



CREDIT COURSE OUTLINE

I. COVER PAGE

(1) SCI 1A

(2) INTRODUCTORY CHEMICAL AND PHYSICAL SCIENCE

(3) 4

Number	Title	Units
(4)	Lecture / Lab Hours:	(8)Classification:
	Total Course Hours	
	Total Lec hours: 3.00	Degree applicable: X
	Total Lab hours: 2.00	Non-degree applicable:
	Total Contact hours: 90.00	Basic skills:
	Lec will generate <u>0</u> hour(s) outside work.	(9)RC Fulfills AS/AA degree requirement: (area)
	Lab will generate <u>0</u> hour(s) outside work.	General education category:
		Major:
(5)	Grading Basis: Grading Scale Only	Certificate of:
	Pass/No Pass option X	Certificate in:
	Pass/No Pass only	
(6)	Advisories:	(10)CSU Baccalaureate: X
	Eligibility for English 126	(11)Repeatable: (A course may be repeated three times)
	Eligibility for English 125	0
(7)	Pre-requisites(requires C grade or better):	
	Corequisites:	
<p>(12) Catalog Description: Basic concepts in chemistry and physics and their relation to the everyday environment. The emphasis is on topics appropriate for</p>		

students planning to enter K-6 teacher training programs. This course is specifically designed for students intending to transfer into CSUF's Teacher Education Program.

II. COURSE OUTCOMES:

(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)

Upon completion of this course, students will be able to:

- A. Explain basic theory and use appropriate terminology for fourteen different major areas in physics and chemistry.
- B. Apply scientific principles and laws from physics and chemistry to the solution of problems of increasing complexity.
- C. Interpret, analyze, and mathematically model physical and chemical phenomena observed in the laboratory.
- D. Design and implement laboratory exercises that demonstrate and elucidate concepts in physics and chemistry.
- E. Explain common misconceptions in physical science and give the correct interpretation of these concepts.

III. COURSE OBJECTIVES:

(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)

In the process of completing this course, students will:

- A. Physics part of the course (seven of the following ten objectives):
- B. Determine the center of mass experimentally and via mathematical equations and predict mechanical stability.
- C. Describe the difference between mass and weight and explain the concepts of mechanical equilibrium and linear motion (including position, velocity, and acceleration). Perform calculations pertaining to free-fall in the earth's atmosphere.
- D. Solve simple application problems using Newton's three Laws of Motion.
- E. Solve simple application problems using the concepts of momentum, impulse, and energy (potential and kinetic).
- F. Explain the concept of torque and perform simple calculations pertaining to torque.
- G. Explain the concept of projectile motion and its application to satellite motion.
- H. Explain the concepts of temperature and heat. Understand the 0th, 1st, and 2nd Laws of Thermodynamics.
- I. Solve simple application problems in fluid mechanics including pressure, buoyancy, and Bernoulli's Equation.
- J. Explain the basic concepts of charge, voltage, current, and series and parallel wiring. Solve simple application problems in electricity.
- K. Explain basic concepts in magnetism and solve simple application problems.
- L. Chemistry part of the course (seven of the following ten objectives):
- M. Explain the concept of an element and the various categories of elements.
- N. Explain the component parts of the atom and models of its structure.
- O. Explain the organization of the periodic table use it to deduce various properties of elements.
- P. Describe physical and chemical properties of elements and explain changes of phase.
- Q. Describe various types and properties of mixtures.
- R. Describe the three types of chemical bonds (ionic, covalent, and metallic) and their role in the chemical and physical properties of elements and compounds.
- S. Explain molecular dipoles and their role in solubility.
- T. Balance chemical reaction equations, determine reaction rates, and determine the energy associated with simple reactions.
- U. Describe acid/base reactions and explain the concept of pH.
- V. Describe electrochemical reactions and perform simple calculations pertaining to them.

