Cerro Coso College

Course Outline of Record Report

02/23/2022

CHEMC111 : General Inorganic Chemistry I

General Information

Author:	• Vivian Baker • Stenger Smith, John
Course Code (CB01) :	CHEMC111
Course Title (CB02) :	General Inorganic Chemistry I
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) :	CCC000242628
Curriculum Committee Approval Date:	11/03/2017
Board of Trustees Approval Date:	12/14/2017
External Review Approval Date:	12/14/2017
Course Description:	In this course, students learn about matter and measurement, atoms, molecules, ions, calculations with chemical formulas and equations, aqueous reactions and solution stoichiometry, thermochemistry, the electronic structure of atoms, periodic properties of the elements, concepts of chemical bonding, molecular geometry and bonding theories, the gaseous state, intermolecular forces in solids and liquids, modern materials, and properties of solutions.
Submission Type:	Change to Content Update Course Description, review SLOs, textbook, etc.
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Chemistry
Alternate Master Discipline Preferred:	• Chemistry
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

- Pass/No Pass

- Letter Grade Methods

☐ 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:

☑ 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
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
CC Kinesiology for Transfer	A.A. Degree for Transfer	Fall 2018
Nutrition and Dietetics Associate in Science Degree for Transfer (AS-T)	A.S. Degree for Transfer	Fall 2019 to Spring 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

Nutrition and Dietetics Associate in Science Degree for Transfer (AS-T)	A.S. Degree for Transfer	Spring 2020 to Spring 2022
Liberal Arts: Mathematics & Science Associate in Arts Degree	A.A. Degree Major	Fall 2020
Nutrition and Dietetics Associate in Science Degree for Transfer (AS-T)	A.S. Degree for Transfer	Spring 2022
CC Kinesiology for Transfer (In Development)	A.A. Degree for Transfer	Fall 2022

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 110

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	

CSU General Education Certification	Categories	Status	Approval Date	Comparable Course
Area B.1	Scientific Inquiry & Quantitative Reasoning Physical Sciences	Pending	No value	CHEM 110
Area B.3	Scientific Inquiry & Quantitative Reasoning Laboratory	Pending	No value	

Units and Hours

Summary

Minimum Credit Units (CB07)	5
Maximum Credit Units (CB06)	5
Total Course In-Class (Contact) Hours	126
Total Course Out-of-Class Hours	144
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 Class
Lecture Hours	4	8
Laboratory Hours	3	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	126
Course Out-of-Class Hours	
Lecture	0
Laboratory	0
Activity	0
Total	144

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 C111
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. 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.

Methods of Instruction	Written work
Rationale	No value

Methods of Instruction	Problem Solving
Rationale	No value

Methods of Instruction	Presentations (by students)
Rationale	No value

Methods of Instruction	Outside reading
Rationale	No value

Methods of Instruction	Lecture
Rationale	No value

Methods of Instruction	Laboratory
Rationale	Laboratory Experiments to cover and reinforce the entire detailed topical outline, and often require integration of 2 or more skills/topics covered in lecture.

Methods of Instruction	Guest Lecturers
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	Field Trip
Rationale	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 L and M
Methods of Instruction	Discussion
Rationale	No value
Methods of Instruction	Demonstration
Rationale	No value
Methods of Instruction	Computational Work
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 empirical formula of a substance from elemental analysis results.

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 thelaboratory 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 are required to report on the percent chloride using an gravimetric analysis.

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: Arsenic-based bacteria, 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 understanding of balancing chemical equations, determining limiting reactants and calculating the amount of product.
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 the quantitative analysis in triplicate of the amount of chloride anion in an unknown salt. Students are graded specifically on accuracy and precision.
Participation	Laboratory participation measuring the ability to work in groups, preparation level, and attention to safety Example: Students are required to read the lab text in advance, wear the appropriate level of protection (eye protection is always required), and dispose of waste chemicals in the appropriate containers.
Homework	Regular homework assignments reinforce material learned in class and evaluate the student's ability to learn outside the classroom. • Example: Homework assigned on the relevant chapter which covers the application of the Ideal Gas Law

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
	Nelson, J. H. Kemp, K. C. Stotlzfus, M W, Lufaso, M. (2018) Chemistry the Central Science, Laboratory Experiments, 14th , Prentice Hall			
	Brown, T L, LeMay, H E, Bursten, B. E. , Murphy, C J, Woodward, P M, Stoltzfus, M W. (2018) Chemistry: The Central Science, 14th , Prentice Hall			

Other Instructional Materials

No Value

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

No value

CSLOs

Perform analyses involving calculations that include units, chemical formulas, balancing chemical equations and quantitative calculations from balanced chemical equations and perform integrated exercises based upon one or more of the previously listed topics. 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.
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 think critically and creatively and apply reasoning.
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.

