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Alabama Department of Postsecondary Education

Representing Alabama's Public Two-Year College System

Jefferson State Community College

PHY 202
General Physics II – Trig Based

I. PHY 202 General Physics II – 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 using college algebra and basic trigonometry. Specific topics include wave motion, sound, light optics, electrostatics, circuits, magnetism, and modern physics. Lab is required.

III. **Prerequisite**

PHY 201.

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. Waves (general, sound)
B. Electric fields
C. Electric potential
D. Capacitance
E. Circuits (simple, complex)
F. Magnetic fields

G. AC circuits
H. Light (electro-magnetic radiation, geometrical optics)
I. Selected topics from modern physics

Suggested Labs:

A. Waves on a string
B. Speed of sound
C. Plotting electric fields
D. Simple circuits
E. Resistors in series and parallel
F. Magnetic fields
G. Lenz's Law
H. RC circuit
I. Plane and curved mirrors
J. Refraction and lenses
K. Diffraction
L. Radioactivity

VII. Evaluation and Assessment

Specific information on how grade is determined to be included.

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

VIII. Class Activities

A. Lecture
B. Discussion
C. Experimentation
D. Demonstration
E. Recitation
F. Written examination

IX. GENERAL COURSE COMPETENCIES

A. The student will acquire the basic vocabulary for this second course in general physics.
B. The student will understand and be able to apply the concepts of electrostatics and electrodynamics.
C. The student will understand and be able to apply the concepts of magnetism and the relation between magnetism and electrodynamics.
D. The student will understand and be able to apply concepts of optics and light.
E. The student will understand the techniques required to observe carefully and 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 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, temperature, current and potential difference.
I. The student will be able to apply the techniques of collecting and analyzing experimental data, including graphic and statistical analysis.

X. COURSE OBJECTIVES STATED IN PERFORMANCE TERMS

A. The student will acquire the basic vocabulary for this second course in general physics. The student will be able to:

1. Define such terms as: electricity, electron, current, voltmeter, focal length, transformer and flux
2. Define such concepts as: Coulombs law, electrostatic induction, electric field, potential difference, Ohm's law and magnetic field

B. The student will understand and be able to apply the concepts of electrostatics and electrodynamics. The student will be able to:

1.Solve problems dealing with Coulombs law.
2.Describe the process of electrostatic induction.
3.Use the electric field concept to solve problems with a distribution of charge.
4.Relate the potential difference to the electric field.
5.Solve problems dealing with electrical potential energy.
6.Sketch the equipotential surfaces for various shaped conductors.
7.Solve physical problems dealing with capacitance and energy stored.
8.State Ohm's law.
9.Solve problems in capacitance when a dielectric material is used.
10. Solve problems with series and parallel resistors.
11. Solve problems dealing with Ohm's law and conservation of energy in electrical circuits.
12. Use Kirchoff's laws in a complete electrical circuit.

C. The student will understand and be able to apply the concepts of magnetism and the relation between magnetism and electrodynamics. The student will be able to:

1. Define the magnetic field in terms of the force on a moving charge or in terms of current.
2. Solve problems dealing with magnetic field phenomena.
3. Demonstrate the principles of a galvanometer, voltmeter and ammeter.
3. Derive the magnetic field due to an infinite straight conductor, circular turn and solenoid.
4. Define induced electromotive force (emf) and magnetic flux.
5. Apply Faraday's law and Lenz's law to determine the induced emf where there is a flux change.
6. Solve problems dealing with transformers.

D. The student will understand and be able to apply concepts of optics and light. The student will be able to:

1. Apply the equations for thin lenses to the solution of physical problems.
2. Obtain the solutions to certain physical problems with thin lenses by ray diagrams.
3. Solve problems dealing with the law of reflection of plane, concave and convex surfaces.
4. Apply the theory of simple lenses to those optical systems illustrated.
5. Apply the concept of wave motion to a description of light.

E. The student will understand the techniques required to observe carefully and measure precisely. The student will be able to:

1. Demonstrate correct graphing techniques.
2. Relate the concept of resistive heating to the techniques of calorimetry.
3. ap magnetic fields of bar magnets and/or current bearing wires, solenoids and flat coils, with iron filings.
4. Trace light rays reflected from and refracted by various surfaces.

F. The student will understand the techniques required to observe carefully and measure precisely. The student will be able to:
   1. Construct a graph on the appropriate scales including units, clearly indicating data points and drawing the best fitting curve.
   2. Include as a minimum:
      1. Data in a neat and clearly presented form.
      2. Graphs (where appropriate).
      3. 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 techniques required to understand physical laws and principles by actual experimentation. The student will be able to:
   1. Configure a set of resitors in series, parallel, or a mixed pattern, and to compare the results with theoretical predictions.
   2. Describe the relationship between current and the amount of material deposited in an electrolysis experiment.
   3. Describe the laws of reflection and refraction.
   4. Calculate the index of refraction of transparent media.
   5. Apply the equations for lenses and curved mirrors for the calculation of focal length and to describe the images formed by these surfaces for various object distances.

H. The student will demonstrate an ability to use the basic tools of measurements as applied to distance, time mass, temperature, current and potential difference. The student will be able to:
   1. Demonstrate facility in the use of the apparatus by collecting and tabulating data to obtain results within 10% of the accepted standards.
   2. Demonstrate the correct use of voltmeters, ammeters, and galvanometers.
   3. The student will be able to use the oscilloscope to determine A.C. voltages and frequencies.

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 equations derived from the graphs.
   2. Produce the mathematical relations and the physical constants from the graphs of data.
   3. Demonstrate the technique for presenting and analyzing data by the submission of well written laboratory reports.

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).