Cerro Coso College

Course Outline of Record Report

10/13/2021

CHEMC101 : Introduction to Chemistry

General Information

Author:	• Vivian Baker • Stenger Smith, John
Course Code (CB01) :	CHEMC101
Course Title (CB02) :	Introduction to Chemistry
Department:	Science
Proposal Start:	Fall 2018
TOP Code (CB03) :	(1905.00) Chemistry, General
SAM Code (CB09) :	Non-occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	CCC000178314
Curriculum Committee Approval Date:	11/03/2017
Board of Trustees Approval Date:	11/14/2013
External Review Approval Date:	02/24/2014
Course Description:	In this course, students learn about measurement and units in chemistry,properties of matter, the structure of the atom, inorganic compounds, organic compounds, the periodic table, calculations from balanced chemical equations, basic chemical bonding, the ideal gas law, properties of aqueous systems, solutions and other liquids.
Submission Type:	Change to Content Update
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Chemistry
Alternate Master Discipline Preferred:	• Physical Sciences • Chemistry • Physical Sciences
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) (In Development)	Certificate of Achievement	Fall 2021
Intersegmental General Education Transfer Curriculum Certificate of Achievement (In Development)	Certificate of Achievement	Fall 2021
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

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	CHEM 101

CSU General Education Certification	Categories	Status	Approval Date	Comparable Course
Area B.1	Scientific Inquiry & Quantitative Reasoning Physical Sciences	Approved	No value	CHEM 101

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.
Area 5.C	Physical & Biological Sciences Laboratory/Activity	Approved	No value	

Units and Hours

Summary

Minimum Credit Units (CB07)	3
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

MATHC055 - Intermediate Algebra

SUBJECT DISCIPLINE and COURSE NUMBER: CHEM C101
1. These are the Entering Skills Expected of Students Coming into the Course:
A. Perform cross multiplications
B. Understand exponentials
C. Calculate with exponentials
D. Perform Calculations with Units
E. Solve Algebraic equations
F. Calculate Equilibrium Points Between Various Types Of Acids And Bases.
G. Work with metric glassware and metric units of measurement

2. These are the Exit Skills/Competency Standards of the Proposed Requisite:
Proposed Requisite: Math C055
Source of List: Goals and Objectives on Course Outline
A. Proficiency in signed numbers, factoring, linear equations.

B. Proficiency in systems of equations, simple and complex fractions
C. Proficiency in functions and graphing.
D. Proficiency in exponents, radicals, quadratic equations and determinants.
E. Ability to use a combination of the above 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	A. Lectures to cover the relevant topics and entire detailed topical outline over the course of the semester. B. Recitation by Students to cover the entire detailed topical outline with emphasis on questions that require the integration of 2 or more skills/topics covered in the lecture. C. Laboratory Experiments to cover and reinforce the entire detailed topical outline, and often require integration of 2 or more skills/topics covered in lecture. D. Field trips to Local laboratories to provide real life examples of 2 or 3 topics in the detailed topical outline. • Example: A field trip to the chemistry division at the China Lake NAWC will cover topics C and D..
Methods of Instruction	Discussion
Rationale	No value
Methods of Instruction	Demonstration
Rationale	No value
Methods of Instruction	Field Trip
Rationale	No value

Methods of Instruction	In-class writing
Rationale	No value
Methods of Instruction	Laboratory
Rationale	No value
Methods of Instruction	Lecture
Rationale	No value
Methods of Instruction	Outside reading
Rationale	Field trip
Methods of Instruction	Problem Solving
Rationale	No value
Methods of Instruction	Project-based learning
Rationale	No value

Assignments

Out of class assignments may include but are not limited to
A. Homework: Students are required to solve 15 to 30 homework problems of various degrees of difficulty each week. Each assignment has problems that involve reinforcement of topics covered in the lecture as well as problems with involve the integration of several techniques to solve relevant chemistry problems. Example: students are required to find out the amount and worth of gold in 1 cubic kilometer of Ocean water.

B. Laboratory Reports: Students are required to write laboratory reports based upon data that was gathered in the lab. The reports must include results of the laboratory experiment (such as the identity of an unknown or the percentage composition of an unknown compound) as well as relevant problems from the laboratory text which reinforce the lab technique(s) used in the experiment. Example: Students must identify and unknown metal based upon its experimentally determined heat capacity.

C. Textbook Readings: Students are expected to read each of the chapter in advance of the lecture. The chapters cover new material and are written at college-level english with many new technical terms, and must often be read more than once.

D. Background Research: As topics arise, students may need to perform background research and be ready to discuss in class. For example: Genetically Modified Food, Climate Change, Mars Orbiter crash due to incorrect dimensional analysis.

Methods of Evaluation	Rationale
Tests	Exams evaluate the students ability to apply techniques taught in class and apply these techniques in problem solving.

	Example: The first midterm exam comprises answers that require the use of the periodic chart, calculations for unit conversions, and knowledge of the Scientific Method
Other	Laboratory reports measuring the student's ability to perform techniques, to identify unknowns, assess accuracy and precision where appropriate. • Example: One of the laboratory experiments involves determination of the density of various sodium chloride solutions, construction of a calibration curve, followed by the determination of the weight percent sodium chloride of an unknown
Participation	Laboratory participation measuring the ability to work in groups, preparation level, and attention to safety • Example: Students are required to wear the appropriate level of protection (eye protection is always required), complete prelaboratory assignments, perform the experiment and dispose of waste chemicals in the appropriate containers.
Other	Regular homework assignments reinforce material learned in class and evaluate the students ability to learn outside the classroom. • Example: Homework assigned on the relevant chapter which covers single and double replacement reactions.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
	Hein, M. & Arena, S. . (2016) Foundations of College Chemistry Laboratory, 15th , Wiley Publishing			
	Hein, M. & Arena, S. . (2016) Foundations of College Chemistry, 15th , Wiley Publishing			