Assess equations involving changes in enthalpy, free energy, entropy, free energy and entropy as they relate to equilibrium, kinetics, activation energy, and heats of reaction and formation. Expected SLO Performance: 70.0

Calculate and compare values for heats in exothermic and endothermic reactions by calorimetry, bond dissociation energy, and Hess's Law. Expected SLO Performance: 70.0

Explain the structure of the atom and give appropriate electronic configuration of elements and properties of the elements using the periodic chart, as well as be able to recognize the contributions of Quantum Mechanics to the theoretical understanding of the periodic properties of elements. Expected SLO Performance: 70.0

Classify the driving forces behind chemical bonding, be able to classify bonds as ionic, covalent or both, apply bonding theories to predict structure and properties of substances. Expected SLO Performance: 70.0

Draw the optimum Lewis Dot structure(s)for covalently bounded compounds and to accurately predict shape and reactivity. Expected SLO Performance: 70.0

ISLOs Core ISLOs	Students who are completing a program will be able to communicate ideas, perspectives, and values clearly and persuasively while listening to others openly

Perform calculations using the ideal gas law. Expected SLO Performance: 70.0

Assess the intermolecular forces and interactions present in liquids and solids in order to explain how these forces influence phase changes and phase diagrams.. Expected SLO Performance: 70.0

Compare and contrast phase diagrams for different chemicals. Expected SLO Performance: 70.0

ISLOs Core ISLOs	Students who are completing a program will be able to access, evaluate, and effectively use information.

Design and safely perform scientific experiments, including recording and analyzing the results. Expected SLO Performance: 70.0

ISLOs Core ISLOs	Students who are completing a program will be prepared to engage in responsible citizenship at various levels.

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. Introduction: Matter and Measurement
1. The Study of Chemistry
2. Classification of Matter
3. Properties of Matter
4. Units of Measurement
5. Uncertainty in Measurement
6. Dimensional Analysis

B. Atoms, Molecules, and Ions
1. Atomic Theory of Matter
2. Discovery of Atomic Structure
3. Modern View of Atomic Structure
4. Periodic Table
5. Molecules and Molecular Compounds
6. Ions and Ionic Compounds
7. Naming Inorganic Compounds

C. Calculations with Chemical Formulas and Equations
1. Chemical Equations
2. Patterns of Chemical Reactivity
3. Atomic and Molecular Weights
4. The Mole
5. Empirical Formulas from Analysis
6. Quantitative Information from Balanced Equations
7. Limiting Reactants

D. Aqueous Reactions and Solution Stoichiometry
1. Solution Composition
2. Properties of Solutes in Aqueous Solution
3. Acids, Bases, and Salts
4. Ionic Equations
5. Metathesis Reactions
6. Introduction to Oxidation-Reduction Reactions
7. Solution Stoichiometry and Chemical Analysis

E. Thermochemistry
1. Nature of Energy
2. First Law of Thermodynamics
3. Enthalpy
4. Enthalpies of Reactions
5. Calorimetry
6. Hess's Law
7. Enthalpies of Formation

F. Electronic Structure of Atoms
1. The Wave Nature of Light
2. Quantized Energy and Photons
3. Bohr's Model of the hydrogen Atom
4. Wave Behavior of Matter
5. Quantum Mechanics and Atomic Orbitals
6. Representations of Orbitals

7. Orbitals in Many-Electron Atoms
8. Electron Configurations
9. Electron Configurations and the Periodic Table

G. Periodic Properties of the Elements
1. Development of the Periodic Table
2. Electron Shells and the Sizes of Atoms
3. Ionization Energy
4. Electron Affinities
5. Metals, Nonmetals, and Metalloids
6. Group Trends for the Active Metals
7. Group Trends for Selected Nonmetals

H. Basic Concepts of Chemical Bonding
1. Lewis Symbols and the Octet Rule
2. Ionic Bonding
3. Size of Ions
4. Covalent Bonding
5. Hybrid Orbitals
6. Multiple Bonds
7. Molecular Orbitals
8. Second-Row Diatomic Molecules

I. Molecular Geometry and Bonding Theories
1. Molecular Shapes
2. The VSEPR Model
3. Polarity of Molecules
4. Covalent Bonding and Orbital Overlap
5. Hybrid Orbitals
6. Multiple Bonds
7. Molecular Orbitals
8. Second-Row Diatomic Molecules

J. The Gaseous State
1. Characteristics of Gases
2. Pressure
3. The Gas Laws
4. The Ideal-Gas Equation
5. Further Applications of the Ideal Gas Equation
6. Gas Mixtures and Partial Pressures
7. Kinetic-Molecular Theory
8. Molecular Effusion and Diffusion
9. Real Gases: Deviations from Ideal Behavior

K. Intermolecular Forces, Liquids, and Solids
1. Molecular Composition of Liquids and Solids
2. Intermolecular Forces
3. Some Properties of Liquids
4. Phase Changes
5. Vapor Pressure
6. Phase Diagrams
7. Structure of Solids
8. Bonding in Solids

L. Modern Materials
1. Liquid Crystals
2. Polymers
3. Ceramics
4. Thin Films
5. Nano Materials

M. Laboratory Experiments
1. Safety Orientation
2. Performance of and Participation in Hands-on Experiments

3. Report Submission

Lab Outline

The laboratory portion augments the lecture portion of the course. It consists of: practical hands-on experiments that lead to the understanding of chemical principles, writing of laboratory reports, and discussion of results. Example: Students work with a Calorimeter to determine the heat of a reaction.

A. Laboratory Experiments
1. Safety Orientation
2. Performance of and Participation in Hands-on Experiments
3. Report Submission

Laboratory Experiments and Reports Include but not limited to:
1. Basic Laboratory Techniques
2. Identification of a Substance by Physical Properties
3. Separation of the Components of a Mixture
4. Activity Series
5. Heat of Neutralization (Calorimetry)
6. Types of Chemical Reactions
7. Gravimetric Analysis
8. Chromatography
9. Reactions in Aqueous Solutions
10. Determination of the Gas Constant
11. Molecular Geometry 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

Face 2 Face true

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.

No Value

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