

**Course Outline**

**COURSE:** PHYS 2B                      **DIVISION:** 10                      **ALSO LISTED AS:**

**TERM EFFECTIVE:** Spring 2018    **CURRICULUM APPROVAL DATE:** 10/09/2017

**SHORT TITLE:** GENERAL PHYSICS II

**LONG TITLE:** General Physics II

Units	Number of Weeks		Contact Hours/Week		Total Contact Hours
4	18	Lecture:	3	Lecture:	54
		Lab:	3	Lab:	54
		Other:	0	Other:	0
		Total:	6	Total:	108

**COURSE DESCRIPTION:**

An introduction to the principles of physics using algebra and trigonometry. Topics include electricity and magnetism, light and optics, modern physics, and an introduction to relativity. (C-ID: PHYS 110) (C-ID: PHYS 100S: Phys 2A + Phys 2B) **PREREQUISITE:** Physics 2A with a grade of 'C' or better. **ADVISORY:** Eligible for English 250 and English 260

**PREREQUISITES:**

Completion of PHYS 2A, as UG, with a grade of C or better.

**COREQUISITES:**

**CREDIT STATUS:** D - Credit - Degree Applicable

**GRADING MODES**

L - Standard Letter Grade

**REPEATABILITY:** N - Course may not be repeated

**SCHEDULE TYPES:**

- 02 - Lecture and/or discussion
- 03 - Lecture/Laboratory
- 04 - Laboratory/Studio/Activity

**STUDENT LEARNING OUTCOMES:**

1. Identify, describe, compare and contrast gravitational, electric and magnetic forces and fields.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2018

Semester: Spring

2. Identify, describe, compare and contrast gravitational and electrical potential energy and electric potential.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2014

3. Identify, describe, compare and contrast circuit elements, and series and parallel circuits.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2018

Semester: Spring

4. Apply conservation of energy and conservation of charge to circuits using Kirchoff's Rules.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2014

5. Identify, describe, compare and contrast electromagnetic and sound waves.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2014

6. Identify, describe, compare and contrast reflection and refraction and the formation of images.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2018

Semester: Spring

7. Identify, describe, compare and contrast refraction, interference and diffraction.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2018

Semester: Spring

8. Identify and describe special relativity, time and length contraction, equivalence of mass and energy.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2015

9. Describe wave-particle duality, the photoelectric effect, the wave nature of matter, and the Heisenberg uncertainty principle.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2015

10. Describe the structure of the atom, compare and contrast the strong nuclear force, the electrostatic force, and the gravitational force, describe radioactive decay.

Measure of assessment: Exam, Lab

Year assessed, or planned year of assessment: 2015

## **CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS**

Curriculum Approval Date: 10/09/2017

Hours

3 Lec/3 Lab

Content: Electric forces and fields.

**Out of Class Assignments:** Reading and homework problems from text.

Student Performance Objectives: Student will identify, describe, compare and contrast electric charge, electric forces and gravitational forces, electric fields and gravitational fields, Coulomb's Law and Newton's Law of Gravitation. Student will identify, set-up, and solve electric field problems.

Lab: Conservation of charge.

Hours

3 Lec/3 Lab

Content: Electric potential energy and electric potential.

Out of Class Assignments: Reading and homework from text.

Student Performance Objectives: Student will identify, describe, compare and contrast electric potential energy and gravitational potential energy.

Student will identify and describe equipotential surfaces and their relationship to the electric field. Student will identify and describe capacitors. Student will identify, set-up, and solve electric potential energy and potential problems.

Lab: Electric fields.

Hours

6 Lec/6 Lab

Content: Electric circuits.

Out of Class Assignments: Problems and reading from the text.

Student Performance Objectives: Student will identify, describe, compare and contrast resistive circuits in series and parallel, Ohm's Law and Kirchoff's rules, resistors and capacitors in series and parallel. Student will identify, set-up, and solve circuit problems.

Lab: Ohm's Law.

Hours

6 Lec/6 Lab

Content: Magnetic forces and fields.

Out of Class Assignments: Reading and problems from the text.

Student Performance Objectives: Students will identify, describe, compare and contrast magnetic forces on moving charges, electrostatic forces and gravitational forces. Students will describe the force on a current carrying coil in a magnetic field. Students will identify, set-up, and solve magnetic force and field problems.

Lab: Conservation of energy in the magnetic field.

Hours

6 Lec/6 Lab

Content: Electromagnetic induction.

Out of Class Assignments: Problems and reading from the text.

Student Performance Objectives: Students will identify, describe, compare and contrast induced current and emf, magnetic flux, Faraday's Law, Lenz's Law, the electric generator, mutual and self-inductance, and transformers. Students will identify, set-up, and solve Faraday's Law problems.

Lab: Determine  $e/m$  for an electron.

Hours

3 Lec/3 Lab

Content: Electromagnetic waves.

Out of Class Assignments: Reading and problems from text.

