Adopted: 1980
Reviewed: 1985, 2007, 2011
Revised: 1990, 1998, 2001, 2004, 2008, 2011

Alabama Department of Postsecondary Education

Representing Alabama's Public Two-Year College System

Jefferson State Community College

PHY 201
General Physics I – Trig Based

I. **PHY 201 General Physics I – Trig Based – 4 Semester Hours**
Core Area III, ASCI TSCI (Lec 3 hrs, Lab 2 hrs)

II. **Course Description**
This course is designed to cover general physics at a level that assures previous exposure to college algebra and basic trigonometry. Specific topics include mechanics, properties of matter and energy, thermodynamics, and periodic motion. Lab is required.

III. **Prerequisite**

MTH 113 or equivalent

IV. **Textbook**
College Physics: A Strategic Approach. Knight, Jones and Field. 2nd edition. Addison/Wesley.

V. **Course Objectives**

The student will:

A. Gain an understanding of the basic principles and concepts of physics presented.
B. Appreciate applications of physics to the real world.
C. Develop techniques of problem solving.
D. Acquire knowledge to be used in future courses.
E. Develop an aptitude for empiricism (the pursuit of knowledge through observation and experiment)

VI. **Course Outline of Topics**

A. Measurement and mathematics
B. Kinematics
C. Vectors (projectile motion)
D. Laws of motion and equilibrium
E. Unifrom circular motion
F. Gravitation
G. Work, energy and power

H. Linear and angular momentum
I. Mechanics and fluids
J. Gas laws and thermodynamics
K. Periodic motion

Suggested Labs:

A. Statistical analysis of data – error analysis
B. Density
C. "g" by free fall
D. Projectile motion
E. Force table
F. Centripetal acceleration
G. Moment of interia
H. Ballistic Pendulum
I. Conservation of momentum
J. Equilibrium
K. Young's Modulus
L. Calorimetry
M. Linear expansion
N. Hooke's Law
O. The pendulum

VII. GENERAL COURSE COMPETENCIES:

A. The student will acquire the basic vocabulary for this first course in general physics.
B. The student will understand Newton's laws and attendant concepts and will be able to apply these in appropriate situations.
C. The student will understand energy and momentum and be able to apply these concepts to describing the behavior of systems of particles.
D. The student will understand and be able to apply principles relating to the macroscopic properties of matter.
E. The student will demonstrate an understanding of the techniques required to observe carefully and to measure precisely.
F. The student will develop skills in reasoning logically and reporting results concisely from the data obtained.
G. The student will be able to apply the techniques required to understand physical laws and principles by actual experimentation.
H. The student will demonstrate an ability to use the basic tools of measurements as applied to distance, time, mass and temperature.
I. The student will be able to apply the techniques of collecting and analyzing experimental data, including graphic and statistical analysis.

VIII. COURSE OBJECTIVES STATED IN PERFORMANCE TERMS:

A. The student will acquire the basic vocabulary for this first course in general physics. The student will be able to:
    1. Define such terms as: force, mass, inertia, energy, friction, momentum, torque and pressure.
    2. Define such concepts as: conservation of energy and conservation of momentum.
B. The student will understand Newton's laws and attendant concepts and will be able to apply these in appropriate situations. The student will be able to:
    1. Differentiate between mass and weight and use these quantities correctly in problems.
    2. State and use in problem situations the three laws known as Newton's laws.

3. Incorporate friction forces into a system of forces in applying Newton's laws.
4. Resolve vectors into their respective components along given sets of axis.
5. Distinguish between vector and scalar quantities.
6. Use in problem situations the equations of angular motion.
7. Use equations of centripetal acceleration and centripetal force and be able to define these terms.
8. State and apply the Law of Universal Gravitation.
9. Define the terms of torque and lever arm and use these terms in problem situations.
10. Compute frictional force when the normal force and coefficient of friction are known.
11. Solve problems dealing with rigid systems in both translational and rotational equilibrium.

C. The student will understand energy and momentum and be able to apply these concepts to describing the behavior of systems of particles. The student will be able to:
   1. Solve problems involving work, energy, and power, including the conservation of energy principle, in which one form of energy decreases while another form increases.
   2. Apply Hooke's law and energy concepts to simple harmonic motion.
   3. Use the concept of conservation of momentum (both linear and angular) of elastic and inelastic systems.
   4. Solve problems involving gravitational potential energy, translational kinetic energy, and rotational kinetic energy.

