Cerro Coso College

Course Outline of Record Report

10/07/2021

PHSCC115 : Physical Science

General Information

Author:	-
Course Code (CB01) :	PHSCC115
Course Title (CB02) :	Physical Science
Department:	Science
Proposal Start:	Fall 2013
TOP Code (CB03) :	(1901.00) Physical Sciences, General
SAM Code (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	CCC000529057
Curriculum Committee Approval Date:	10/14/2011
Board of Trustees Approval Date:	11/10/2011
External Review Approval Date:	01/09/2012
Course Description:	This course covers conceptual topics in physics and chemistry, with applications to the earth sciences and astronomy, for the non-science major. Topics such as motion, energy, electricity, magnetism, waves, atoms, chemistry and chemical reactions are covered. The laboratory portion of this course covers conceptual experiments in physics and chemistry, with applications to the earth sciences and astronomy. Experiments in motion, energy, electricity, magnetism, waves, atoms, chemistry and chemical reactions are performed. Not open to students who have completed PHSC 111.
Submission Type:	New Course
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Physical Sciences
Alternate Master Discipline Preferred:	• Astronomy • Chemistry • Earth Science
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
No value

Retake Policy Description
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 Liberal Arts: Mathematics & Science	A.A. Degree Major	Summer 2018 to Fall 2020
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)	4
Maximum Credit Units (CB06)	4
Total Course In-Class (Contact) Hours	108
Total Course Out-of-Class Hours	108
Total Student Learning Hours	216
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

Course Student Hours

Course Duration (Weeks)	18

Lecture Hours	3	6
Laboratory Hours	3	0
Activity Hours	0	0

Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	0
Laboratory	0
Activity	0
Total	108
Course Out-of-Class Hours	
Lecture	0
Laboratory	0
Activity	0
Total	108

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

MATHC050 - Elementary Algebra

Students entering PHSC C115 are required to solve problems involving mathematical operations such as ratios, square roots, surface areas related to radius, and solving for a single variable (pre-algebra).
Math C050 provides students with the requisite skills to solve these problems

AND

Advisory

ENGLC070 - Introductory Composition

Students entering PHSC C115 are expected to identify central points, both explicit and implied, of scientific periodical articles and textbooks, outline and summarize complex and technical scientific readings, interpret difficult and figurative language: academic discourse and scientific terminology , write lab reports in an accepted format. Students are also expected to answer essay questions in clear and error free prose based on readings from texts and scientific journals and also outline and summarize assigned readings texts and scientific journals.

The reading advisory level provides the student with the requisite skills to meet this expectation.

Students entering PHSC C115 are expected to identify central points, both explicit and implied, of scientific periodical articles and textbooks, outline and summarize complex and technical scientific readings, interpret difficult and figurative language: academic discourse and scientific terminology , write lab reports in an accepted format. Students are also expected to answer essay questions in clear and error free prose based on readings from texts and scientific journals and also outline and summarize assigned readings texts and scientific journals.
The writing advisory level provides the student with the requisite skills to meet this expectation.

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	Written work
Rationale	No value
Methods of Instruction	Project-based learning
Rationale	No value
Methods of Instruction	Problem Solving
Rationale	No value
Methods of Instruction	Presentations (by students)

Rationale	No value
Methods of Instruction	Peer analysis, critique & feedback
Rationale	No value
Methods of Instruction	Lecture
Rationale	No value
Methods of Instruction	Laboratory
Rationale	No value
Methods of Instruction	Instruction through examination or quizzing
Rationale	No value
Methods of Instruction	In-class writing
Rationale	No value
Methods of Instruction	Group Work
Rationale	No value
Methods of Instruction	Demonstration
Rationale	No value
Methods of Instruction	Discussion
Rationale	No value

Assignments

- A. Homework assignments from the relevant chapter, including participation in the recitation/discussion session. Example: Students must solve problems on distance, velocity and acceleration and participate in discussions distinguishing the relationship among these three terms. B. Assigned readings from the textbook and/or other sources. Example: Students must read the relevant chapter on forces and how to analyze the forces that a person parachuting to earth encounters. C. Research Paper/Presentation. Example: Students are required to present a paper on the chemicals found in their household and the benefits and dangers of each. D. Laboratory reports Example: Students write a structured report with the results of their work with a partner on the time it takes for them to see the lights turn on in a car to the time it takes to hear the cars horn when the car and the subject are at least 500 meters apart. E. Critical Analysis of course relevant topics that appear in the media. Example: Students are required to read two science-based (not popular media) articles on both sides of the climate change discussion and present a cogent synopsis, including the strengths and weaknesses of each paper.

