

# PHY 251 – Fundamentals of Physics I

## Syllabus

### Credit

4 semester hours

3 hours of lecture per week, 3 hours of lab per week

### Co-requisites

MAT 122 (Second semester calculus)

### Course Description

Mechanics, thermodynamics, waves, and sound presented with the aid of calculus.

### 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 introduce the fundamental concepts of physics, focusing primarily on the area of classical mechanics. Students will develop problem solving skills, learning how to logically approach and evaluate a variety of physical situations.

### Learning Objectives

- The student will become proficient in the use of algebra and calculus to describe and analyze classical linear and rotational motion and static mechanics problems.
- The student will become proficient in the use of vector mathematics.
- The student will be able to use kinematic equations to analyze problems involving motion at a constant acceleration.
- The student will understand physical motion based on the principles of Newton's Laws and will be able to analyze classical mechanics problems using Newton's Laws.
- The student will become familiar with the principles of conservation of energy and conservation of momentum and will be able to analyze classical mechanics problems using these conservation principles.
- The student will be introduced to the concept of periodic motion and will be able to solve problems displaying simple harmonic behavior.
- The student will become familiar with the physical properties of fluids and will be able to analyze problems involving fluids at rest and in motion.
- The student will become familiar with the physical properties of mechanical waves and will be able to analyze problems involving mechanical wave propagation.

### 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

- Units, Physical Quantities, and Vectors
- Motion in One Dimension
- Motion in Two and Three Dimensions

- Newton's Laws of Motion
- Work and Kinetic Energy
- Potential Energy and Energy Conservation
- Momentum, Impulse, and Collisions
- Rotation of Rigid Bodies
- Dynamics of Rotational Motion
- Equilibrium and Elasticity
- Periodic Motion
- Fluid Mechanics
- Mechanical Waves and Sound

### 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 and Materials

*University Physics with Modern Physics, 12<sup>th</sup> Edition*, by Young and Freedman. In addition to the text, you will need a scientific calculator and a laboratory data notebook. Procedures for individual lab experiments can be found online at [http://www.mc.edu/academics/departments/physics/lab\\_information/](http://www.mc.edu/academics/departments/physics/lab_information/). You are expected to have the laboratory procedures printed out and previewed before you come to lab. It may also be beneficial to bring a set of colored pencils to lecture and lab. Figures shown on the board are often drawn in multi-color for clarity, so it is recommended that the illustrations in your notes take advantage of this capability as well.

### Grading

The final average will be computed as follows: 60% will be from lecture tests, 20% from lab, and 20% from the final exam. The final exam is comprehensive. Lab points will be determined based on lab report grades (see Lab Policies and Procedures handout).

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).