

# CH 001B: GENERAL CHEMISTRY II

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**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**

001B

**Full Course Title**

General Chemistry II

**Short Title**

GEN CHEMISTRY II

**Discipline****Disciplines List**

Chemistry

**Modality**

Face-to-Face

Hybrid

**Catalog Description**

This is the second 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 thermodynamics, reaction kinetics, chemical equilibrium, acid-base equilibria in aqueous solutions, electrochemistry. There is a brief introduction to organic, biological and nuclear chemistry. The laboratory part of the course complements the lectures and also includes one experiment on qualitative analysis of cations and anions.

**Schedule Description**

This course is the second of a two-semester sequence covering the basic principles and concepts of chemistry with emphasis on chemical calculations. Prerequisite: CH 001A 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 001A

**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, Nivaldo J.

**Title**

Chemistry: Structure and Properties

**Edition**

2nd

**City**

Hoboken, NJ

**Publisher**

Pearson

**Year**

2018

**College Level**

Yes

**Flesch-Kincaid Level**

12

**ISBN #**

9780134293936

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**Resource Type**

Web/Other

**Description**

Selected articles from: J. Chem. Education, New Scientist and Discover

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**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 001A-Describe the kinetic molecular theory of matter, states of matter and use the gas laws in calculations.

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**Entrance Skills**

Describe atomic structure to the level of atomic orbitals.

**Requisite Course Objectives**

CH 001A-Describe atomic structure to the level of atomic orbitals and explain the relationship to periodicity.

CH 001A-Describe the shapes of molecules in terms of valence bond theory, hybrid orbitals and molecular orbitals.

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**Entrance Skills**

Explain the relationship between electronic structure and periodicity.

**Requisite Course Objectives**

CH 001A-Describe atomic structure to the level of atomic orbitals and explain the relationship to periodicity.

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**Entrance Skills**

Distinguish between different types of chemical bonds and the shapes of molecules in terms of valence bond theory, hybrid orbitals and molecular orbitals.

**Requisite Course Objectives**

CH 001A-Describe atomic structure to the level of atomic orbitals and explain the relationship to periodicity.

CH 001A-Distinguish between different types of chemical bonds.

CH 001A-Describe the shapes of molecules in terms of valence bond theory, hybrid orbitals and molecular orbitals.

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**Entrance Skills**

Solve problems in stoichiometry.

**Requisite Course Objectives**

CH 001A-Solve problems in stoichiometry.

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**Entrance Skills**

Recognize and describe the different varieties of chemical reactions, including balancing REDOX equations.

**Requisite Course Objectives**

CH 001A-Recognize and describe the different varieties of chemical reactions, including balancing REDOX equations.

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**Entrance Skills**

Describe the kinetic molecular theory of matter, states of matter and use the gas laws in calculations.

**Requisite Course Objectives**

CH 001A-Describe the kinetic molecular theory of matter, states of matter and use the gas laws in calculations.

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**Course Content**

1. Thermodynamics.
2. Reaction kinetics and mechanisms.
3. Chemical equilibria relating to mass action laws, acids and bases, pH and buffers, solubility.
4. Electrochemistry.
5. Chemistry of selected representative and transition elements.
6. Introductory organic and chemistry, emphasis on nomenclature and functional groups.
7. Introduction to biochemistry, emphasis on macromolecules.

**Lab Content**

1. Students will continue acquiring efficiency in performing REDOX, acid-base titrations using Vernier equipment.
2. Students will determine the rate law and activation energy.
3. Students will perform an experiment on the thermodynamics of solubility and calculate enthalpy, entropy and Gibbs free energy, and graph the data.
4. Students will do an experiment on electrochemistry using the Nernst equation.
5. Students will perform qualitative analysis of the standard sub-groups of cations and selected anions.
6. Students will also become familiar with organic chemistry by synthesizing aspirin.

**Course Objectives**

	<b>Objectives</b>
Objective 1	Describe the laws of thermodynamics and compute energy changes in reactions.
Objective 2	Describe the kinetics of reactions, perform calculations using rate laws and describe basic reaction mechanisms.
Objective 3	Analyze the nature of chemical equilibria, the Law of Mass Action and perform calculations involving equilibria, weak acids and bases, pH, buffers and slightly soluble substances.
Objective 4	Predict the outcome of reactions based on the electrochemical activity series and perform related calculations.
Objective 5	Compare and contrast selected representative and transition elements.
Objective 6	Delineate simple organic and biochemical functional groups and their reactions.
Objective 7	Describe the nature of radiation and its measurement, balance nuclear equations and explain the process of fission and fusion and their relationship to binding energy.

**Student Learning Outcomes**

	<b>Upon satisfactory completion of this course, students will be able to:</b>
Outcome 1	Analyze data using kinetic, thermodynamic, and equilibrium calculations to draw plausible conclusions.
Outcome 2	Relate the macroscale observations of a reaction to microscale mechanistic concepts.
Outcome 3	Apply chemical terminology to provide explanations of observed chemical phenomena.

Outcome 4 Perform second semester laboratory experiments using modern chemical equipment safely and accurately.

Outcome 5 Design and carry out a process to solve a chemical problem experimentally.

### 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 and scientific reasoning.
Technology-based instruction	Use CANVAS LMS for course announcements, grades, and course materials such as handouts, homework assignments, and AV materials from in person meetings.
Participation	Solving problems in groups during lab and 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, for clarity of presentation, scientific understanding, and scientific literacy.	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 examinations including essay, multiple-choice questions, calculations, and fill in the blanks.	In Class Only
Laboratory projects	Seven to nine lab reports and lab practical. Each lab experiment is three hours long once a week and some may take two weeks to complete.	In and Out of Class

### Assignments

#### Other In-class Assignments

1. Complete all laboratory experiments in the manual.

#### Other Out-of-class Assignments

1. Read all relevant material, approximately 20 pages per week.
2. Complete all assigned problems, approximately 25-30 problems per week.
3. Complete all laboratory experiments in the manual.
4. Identify unknowns in the qualitative analysis laboratory section.

#### 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?**

The face to face portion of the class will be used for chemical lab experiments. Safety and supply concerns necessitate face to face instruction for this part of class.

## 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, 3cm mediasolutions, etc.)
- Synchronous audio/video
- Teleconferencing
- Telephone contact/voicemail

#### For hybrid courses:

Orientation, study, and/or review sessions

### 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

CSU

### Campus

CSU San Bernardino

### Course Number

2200 and 2200L

### Course Title

General Chemistry II and General Chemistry II Laboratory

### Catalog Year

2021-2022

### Rationale

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

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### University System

UC

### Campus

UC Riverside

### Course Number

CHEM 1C and 1LC

### 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

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### 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 120S

**Allow Audit**

No

**Repeatability**

No

**Materials Fee**

No

**Additional Fees?**

No

**Approvals****Curriculum Committee Approval Date**

11/02/2021

**Academic Senate Approval Date**

11/11/2021

**Board of Trustees Approval Date**

12/17/2021

**Chancellor's Office Approval Date**

02/03/2022

**Course Control Number**

CCC000329814

**Programs referencing this course**Environmental Science AS-T (<http://catalog.collegeofthedesert.eduundefined/?key=216>)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>)