

**PHYS 21 - College Physics I****Catalog Description****Transfer Status:** CSU/UC**Prerequisite:** MATH 20, MATH 28, MATH 28s or high school trigonometry**Unit(s):** 4.00**Lecture:** 51.00 Contact hours/102.00 Out of class hours/153.00 Total hours/3.00 Unit(s)**Lab:** 51.00 Contact hours/0.00 Out of class hours/51.00 Total hours/1.00 Unit(s)**Total:** 102.00 Contact hours/102.00 Out of class hours/204.00 Total hours/4.00 Unit(s)

Course Description: This course is intended for students not majoring in physics or engineering but needing a one-year course in physics as a requirement for their major program. The course is part of a two-semester sequence whose contents may be offered in other sequences or combinations at articulated institutions. Topics include kinematics, dynamics, work and energy, momentum, fluids and simple harmonic motion. Graded only. (C-ID PHYS 105/PHYS 100S).

Objectives

Upon successful completion of this course, the student should be able to:

1. Predict the future trajectory of an object in two dimension with uniform acceleration.
2. Analyze a physical situation with multiple constant forces acting on a point mass using Newtonian mechanics.
3. Analyze a physical situation using concept of work and energy.
4. Analyze static and dynamic extended systems using the concepts of torque and angular acceleration.
5. Analyze real-world experimental data, including appropriate use of units and significant figures. (Lab)
6. Relate the results of experimental data to the physical concepts discussed in the lecture portion of the class. (Lab)

Course Content**Topic Titles / Suggested Time Topic****Lecture**

<u>Topics</u>	<u>Lec Hrs</u>
Sound	3.00
Vibrations and Waves	3.00
Entropy	3.00
Kinetic Theory	3.00
Heat Engines	3.00
Laws of Thermodynamics	3.00
Fluids	3.00
Simple Harmonic Motion	3.00
Gravitation	3.00
Momentum	3.00
Work and Energy	3.00
Rotational Kinematics	3.00
Translational Kinematics	3.00
Statics and Dynamics	3.00
Newton's Laws	6.00
Vectors and Scalars	3.00

Total Hours: 51.00**Lab**

<u>Topics</u>	<u>Lab Hrs</u>
Scatter Pattern	3.00
Freefall	3.00
Projectile Motion	3.00
Collisions	6.00
Static Equilibrium	3.00
Circular Motion	3.00
Ballistic Pendulum	3.00

<u>Topics</u>	<u>Lab Hrs</u>
Moment of Inertia	3.00
Young's Modulus	3.00
Kepler's Laws of Planetary Motion	3.00
Static and Dynamic Fluids	3.00
Gas Laws	3.00
Specific Heat of a Solid	3.00
Solar Energy	3.00
Vibrating Systems (Air Track)	3.00
Vibrating Columns and Strings	3.00
Total Hours: 51.00	

Methods of Instruction

- A. Discussion
- B. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- C. Instructor Demonstrations
- D. Laboratory Experiments
- E. Lecture
- F. Problem-Solving Sessions
- G. Reading Assignments

Methods of Evaluation

- A. Exams/Tests
- B. Homework
- C. Lab Projects

Examples of Assignments

Reading Assignments

1. Read the section on Newton's first law and be prepared to participate in conceptual questioning.
2. Read through the worked example where the cat is thrown off the high rise building on Mars. Be prepared to do a similar problem on a quiz.

Writing Assignments

1. Write up a proposed lab procedure for determining the acceleration due to gravity near the earth.
2. Write a critique of a problem you solved that turned out to be wrong. Explain your mistake and how to solve it correctly.

Out-of-Class Assignments

1. Find an example "in the wild" of a clear demonstration of the doppler effect and be prepared to explain to the class.
2. Measure the time it takes for an ice cube to melt in water. Note the important features of the "experiment" and construct a hypothesis regarding the law of heat flow.

Recommended Materials of Instruction

Young, H, Adams. (2020). Sears & Zemansky's College Physics. *Pearson*, 11th. 9780134987316.
 Raymond A Serway, Chris Vuille. (2025). College Physics. *Cengage*, 12th. 9780357976425.

Other Learning Materials

Eggert S. and Trento J., Physics 21 Lab manual; scientific calculator; online homework

Minimum Qualifications

Engineering (Masters Required)
 Physics/Astronomy (Masters Required)

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Date: 12/02/2024