CH 001A: GENERAL CHEMISTRY I

Originator
cmelton

Justification / Rationale
To offer our students more online options for the safety of the students, faculty, and staff during the pandemic, but also to accommodate more of our students who may need access to online courses in order to attend.

Effective Term
Fall 2022

Credit Status
Credit - Degree Applicable

Subject
CH - Chemistry

Course Number
001A

Full Course Title
General Chemistry I

Short Title
GEN CHEMISTRY I

Discipline

Disciplines List
Chemistry

Modality
Face-to-Face
Hybrid

Catalog Description
This is the first course of a two-semester sequence covering the basic principles and concepts of chemistry with emphasis on chemical calculations. Inorganic chemistry is stressed, and the material includes a discussion of atomic structure, chemical bonding, molecules, reaction types, states of matter, and the properties of solutions. The laboratory part of the course complements the lectures and includes qualitative analysis.

Schedule Description
This is the first course of a two-semester sequence covering the basic principles and concepts of chemistry, with emphasis on chemical calculations. Prerequisite: MATH 049 and CH 003 or one year high school chemistry
Advisory: MATH 012
IGETC: 5A, 5C

Lecture Units
4

Lecture Semester Hours
72

Lab Units
1

Lab Semester Hours
54

In-class Hours
126

Out-of-class Hours
144

Total Course Units
5

Total Semester Hours
270

Prerequisite Course(s)
CH 003 or one year high school chemistry, and MATH 049
Advisory: MATH 012

Required Text and Other Instructional Materials

Resource Type
Book

Author
Beran, J.A.

Title
Laboratory Manual for Principles of General Chemistry

Edition
10th

City
New York, NY

Publisher
John Wiley Sons Inc.

Year
2014

College Level
Yes

Flesch-Kincaid Level
12

ISBN #
9781118621516

Resource Type
Book

Author
Tro, N. J.

Title
Chemistry: Structure and Properties

Edition
2nd

City
Hoboken, NJ

Publisher
Pearson

Year
2018

College Level
Yes

Flesch-Kincaid Level
12

ISBN #
9780134293936

For Text greater than five years old, list rationale:
This text has not been updated, better materials have not been published.

Class Size Maximum
24

Entrance Skills
Describe the different forms of matter.

Requisite Course Objectives
CH 003-Demonstrate an understanding of the fundamental concepts of chemistry with their applications to human affairs.

Entrance Skills
Describe the different types of chemical reactions.

Requisite Course Objectives
CH 003-Demonstrate an understanding of the fundamental concepts of chemistry with their applications to human affairs.
CH 003-Demonstrate use of tools and instruments involved in making findings in chemical behavior.
CH 003-Demonstrate the ability to collect and interpret the data

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Entrance Skills
Use simple instruments used in examining chemical behavior.

Requisite Course Objectives
CH 003-Demonstrate use of tools and instruments involved in making findings in chemical behavior.
CH 003-Solve chemistry problems with the coupled recognition that calculation methods in chemistry are shared in other domains such as business, economics, and technology.
CH 003-Demonstrate the ability to collect and interpret the data

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Entrance Skills
Solve simple chemical problems.

Requisite Course Objectives
CH 003-Solve chemistry problems with the coupled recognition that calculation methods in chemistry are shared in other domains such as business, economics, and technology.

Entrance Skills
Analyze data in a graphical manner.

Requisite Course Objectives
MATH 012-Analyze functions and graphs that are described either parametrically, using polar coordinates, or using rectangular coordinates. Demonstrate an understanding of the relationship between different coordinate systems.

MATH 012-Analyze exponential and logarithmic functions by finding an exponential expression based on essential characteristics such as the growth factor and in terms of domain, concavity, intercepts, asymptotes, transformations, and by visualizing these in the construction of a graph for the function.
MATH 049-Comprehend that the key characteristic of a linear model is its constant rate of change. Recognize when a table, graph or equation is linear.
MATH 049-Interpret slope as a rate of change, in preparation for generalizing the rate of change to the derivative in the Calculus course.
MATH 049-Create and comprehend a linear model in the form of a table, graph, or equation from a verbal description, using the rule of 4.

Entrance Skills

Create ideas and expound them in brief essay form.

Requisite Course Objectives

CH 003-Demonstrate the ability to raise questions and how to formulate them clearly

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Entrance Skills

Convert between logarithmic and exponential equations.

Requisite Course Objectives

MATH 012-Apply the properties of equality to solve equations in one variable involving polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric expressions which may involve parameters.
MATH 012-Analyze exponential and logarithmic functions by finding an exponential expression based on essential characteristics such as the growth factor and in terms of domain, concavity, intercepts, asymptotes, transformations, and by visualizing these in the construction of a graph for the function.
MATH 049-Develop the logarithm function as an inverse of the exponential function. Solve basic exponential logarithmic equations. Apply properties of logarithms in anticipation of the Pre-Calculus course.

Entrance Skills

Utilize the concept of functions.

