CHEM-110: INTRODUCTION TO CHEMISTRY

Effective Term
Fall 2025

CC Approval
02/07/2025

AS Approval
02/13/2025

BOT Approval
02/20/2025

COCI Approval
04/30/2025

SECTION A - Course Data Elements

CB04 Credit Status
Credit - Degree Applicable

Discipline

Minimum Qualifications	And/Or
Chemistry (Master's Degree)	

Subject Code
CHEM - Chemistry
Course Number
110

Department
Chemistry (CHEM)

Division
Science and Engineering (SE)

Full Course Title
Introduction to Chemistry

Short Title
Introduction to Chemistry

CB03 TOP Code
1905.00 - Chemistry, General

CB08 Basic Skills Status
NBS - Not Basic Skills

CB09 SAM Code
E - Non-Occupational

Rationale
Common course numbering course update.

SECTION B - Course Description

Catalog Course Description
The first course in chemistry for students preparing for biological or health sciences, for more advanced chemistry courses, or for those desiring to learn about chemistry in the everyday world for general education. Laboratory is included.

SECTION C - Conditions on Enrollment

Open Entry/Open Exit
No

Repeatability
Not Repeatable

Grading Options
Letter Grade or Pass/No Pass

Allow Audit
Yes

Requisites

Prerequisite(s)
Completion of Intermediate Algebra, MATH-93 or STAT-C1000 with a minimum grade of C or appropriate placement.

Requisite Justification

Requisite Description
Course Not in a Sequence

Subject
MATH
Course #
93

Level of Scrutiny
Content Review

Upon entering this course, students should be able to:
Completion of Intermediate Algebra, MATH-93 or MATH-232 with a minimum grade of C or appropriate placement.

Requisite Description
Course Not in a Sequence

Subject
STAT
Course #
C1000

Level of Scrutiny
Content Review

Upon entering this course, students should be able to:
Completion of Intermediate Algebra, MATH-93 or STAT-C1000 with a minimum grade of C or appropriate placement.

SECTION D - Course Standards

Is this course variable unit?
No

Units
4.000

Lecture Hours
54.00

Lab Hours
54.00

Outside of Class Hours
108

Total Contact Hours
108

Total Student Hours
216

Distance Education Approval

Is this course offered through Distance Education?
Yes

Online Delivery Methods

DE Modalities	Permanent or Emergency Only?
Entirely Online	Permanent
Hybrid	Permanent
Online with Proctored Exams	Permanent

SECTION E - Course Content

Student Learning Outcomes

	Upon satisfactory completion of the course, students will be able to:
1.	Describe chemical and physical processes at the molecular level and how they relate to the macroscopic environment.
2.	Solve both qualitative and quantitative chemistry problems while demonstrating the reasoning clearly and completely.
3.	Implement laboratory techniques correctly using appropriate safety procedures and express them clearly in written laboratory reports.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1.	Perform basic chemically related mathematical computations, including conversions within the metric system, conversions between English and metric systems, density, temperature conversion, gas laws, exponents, dimensional analysis and proportions, and mole-related problems, including concentration of solutions.
2.	Define and appropriately use the terms: atom, ion, charge, atomic number, mass number, atomic mass, isotope, energy states, element, compound, mixture, solution, molecule, and formula unit.
3.	Create drawings to explain ionic bonding and covalent bonding, including coordinate covalent bonding.
4.	Explain the organization and structure of the Periodic Table.
5.	Write ionic and covalent formulas, and name simple ionic and covalent compounds and acids; draw the Lewis (electron dot and dash) structures of simple covalent compounds, including skeletal structures.
6.	Explain polar covalent bonds using the concept of electronegativity; determine oxidation numbers and identify oxidation and reduction processes and their agents.
7.	Explain hydrogen bonding and their role in the dissolution of solutes.
8.	Correctly apply the terms: salts, strong and weak bases, strong and weak acids, hydronium ion, ionize and dissociate.
9.	Explain neutralization and bases as proton acceptors.
10.	Classify chemical equations, and write balanced chemical equations given only the reactants.
11.	Apply the mole concept and perform mole-equation computations for gas-volume and non-gas-volume problems; calculate mole amounts, molar volumes, and molar masses; determine gas densities from formula masses.
12.	Contrast the meanings of "concentrated and dilute" with "strong and weak;" calculate molar concentrations (molarity) and normality.

13.	Apply the concept of pH and the factors that influence it.
14.	Work in a laboratory setting utilizing appropriate safety and technique procedures and standard laboratory equipment.
15.	Perform a variety of experiments following laboratory directions.
16.	Develop and test hypotheses, gather and weigh evidence, and make appropriate conclusions.