IV. COURSE OUTLINE:

Lecture Content:

A. Physics (do 7 of the following 10 topics)

1. Mass, center of mass and stability
2. Equilibrium and linear motion
3. Newton's Laws of Motion
4. Momentum, impulse, and energy
5. Torque
6. Gravity, projectiles, and satellites
7. Temperature, heat, and thermodynamics
8. Fluid mechanics
9. Electricity
10. Magnetism

B. Chemistry (do 7 of the following 10 topics)

1. The elements
2. Atomic structure
 - i. Protons, neutrons, and electrons
 - ii. The nucleus
 - iii. The quantum hypothesis
 - iv. Probability clouds and atomic orbitals
 - v. The shell model
3. The periodic table
4. Physical and chemical properties
5. Compounds and mixtures
6. Molecules and chemical bonds
7. Molecular Attractions
 - i. Dipoles
 - ii. Solubility
8. Chemical reactions
 - i. Balancing chemical reactions
 - ii. Reaction rates
 - iii. Energy of reaction
9. Acids and bases
 - i. Reactions
 - ii. pH
10. Electrochemistry

Lab Content:

Note: Laboratory exercises will accompany the majority of the above listed topics. Specific experiments will depend on the laboratory facilities available. Some of the common experiments are:

1. Two-dimensional center of mass determination
2. Measurement systems
3. Energy ramp
4. Buoyancy of composite materials
5. Gas generation
6. Production of a salinity calibration curve
7. Household chemical identification

V. APPROPRIATE READINGS

Reading assignments may include but are not limited to the following:

A. Sample Text Title:

1. Recommended - Hewitt *Conceptual Physics Lab Manual*, ed. 8th Addison-Wesley, 1998,
2. Recommended - Hewitt, Suchocki, and Hewitt *Conceptual Physical Science*, ed. 4th Addison-Wesley, New York,

2008,

B. Other Readings

1. Recommended - *Current journal articles from sources such as Scientific America and Nature.*

Global or international materials or concepts are appropriately included in this course

Multicultural materials and concepts are appropriately included in this course

If either line is checked, write a paragraph indicating specifically how global/international and/or multicultural materials and concepts relate to content outline and/or readings.

VI. METHODS TO MEASURE STUDENT ACHIEVEMENT AND DETERMINE GRADES:

Students in this course will be graded in at least one of the following four categories. Please check those appropriate. A degree applicable course must have a minimum of one response in category A, B, or C.

A. Writing Check either 1 or 2 below			
X	1. Substantial writing assignments are required. Check the appropriate boxes below and provide a written description in the space provided.		
	2. Substantial writing assignments are NOT required. If this box is checked leave this section blank. For degree applicable courses you must complete category B and/or C.		
	a) essay exam(s)	X	d) written homework
X	b) term or other paper(s)		e) reading reports
X	c) laboratory report(s)		f) other (specify)

Required assignments may include but are not limited to the following:

1. Write-ups of laboratory experiments that demonstrate analysis and communication skills.
2. Biography paper (1000 words) on a noteworthy physicist or chemist.
3. Paper (1000 words) on a current event in physical science.

B. Problem Solving Computational or non-computational problem-solving demonstrations, including:			
X	a) exam(s)	X	d) laboratory reports

	b) quizzes		e) field work
X	c) homework problems		f) other (specify):

Required assignments may include but are not limited to the following:

1. Problem sets that require the students to apply the theory learned in lecture.
2. Exams that include computational problem solving.
3. Write-ups of laboratory experiments that demonstrate analysis and communication skills.

C. Skill demonstrations, including:			
	a) class performance(s)		c) performance exams(s)
	b) field work		d) other (specify)

Required assignments may include but are not limited to the following:

D. Objective examinations including:			
X	a) multiple choice	X	d) completion
X	b) true/false		e) other (specify):
X	c) matching items		

COURSE GRADE DETERMINATION:

Description/Explanation: Based on the categories checked in A-D, it is the recommendation of the department that the instructor's grading methods fall within the following departmental guidelines; however, the final method of grading is still at the discretion of the individual instructor. The instructor's syllabus must reflect the criteria by which the student's grade has been determined. (A minimum of five (5) grades must be recorded on the final roster.)

If several methods to measure student achievement are used, indicate here the approximate weight or percentage each has in determining student final grades.

