

# BUTTE COLLEGE

## COURSE OUTLINE

### I. CATALOG DESCRIPTION

#### **PHYS 21 - College Physics I**

**4 Unit(s)**

**Prerequisite(s):** MATH 20 or high school trigonometry

**Recommended Prep:** NONE

**Transfer Status:** CSU/UC

51 hours Lecture

51 hours Lab

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. (C-ID PHYS 105). Graded only.

### II. OBJECTIVES

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

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

### III. COURSE CONTENT

#### **A. Unit Titles/Suggested Time Schedule**

		Lecture	
<u>Topics</u>			<u>Hours</u>
1. Vectors and Scalars			3.00
2. Newton's Laws			6.00
3. Statics and Dynamics			3.00
4. Translational Kinematics			3.00
5. Rotational Kinematics			3.00
6. Work and Energy			3.00
7. Momentum			3.00
8. Gravitation			3.00
9. Simple Harmonic Motion			3.00
10. Fluids			3.00
11. Laws of Thermodynamics			3.00
12. Heat Engines			3.00
13. Kinetic Theory			3.00
14. Entropy			3.00

15.	Vibrations and Waves	3.00
16.	Sound	3.00
Total Hours		51.00

#### Lab

<u>Topics</u>	<u>Hours</u>
1. Scatter Pattern	3.00
2. Freefall	3.00
3. Projectile Motion	3.00
4. Collisions	6.00
5. Static Equilibrium	3.00
6. Circular Motion	3.00
7. Ballistic Pendulum	3.00
8. Moment of Inertia	3.00
9. Young's Modulus	3.00
10. Kepler's Laws of Planetary Motion	3.00
11. Static and Dynamic Fluids	3.00
12. Gas Laws	3.00
13. Specific Heat of a Solid	3.00
14. Solar Energy	3.00
15. Vibrating Systems (Air Track)	3.00
16. Vibrating Columns and Strings	3.00
Total Hours	51.00

#### IV. **METHODS OF INSTRUCTION**

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

#### V. **METHODS OF EVALUATION**

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

#### VI. **EXAMPLES OF ASSIGNMENTS**

- A. Reading Assignments
  - 1. Read the section on Newton's first law in the text 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.
- B. 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.

C. 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.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

- A. Young, H., Adams, P., Chastain, R. College Physics. 10th Edition. Sears and Zemansky, 2016.
- B. Young, H. College Physics. 9th Edition. Sears and Zemansky, 2011.

Materials Other Than Textbooks:

- A. Eggert S. and Trento J., Physics 21 Lab manual, purchased at the bookstore
- B. Scientific Calculator
- C. Online Homework

**Created/Revised by:** Robert White

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