Cerro Coso College

Course Outline of Record Report

10/07/2021

PHYSC111 : Mechanics

General Information

Author:	-
Course Code (CB01) :	PHYSC111
Course Title (CB02) :	Mechanics
Department:	Science
Proposal Start:	Fall 2013
TOP Code (CB03) :	(1902.00) Physics, General
SAM Code (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	CCC000247049
Curriculum Committee Approval Date:	03/09/2014
Board of Trustees Approval Date:	06/12/2014
External Review Approval Date:	07/24/2014
Course Description:	This course covers the fundamental laws of nature governing the motion of bodies and their relation to external forces. Motion in 1, 2, and 3 dimensions is covered as well as energy, linear momentum, angular momentum, gravitation, fluids, oscillations, and simple harmonic motion.
Submission Type:	New Course
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Physics/Astronomy
Alternate Master Discipline Preferred:	• Physics/Astronomy
Bachelors or Associates Discipline Preferred:	No value
Additional Bachelors or Associates Discipline Preferred:	No value

Course Development Options

Basic Skills Status (CB08)

Course is not a basic skills course.

Course Special Class Status (CB13)

Course is not a special class.

Grade Options

- Letter Grade Methods
- Pass/No Pass

☐ Allow Students to Gain Credit by Exam/Challenge

Allowed Number of Retakes

0

Course Prior To College Level (CB21)

Not applicable.

Rationale For Credit By Exam/Challenge

Retake Policy Description

☑ Allow Students To Audit Course

No value

Type:|Non-Repeatable Credit

Allow Students To Audit Course

Course Support Course Status (CB26)

No value

Associated Programs

Course is part of a program (CB24)

Associated Program	Award Type	Active
CC General Sciences	A.A. Degree Major	Spring 2018
CC Kinesiology for Transfer	A.A. Degree for Transfer	Spring 2018 to Fall 2018
CC Liberal Arts: Mathematics & Science	A.A. Degree Major	Summer 2018 to Fall 2020
Associate in Science Degree In Mathematics for Transfer	A.A. Degree for Transfer	Summer 2018
CSU General Education (CSU GE Breadth)	Certificate of Achievement	Fall 2020
Intersegmental General Education Transfer Curriculum Certificate of Achievement	Certificate of Achievement	Fall 2020
Liberal Arts: Mathematics & Science Associate in Arts Degree	A.A. Degree Major	Fall 2020
CSU General Education (CSU GE Breadth) (In Development)	Certificate of Achievement	Fall 2021
Intersegmental General Education Transfer Curriculum Certificate of Achievement (In Development)	Certificate of Achievement	Fall 2021

Transferability & Gen. Ed. Options

Course General Education Status (CB25)

No value

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

Cerro Coso General Education Requirements	Categories	Status	Approval Date	Comparable Course
Area 1.2	Natural Science Physical Sciences	Approved	No value	No Comparable Course defined.

CSU General Education Certification	Categories	Status	Approval Date	Comparable Course
Area B.1	Scientific Inquiry & Quantitative Reasoning Physical Sciences	Approved	No value	No Comparable Course defined.
Area B.3	Scientific Inquiry & Quantitative Reasoning Laboratory	Approved	No value	

Intersegmental General Education Transfer Curriculum	Categories	Status	Approval Date	Comparable Course
Area 5.A	Physical & Biological Sciences Physical Science	Approved	No value	No Comparable Course defined.

Units and Hours:

Summary

Minimum Credit Units (CB07)	5
Maximum Credit Units (CB06)	5
Total Course In-Class (Contact) Hours	144
Total Course Out-of-Class Hours	126
Total Student Learning Hours	270
Faculty Load	0

Credit / Non-Credit Options

Course Credit Status (CB04)

Credit - Degree Applicable

Course Non Credit Category (CB22)

Credit Course.