Requisite Course Objectives

MATH 049-Develop the language of functions: calculate and find x and y intercepts, evaluate difference quotients, and how these calculations relate to graphs in preparation for the graphing application in the Calculus course.
MATH 049-Create and comprehend a linear model in the form of a table, graph, or equation from a verbal description, using the rule of 4.

Entrance Skills

Analyze linear regression for graphs of tabulated data and use it to solve related problems.

Requisite Course Objectives

MATH 012-Analyze exponential and logarithmic functions by finding an exponential expression based on essential characteristics such as the growth factor and in terms of domain, concavity, intercepts, asymptotes, transformations, and by visualizing these in the construction of a graph for the function.
MATH 049-Find the equation of a line and apply it to solve problems with a constant rate of change.

Course Content

1. Review of mathematics, measurement units and dimensional analysis.
2. Matter and its nature.
3. Atomic structure and its relationship to periodicity.
4. Nomenclature
5. Quantum Theory
6. Energy and chemical change
7. Types of chemical reactions, including metathesis, acids and bases, REDOX and metathesis reactions.
8. Chemical bonding and the nature of molecules and molecular shapes.

9. States of matter, gas laws and kinetic molecular theory of gases.
10. Solutions, their formation and colligative properties.

Lab Content

1. Students will learn about safety and how to determine quantities of material gravimetrically and volumetrically using chemical balances, pipettes and burettes.
2. Students will learn how to safely mix reagents and perform different chemical reactions including oxidation-reduction reactions.
3. Students will learn to perform quantitative analyses using titration.
4. Students will learn about acids, bases and salts.
5. Students will do a calorimetry experiment with three parts and lots of graphing using excel
6. Students will learn how to do a synthesis reaction of Potassium Alum
7. Students will determine the molar mass of a solid and the molar volume of a gas
8. Students will use sensors, LabQuest, Logger Pro from Vernier

Course Objectives

	Objectives
Objective 1	Explain atomic structure to the level of atomic orbitals and explain the relationship to periodicity.
Objective 2	Distinguish between different types of chemical bonds.
Objective 3	Explain the shapes of molecules in terms of valence bond theory, hybrid orbitals, and molecular orbitals.
Objective 4	Solve problems in stoichiometry.
Objective 5	Classify and analyze the different varieties of chemical reactions, including balancing REDOX equations.
Objective 6	Explain the kinetic molecular theory of matter, states of matter, and use the gas laws in calculations.
Objective 7	Analyze the properties of solutions and perform relevant calculations.
Objective 8	Discuss observed chemical phenomena with appropriate terminology.
Objective 9	Operate chemical instrumentation to safely and successfully gather experimental data.
Objective 10	Conclude how microscopic atomic concepts relate to gathered experimental data.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Analyze data using stoichiometric calculations to draw plausible conclusions.
Outcome 2	Relate the macroscale phenomena of daily life to microscale atomic concepts.
Outcome 3	Apply chemical terminology to provide explanations of observed chemical phenomena.
Outcome 4	Perform first semester laboratory experiments using modern chemical equipment safely and accurately.
Outcome 5	Identify the essential parts of a problem and formulate a coherent and empirically valid strategy for solving the problem.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Discussion	Classroom discussion to improve critical thinking.
Technology-based instruction	Use CANVAS
Supplemental/External Activity	Power point lectures for some chapters additional to the lecture notes. Field trips to chemistry laboratories in our area.
Participation	Students come to the board and solve a problem for extra credit. Students work in groups of two or four at a problem during lecture.
Lecture	1. Lecture presentations including visual aids. 2. Handouts summarizing lecture material.
Laboratory	Laboratory work to give “hands-on” knowledge.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Written homework	The laboratory assignments will be graded for ability to follow directions and for clarity of presentation. There will be roughly 10-14 assignments, each of which should take three to six hours of work to complete.	Out of Class Only
Mid-term and final evaluations	There will be a comprehensive final examination on the lecture material.	In Class Only
Tests/Quizzes/Examinations	Three to five periodic examinations will be given on the subject matter, they will include essay and multiple choice questions.	In Class Only
Group activity participation/observation	Students work in groups of two for each of the 10-14 experiments in the laboratory. Each experiment is three to six hours long.	In Class Only
Laboratory projects	They have to read a scientific article and type an abstract on that article.	In and Out of Class

Assignments

Other In-class Assignments

1. Complete all assigned laboratory experiments.

Other Out-of-class Assignments

1. Read all relevant material (approximately 30 pages per week).
2. Complete all assigned homework problems (approximately 40 problems per week).
3. Complete all laboratory experiments in the manual.

Grade Methods

Letter Grade Only

Distance Education Checklist

Include the percentage of online and on-campus instruction you anticipate.

Online %

60

On-campus %

40

What will you be doing in the face-to-face sections of your course that necessitates a hybrid delivery vs a fully online delivery?

Laboratory experiments will be face-to-face.

Lab Courses

How will the lab component of your course be differentiated from the lecture component of the course?