Other Instructional Materials

No Value

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

No value

CSLOs

Analyze the fundamental features of chemistry including measurement and dimensional analysis of physical properties such as mass, volume, density, solution concentrations, dilutions. Expected SLO Performance: 70.0

Perform an analysis of physical and chemical processes using the laws of conservation of mass and energy and information of reactivity and solubility. Expected SLO Performance: 70.0

Evaluate the chemical and physical properties of solids, liquids, solutions and gasses. Expected SLO Performance: 70.0

Use the periodic chart to assess the properties of materials and to determine realistic bonding stoichiometries. Expected SLO Performance: 70.0

Analyze the features of chemistry including physical and chemical properties, naming and writing chemical formulas of compounds along with balancing and classifying chemical reactions. Expected SLO Performance: 70.0

Perform calculations from balanced chemical equations including but not limited to composition, yield and limiting reactant calculations. Expected SLO Performance: 70.0

Draw and interpret Lewis dot, line bond and short hand structures of inorganic compounds and ions as well as organic compounds and organic functional groups. Expected SLO Performance: 70.0

Perform experiments adhering to safety regulations in the laboratory. Expected SLO Performance: 70.0

Explain in detail and apply the Scientific Method. Expected SLO Performance: -

Outline

Course Outline

I. Introduction to Chemistry
- A. The Nature of Chemistry
- B. Process of Chemistry
- C. The Scientific Method

II. Standards for Measurement
- A. Mass and Weight
- B. Measurement
- C. Error Estimation and Rounding
- D. Unit analysis
- E. Problem Solving

III. Classification of Matter
- A. Physical States
- B. Mixtures
- C. Elements
- D. Distribution of the Elements

IV. Properties of Matter
- A. Physical Changes
- B. Chemical Changes
- C. Conservation of Mass and Energy
- D. Calorimetry

V. Atomic Theory
- A. Model of the Atom
- B. Electric Charge and Electrons
- C. Atomic Numbers, Isotopes and Atomic Mass

VI. Inorganic Compounds
- A. Systematic Names
- B. Formulas

C. Binary and Polyatomic Ions
D. Acids

VII. Quantitative Composition
A. The Mole
B. Molar Mass
C. Percent Composition and Empirical Formula
D. Empirical and Molecular Formulas

VIII. Chemical Equations
A. Balancing Chemical Equations
B. Calculations from Chemical Equations
C. Types of Reactions
D. Heat in Chemical Reactions

IX. Calculations from Chemical Equations
A. Stoichiometry
B. Mole-Mole Calculations
C. Mole-Mass Calculations
D. Mass-Mass Calculations
E. Limiting Reactant and Yield

X. The Periodic Table
A. Light as a Particle and a Wave
B. Electronic Structures
C. Detailed Analysis of the Periodic Chart

XI. Chemical Bonds
A. Trends in the Periodic Chart
B. Lewis Structure of Atoms
C. Ionic Bonds and Ionic Compound Formulas
D. Covalent Bonds
E. Electronegativity
F. Lewis Structure of Molecules and Complex Ions
G. Molecular Shape and Electron Pair Repulsion

XII. Aqueous Systems
A. Solubility
B. Concentrations of Solutions
C. Reactions in solutions

XIII Acid Base reactions
A. Acid and Base Strength
B. Acids bases and salt formation
C. Introduction to Titrations.

XIV. The Ideal Gas Law
A. Kinetic Molecular Theory
B. Boyles, Charles and Lussac's Law
C. The Ideal Gas Law
D. Uses of the Ideal Gas Law
E. Density of Gasses

XV.Nuclear Chemistry
A. Radioactivity
B. Alpha Particles, Beta Particles and Gamma Rays
C. Radioactive Decay
D. Nuclear Fission and Fusion

XVI.Basic Organic Chemistry
A. The Carbon Atom
B. Hydrocarbons
C. Alkanes, Alkenes, Alkynes and Aromatic Hydrocarbons
D. Alcohols, Ketones, Acids, Esters and Polymers

Lab Outline

Hands-on laboratory experiments designed to reinforce and complement subjects covered in the lecture. There are 10-14 such experiments offered in this class. Example: Students perform
paper chromatography to determine the presence of Iron, Copper, or Chromium in an unknown sample, then submit the laboratory report.

XV.Laboratory Experiments and Reports--Include but not limited to:
1. Basic Laboratory Techniques
2. Scientific Measurements
3. Calorimetry
4. Identification of Selected Ions

5. Heat of Reaction
6. Properties of Solution
7. Chromatography
8. Double Displacement
9 Single Displacement
10. Chemical Equilibrium: Reversible Reactions
11. Neutralization: Acid/Base Titration
12. Organic Compounds
13. Lewis Structures and Molecular Models

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

Interactive video = Face to face course with significant required
activities in a distance modality
Online with some required face-to-face meetings (“Hybrid”)
Face to 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?

All assignments in distance education courses (online, hybrid and iTV) are of the same rigor as those in the on-ground course, except that students in purely online sections will submit all of their assignments virtually. Instructor evaluation of student work in distance education courses is the same as in the on-ground course, except that evaluation of student work in online is presented virtually. Instead of onsite lectures, hybrid and online courses use a variety of methods including, but not limited to videos and written lecture notes.
Labs must always be hands on and face-to-face for both safety and rigor reasons.

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)

discussion forums
learning management system message
chat
newsgroup/discussion board
proctored
itv

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
learning manaagement system
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