Non-Credit Characteristic

No Value

Course Classification Status (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Classs
Lecture Hours	3.5	7
Laboratory Hours	4.5	0
Activity Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	0
Laboratory	0
Activity	0
Total	144
Course Out-of-Class Hours	
Lecture	0
Laboratory	0
Activity	0
Total	126

Time Commitment Notes for Students

No value

Faculty Load

Extra Duties: 0

Faculty Load: 0

Units and Hours: - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

MATHC151 - Analytic Geometry and Calculus I

Students taking PHYS C111 will encounter and utilize the mathematical concepts of differential calculus and integral calculus. MATH C151 provides those skills.

AND

Co-Requisite

MATHC151 - Analytic Geometry and Calculus I

Students taking PHYS C111 will encounter and utilize the mathematical concepts of differential calculus and integral calculus. MATH C151 provides those skills.

Entrance Skills

Entrance Skills	Description
No value	No value

Limitations on Enrollment

Limitations on Enrollment	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	Other
Rationale	Other Methods: Recitation
Methods of Instruction	Outside reading
Rationale	No value
Methods of Instruction	Problem Solving
Rationale	No value
Methods of Instruction	Written work
Rationale	No value
Methods of Instruction	Laboratory
Rationale	No value

Methods of Instruction	Lecture
Rationale	No value
Methods of Instruction	In-class writing
Rationale	No value
Methods of Instruction	Instruction through examination or quizzing
Rationale	No value
Methods of Instruction	Group Work
Rationale	No value
Methods of Instruction	Discussion
Rationale	No value
Methods of Instruction	Demonstration
Rationale	No value
Methods of Instruction	Computational Work
Rationale	No value

Assignments

- A. Regular homework assignments to reinforce material covered in class. Example: The student is expected to answer instructor assigned questions from the relevant textbook chapters. B. Readings from the assigned textbook chapters. Example: The student is expected to read the textbook chapter that is covered each week. C. Preparatory readings for the assigned laboratory experiments. Example: The student is expected to read the lab procedures before each week's lab experiment. D. Written laboratory reports. Example: The student is expected to summarize his/her lab data, analysis, and results in the form of a written lab report.

Methods of Evaluation	Rationale
Homework	A. Regular homework assignments to reinforce material covered in class. Example: The student is expected to answer instructor assigned questions from the relevant textbook chapters.
Tests	B. Quizzes and exams evaluate the student’s ability to apply techniques taught in class and apply these techniques to solving problems. Example: The first exam or quiz would include a question that requires the use of the free-fall equations.
Participation	C. Laboratory experiments measure the student’s ability to perform experiments, work in groups, and assess the accuracy and precision of experiments where appropriate. Example: A laboratory experiment involving the analysis of projectile motion.

D. Written laboratory reports. Example: The student is expected to summarize his/her lab data, analysis, and results in the form of a written lab report.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
	Halliday, Resnick, and Walker. (2014) Fundamentals of Physics, Extended, 10th, John Wiley & Sons, Inc.			

Other Instructional Materials

Description Other: Laboratory notes and procedures are developed locally by the local physics instructors.

Author

Citation Mechanics

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

No value

CSLOs

Predict the future trajectory of an object moving in two dimensions with uniform acceleration. Expected SLO Performance: 70.0

Analyze a physical situation with multiple constant forces acting on a point mass using Newtonian mechanics. Expected SLO Performance: 70.0

Science Liberal Arts: Mathematics & Science AA Degree	Describe the nature of science, the methods applied in scientific investigations, and the value of those methods in developing a rigorous understanding of the physical world.

Analyze a physical situation with multiple forces acting on a point mass or extended object using concepts of work and energy. Expected SLO Performance: 70.0

Analyze real-world experimental data, including appropriate use of error propagation, units and significant figures. Expected SLO Performance: 70.0

Science Liberal Arts: Mathematics & Science AA Degree	Apply algebraic, graphical, numerical, and other methods to solve applied problems in the areas of mathematics, natural sciences, computer graphics, and computer animation.
ISLOs Core ISLOs	Students who are completing a program will be able to access, evaluate, and effectively use information.