Homework 10% Lab reports 20% Term paper(s) 10% Midterm exams (3) 40% Final exam 20%

VII. EDUCATIONAL MATERIALS

For degree applicable courses, the adopted texts, as listed in the college bookstore, or instructor-prepared materials have been certified to contain college-level materials.

Validation Language Level (check where applicable):

College-Level Criteria Met

YES NO

Textbook	<u> X </u>	<u> </u>
Reference materials	<u> </u>	<u> X </u>
Instructor-prepared materials	<u> X </u>	<u> </u>
Audio-visual materials	<u> X </u>	<u> </u>

Indicate Method of evaluation:

Used readability formulae (grade level 10 or higher)	<u> </u>
Text is used in a college-level course	<u> X </u>
Used grading provided by publisher	<u> </u>
Other: (please explain; relate to Skills Levels)	<u> </u>

Computation Level (Eligible for MATH 101 level or higher where applicable) X

Content

Breadth of ideas covered clearly meets college-level learning objectives of this course X

Presentation of content and/or exercises/projects:

Requires a variety of problem-solving strategies including inductive and deductive reasoning. X

Requires independent thought and study X

Applies transferring knowledge and skills appropriately and efficiently to new situations or problems. X

List of Reading/Educational Materials

Recommended - Hewitt *Conceptual Physics Lab Manual*, ed. 8th Addison-Wesley , 1998,

Recommended - Hewitt, Suchocki, and Hewitt *Conceptual Physical Science*, ed. 4th Addison-Wesley , New York, 2008, ISBN: 9780321516954

Comments:

This course requires special or additional library materials (list attached).

This course requires special facilities:
Science laboratory capable of running physics and chemistry experiments

Attached Files:

[SCI 1A FORMS B & C](#)

BASIC SKILLS ADVISORIES PAGE The skills listed are those needed for eligibility for English 125, 126, and Math 101. These skills are listed as the outcomes from English 252, 262, and Math 250. In the right hand column, list at least <u>three</u> major basic skills needed at the beginning of the target course and check off the corresponding basic skills listed at the left.	
(eligibility for English 126) (as outcomes for English 262) <input checked="" type="checkbox"/> Using phonetic, structural, contextual, and dictionary skills to attack and understand words. <input checked="" type="checkbox"/> Applying word analysis skills to reading in context. <input checked="" type="checkbox"/> Using adequate basic functional vocabulary skills. <input checked="" type="checkbox"/> Using textbook study skills and outlining skills. <input checked="" type="checkbox"/> Using a full range of literal comprehension skills and basic analytical skills such as predicting, inferring, concluding, and evaluating.	1. Reading and comprehending a college level science textbook. 2. Reading and comprehending a laboratory procedure (including safety instructions). 3. Reading and comprehending problem solution examples.
(eligibility for English 125) (as outcomes for English 252) <input checked="" type="checkbox"/> Writing complete English sentences and avoiding errors most of the time. <input checked="" type="checkbox"/> Using the conventions of English writing: capitalization, punctuation, spelling, etc. <input checked="" type="checkbox"/> Using verbs correctly in present, past, future, and present perfect tenses, and using the correct	1. Correctly formulating answers to descriptive problems. 2. Drawing conclusions from experimental observations and writing them down in coherent sentences. 3. Correctly writing a lab report incorporating proper English usage. 4. Writing one or more papers.

<p>forms of common irregular verbs.</p> <p><input checked="" type="checkbox"/> Expanding and developing basic sentence structure with appropriate modification.</p> <p><input checked="" type="checkbox"/> Combining sentences using coordination, subordination, and phrases.</p> <p><input checked="" type="checkbox"/> Expressing the writer's ideas in short personal papers utilizing the writing process in their development.</p>	
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Check the appropriate spaces.

Eligibility for Math 101 is advisory for the target course.

Eligibility for English 126 is advisory for the target course.

Eligibility for English 125 is advisory for the target course.

If the reviewers determine that an advisory or advisories in Basic Skills are all that are necessary for success in the target course, stop here, provide the required signatures, and forward this form to the department chair, the appropriate associate dean, and the curriculum committee.

CONTENT REVIEW

REQUISITES

No requisites