Methods of Evaluation	Rationale
Tests	A. Exams and Quizzes evaluate the students' ability to apply techniques taught in class and apply these techniques in problem solving. Example: The first midterm exam requires students to conceptually solve equations relating to the motion of an object under the influence of gravity and air resistance.
Homework	B. Regular homework assignments reinforce material learned in class and evaluate the student's ability to learn outside the classroom. Example: A homework assignment covers the conceptual analysis of electric current in the household
Participation	C. Participation in Problem Solving evaluates the student's ability to solve problems in a group environment. Example: Students participate in the analysis of the speed of sound. D. Laboratory reports measuring the student's ability to perform techniques, assess accuracy and precision where appropriate. Example: One of the laboratory experiments involves determination of the time it takes for an object to fall demonstrating the effect of gravity.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
	Hewitt, P. G. Suchocki, J., & Hewitt, L. A. . (2012) Conceptual Physical Science., 5th, Addison-Wesley.			

Other Instructional Materials

Description	Manuals: Hewitt, Suchocki and Hewitt. (2008-01-01 00:00:00.0) Conceptual Physical Science Lab Manual, Addison Wesely
Author	
Citation	Physical Science

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

No value

CSLOs

Solve problems related to motion, momentum and energy using the appropriate theoretical concept. Expected SLO Performance: 70.0

Perform an analysis of thermodynamic concepts in order to solve problems in heat transfer and phase change. Expected SLO Performance: 70.0

Use the concepts of electromagnetism and wave theory to solve problems related to electricity, magnetism, waves and sound. Expected SLO Performance: 70.0

Solve problems involved in basic chemistry, chemical bonding, reactions and mixtures using the concepts of conservation of mass, bonding theory and atomic theory. Expected SLO Performance: 70.0

Solve problems related to motion, momentum and energy using the appropriate theoretical concept and perform hands-on experiments. Expected SLO Performance: 70.0

Perform an analysis of thermodynamic concepts in order to solve problems in heat transfer and phase change and perform hands-on experiments. 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.

Use the concepts of electromagnetism and wave theory to solve problems related to electricity, magnetism, waves and sound in order to design and perform hands-on experiments. Expected SLO Performance: 70.0

Safely perform hands-on conceptual experiments then analyze and report the results. Expected SLO Performance: 70.0

Analyze and utilize the scientific method and proper scientific formatting in problem solving. Expected SLO Performance: 70.0

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.
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.
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.

Outline

Course Outline

A. Motion and Equilibrium
1 Aristotle On Motion
2 Galileo's Concept of Inertia
3 Mass-A Measure of Inertia
4 Net Force
5 The Equilibrium Rule
6 Support Force
7 Equilibrium Of Moving Things
8 The Force of Friction
9 Speed and Velocity
    a. Speed
    b. Instantaneous speed

- c. Average speed
- d. Velocity

10 Acceleration

B. Newton's Laws of Motion
1. Newton's First Law Of Motion
2. Newton's Second Law of Motion
3. Forces and Interactions
4. Newton's Third Law of Motion
5. Vectors
6. Summary of Newton's Three Laws

C. Momentum and Energy
1. Momentum
2. Impulse
3. Impulse-Momentum Relationship
4. Conservation of Momentum
   - a. Collisions
5. Energy
   - a. Work
6. Power
7. Potential Energy
8. Kinetic Energy
   - a. Work-Energy Theorem
   - b. Kinetic Energy and Momentum Compared
9. Conservation of Energy
10. Machines
    - a. Efficiency

D. Thermal Energy and Thermodynamics
1. Thermal Energy
2. Temperature
3. Absolute Zero
4. Heat
5. Quantity of Heat
6. The Laws of Thermodynamics
7. Specific Heat Capacity
8. Thermal Expansion
   - a. Expansion of Water

E. Heat Transfer and Change of Phase
1. Conduction
2. Convection
3. Radiation
   - a. Emission of Radiant Energy
   - b. Absorption of Radiant Energy
   - c. Reflection of Radiant Energy
   - d. Cooling at Night by Radiation
4. Newton's Law Of Cooling
5. Heat Transfer and Change of Phase
6. Evaporation
7. Condensation
8. Boiling
9. Melting and Freezing
10. Energy and Change of Phase

F. Static and Curernt Electricity
1. Electric Force and Charge
   - a. Conservation of Charge
2. Coulomb&rsquo:s Law
   - a. Charge Polarization
3. Electric Field
4. Electric Potential
5. Voltage Sources
6. Electric Current
   - a. Direct Current and Alternating Current

