

**JEFFERSON COLLEGE**

**COURSE SYLLABUS**

**PHY112**

**ELEMENTARY COLLEGE PHYSICS II**

4 Credit Hours

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Revised by: Dr. Bob Brazzle  
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Minor Revision or Update by: Fran Moore  
Per Curriculum Committee Process Change: April 25, 2018

Ms. Constance Kuchar, Interim Division Chair, Math & Science  
Ms. Shirley Davenport, Dean, Arts & Science Education

## PHY112 Elementary College Physics II

### I. CATALOG DESCRIPTION

- A. Pre-requisites:
- PHY111, with a grade of C or better
  - Reading proficiency
- B. 4 semester hours credit
- C. Elementary College Physics II is an advanced study of topics from Elementary College Physics I and is designed to meet the requirements of pre-medicine students. The course is composed of three hours of lecture and two hours of laboratory per week (D)
- D. Curricular alignment: Elective course applies toward AA or AAT degree.

### II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

Expected Learning Outcomes	Assessment Measures
Develop knowledge of the fundamental laws of physics	Classroom discussions, homework, and exams
Develop comprehension of the methods and techniques used by physicists in the analysis of physical problems	Classroom discussions, homework, and exams
Become acquainted with the phenomenon that has had and continues to have a great impact on society	Classroom discussions, homework, and exams
Comprehend the difference between science and pseudoscience	Classroom discussions, presentation of alternative theories, and exams

### III. OUTLINE OF TOPICS

- A. Friction – Understand the difference between static and kinetic friction
- B. Statics
1. Develop a more detailed free body diagram
  2. Show that statics is just a special case of Newton's second law
  3. State the conditions for equilibrium
- C. Uniform circular motion
1. Diagram centripetal force
  2. Explain why centrifugal force is imaginary
- D. Elastic and inelastic collisions
1. State collisions that involve only conservation of momentum
  2. State collisions that involve both momentum and energy conservation
  3. Analyze two dimensional collisions

- E. Angular motion
  - 1. Derive the angular equations of motion
  - 2. Describe torque
  - 3. Classify angular momentum
  - 4. Calculate rotational kinetic energy
  - 5. Utilize conservation of angular momentum
  
- F. Fluids
  - 1. Use the gas laws in appropriate problem-solving
  - 2. Analyze Archimedes' principle
  
- G. Periodic motion
  - 1. State concepts of period, frequency, and amplitude
  - 2. Examine wave motion
  - 3. Define the simple pendulum
  
- H. Electrical capacitors – Investigate capacitors as storage devices for electrical energy
  
- I. Kirchhoff's laws
  - 1. Identify voltage nodes and current loops
  - 2. Calculate combinations of resistors
  - 3. Calculate combinations of capacitors
  - 4. Analyze complex electric circuits
  
- J. Alternating current
  - 1. State the relationship between direct and alternating currents
  - 2. Describe the production of alternating current
  
- K. Wave optics
  - 1. Treat light as a wave
  - 2. Define refraction
  - 3. Utilize Snell's law
  
- L. Quantum Mechanics
  - 1. Recount the historical development of quantum mechanics
  - 2. Criticize Rutherford's planetary model of the atom
  - 3. Outline the conflict with Newton's laws
  - 4. Review de Broglie's wave-particle duality
  - 5. Generalize Schrodinger's treatment of the electron as a wave
  - 6. Investigate the probability interpretation of the wave equation

IV. METHODS OF INSTRUCTION

- A. Lecture
- B. Classroom discussion
- C. Homework
- D. Laboratories

IV. REQUIRED TEXTBOOKS

Serway, Raymond; *College Physics* (current edition). Boston: Cengage.

*Physics Software Guide* by Cliff Castle

V. REQUIRED MATERIALS

Calculator and flash drive

VI. SUPPLEMENTAL REFERENCES

None

VII. METHODS OF EVALUATION

- A. Required homework
- B. Lab write-ups
- C. Examinations

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (TC 101; phone 636-481-3169).

X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, <http://www.jeffco.edu>).

## XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

## XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.