

# PHYS 2CM: GENERAL PHYSICS: CALCULUS SUPPLEMENT

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	1
Hours:	1 lecture per week (12 total per quarter)
Prerequisite:	MATH 1B or 1BH.
Corequisite:	Completion of or concurrent enrollment in PHYS 2C.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU/UC
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

## Student Learning Outcomes

- The student will be able to solve problems in Modern Physics involving calculus.
- The student will be able to interpret phenomena in Waves and Optics with a calculus treatment.

## Description

Application of calculus to physics topics and problems in thermodynamics, waves, optics and modern physics.

## Course Objectives

The student will be able to:

- Solve problems in thermodynamics involving calculus
- Interpret phenomena in waves and optics with a calculus treatment
- Solve problems in modern physics involving calculus

## Course Content

- Solve problems in thermodynamics involving calculus
  - Work in thermodynamics
    - Area under the curve
    - Isotherms
  - Adiabatic processes
    - Definition
    - Relationship between temperature and pressure
    - Conserved quantities and work done
  - Entropy using integrals
    - Definition
    - Entropy in temperature change
    - Entropy in free expansion of gas
    - Entropy of mixing
  - Speeds and the Maxwell-Boltzmann velocity distribution
- Interpret phenomena in waves and optics with a calculus treatment

- The wave equation
  - Definition/solution
  - Speed
  - Energy transport
- Snell's Law as a minimization problem
- Rainbows
  - Refraction by raindrops
  - Minimization leading to the rainbow
- Solve problems in modern physics involving calculus
  - Radioactivity
    - Differential equation
    - Exponential decay and half-lives
  - Schrodinger's equation - particle in a box
    - The time-independent equation
    - Conditions that define a particle in a box
    - Solutions
  - Schrodinger's equation - probabilities
    - Probabilistic interpretation of quantum mechanics
    - How to use coefficients to generate probabilities

## Lab Content

Not applicable.

## Special Facilities and/or Equipment

When taught via Foothill Global Access, on-going access to computer with email software and hardware; email address.

## Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Weekly assignments  
Midterms  
Final examination

## Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture  
Demonstration

## Representative Text(s) and Other Materials

Instructor-generated materials. Text at the level of Halliday and Resnick optional.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- Homework problems covering subject matter from text and related material ranging from 3-10 problems per week. Students will need to employ critical thinking in order to complete assignments.

- b. One hour per week of lecture covering subject matter from text and related material. Reading and study of the textbook, related materials and notes.

## **Discipline(s)**

Physics/Astronomy