SMU Spring 2012

Physics 1308 : Electromagnetism

Syllabus

Instructor : Will McElgin
Office : Fondren 49
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Email : mcelgin@physics.smu.edu
Office Hours : Tuesday and Thursday 2pm-4pm

Lecture Times : Tuesday and Thursday 9:30am-10:50am
Lecture Location : Fondren 158

Teaching Assistant : Farley Ferrante
TA Email : fferrante@mail.smu.edu
Text: Halliday, Resnick and Walker, "Fundamentals of Physics, Volume 2, 9th edition"
Text Website : http://edugen.wileyplus.com/edugen/class/cls247381
Course Website : http://www.physics.smu.edu/mcelgin/P1308_spring2012/P1308.html

Course Description

This course is intended as a calculus-based introduction to electromagnetism and related topics. Initially, the concepts of electric charge, field, and potential will be introduced. Following this, there will be a treatment of electric current, magnetism, and electromagnetic induction. To complete the foundations of electromagnetism, the last of Maxwells equations will then be introduced. This permits a description of light as electromagnetic radiation. Various topics in the physics light will be covered, including refraction, interference and diffraction. Finally, a treatment of special relativity will be given. There will be an emphasis on in-class problem solving using similar ideas and techniques as required on homework and exams.

Evaluation

There will be two exams (25% each), and a semi-cumulative final (25%). Homework (25% total) will be collected approximately weekly. Attendance in class is strongly expected and, unless expressly told otherwise, students are responsible for all aspects of the class discussion.

Instructor Formulated Student Learning Outcomes

It is expected that students should be able to incorporate physical concepts with mathematical techniques to solve problems in Electromagnetism and related topics. While only algebraic techniques will be required on exams, calculus will be utilized in the class discussion and in selected homework problems, and is expected that students will be conversant in these descriptions of physics.

General Education Student Learning Outcomes

Students demonstrate the ability to understand, critique, and draw conclusions from numerical arguments and data. Students demonstrate basic facility with the methods and approaches of scientific inquiry and problem-solving.

Schedule

1/17 : Preliminaries and Electric Force. Chapter 21.

1/19 : Force and the Electric Field. Chapters 21 and 22.

1/24 : Electric Field. Chapter 22.

1/26 : Electric Field and Gauss' Law. Chapters 22 and 23.

1/31 : Gauss' Law. Chapter 23.

2/2 : Gauss' Law and Electric Potential. Chapters 23 and 24.

2/7 : Electric Potential. Chapter 24.

2/9 : Electric Potential and Capacitance. Chapters 24 and 25.

2/14 : Capacitance. Chapter 25.

2/16 : Exam 1.

2/21 : Current and Magnetic Force. Chapters 26 and 28.

2/23 : Current and Magnetic Force. Chapters 26 and 28.

2/28 : Magnetic Fields. Chapter 29.

3/1 : Magnetic Fields. Chapter 29.

3/6 : Magnetic Fields. Chapter 29.

3/8 : Faradays Law and Electromagnetic Induction. Chapter 30.

3/20 : Faradays Law and Electromagnetic Induction. Chapter 30.

3/22 : Faradays Law and Electromagnetic Induction. Chapter 30.

3/27 : Exam 2.

3/29 : Maxwells Equations. Chapter 32.

4/3 : Maxwells Equations. Chapter 32.

4/5 : Maxwells Equations and Electromagnetic Waves. Chapters 32 and 33.

4/10 : Electromagnetic Waves. Chapter 33.

4/12 : Electromagnetic Waves and Interference. Chapters 33 and 35.

4/17 : Interference. Chapter 35.

4/19 : Relativity. Chapter 37.

4/24 : Relativity. Chapter 37.

4/26 : Relativity. Chapter 37.

5/2 : Final Exam 11:30am-2:30pm