Shih Chien University

STP Program (July 01-Aug 02)

PHY 122 Electromagnetism

Course Outline

Course Code: PHY 122

Instructor: Roberto Vega

Home Institution: Southern Methodist University

Office Hours: TBA

Email: rvega@mail.smu.edu

Credits: 4

Class Hours:

This course will have 144 class hours, including 50 lecture hours, professor 30 office hours, 20-hour TA discussion sessions, 10-hour review sessions, 34-hour extra classes.

Prerequisites: N/A

Course Description:

This course covers the subfield of physics called electromagnetism. It deals with one of the four fundamental forces of nature, the electromagnetic force. The principles of electromagnetism underlie the design of every modern electronic device. The electromagnetic force is, like the force of gravity, is ubiquitous in every aspect of our lives.

Course Objectives:

Upon successful completion of this course, students will be able to:

- 1) demonstrate basic facility with the methods and approaches of scientific inquiry and problem-solving
- 2) explain how the concepts and findings of physics shape our world
- 3) solve short and extended problems in introductory electromagnetics
- 4) Explain why light from the sun takes 8 minutes to reach earth, how to avoid being struck by lightning, how a Faraday cage works and other fun facts.

Student Learning Outcomes

Upon successful completion of this course, students will meet the expectations from the Quantitative Reasoning student learning outcomes:

- Students will be able to develop quantitative models appropriate to problems in Physics.
- Students will be able to assess the strengths and limitations of quantitative models and methods used in Physics.
- Students will be able to apply symbolic systems of representation.
- Students will be able to collect, organize and analyze data from a variety of sources. Students will be able to formulate structured and logical arguments.
- Students will be able to test hypotheses and make recommendations or predictions based on results.
- Students will be able to communicate and represent quantitative information or results numerically, symbolically, aurally, visually, verbally, or in writing.

How this course achieves these Student Learning Outcomes:
The above objectives will be achieved through: participation in in-class discussion of lecture and reading materials; discussion with the lead instructor(s) of reading and lecture during regular office hours; successful completion of routine homework assignments; successful completion of several in-class examinations. In addition, students are expected to show proficiency in the application of these ideas through a parallel laboratory course.

Required Course Materials:

Halliday, Resnick, and Walker, “Fundamentals of Physics”

Grading & Evaluation:

Homework (30%), three partial exams (35%), and final exam (35%). Typically, the standard grade assignment will apply.

Grading System (1 ~ 100):

Quality Points	Grade	Percentage %
4	**A**	**80-100**
3	**B**	**70-79**
2	**C**	**60-69**
1	**D**	**50-59**
0	**E**	**0-49**

Course Schedule

WEEK	Lecture Topic	Text Reading	Helpful Links
1	Introduction, Electric Charge Coulombs Law	21-1 to 21-3 21-4 to 21-6	Static Electricity
	Coulombs Law Electric Fields	21-4 to 21-7 22-1 to 22-5	Electric Fields Simulation
	Electric Fields Continuos Charge Distributions	 22-6 to 22-9	
	Continuos Charge Distributions Gauss Law	22-6 to 22-9 23-1 to 23-5	 Khan Academy
	Gauss Law Applications	23-5 to 23-9	
2	Electric Potential	24-1 to 24-8	Electric Potential & Potential Energy
	Potential Energy	24-7 to 24-8	Equipotentials Simulation

Academic Inquiry: Shih Chien University

Disclaimer: Course schedule is subject to change.

	Elect. Pot. And Conductors		
	Capacitance	Chapter 25	RC Circuits Simulation
	Current and Resistence	Chapter 25 Chapter 26	 Ohm's Law
	Circuits	Chapter 27	
3	Magnetic Fields	Chapter 28	 Charges Moving in E- & B-Fields Simulation
	Magnetic Fields due to Currents	29-1 to 29-2	
	Ampere's Law	29-3 to 29-5	
	Induction and Inductance	30-1 to 30-5	Long-Straight Wire in B-Fields Simulation B-field Around Parallel Wires Simulation
	RL Circuits, Energy Storage	30-6 to 30-9	Ampere's Law reference
4	Oscillations	31-1 to 31-7	Faraday's Induction Law Simulation
	RLC Circuits	31-8 to 31-11	Lenz's Law Simulation Simulation
	RLC Circuits	31-8 to 31-11	RLC Youtube
	Maxwells' Equations	32-1 to 32-7	Maxwell's Equations Hyperphysics
	Maxwells' Equations	32-1 to 32-7	

5	Magnetic Materials	32-8 to 32-11	
	Electromagnetic Waves	Chapter 33	EM-Waves
	Images	Chapter 34	Ray Optics
	Interference	Chapter 35	The Double Slit Experiment
	Diffraction	Chapter 36	The bending of Light