Course Outline

2026-2027 Catalog

CHEM 2 - General Chemistry II

Catalog Description

Transfer Status: CSU/UC

Prerequisite: CHEM 1

Unit(s): 5.00

Lecture: 51.00 Contact hours/102.00 Out of class hours/153.00 Total hours/3.00 Unit(s)
Lab: 102.00 Contact hours/0.00 Out of class hours/102.00 Total hours/2.00 Unit(s)
Total: 153.00 Contact hours/102.00 Out of class hours/255.00 Total hours/5.00 Unit(s)

Course Description: This course is a continuation of CHEM 1, General Chemistry I. Topics include chemical kinetics and equilibrium, acid-base and solubility equilibria, thermodynamics, oxidation-reduction, electrochemistry, coordination compounds, nuclear chemistry, introduction to organic chemistry and qualitative analysis. This is the second semester of a one-year course in chemistry intended for majors in the natural sciences (chemistry, biochemistry, biology, physics, pre-medicine), mathematics, and engineering. The two-semester sequence of CHEM 1 and CHEM 2 provides the basic chemical background needed for further investigations into our physical environment. Graded only. (C-ID CHEM 120S) (C-ID CHEM 120S = CHEM 1 and CHEM 2).

Objectives

Upon successful completion of this course, the student should be able to:

1. Demonstrate basic experimental knowledge by employing standard laboratory techniques for data gathering, judging the accuracy and reliability of data, creating informative graphs, and discussing the limitations of experimental designs.
2. Demonstrate basic analytical skills by interpreting graphs and schematics and diagnosing realistic physical problems.
3. Demonstrate conceptual understanding by being able to describe qualitatively the underlying causes of basic physical and chemical phenomena.

Course Content

Topic Titles / Suggested Time Topic

Lecture

Topics	Lec Hrs
Chemical Kinetics	6.00
Chemical Equilibrium	5.00
Acids and Bases	5.00
Acid-Base Equilibria	6.00
Solubility and Complex Ion Equilibria	3.00
Spontaneity, Entropy and Free Energy	6.00
Electrochemistry	6.00
The Nucleus: A Chemist's View	5.00
Transition Metals and Coordination Chemistry	5.00
Properties of Solutions	4.00
Total Hours:	**51.00**

Lab

Topics	Lab Hrs
Chemical Kinetics	12.00
Chemical Equilibrium	12.00
Acids and Bases	12.00
Acid-Base Equilibria	12.00
Solubility and Complex Ion Equilibria	12.00
Spontaneity, Entropy and Free Energy	9.00
Electrochemistry	12.00
The Nucleus: A Chemist's View	6.00
Transition Metals and Coordination Chemistry	9.00
Properties of Solutions	6.00
Total Hours:	**102.00**

Methods of Instruction

A. Class Activities
B. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
C. Instructor Demonstrations
D. Laboratory Experiments
E. Lecture
F. Reading Assignments

Methods of Evaluation

A. Quizzes
B. Lab Projects
C. Final Examination
D. Examinations
E. Written examinations, Laboratory reports and activities

Examples of Assignments

Reading Assignments

1. Read the section on integrated rate laws in the text, and be prepared to participate in discussions of the derivation of these laws and be able to apply them to zero, first and second order reactions.
2. In your text, read the sections on the common ion effect and acid/base equilibrium. Be prepared to answer examination questions regarding applications of the common ion effect, in particular with respect to determining the acid dissociation constant, and the pH of buffered solutions.

Writing Assignments

1. For the experiment to determine the rate law for a chemical reaction, create a properly formatted report in your lab notebook. The report must include the title, date, an overview and data tables.
2. For the experiment to determine the Ka of a weak acid, write a report that includes the title, date, an overview and data tables.

Out-of-Class Assignments

1. After reading the experiment for determining the rate law for a chemical reaction, complete the prelab and use the method of initial rates to calculate the order of the reaction with respect to the assigned species.
2. After reading the experiment for determining the acid dissociation constant for a chemical reaction, complete the prelab and calculate the Ka for a reaction using the graph of a titration curve.

Recommended Materials of Instruction

Zumdahl, S.S. & Zumdahl, S.A. (2018). Chemistry. *Brooks Cole, Belmont, CA, 10th.* 9781305957404.
Chemistry Faculty. (2022). Laboratory Manual for General Chemistry II. *Butte College, Current.* Butte College.

Minimum Qualifications

Chemistry (Masters Required)

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