Course Content

Unit 1: Measurement and Calculations

1. Significant Figures
2. Exponential Notation
3. Metric-metric conversions
4. Metric-English conversions
5. Using units and the dimensional analysis method
6. Using proportions
7. Density

Unit 2: The Mole

1. Definition of a mole and Avogadro's number
2. States of matter
3. Molarity, Percent by mass, Percent by volume
4. Solubility Rules
5. Descriptive chemistry - the chemistry of main group elements
6. Qualitative analysis
7. Strong and weak acids and bases
8. Hydronium ion
9. Definitions of acid and base
10. Reaction Types including but not limited to single and double replacement, neutralization, combustion, combination, decomposition, and oxidation-reduction.
11. Predicting the products of a reaction
12. complete and balanced chemical equations
13. Limiting Reactants in solution
14. Empirical Formulas
15. Electronegativity
16. Oxidation and reduction
17. Ideal Gas Laws
18. Vapor Pressure
19. Molar volume of a gas, solid and liquid
20. Temperature conversions (Fahrenheit , Celsius, Kelvin)

Unit 3: Atoms and Bonding

1. The atom, protons, neutrons, electrons, isotopes, atomic number, mass number, atomic mass
2. Elements, compounds, molecular mass, mixtures, and solutions
3. Ionic and covalent compounds and their nomenclature
4. Energy and the electron shells
5. Orbital Filling
6. The Periodic Table
7. The Octet Rule and ionic bonding
8. Lewis structures

Lab: Basic safety rules and lab techniques. A variety of experiments including;

1. Synthesis of a compound and calculation of an empirical formula
2. Titrations
3. Analysis of aspirin by titration
4. Calculation of the Ideal Gas Law Constant, R
5. Density of Gases
6. The Percentage of Oxygen in the Air
7. Redox Titration - The percentage of Cobalt in an unknown
8. Spectrophotometric determination of Cobalt

9. Crystal Field Theory and Calculation of octahedral field splitting
10. Covalent Bonding and Molecular Models

Methods of Instruction

Methods of Instruction

Types	Examples of learning activities
Activity	
Experiments	
Individualized Instruction	
Lecture	
Observation and Demonstration	
Other	Chemical demonstrations. Video presentations. Individual and group problem solving in the classroom. Individual and group laboratory experiments. Peer oriented guided instruction where the students help one another under the guidance of an instructor.

Instructor-Initiated Online Contact Types

Announcements/Bulletin Boards
Chat Rooms
Discussion Boards
E-mail Communication
Telephone Conversations
Video or Teleconferencing

Student-Initiated Online Contact Types

Chat Rooms
Discussions
Group Work

Course design is accessible

Yes

Methods of Evaluation

Methods of Evaluation

Types	Examples of classroom assessments
Exams/Tests	Normally, five exams are given including the final exam. Exams will be fill-in, multiple choice, true/false, and short answer, and will be graded on a point scale. A sample question may be, how many grams of sulfur are there in 10 grams of FeSO4? or how many moles of gas occupy a 10 L container at STP? or perhaps, please write the complete orbital configuration for Bromine.
Quizzes	Weekly quizzes will be given. Quizzes will be fill in, multiple choice, true/false, and short answer, and will be graded on a point scale. A sample question may be, what is the empirical formula of a compound that is 75% carbon and 25% hydrogen? or What is the percentage of oxygen in FeSO4? or perhaps, please write down the complete orbital configuration for bromine.
Lab Activities	Students are required to attend a weekly lab. Students will work individually and in groups. All labs will be checked off by the instructor prior to the student leaving the lab. Labs are graded and returned to the student upon completion. A typical lab will include the collection of experimental data, data analysis, graphical representations of the data, a report on the results and error analysis as well as a section on objectives, procedure, and conclusions. A sample lab might be, The Titration of an Unknown Acid, or Calculation of the Gas Constant, R.
Other	Final Exam -- A comprehensive final exam will be given. This exam will be fill in, multiple choice, true/false, short answer, and multistep chemical processes where work must be shown. The exam will be graded on a point scale. A sample question may be, how many grams for sulfur are there in 10 grams of FeSO4? or What is pressure of 0.4 mole of gas at STP? or perhaps, please write down the complete orbital configuration for Sulfur.

Other	Regular attendance in the laboratory is required. All labs will be checked off by the instructor prior to the student leaving the lab.

Assignments

Reading Assignments

Daily reading of text; weekly reading of lab manual (ex: Read Chapter 2,"Scientific Measurements," Sections 2.1 through 2.9 in your text and read the first lab, "Burning and Breathing.")

Writing Assignments

Lecture homework is assigned at each class period; laboratory homework is assigned weekly. Sample tests/study sheets are assigned for each of the five instructional (lecture and lab) units.

SECTION F - Textbooks and Instructional Materials

Material Type

Textbook

Author

Corwin

Title

Introductory Chemistry: Concepts and Critical Thinking

Edition/Version

8th

Publisher

Prentice Hall

Year

2018

Material Type

Textbook

Author

Tro

Title

Introductory Chemistry Essentials

Edition/Version

4th

Publisher

Prentice Hall

Year

2011

Material Type

Manual

Author

Quinlan

Title

Chem 110 Laboratory Manual

Publisher
NVC Reproduction Services

Year
08-12-2013

Course Codes (Admin Only)

ASSIST Update
No

CB00 State ID
CCC000558183

CB10 Cooperative Work Experience Status
N - Is Not Part of a Cooperative Work Experience Education Program

CB11 Course Classification Status
Y - Credit Course

CB13 Special Class Status
N - The Course is Not an Approved Special Class

CB23 Funding Agency Category
Y - Not Applicable (Funding Not Used)

CB24 Program Course Status
Program Applicable

Allow Pass/No Pass
Yes

Only Pass/No Pass
No