PHYS 20B Course Outline as of Fall 2020

CATALOG INFORMATION

Dept and Nbr: PHYS 20B Title: GENERAL PHYSICS PART II Full Title: General Physics Part II Last Reviewed: 4/8/2019

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	4.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	4.00	Lab Scheduled	3.00	8	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	6.00		Contact Total	105.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 210.00

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:

This is a continuation of Phys 20A. This course covers electricity and magnetism, light, and modern physics.

Prerequisites/Corequisites: Course Completion of PHYS 20 and PHYS 20L; or Course Completion of PHYS 20A

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:

Description: This is a continuation of Phys 20A. This course covers electricity and magnetism, light, and modern physics. (Grade or P/NP) Prerequisites/Corequisites: Course Completion of PHYS 20 and PHYS 20L; or Course Completion of PHYS 20A Recommended: Limits on Enrollment: Transfer Credit: CSU;UC.

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	Area C	Natural Science	S	Effective: Fall 2020	Inactive:
CSU GE:	Transfer Area B1 B3	Physical Scienc Laboratory Act	e ivity	Effective: Fall 2020	Inactive:
IGETC:	Transfer Area5APhysical Sciences5CFulfills Lab Requirement		es quirement	Effective: Fall 2020	Inactive:
CSU Transfer:	Transferable	Effective:	Fall 2020	Inactive:	
UC Transfer:	Transferable	Effective:	Fall 2020	Inactive:	

Algebra/Trigonometry-Based Physics: AB
PHYS20 AND PHYS20L AND PHYS21 AND PHYS21L OR
PHYS20A AND PHYS20B
Algebra/Trigonometry-Based Physics B
PHYS21 AND PHYS21L OR PHYS20B

Certificate/Major Applicable:

Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:

At the conclusion of this course, the student should be able to:

- 1. Apply physics principles and laws to analyze and solve problems related to electricity, magnetism, light, and optics through critical thinking, problem solving, mathematical modeling, and laboratory experimentation.
- 2. Compare and contrast elements of classical and modern physics.
- 3. Collect and analyze experimental data related to principles of physics, including appropriate use of units and significant figures.

Objectives:

At the conclusion of this course, the student should be able to:

- 1. Analyze electric fields and potentials.
- 2. Relate capacitors to electrostatics.
- 3. Analyze alternating and direct current (AC and DC) circuits.
- 4. Describe magnetism in relation to electric current and calculate the force on a moving charge.
- 5. Solve problems related to Faraday's law of induction.
- 6. Explain the concepts related to geometric optics and optical systems.
- 7. Apply the concept of wave interference to explain interference patterns.
- 8. Describe the concepts of special relativity.
- 9. Explain various concepts related to atomic/nuclear and quantum physics.

Lab objectives:

1. Conduct experiments that apply the scientific method and error analysis to explore physics

principles related to electricity, magnetism, light and optics, and modern physics.

- 2. Use manual and computerized data collection techniques to measure and analyze parameters related to electricity, magnetism, light and optics, and modern physics.
- 3. Plot, curve fit, and interpret data using a spreadsheet or other analysis tool.

Topics and Scope:

- I. Electrostatics and Fields
 - A. Electric charges and field lines
 - B. Coulomb's law
 - C. Gauss' Law
- II. Electric Potential
 - A. Potential difference in a uniform electric field
 - B. Electric potential of point charges
- III. DC Circuits
 - A. Batteries and EMF
 - B. Resistors in series and parallel
 - C. Resistivity
 - D. Kirchhoff's rules
 - E. Capacitors
 - F. RC circuits
- IV. Magnetic Forces and Fields
 - A. Magnetic force on a moving charge
 - B. Magnetic force on a current carrying conductor
 - C. Torque on a current loop in a uniform magnetic field
 - D. Ampere's law
- V. Electromagnetic Induction
 - A. Faraday's law
 - B. Lenz's law
 - C. Inductance and transformers
- VI. AC Circuits
 - A. Capacitors and inductors in AC circuits
 - B. RLC circuits
 - C. Resonance
- VII. Electromagnetic Waves
 - A. Properties of waves: speed, wavelength, frequency
 - B. Energy and electromagnetic waves
 - C. Doppler effect and electromagnetic waves
- VIII. Geometric Optics
 - A. Nature of light
 - B. Reflection and refraction of light
 - C. Total internal reflection
- IX. Lenses, mirrors, and optical instruments
 - A. Plane and spherical mirrors
 - B. Lenses and image formation
 - C. Applications
- X. Wave optics and Polarization of Light
 - A. Interference
 - B. Diffraction
 - C. Polarization
- XI. Special Relativity
 - A. Postulates of special relativity

- B. Time dilation
- C. Length contraction
- D. Equivalence of mass and energy
- XII. Quantum Physics
 - A. Wave-particle duality
 - B. Blackbody radiation
 - C. Photoelectric effect
 - D. Wave nature of matter
- XIII. Atomic Physics and the Emission of Light
 - A. Bohr model of the atom and line spectra
 - B. Rutherford scattering
 - C. Quantum mechanical picture of the atom
- XIV. Nuclear Physics
 - A. Nuclear structure
 - B. Radioactive decay and dating
 - C. Radiation detectors

Lab Topics:

- I. Laboratory Safety and Procedures
- II. Writing Lab Reports
- III. Measurement Techniques for Electromagnetic and Optical Phenomena
 - A. Manual data collection with calipers, meter sticks, etc.
 - B. Computerized data collection with field detectors, spectrometers, oscilloscopes, etc.
- IV. Data Processing and Graphing Results with Spreadsheets
- V. Error Analysis

Assignment:

Lecture-Related Assignments:

- 1. Homework problem sets (12 20)
- 2. Quizzes (0 15)
- 3. Midterm exams (3 5)
- 4. Final exam

Lecture- and Lab-Related Assignments:

1. Individual and/or group lab experiments and reports (12-16)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports (individual and group)

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problem sets

Writing 10 - 25%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, midterm exams, and final exam

Other: Includes any assessment tools that do not logically fit into the above categories.

Lecture and laboratory participation

Representative Textbooks and Materials:

Physics. 11th ed. Cutnell, John and Johnson, Kenneth and Young, David and Stadler, Shane.
Wiley. 2018
College Physics: A Strategic Approach. 4th ed. Knight, Randall and Jones, Brian and Field, Stuart. Pearson. 2018
Essentials of College Physics. Serway, Raymond and Vuille, Chris. Cengage Learning. 2007 (Classic)
Instructor-prepared lab manual

Skill Demonstrations 0 - 0%



Other Category 0 - 10%