



El Camino College
COURSE OUTLINE OF RECORD – Official

Course Acronym:	PHYS
Course Number:	11
Descriptive Title:	Descriptive Introduction to Physics
Division:	Natural Sciences
Department:	Physics
Course Disciplines:	Astronomy, Physics
Catalog Description:	This course utilizes lectures and demonstrations to present various principles of physics in a conceptual manner. Newton's Laws of motion and gravitation, momentum, work, energy, and heat will be presented. Other topics will be selected from properties of matter, fluids, sound, light, electricity and magnetism, atomic and modern physics, special and general relativity.
Prerequisite:	
Co-requisite:	
Recommended Preparation:	Eligibility for ENGL C1000 or equivalent
Enrollment Limitation:	
Hours Lecture (per week):	3
Hours Laboratory (per week):	0
Outside Study Hours:	6
Total Course Hours:	54
Course Units:	3
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	Prior to July 1992
Transfer UC:	Yes
Effective Date:	prior to fall 1992
General Education: ECC	Area 1 - Natural Sciences
Term:	
Other:	
CSU GE:	Area B1 - Physical Universe and its Life Forms: Physical Science
Term:	

Other:	
IGETC:	Area 5A - Physical Science
Term:	
Other:	
CalGETC:	
Term:	
Other:	
Student Learning Outcomes:	1. Given a situation where an object is in static equilibrium, draw a diagram which correctly illustrates the forces acting on that object. 2. Given a process involving mechanical energy, identify the forms of mechanical energy involved in the process, and correctly state whether each of these increased or decreased during the process. Correctly state whether or not the total mechanical energy was constant during the process 3. Given a situation in which heat is exchanged between a specified object and another object, or between a specified object and its environment, correctly identify the mechanism or mechanisms by which heat is transferred to or from the specified object. Correctly state whether the specified object is receiving energy or losing energy due to the heat exchange.
Course Objectives:	1. Explain Newton's Laws of Motion, the concepts of work and energy, and the concepts of impulse and momentum. 2. Explain conceptually/qualitatively physical phenomena in terms of specific principles of physics. 3. Make qualitative predictions about the outcome of a natural physical event using specific principles of physics.
Major Topics:	I. Newton's Laws of Motion (9 hours, lecture) A. Statics B. Constant acceleration C. Non-constant acceleration D. REPRESENTATIVE LIST OF DEMONSTRATIONS: 1. Inertia 2. Monkey-hunter 3. Drop shoot 4. Paradox of forces 5. Spool 6. Tricycle 7. Falling coffee-filters II. Conservation Laws (6 hours, lecture) A. Work and Energy B. Momentum C. REPRESENTATIVE LIST OF DEMONSTRATIONS: 1. Egg-sheet collision 2. Water rocket 3. Two carts with spring between and assorted masses 4. Air tracks 5. Fan cart

6. Faith in physics ball
7. Colliding balls
8. Bouncing balls
9. Light bulb comparison
10. Elephant trebuchet

III. Rotational Motion (6 hours, lecture)

- A. Centripetal Force and Acceleration
- B. Rotation
- C. Torque
- D. Angular Momentum
- E. REPRESENTATIVE LIST OF DEMONSTRATIONS:
 1. Large wrench
 2. Center of mass
 3. Pipes with different moments of inertia
 4. Hoop vs. disk down a plane
 5. Water bucket
 6. Coffee cup swing
 7. Spinning chair
 8. Spinning bicycle tires
 9. Roller coaster with missing section

IV. Gravity (3 hours, lecture)

- A. Laws of Gravity
- B. Satellite Motion
- C. REPRESENTATIVE LIST OF DEMONSTRATIONS:
 1. Earth globe
 2. Bathroom scale
 3. Model space-shuttle

V. Heat (6 hours, lecture)

- A. Temperature, Heat, and Expansion
- B. Heat Transfer
- C. Change of Phase
- D. Thermodynamics
- E. REPRESENTATIVE LIST OF DEMONSTRATIONS:
 1. Thermometers, expansion (pin breaker, sphere/ring) bimetallic strip, color change with temperature
 2. Wood/pipe conduction, radiometer, photos taken with infrared sensitive film, thermos bottles, black body (razor blades), carbon rods
 3. Boil water in student's hand, boil-freeze, evaporation cooling, salt, radiator cap
 4. Drinking bird, engines, adiabatic compression igniter

