

PHY 301 – Modern Physics Syllabus

Credit

3 semester hours

Prerequisites

PHY 152 or PHY 252 (Second semester physics) and MAT 122 (Second semester calculus)

Course Description

Introduction to the subjects of special relativity, quantum theory, atomic, nuclear, and particle physics. An oral presentation on a relevant topic, selected in consultation with the instructor, will be made by each student.

Rationale for Course

Physics is the study of the physical phenomena that we observe in our universe. It is broad ranging and essential to all the sciences. This course aims to further explore the fundamental concepts of physics, focusing primarily on the revolutionary physics discoveries of the 20th century. Students will develop problem solving skills, learning how to logically approach and evaluate a variety of physical situations.

Learning Objectives

- The student will explore the physics of particles moving at constant velocities near the speed of light (special relativity) and will become proficient in the analysis of special relativity problems.
- The student will explore the physics of light, specifically how a wave-particle interpretation of light is necessary to explain observed phenomena such as interference, diffraction, and the photoelectric effect.
- The student will explore how a wave-particle interpretation of matter is necessary to explain observed phenomena at the atomic level (such as electron diffraction) and the unexpected consequences of this interpretation.
- The student will learn about elementary particles and the methods used to classify these particles under the Standard Model.

Academic Integrity

Students are expected to be honest and to submit their own work on exams and research papers. Strict adherence to the Mississippi College "Honesty Policy" (*2010-2011 Mississippi College Undergraduate Bulletin*, pg. 60) will be followed.

Course Outline

- The Special Theory of Relativity
- The Particlelike Properties of Electromagnetic Radiation
- The Wavelike Properties of Particles
- The Schrodinger Equation
- Statistical Physics
- Elementary Particles and Nuclear Structure
- The Standard Model and an Introduction to String Theory

Method of Instruction

Class will consist primarily of presenting fundamental physics concepts, working problems, and discussing in-class demonstrations. Key points will be highlighted by the choice of examples, and these points will be discussed in the context of the example.

Required Text

Modern Physics, Second Edition by Kenneth Krane.

Recommended Text

University Physics, Twelfth Edition by Young and Freedman

Grading

The final average will be computed as follows: 40% will be from lecture tests, 20% from homework, 20% from class presentation, and 20% from the final exam. The final exam is comprehensive.

Scale:	Grade	Final Average
	A	90-100
	B	80-89
	C	70-79
	D	60-69
	F	0-59

Makeup Tests

Makeup tests will be given only under the following circumstances:

- Consent of the instructor has been obtained prior to the test.
- An excused absence is obtained from a doctor or the Vice-President for Academic Affairs

Absences

Mississippi College policies on attendance and academic integrity will be enforced. Please see the *2010-2011 Mississippi College Undergraduate Bulletin, pg. 56-57* for additional details of these policies. Students are responsible for all work missed during an absence.

Special Needs

If you need special accommodations due to learning, physical, psychological, or other disabilities, please contact the Counseling and Career Development Center (601-925-3354).