D. The student will understand and be able to apply principles relating to the macroscopic properties of matter. The student will be able to:
   1. Define and solve problems dealing with the density and specific gravity of solids, liquids, and gases.
   2. State and apply Archimedes' Principle in problem situations.
   3. Use the Bernoulli relation in problems involving rate of flow, height in reference to a given point, and pressure.

E. The student will demonstrate an understanding of the techniques required to observe carefully and to measure precisely. The student will be able to:
   1. Demonstrate correct graphing techniques with cartesian, semi-log, and log-log graph paper.
   2. Apply various techniques to calculate the initial velocity of a projectile.
   3. Apply Hooke's law and relate this law to simple harmonic motion, both linear and rotational.
   4. Observe motion of simple and physical pendulums and will apply the scientific method to determine the interrelationships between the associated members.

F. The student will develop skills in reasoning logically and reporting results concisely form the data obtained. The student will be able to:
   1. Construct a graph on the appropriate scales including units, clearly indicating data points and drawing the best fit curve.
   2. Demonstrate the technique for presenting and analyzing data by the submission of well written laboratory reports.
   3. Include as a minimum:
      a. Data in a neat and clearly presented form.
      b. Graphs (where appropriate).
      c. Sample calculations.
      d. Analysis - The student will discuss the results obtained from his/her collected data, comparing these to the theoretical relationships. In all

cases, the student will explain any discrepancies between experimentally derived results and theoretical expectations.

G. The student will be able to apply the techniques required to understand physical laws and principles by actual experimentation. The student will be able to:
   1. Calculate the densities of various materials based on appropriate measurements.
   2. Calculate the acceleration due to gravity by both graphical and arithmetic means from the collected data of displacement and time.
   3. Place a system of particles in equilibrium.
   4. Measure the mechanical advantage of simple machines.
   5. Apply Archimedes' principle to find the density of unknown solids and liquids.

H. The student will demonstrate an ability to use the basic tools of measurements as applied to distance, time, mass and temperature. The student will be able to:
   1. Demonstrate facility in use of the apparatus by collecting and tabulating data to obtain results within 10% of the accepted standards.
   2. Correctly use instruments for linear measurement.

I. The student will be able to apply the techniques of collecting and analyzing experimental data, including graphic and statistical analysis. The student will be able to:
   1. Correctly interpret these graphs and where possible give the algebraic equation derived from the graphs.
   2. Produce the mathematical relations and the physical constants from the graphs of his/her data.
   3. Interpret the relationships between variables by mathematical and graphical analysis.
   4. Resolve forces into components along specific axis and apply the rotational and translational equilibrium conditions to forces in laboratory simulations.
   5. Apply the concept of friction to the solution of problems dealing with motion.

IX. Evaluation and Assessment

Grades are based on:

A. Periodic exams
B. Final exams
C. Lab Reports

Grades will be given based upon A = 90 – 100%, B = 80 – 89%, C = 70 – 79%, D = 60 – 69%, and F = below 60%.

X. Class Activities

A. Lecture
B. Problem solving
C. Laboratory exercises

XI. Attendance

Students are expected to attend all classes for which they are registered. Students who are unable to attend class regularly, regardless of the reason or circumstance, should withdraw from that class before poor attendance interferes with the student's ability to achieve the objectives required in the course. Withdrawal from class can affect eligibility for federal financial aid.

XII. Statement on Discrimination/Harassment

The College and the Alabama State Board of Education are committed to providing both employment and educational environments free of harassment or discrimination related to an individual's race, color, gender, religion, national origin, age, or disability. Such harassment is a violation of State Board of Education policy. Any practice or behavior that constitutes harassment or discrimination will not be tolerated.

XIII. Americans with Disabilities

The Rehabilitation Act of 1973 (Section 504) and the Americans with Disabilities Act of 1990 state that qualified students with disabilities who meet the essential functions and academic requirements are entitled to reasonable accommodations. It is the student's responsibility to provide appropriate disability documentation to the College. The ADA Accommodations office is located in FSC 300 (205-856-7731).