Labs will be face-to-face and focused on performing experiments. Lectures will be focused on the theory and problem-solving aspects of chemistry.

From the COR list, what activities are specified as lab, and how will those be monitored by the instructor?

Face-to-face delivery of chemical laboratory experiments.

How will you assess the online delivery of lab activities?

n/a

Instructional Materials and Resources

If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?

Zoom teleconferencing for synchronous course times and office hours. Security will be ensured by the use of a pass code in order to enter.

If used, explain how specific materials and resources outside the LMS will be used to enhance student learning.

Email, zoom, and phone will allow students more options for contact with faculty as well as live help or Q&A.

Effective Student/Faculty Contact

Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?

Within Course Management System:

Chat room/instant messaging
Discussion forums with substantive instructor participation
Online quizzes and examinations
Private messages
Regular virtual office hours
Timely feedback and return of student work as specified in the syllabus
Video or audio feedback
Weekly announcements

External to Course Management System:

Direct e-mail
Posted audio/video (including YouTube, 3cmediasolutions, etc.)
Synchronous audio/video
Teleconferencing
Telephone contact/voicemail

For hybrid courses:

Orientation, study, and/or review sessions
Scheduled Face-to-Face group or individual meetings

Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.

Synchronous Zoom time for class and office hours will allow direct conversation with students. On top of that, regular weekly announcements will update students about course happenings, such as upcoming due dates or recently graded assignments. Email, chat, discussion boards, zoom office hours, and phone calls/voicemail will enable students to keep in regular touch if they have questions and for the professor to check in with them regularly as needed. Posted audio/video can be used to deliver lectures or course messages. Last, assignment feedback and rubrics will give students a good idea of how to do assignments and what mistakes might be occurring, so they can make corrections.

If interacting with students outside the LMS, explain how additional interactions with students outside the LMS will enhance student learning.

Email, zoom, and phone will allow students more options for contact with faculty as well as live help or Q&A.

Other Information

Provide any other relevant information that will help the Curriculum Committee assess the viability of offering this course in an online or hybrid modality.

All posted videos have been closed captioned through 3CMedia. All documents will be checked for accessibility.

Comparable Transfer Course Information

University System

UC

Campus

UC Riverside

Course Number

CHEM 1A and 1LA

Course Title
General Chemistry and General Chemistry Lab

Catalog Year
2021-2022

Rationale
College of the Desert CH1A and CH1B
Articulate as UCR Sequence CHEM 1A/LA, CHEM 1B/LB, CHEM 1C/LC

University System
CSU

Campus
CSU San Bernardino

Course Number
2100 and 2100L

Course Title
General Chemistry I and General Chemistry I Lab

Catalog Year
2021-2022

Rationale
College of the Desert CH1A and CH1B articulate as CSU-SB Sequence CHEM 2100/2100L and 2200/2200L

COD GE
C1 - Natural Sciences

CSU GE
B1 - Physical Science
B3 - Laboratory Activity

IGETC GE
5A - Physical Science
5C - Science Laboratory

MIS Course Data

CIP Code
40.0501 - Chemistry, General.

TOP Code
190500 - Chemistry, General

SAM Code
E - Non-Occupational

Basic Skills Status
Not Basic Skills

Prior College Level
Not applicable

Cooperative Work Experience
Not a Coop Course

Course Classification Status
Credit Course

Approved Special Class
Not special class

Noncredit Category
Not Applicable, Credit Course

Funding Agency Category
Not Applicable

Program Status
Program Applicable

Transfer Status
Transferable to both UC and CSU

General Education Status
Y = Not applicable

Support Course Status
N = Course is not a support course

C-ID
CHEM 110, CHEM 120 S

Allow Audit
No

Repeatability
No

Materials Fee
No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
11/02/2021

Academic Senate Approval Date
11/11/2022

Board of Trustees Approval Date
12/17/2021

Chancellor's Office Approval Date
02/03/2022

Course Control Number
CCC000331587

Programs referencing this course
Environmental Science AS-T (http://catalog.collegeofthedesert.eduundefined/?key=216)
Engineering AS Degree (http://catalog.collegeofthedesert.eduundefined/?key=24)
Chemistry UC Transfer Pathway AS Degree (http://catalog.collegeofthedesert.eduundefined/?key=274)
Liberal Arts: Math and Science AA Degree (http://catalog.collegeofthedesert.eduundefined/?key=29)
Biology AS-T Degree (http://catalog.collegeofthedesert.eduundefined/?key=40)

Chemistry AS-T Degree (http://catalog.collegeofthedesert.eduundefined/?key=41)
Geology AS-T Degree (http://catalog.collegeofthedesert.eduundefined/?key=42)
Nutrition and Dietetics AS-T Degree (http://catalog.collegeofthedesert.eduundefined/?key=7)
Natural Resources AS Degree (transfer preparation) (http://catalog.collegeofthedesert.eduundefined/?key=71)
Kinesiology AA-T Degree (http://catalog.collegeofthedesert.eduundefined/?key=8)