VI. The remainder of the course content is to be selected, at the instructor's discretion, from the following (24 hours, lecture)

- A. Properties of Matter (Solids, Liquids, Gases & Plasmas)

	B. Vibrations, Mechanical Waves, Sound C. Electricity and Magnetism D. Light E. Atomic and Nuclear Physics F. Relativity G. REPRESENTATIVE LIST OF DEMONSTRATIONS: 1. Atomic chart, candle/inverted beaker, density, helium balloon, burning steel wool, toy blocks for area/volume, fish tank, large straw, crush can, barometer, Magdeburg spheres, surface tension, Bernoulli and equation of continuity 2. Springs with different spring constant, slinky, bell jar, Doppler ball, tuning forks, variable length pendulum, mechanical resonance, sound chart, video of Tacoma Narrows Bridge collapse, recorders 3. Rod and fur, bits of paper, electroscope, Van De Graaff generator, batteries, parallel and series circuits, digital multimeter, magnets, compass, dip needle, power supply, Lenz's Law, eddy currents, cow magnet, transformer 4. Diffraction gratings, spectrum tubes and power supplies, lasers, prism, assorted lenses, polarization, fish tank/milk powder, total internal reflection, variable index tank (sugar cubes on bottom) emission absorption line chart 5. Geiger Counter
Total Lecture Hours:	54
Total Laboratory Hours:	0
Total Hours:	54
A.1. Primary Methods of Evaluation (Part 1 - CCN courses only):	
A.2. Primary Method of Evaluation (Part 2 - all courses; choose one):	2) Problem solving demonstrations (computational or non-computational)
Typical Assignment Using Primary Method of Evaluation:	What could explain the claim that a cat that accidentally falls from the top of a 50-story building would hit the pool below no faster than if it fell from the 20th story? (choose one). 1) gravity is significantly weaker from the higher floor, 2) the drag force on the cat is greater in magnitude than the cat's weight, 3) the drag force on the cat becomes equal to the cat's weight in both cases, 4) this can never happen because gravity always makes the cat increase in speed as it falls toward the ground.
Critical Thinking Assignment 1:	A park ranger shoots a monkey hanging from a branch with a tranquilizing dart. The ranger aims directly at the monkey, not realizing that the dart will follow a parabolic path and thus fall below the monkey. The monkey, however, sees the dart leave the gun and immediately lets go of the branch. Will the monkey be hit by the dart? Does the velocity of the dart affect your answer, assuming it is great enough to travel the horizontal

	distance to the tree before hitting the ground? Defend your answer in a one-paragraph essay.
Critical Thinking Assignment 2:	Using physics principles, explain why an ice cube on a metal table melts faster than an ice cube on a wooden table in the same room.
Other Evaluation Methods:	Class Performance, Completion, Essay Exams, Homework Problems, Matching Items, Multiple Choice, Other Exams, Quizzes, True/False, Written Homework
Instructional Methods:	Lecture, Demonstration, Discussion, Group Activities, Multimedia presentations
If other:	
Work Outside of Class:	Answer questions, Required reading, Study, Written work (such as essay/composition/report/analysis/research)
If Other:	
Up-To-Date Representative Texts:	P. Hewitt . <u>Conceptual Physics</u> . 13th ed. Pearson, 2022
Alternative Texts:	Conceptual Physics, Pasquale, A. Bennet, C. and Fazzini, D., 2024, https://oercommons.org/courses/conceptual-physics-5 , Licenced by Creative Commons by Non-Commercial 4.0 International
Required Supplementary Readings:	
Other Required Materials:	
Requisite:	
Category:	
Requisite course(s): List both prerequisites and corequisites in this box.	
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	
Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable	
Requisite course:	
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	Eligibility for ENGL C1000 or qualification by appropriate assessment

Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable	A student needs to have good reading skills to understand and interpret information provided in their textbooks. Summarize, analyze, evaluate and synthesize college-level texts.
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	M. Feero
Date:	02/01/1975
Original Board Approval Date:	
Last Reviewed and/or Revised by:	Azul Rodriguez
Date:	10/09/2025
Last Board Approval Date:	12/16/2025
Effective Term:	FA 2026