Relate the results of experimental data to the physical concepts discussed in the lecture portion of the class. Expected SLO Performance: 70.0

Social Science PLOs for CSU GE COA	Communicate scientific results by applying the appropriate scientific method, including experimental and empirical methodologies characteristic of science and modern methods and tools used in scientific inquiry through the use of graphs, oral communications, and writings.
Social Science IGETC PLOs	Communicate scientific results by applying the appropriate scientific method, including experimental and empirical methodologies characteristic of science and modern methods and tools used in scientific inquiry through the use of graphs, oral communications, and writings.

Outline

Course Outline

A. Measurement
The International System of Units
Changing Units
Length
Mass
Time

B. Motion along Straight Line
Position and Displacement
Average Velocity and Average Speed
Instantaneous Velocity and Instantaneous Speed
Average Acceleration
Instantaneous Acceleration
Constant Acceleration
Free-fall Acceleration

C. Vectors
Vectors and Scalars
Components of Vectors
Unit Vectors
Adding Vectors
Multiplying Vectors

D. Motion in Two and Three Dimensions
Position and Displacement
Average Velocity and Average Speed
Instantaneous Velocity and Instantaneous Speed
Average Acceleration
Instantaneous Acceleration
Projectile Motion
Uniform Circular Motion

E. Force and Motion
Newtonian Mechanics
Newton's First Law
Force
Mass

Newton's Second Law
Newton's Third Law

F. Particular Forces
Gravitational Force
Weight
Normal Force
Tension
Friction
Drag Force and Terminal Speed

G. Kinetic Energy and Work
Energy
Kinetic Energy
Work
Work and Kinetic Energy
Work done by the Gravitational Force
Work done by a Spring Force
Work done by a Variable Force
Power

H. Potential Energy and Conservation of Energy
Potential Energy
Work and Potential Energy
Conservative Forces
Conservation of Mechanical Energy
Conservation of Energy

I. Center of Mass and Linear Momentum
Center of Mass
Linear Momentum
Linear Momentum for a System of Particles
Collisions and Impulse
Conservation of Linear Momentum
Elastic Collisions
Inelastic Collisions

J. Rotation
Angular Variables
Constant Angular Acceleration
Kinetic Energy of Rotation
Rotational InertiaTorque
Newton's Second Law for Rotation
Work and Rotational Kinetic Energy

K. Rolling; Torque; and Angular Momentum
Kinetic Energy of Rolling
Forces of Rolling
Torque and Rolling
Angular Momentum
Conservation of Angular Momentum
Newton's Second Law in Angular Form
Rigid Body Rotation

L. Equilibrium and Elasticity
Equilibrium
Static Equilibrium
Center of Gravity
Elasticity

M. Gravitation
Newton's Law of Gravity
Gravitation near Earth's Surface
Gravitation inside Earth
Gravitational Potential Energy
Kepler's Laws
Orbits

N. Fluids
Density and Pressure
Static Fluids
Pascal's Principle
Archimedes' Principle
Dynamics of Ideal Fluids
Equation of Continuity
Bernoulli's Equation

O. Oscillations
Simple Harmonic Motion
Pendulums
Uniform Circular Motion
Damped Simple Harmonic Motion
Forced Simple Harmonic Motion
Resonance

Lab Outline

The lab portion of this course consists of 10-12 hands-on experiments that complement and reinforce topics covered in lecture. Each lab experiment consists of: lab preparation; data collection; data analysis; and the presentation of lab results in the form of a written lab report. Lab topics may include; but are not limited to:

A. Measurement
B. Error Analysis
C. Projectile Motion
D. Force Table
E. Friction
F. Work and Kinetic Energy
G. Conservation of Energy
H. Statics of Structures
I. Ballistic Pendulum
J. Moments of Inertia of Rigid Objects
K. Torques on Rigid Objects
L. Buoyancy
M. Free-fall Acceleration near Earth's Surface

Delivery Methods and Distance Education

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings ("Hybrid") -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

Face 2 Face

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how will these requirements be met with the same rigor in the Distance Education section?

No Value

Effective Student-Instructor Contact: Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Moodle Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV - Interactive Video -Other (specify)

No Value

Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

No Value

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology. Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

itv
LMS
publisher

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

No Value