals with limits.
3. Compute the work done on an object by a force using a line integral in one dimension. Use the result to solve problems that require the work-energy theorem.
4. Compute the impulse imparted to an object by a force during a specified time interval using an integral. Use the result to solve problems using the impulse-momentum theorem.
5. Determine the net force on an object given its momentum as a function of time.
6. Determine the location of the center-of-mass of an object using integration.
7. Determine the moment of inertia of an object using integration.
8. Calculate hydrostatic forces and torques exerted on flat objects using integration.
9. Calculate the work done by an ideal gas using integration.

6. **COURSE CONTENT:**

Lecture Content:

1. Kinematics in one and two dimensions including circular motion and optimization problems using derivatives and definite integrals
2. Work as a line integral and the Work-Energy Theorem
3. Impulse as the time integral of force, the Impulse-Momentum Theorem and force as the time derivative of momentum
4. Center of mass and moment of inertia calculations using integration
5. Selected topics from the following:
 - A. Gravitational force of extended objects
 - B. Hydrostatic forces and torques
 - C. Simple Harmonic Motion
 - D. Work done by an ideal gas and adiabatic processes

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

- A. Lecture
- B. Discussion
- C. Other (Specify): Lecture with Examples, Guided problem solving, Out of class assignments are homework problems that illustrate and elaborate on the topics covered in lecture.

8. REPRESENTATIVE ASSIGNMENTS

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Students complete homework problems, either hand written or online depending on the instructor and the mode of delivery of the course. Assignments consist of approximately 4 physics problems per week. Each problem requires interpretation by the student, set-up of the problem, and working out the solution.

Reading Assignments:

Students read one 3-4 page handout per week addressing the weeks topic. Handout supplements material presented in the requisite course Physics 210.

9. REPRESENTATIVE METHODS OF EVALUATION

Representative methods of evaluation may include:

- A. Exams/Tests
- B. Homework
- C. Graded homework assignments and exams.

10. REPRESENTATIVE TEXT(S):

Possible textbooks include:

- A. Young, Adams, and Chastain. *College Physics*, 11th ed. Pearson, 2019

Other:

- A. Physics 211 Worksheets written by CSM Physics faculty, continually revised.

Origination Date: November 2020

Curriculum Committee Approval Date: December 2020

Effective Term: Fall 2021

Course Originator: David Locke