

General Information

PHGN361

Coordinator: Frank Kowalski

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Text: *The Electromagnetic Field* by Albert Shadowitz.

Prerequisites: PHGN200 and PHGN311.

Learning Objectives: The purpose of this course is to (a) enhance critical thinking skills and motivation via questioning (b) develop analytical skills, particularly with regard to vector calculus (b) improve problem solving skills. The overall student learning objective is to become scientifically literate, that is, to have the contextualized knowledge and analytic skills necessary to construct an understanding of real world phenomena in the domain of electricity and magnetism.

Topics: Static electric and magnetic fields in free space, dielectric materials, and magnetic materials; steady currents; scalar and vector potentials; Gauss's law and Laplace's equation applied to boundary value problems; Ampere's and Faraday's laws.

Grades: We will have an exam about every two weeks plus a final. Tentatively, all exams will contribute 70% of the final grade while the homework will contribute 10% and class participation 20%.

Homework: Problem assignments will be made and collected on a weekly basis. You may consult me or other students about any homework questions. However, direct copying will be treated as academic dishonesty.

Homework due at the beginning of class Jan. 15

1. Calculate the area of a circle of radius R first by first deriving the infinitesimal area in dr and $d\theta$ and then by carrying out the integration.
2. Calculate the area of a sphere of radius R first by first deriving the infinitesimal area in $d\phi$ and $d\theta$ and then by carrying out the integration.
3. Calculate the volume of a sphere of radius R first by first deriving the infinitesimal area in dr and $d\theta$ and then by carrying out the integration.
4. Chapter 1: Section 1-1 problems 3 and 8, Section 1-2 problems 2 and 9, Section 1-3 problem 2, Section 1-4 problem 5.
5. Derive an integral expression for the electric field at point (x_0, y_0, z_0) from a uniformly charged spherical shell centered at the origin.

Homework rules

1. Write a statement of the assignment (chapter number and problem numbers) at the top of the first sheet.
2. Write your name in block letters, last name first.
3. Draw a line at beginning and at the end of each problem.
4. Only when explicitly stated for a particular problem in the homework assignment will you need to do the following. Box in

Principles

,

Method of Solution

,

Check

 and write the appropriate solution below each of these boxes.

5. Include a well-labeled diagram where appropriate and work each part to an answer.
6. Staple pages together with problems in numerical order.
7. If the work presented is not legible to the grader then credit will not be given.