Student Performance Objectives: Students will identify, describe, compare and contrast electromagnetic, transverse and longitudinal waves. Students will describe the electromagnetic spectrum, the energy carried by electromagnetic waves, the Doppler effect and polarization. Students will identify, set-up, and solve electromagnetic wave problems.

Lab: Polarization.

Hours

4 Lec/3 Lab

Content: Reflection of light.

Out of Class Assignments: Problems and reading from text.

Student Performance Objectives: Students will identify, describe, compare and contrast images formed by reflection from plane, concave and convex spherical mirrors. Students will identify, set-up, and solve reflection problems using ray diagrams and the mirror equation.

Lab: Images from mirrors.

Hours

6 Lec/6 Lab

Content: Refraction of light.

Out of Class Assignments: Reading and problems from text.

Student Performance Objectives: Students will identify, describe, compare and contrast images formed by refraction by

converging and diverging lenses, total internal reflection, polarization and dispersion. Students will identify, set-up, and solve refraction problems using ray diagrams and the thin-lens and magnification equations.

Lab: Images from lenses.

Hours

3 Lec/3 Lab

Content: Interference and wave nature of light.

Out of Class Assignments: Problems and reading from text.

Student Performance Objectives: Students will identify, describe, compare and contrast the double-slit experiment, single-slit experiment, thin-film interference, and diffraction. Students will identify, set-up, and solve interference of light problems.

Lab: Diffraction.

Hours

3 Lec/3 Lab

Content: Special relativity.

Out of Class Assignments: Reading and problems from text.

Student Performance Objectives: Students will describe inertial reference frames. Students will identify, describe, compare and contrast the postulates of special relativity, time dilation, length contraction, and the equivalence of mass and energy. Students will identify, set-up and solve special relativity problems.

Lab: Electric motor.

Hours

3 Lec/3 Lab

Content: Particles and waves.

Out of Class Assignments: Problems and reading from text.

Student Performance Objectives: Students will identify and describe blackbody radiation, the photoelectric effect, the wave nature of matter, and the Heisenberg uncertainty principle. Students will identify, set-up, and solve wave-particle duality problems.

Lab: Electric motor, continued.

Hours

3 Lec/3 Lab

Content: Physics of the atom.

Out of Class Assignments: Reading and problems from the text.

Student Performance Objectives: Students will identify, describe, compare and contrast various models of the atom. Students will describe the Pauli exclusion principle and the development of the periodic chart. Students will identify, set-up, and solve atomic physics problems.

Lab: Electric motor, continued.

Hours

3 Lec/3 Lab

Content: Nuclear physics.

Out of Class Assignments: Problems and reading from the text.

Student Performance Objectives: Students will describe the structure of the nucleus of an atom, compare and contrast the strong

nuclear force, the electrostatic force and the gravitational force. Students will identify, describe, compare and contrast the methods of obtaining energy from the nucleus. Students will identify, set-up, and solve nuclear physics problems.

Lab: Electric motor presentation and demonstration.

Hours

2

Final Exam

Lab Content:

Lab activities are listed above.

### **METHODS OF INSTRUCTION:**

Lecture/discussion. Laboratory exercises. Group projects

### **OUT OF CLASS ASSIGNMENTS:**

Required Outside Hours: 64

Assignment Description: Regularly assigned homework that requires students to analyze and study pertinent text material, solved examples and lecture notes.

Required Outside Hours: 64

Assignment Description: Regularly assigned homework that requires students to apply the principles and skills covered in class by solving related problems.

### **METHODS OF EVALUATION:**

Writing assignments

Percent of total grade: 20.00 %

Lab Reports.

Problem-solving assignments

Percent of total grade: 20.00 %

Homework, quizzes, projects.

Objective examinations

Percent of total grade: 60.00 %

In-class written exams.

### **REPRESENTATIVE TEXTBOOKS:**

Required Representative Textbooks

Cutnell, Johnson, Young, Stadler. Physics. Wiley,2014.

ISBN: ISBN-10: 1118486897

Reading Level of Text, Grade: 12 Verified by: Jennifer Nari

### **ARTICULATION and CERTIFICATE INFORMATION**

Associate Degree:

GAV B1, effective 201430

GAV B3, effective 201430

CSU GE:

CSU B1, effective 201430

CSU B3, effective 201430

IGETC:

IGETC 5A, effective 201430

IGETC 5C, effective 201430

CSU TRANSFER:

Transferable CSU, effective 201430  
UC TRANSFER:  
Transferable UC, effective 201430

SUPPLEMENTAL DATA:

Basic Skills: N  
Classification: Y  
Noncredit Category: Y  
Cooperative Education:  
Program Status: 1 Program Applicable  
Special Class Status: N  
CAN: PHYS4  
CAN Sequence: PHYS SEQ A  
CSU Crosswalk Course Department: PHYS  
CSU Crosswalk Course Number: 2B  
Prior to College Level: Y  
Non Credit Enhanced Funding: N  
Funding Agency Code: Y  
In-Service: N  
Occupational Course: E  
Maximum Hours:  
Minimum Hours:  
Course Control Number: CCC000547066  
Sports/Physical Education Course: N  
Taxonomy of Program: 190200