# 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:

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

## **Course Content**

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

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

1. 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.

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



Physics/Astronomy