PHYS 11 Course Outline as of Fall 2024

CATALOG INFORMATION

Dept and Nbr: PHYS 11 Title: CONCEPTUAL PHYSICS
Full Title: Conceptual Physics
Last Reviewed: 4/10/2023

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:
In this course, students will be introduced to basic concepts and principles in physics, the role of experimentation and inquiry, and relationships between physics, other disciplines, and society.

Prerequisites/Corequisites:
Completion of MATH 156 or MATH 154 or MATH 155 or AB705 placement into Math Tier 3 or higher

Recommended Preparation:
Eligibility for ENGL 1A or equivalent

Limits on Enrollment:

Schedule of Classes Information:
Description: In this course, students will be introduced to basic concepts and principles in physics, the role of experimentation and inquiry, and relationships between physics, other disciplines, and society. (Grade or P/NP)
Prerequisites/Corequisites: Completion of MATH 156 or MATH 154 or MATH 155 or AB705 placement into <a href='https://assessment.santarosa.edu/understanding-your-math-placement'

class='NormalSiteLink' target='_New'> Math Tier 3 or higher
Recommended: Eligibility for ENGL 1A or equivalent
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
	C	Natural Sciences	Fall 2011	
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B1	Physical Science	Fall 2011	
	B3	Laboratory Activity		
IGETC:	**Transfer Area**		Effective:	Inactive:
	5A	Physical Sciences	Fall 2011	
	5C	Fulfills Lab Requirement		

CSU Transfer:	Transferable	Effective:	Fall 2011	Inactive:
UC Transfer:	Transferable	Effective:	Fall 2011	Inactive:

CID:

Certificate/Major Applicable:
Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Explain the basic principles underlying the physics topics in the course.
2. Apply scientific reasoning skills to ask questions, perform systematic measurements, and develop and test models to investigate physical phenomena.

Objectives:
At the conclusion of this course, the student should be able to:
1. Articulate the process of science as an iterative inquiry process including: observation; developing, testing, and improving models; collaboration and peer review; and generalizing and theory building.
2. Describe how physics is related to and interacts with other disciplines as well as how interdisciplinary collaborations have led to modern achievements and advances.
3. Explain how physics influences and is influenced by society via policy, ethics, and technology.
4. Communicate their knowledge using prose and mathematics.
5. Apply physics to solve problems and predict outcomes in the everyday world.

Laboratory objective:
1. Apply scientific skills such as making measurements, finding patterns, devising models, and testing those models on physical phenomena.

Topics and Scope:

I. Physics as a Scientific Endeavor
A. Scientific process
B. Physics and other disciplines: relationship of physics to other disciplines, interdisciplinary collaborations, and achievements
C. Physics and society: technology, ethics, and public policy
II. Foundational Mechanics
A. Motion: time, position, velocity, acceleration
B. Interactions: forces, Newton's laws of motion
C. Energy: types of energy and conservation of energy
III. Laboratory Skills
A. Using the metric system to express measurements
B. Using computerized (motion detectors, force probes, etc.) and non-computerized (stopwatches, meter sticks, etc.) tools to make measurements of physical phenomena
C. Recording and displaying data using tables and graphs
D. Analyzing and interpreting results, including the role of measurement uncertainty

Instructor will select at least two (2) topics from below to form a coherent storyline for the course:

IV. Mechanics
A. Universal gravitation: circular motion, satellites, and astronomical bodies
B. Momentum: conservation of momentum
C. Rotational motion: conservation of angular momentum, and torque
V. Electricity and Magnetism
A. Electrostatics: conservation of charge, electric fields and forces, and electric potential
B. Electric current: direct current (DC) circuits, Ohm's law
C. Magnetism: magnetic fields and forces, and ferromagnetic materials
D. Induction: electromagnetic induction, generators, and motors
VI. Thermodynamics
A. Heat and temperature
B. First law of thermodynamics: conservation of energy, specific heat, heat transfer, and phase changes
C. Second law of thermodynamics: entropy
VII. Waves
A. Wave phenomena: oscillations, standing waves, reflection, refraction, interference, and diffraction
B. Sound: Doppler effect and musical sounds
C. Light: mirrors and lenses, and color
VIII. Structure of Matter
A. Phases of matter: solids, liquids, and gases
B. Atomic nature of matter: periodic table and the structure of the atom
C. Atomic physics: radioactivity, nuclear processes
IX. Special and General Relativity
A. Special relativity: Newton and Einstein time, relativistic effects, and the correspondence principle
B. General relativity: the equivalence principle, perspective on gravity, and applications to cosmology
C. Experimental evidence
X. Quantum Mechanics
A. Foundational experiments and observations: the photoelectric effect and the double-slit experiment

B. Wave-particle duality
C. Uncertainty principle
D. Quantum model of the atom

Assignment:

Lecture-Related Assignments:
1. Reading assignments (approximately one textbook chapter per week)
2. Homework assignments (12-16)
3. Quizzes (5-16)
4. Exams (2-4)
5. Final exam

Lab-Related Assignments:
1. Laboratory readings and reports (12-17)
2. Laboratory exam(s) (0-3)
3. Special project (0-1), such as:
   A. Demonstrations
   B. Video presentations

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	Writing 10 - 30%

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

Homework assignments	Problem solving 10 - 30%

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

None	Skill Demonstrations 0 - 0%

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

Exams; laboratory exam(s); quizzes; final exam	Exams 40 - 70%

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

Special project, class participation	Other Category 0 - 10%

Representative Textbooks and Materials:

Conceptual Physics. 12th ed. Hewitt, Paul. Addison Wesley. 2014 (classic).
Conceptual Physics Fundamentals. Hewitt, Paul. Addison Wesley. 2008 (classic).
Conceptual Physics Laboratory Manual. Hewitt, Paul. Addison Wesley. 2008 (classic).