Jacksonville State University
College of Arts and Sciences
Updated June 27, 2006

PHS 212 PHYSICS FOR SCIENTISTS AND ENGINEERS II

COURSE DESCRIPTION

This course is the second half of a two-semester sequence designed to introduce the basic concepts of physics. Electricity and magnetism will be the heart of this course, where study of the individual fields will lead to their merging into electromagnetism. Following the emergence of electromagnetic waves, we will study their properties in detail, both as waves and using the ray approximation that leads to geometric optics. Throughout the semester, we will take advantage of the power of calculus to depict the natural world by weaving its structure into our physical laws and theories. Since the development of both calculus and Newtonian mechanics by Sir Isaac Newton, calculus and physics have been intertwined, and students in this course will see these close connections. Prerequisites: PHS 211 and MS 142 or equivalent. Corequisite: PHS 212L: Elementary Lab Techniques II.

TEXT

Physics for Scientists and Engineers (3rd ed.) by Giancoli

COURSE OBJECTIVES

To learn the concepts of electricity, magnetism, and light.
To learn the interrelationships between the concepts.
To learn the fundamental mathematical basis of science

COURSE OUTLINE

Topic	Reading
Electric Charge	Ch. 21.1 – 4
Electric Field	 Ch. 21.5 – 6 Ch. 21.6 – 8
Gauss's Law Electric Potential	Ch. 21.9 – 11, Ch. 22.1 Ch. 22.2 – 3 Ch. 23.1 – 4
Capacitance Batteries, Current and Resistance	Ch. 23.5 – 8, Ch. 24.1 Ch. 24.2 – 5 Ch. 25.1 – 3
 DC Circuits Kirchhoff's Rules	Ch. 25.4 – 10 Ch. 26.1 – 2 Ch. 26.3 – 4
Magnetism **Exam 1**	Ch. 27.1 – 4 Ch. 27.5, 7 – 9 **Ch. 21 – 26**

Magnetic Fields Faraday's Law	Ch. 28.1 – 2 Ch. 28.3 – 6 Ch. 29.1 – 2
Inductance AC Circuits	Ch. 29.3, 6 – 7 Ch. 30.1 – 4 Ch. 30.5 – 6, Ch. 31.1 – 2
 Maxwell's Equations	Ch. 31.3 – 6 Ch. 32.1 – 4 Ch. 32.5 – 7
Light Lenses **Exam 2**	Ch. 33. 1 – 4 Ch. 33.5 – 7, Ch. 34.1 **Ch. 27 – 32**
Lenses Light Waves	Ch. 34.2 – 4 Ch. 34.6 – 7, Ch. 35.1 – 2 Ch. 35.3 – 4, 6
Diffraction Thermal Energy	Ch. 36.1, 4 – 5, 7, Ch. 36.10 – 12 Ch. 17.1 – 17.4
First Law of Thermodynamics **Exam 3**	Ch. 19.1 – 19.5 Ch. 19.6 – 19.7 **Ch. 33 – 36**
	Ch. 19.8 – 19.10
Second Law of Thermodynamics **Comprehensive Final Exam**	Ch. 20.1, 20.5 – 20.8

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PHS 212L ELEMENTARY LAB TECHNIQUES II

COURSE DESCRIPTION

Concepts of physics developed in the associated lecture courses will be studied through the use of hands-on activities. Students will work in groups to explore topics in electricity, magnetism, optics, and modern physics.

TEXT

Physics Lab Manual, by Dr. Laura Weinkauf

COURSE OBJECTIVES

To learn the methods of science and scientific inquiry.
To learn the mathematical and statistical basis of the concepts.
To learn real-world applications of the concepts.

COURSE OUTLINE

Charges and Electric Forces
Capacitors
Moving Charges
Resistance, Voltage and Current in Circuits
Kirchhoff's Laws
Magnets
e/m for the Electron: The Discovery of the Electron
Atomic Spectra
Lenses and Mirrors
Continue Lenses and Mirrors
Interference Patterns