7. Electrical Resistance
8. Ohm's Law
    a. Electric Shock
9. Electric Circuits
    a. Series Circuits
    b. Parallel Circuits
    c. Parallel Circuits and Overloading
    d. Safety Fuses
10. Electric Power

G. Magnetism and Electromagnetic Induction
1. Magnetic Poles
2. Magnetic Fields
3. Magnetic Domains
4. Electric Currents and Magnetic Fields
    a. Electromagnets
    b. Superconducting Electromagnets
5. Magnetic Forces on Moving Charges
    a. Magnetic Force on Current-Carrying Wires
    b. Electric Meters
    c. Electric Motors
6. Electromagnetic Induction
    a. Faraday's Law
7. Generators and Alternating Current
8. Power Production
9. The Transformer-Boosting or Lowering Voltage
10. Field Induction

H. Waves and Sound
1. Vibrations and Waves
2. Wave Motion
a. Wave Speed
3. Transverse and Longitudinal Waves
4. Sound Waves
a. Speed of Sound
5. Reflection of Sound
6. Refraction of Sound
7. Forced Vibrations
8. Resonance
9. Interference
    a. Beats
    b. Standing Waves
10. Doppler Effect
11. Wave Barriers And Bow Waves
12. Shock Waves and the Sonic Boom
13. Musical Sounds
    a. Musical Instruments

I. Light Waves
1. Electromagnetic Spectrum
2. Transparent and Opaque Materials
3. Color
    a. Selective Reflection
    b. Selective Transmission
    c. Mixing Colored Lights
    d. Mixing Colored Pigments
    e. Why the Sky Is Blue
    f. Why Sunsets Are Red
    g. Why Clouds Are White
4. Diffraction
5. Interference
    a. Interference Colors by Reflection from Thin Films
6. Polarization

J. Atoms and Periodic Table
1. The Elements
2. Atoms Are Ancient and Empty

3. Protons and Neutrons
4. Isotopes and Atomic Mass
    a. Figuring Physical Science: Calculating Atomic Mass
5. The Periodic Table
6. Periods and Groups

K. Elements of Chemistry
1. Chemistry: The Central Science
2. The Submicroscopic World
3. Physical and Chemical Properties
4. Determining Physical and Chemical Changes
5. Elements to Compounds
6. Naming Compounds
7. Chemical Equations
    a. Balancing Unbalanced Equations

L. Mixtures
1. Most Materials Are Mixtures
    a. Mixtures Can Be Separated By Physical Means
2. The Chemist&rsquo:s Classification of Matter
3. Solutions
4. Purifying the Water We Drink
5. Desalination
6. Wastewater Treatment
    a. Advanced Integrated Pond Systems

M. How Atoms Bond
1. Electron-Dot Structures
2. The Formation of Ions
    a. Molecules Can Form Ions
3. Ionic Bonds
4. Covalent Bonds
5. Polar Covalent Bonds
6. Molecular Polarity
7. Metallic Bonds
    a. We Should Conserve and Recycle Metals

N. Chemical Reaction
1. Reaction Rates
2. Catalysts
3. Energy and Chemical Reactions
    a. An Exothermic Reaction Involves a Net Release of Energy
    b. An Endothermic Reaction Involves a Net Absorption of Energy
4. Relative Masses of Atoms and Molecules
5. Molar Mass

Lab Outline

Laboratory Experiments
1. Safety Orientation
2. Performance of and Participation in Hands-on Experiments
3. Report Submission
Experiments in motion; energy; electricity; magnetism; waves; atoms; chemistry and chemical reactions are performed.
Lab Examples:
Students mark the time it takes for an object; such as a penny to fall from the first or second story of a building.
Students measure the tire pressure and tire print in all 4 tires of a vehicle and calculate the weight of the car.
Students make salt solutions and measure the density.
Students measure the time it takes for distilled water; tap water and salt water to acheive boiling.

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
Online
Hybrid

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?

Hybrid Assignments will be collected physically or submitted electronically via the class website. Evaluation will be done by the instructor and distributed to the students physically or distributed via the class website. Online Assignments: independent exercises and computer assignments Group Projects: Projects to explore concepts of class Exams Evaluated exactly the same as onsite.

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)

forums
message
email
discussion
proctored
phone

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?

software Excel or similar spreadsheet program either purchased or as freeware so that students may graph data and results.

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.

class_size Hybrid