PHYS 2BM: 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 2B.
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 apply the methods of calculus to calculate electric fields and potentials from charge distributions.
- The student will be able to apply the methods of calculus to solve for the electric/magnetic fields generated from changing electric/magnetic fields.
- The student will be able to apply the methods of calculus to calculate electric and magnetic fields for the appropriate symmetric distributions.
- The student will be able to apply the methods of calculus to solve problems in circuits with time-varying behavior.

Description

Application of calculus to physics topics and problems in electricity and magnetism.

Course Objectives

The student will be able to:

1. Apply calculus to fields
2. Solve problems involving electric fields or voltages, using calculus
3. Apply calculus to circuits
4. Apply calculus to magnetic field problems
5. Interpret EM waves as solutions to Maxwell's equations

Course Content

1. Apply calculus to fields
    a. Review of calculus
        i. Derivatives
        ii. Integrals
    b. Concept of fields
        i. Vector fields
        ii. Graphical interpretation
2. Solve problems involving electric fields or voltages, using calculus
    a. Electric fields from charge distributions
    b. Gauss's Law
        i. Concept of flux
        ii. Symmetries where Gauss's Law can be used
        iii. Solving for electric fields
    c. Voltages
        i. Calculation of voltages from electric fields (and reverse operation)
        ii. Calculation of voltages from charge distributions
3. Apply calculus to circuits
    a. RC circuits
        i. First order differential equations
        ii. Time behavior of RC circuits
    b. LRC circuits
4. Apply calculus to magnetic field problems
    a. Magnetism from Biot and Savart
    b. Ampere's Law
    c. Faraday's Law
        i. Calculation of induced voltage/current/field
        ii. Concept of inductance
5. Interpret EM waves as solutions to Maxwell's equations

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.

Discipline(s)

Physics/Astronomy