PHYS 1 Course Outline as of Summer 2019

CATALOG INFORMATION

Dept and Nbr: PHYS 1 Title: INTRO PBLM SOLVING
Full Title: Introduction to Physics Problem Solving
Last Reviewed: 2/25/2019

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	6	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 157.50

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:
An introduction to basic concepts in physics with an emphasis on the development of problem solving skills. This course helps prepare students for success in Physics 20 or Physics 40.

Prerequisites/Corequisites:
Course Completion of MATH 154 OR MATH 155 OR MATH 156 OR higher (MATH) OR appropriate placement based on AB705 mandates

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: An introduction to basic concepts in physics with an emphasis on the development of problem solving skills. This course helps prepare students for success in Physics 20 or Physics 40. (Grade or P/NP)
Prerequisites/Corequisites: Course Completion of MATH 154 OR MATH 155 OR MATH 156 OR higher (MATH) OR appropriate placement based on AB705 mandates
Recommended:

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:
	B	Communication and Analytical Thinking	Fall 1994	
	MC	Math Competency	Fall 1981	Fall 2009
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B1	Physical Science	Fall 1996	
IGETC:	**Transfer Area**		Effective:	Inactive:

CSU Transfer:	Transferable	Effective:	Fall 1994	Inactive:
UC Transfer:	Transferable	Effective:	Fall 1994	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. Define and identify basic physical laws, theories, and principles applicable to mechanics.
2. Interpret and generate the appropriate graphs and diagrams that represent the evolution of physical systems and events in mechanics.
3. Organize and interpret word problem information and apply the related laws and equations to generate and explain solutions to one- and two- dimensional problems in mechanics.
4. Work in groups to analyze, solve, and present solutions to problems in mechanics.

Objectives:
Students will be able to:
1. Define the physics quantities used in mechanics including: displacement, velocity, acceleration, force, energy, work, power, momentum, and impulse.
2. Identify the major unit systems and convert between them.
3. Organize and interpret written problem statements.
4. Describe basic concepts in mechanics and selected additional physics topics.
5. Generate and/or interpret graphs of physics quantities related to mechanics.
6. Generate free body diagrams and use them in the correct application of Newton's Laws.
7. Apply the equations of mechanics to the solution of selected simple physics problems.
8. Apply interpersonal skills to work in teams to solve physics problems.

Topics and Scope:

I. Problem Solving Tools, Strategies, and Algorithms
   A. Interpretation of written problem statements
   B. Written description or analysis of applicable physics concepts

C. Choice of appropriate mathematical models and equations
D. Organization of information and assignment of variables
E. Interpretation and generation of diagrams and graphs

II. Units and Dimensional Analysis
A. The international system (SI)
B. The centimeter, gram, second system (CGS)
C. The British engineering system (BE)
D. Common metric prefixes
E. Conversion of units
F. Unit consistency in equations

III. One-Dimensional Kinematics
A. Concepts, definitions, and units of displacement, velocity and acceleration
B. Graphs of displacement, velocity and acceleration versus time
C. Slopes of displacement and velocity versus time graphs and areas under velocity and acceleration versus time graphs
D. Equations for uniformly accelerated motion in one dimension
E. Freefall body problem analysis

IV. Vectors and Trigonometry
A. Scalar and vector quantities
B. Components of vectors and right triangle trigonometry
C. Sums of vectors

V. Two-Dimensional Kinematics
A. Separation of coordinate directions
B. Equations of two-dimensional kinematics
C. Projectile motion

VI. Forces and Newton's Laws of Motion
A. Concepts, definitions, and units of mass, force and weight
B. Newton's third law and force interactions between objects
C. Newton's first law and the construction of free body diagrams
D. One- and two-dimensional statics
E. Newton's second law and free body diagrams with acceleration
F. One- and two-dimensional linear dynamics

VII. Work, Energy, and Power
A. Concepts, definitions, and units of work, energy, and power
B. Calculation of work done using force and displacement data and graphs
C. Kinetic and potential energy
D. Conservative and non-conservative forces
E. Conservation of energy
F. Computation of power

Optional Physics Topics:
Faculty should choose 2-6 additional topics of interest to broaden exposure and encourage further investigations, such as:

I. Impulse and momentum
II. Newton's universal law of gravity
III. Rotational kinematics and dynamics
IV. Simple harmonic motion
V. Fluids, statics and dynamics
VI. Temperature, heat, thermodynamics
VII. Waves and sound
VIII. Electricity and magnetism
IX. Optics

X. Superconductivity
XI. Radioactivity
XII. Fusion and Fission
XIII. Special relativity
XIV. Subatomic particles

Assignment:

1. Homework problem sets (12-20)
2. Exams (2-4)
3. Quizzes (0-10)
4. Worksheets (to be completed in groups, in-class) (0-15)
5. Final exam

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.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.	Writing 0 - 0%

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

Homework problem sets	Problem solving 15 - 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, quizzes, final exam	Exams 60 - 80%

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

Class participation, worksheets	Other Category 0 - 10%

Representative Textbooks and Materials:
Physics. 11th ed. Cutnell, John and Johnson, Kenneth. Wiley. 2018
Essentials of College Physics. Serway, Raymond and Vuille, Chris. Cengage Learning. 2007 (Classic)
Instructor prepared materials