COURSE OUTLINE OF RECORD

Number: PHYS G185   TITLE: Calculus Based Physics: Mechanics

ORIGINATOR: James Almy   EFF TERM: Fall 2011
FORMERLY KNOWN AS:   DATE OF
OUTLINE/REVIEW: 05-13-2013
CROSS LISTED COURSE:   TOP NO: 1902.00
CID: PHYS 205

SEMESTER UNITS: 4.0
HRS LEC: 54.0   HRS LAB: 54.0   HRS OTHER: 0.0
CONTACT HRS TOTAL: 108.0
STUDY NON-CONTACT HRS RECOMMENDED: 108.0

CATALOG DESCRIPTION:
This is an introductory course in physics using calculus. Topics studied include vectors, motion, forces, energy, momentum, oscillators and properties of waves. Physics G185, G280 and G285 are required for students majoring in physics, chemistry or engineering. UC Credit Limitations: Physics G120, G125 and G185, G280, G285 combined--maximum credit, one series; deduct credit for duplication of topics. C-ID PHYS 205

JUSTIFICATION FOR COURSE:

PREREQUISITES:
- GWC Math Placement Level of 90 or higher.
- MATH G180: Calculus 1 with a minimum grade of C or better
  or
- OCC Math Placement Level of 80 or higher.
  or
- MATH A180: Calculus 1 with a minimum grade of C or better
  or
- MATH A180H: Calculus 1 Honors with a minimum grade of C or better
  or
- CCC Math Placement Level of 90 or higher.
  or
- MATH C180: Calculus 1 with a minimum grade of C or better
  or

COREQUISITES:

ADVISORIES:
- MATH G185: Calculus 2

ASSIGNED DISCIPLINES:
Physics/Astronomy

MATERIAL FEE: Yes [ ] No [X] Amount: $0.00
CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]
GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]
OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]
TRANSFER STATUS: CSU Transferable[ ] UC/CSU Transferable[X] Not Transferable[ ]
BASIC SKILLS STATUS: Yes [ ] No [X]   LEVELS BELOW TRANSFER: Not Applicable
CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable
NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course
OCCUPATIONAL (SAM) CODE: E

REPEATABLE ACCORDING TO STATE GUIDELINES: No [X]  Yes [ ] NUMBER REPEATS:

REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]
Liberal Arts: Emphasis in Science(Associate in Arts)
Mathematics(Associate in Science for Transfer)
Physics(Associate in Arts)
Physics(Associate in Arts)

GE AND TRANSFER REQUIREMENTS MET:
IGETC Area 5: Physical and Biological Sciences
   5A: Physical Science
      x
      x
CSU GE Area B: Scientific Inquiry and Quantitative Reasoning
   B1 - Physical Science
   B3 - Laboratory Sciences

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:
1. solve problems involving constant acceleration equations using calculus.
2. solve problems involving Newton's Laws using calculus.
3. solve problems involving energy and energy transfer using calculus.
4. solve problems involving momentum using calculus.
5. solve problems involving waves using calculus.

COURSE OBJECTIVES:
1. solve problems involving constant acceleration equations using calculus.
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5. solve problems involving waves using calculus.

COURSE CONTENT:

LECTURE CONTENT:
A. Mechanics
   1. Kinematics
      1. Vectors
         a. Addition, subtraction, components
         b. Multiplication by scalar, dot product, cross product
      2. One dimensional motion
         a. Displacement, velocity, acceleration
      3. Two and three dimensional motion
         a. Displacement, velocity, acceleration
      4. Rotational motion
         a. Angular displacement, velocity, acceleration
   2. Dynamics
      1. Particle dynamics
         a. Newton's laws of motion
         b. Force, mass, friction
      2. Conservation of energy and momentum
         a. Work, kinetic energy, potential energy
         b. Conservative and nonconservative systems
c. Momentum, center of mass, collisions
3. Rotational dynamics
   a. Torque, angular momentum, energy, inertia
4. Oscillations
   a. SHM
   b. 2 body
   c. Forced, damped, resonance
B. Waves
   1. Elastic waves
      1. Types
         a. Transverse, longitudinal
         b. Traveling, standing
      2. Properties
         a. Superposition
         b. Velocity, intensity
         c. Reflection, interference
   2. Sound Waves
      1. Propagation and velocity
      2. Standing waves, resonance, beats
      3. Doppler effect

LABORATORY CONTENT:
A. Collect data with appropriate sensors and significant figures.
B. Analyze data in graphical form.
C. Perform statistical error analysis.
D. Perform experiments involving positions, velocities, accelerations, and forces
E. Perform experiments involving temperature, specific heat, and thermal expansion.
F. Perform experiments involving oscillators, standing waves, and velocity of sound.

METHODS OF INSTRUCTION:
A. Lecture:
B. Lab:
C. Independent Study:

INSTRUCTIONAL TECHNIQUES:

COURSE ASSIGNMENTS:
Reading Assignments
Textbook

Out-of-class Assignments
None required

Writing Assignments
Regular homework assignments are given which stress problem solving ability, and exams are given which test the students ability to solve such problems. The laboratory portion of the course is designed to give the student practice in making measurements and using equipment, and proficiency is determined by lab exams in which the student is expected to demonstrate the ability to use a piece of equipment to the instructor. In addition, students are expected to maintain lab notebooks which contain calculations and an analysis of each experiment.
METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Short Quizzes
Problem Solving Exercises

Demonstration of Critical Thinking:

Students will demonstrate the ability to think critically by analyzing given physical situations (reading word problems and interpreting them), applying the basic laws of physics toward the solution of such problems, deducing valid conclusions from their results, and then explaining these results in terms of non-mathematical ideas. From data collected in the lab, the students will be able to verify and "discover" the basic laws of physics, and use graphs to predict the results of other experiments. The student will then take these ideas and write a lab report which describes the results of his work, as well as answering questions related to the performance of the experiment.

Required Writing, Problem Solving, Skills Demonstration:

Regular homework assignments are given which stress problem solving ability, and exams are given which test the students ability to solve such problems. The laboratory portion of the course is designed to give the student practice in making measurements and using equipment, and proficiency is determined by lab exams in which the student is expected to demonstrate the ability to use a piece of equipment to the instructor. In addition, students are expected to maintain lab notebooks which contain calculations and an analysis of each experiment.

TEXTS, READINGS, AND RESOURCES:

TextBooks:

LIBRARY:

Adequate library resources include:

Comments:

Attachments:

Attached Files