

# CHEM-110: INTRODUCTION TO CHEMISTRY

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**Effective Term**

Fall 2026

**CC Approval**

12/05/2025

**AS Approval**

12/11/2025

**BOT Approval**

12/18/2025

**COCI Approval**

03/04/2026

**SECTION A - Course Data Elements**
**CB04 Credit Status**

Credit - Degree Applicable

**Discipline**
**Minimum Qualifications**

Chemistry (Master's Degree)

**And/Or**
**Subject Code**

CHEM - Chemistry

**Course Number**

110

**Department**

Chemistry

**Division**

Science and Engineering (SE)

**Full Course Title**

Introduction to Chemistry

**Short Title**

Introduction to Chemistry

**CB03 TOP Code**

1905.00 - Chemistry, General

**CIP Code**

40.0501

**CB08 Basic Skills Status**

NBS - Not Basic Skills

**CB09 SAM Code**

E - Non-Occupational

**Rationale**

Common Course numbering alignment.

## 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 a course taught at or above the level of intermediate algebra or Statistics (STAT-C1000) with a minimum grade of C or appropriate placement.

## Requisite Justification

### Requisite Description

Course Not in a Sequence

### Subject

STAT

### Course #

C-1000

### Level of Scrutiny

Content Review

### Upon entering this course, students should be able to:

Complete mathematical problems at the level of intermediate algebra or Statistics (STAT-C1000).

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## 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.
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**Online Adaptation**

Types	Examples of learning activities
Activity	
Directed Study	
Discussion	
Group Work	
Individualized Instruction	
Journal	
Lecture	

**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 FeSO <sub>4</sub> ? 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 FeSO <sub>4</sub> ? 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 FeSO <sub>4</sub> ? 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

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### Material Type

Textbook

### Author

Tro

### Title

Introductory Chemistry Essentials

### Edition/Version

4th

### Publisher

Prentice Hall

### Year

2011

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### Material Type

Manual

### Author

Quinlan

### Title

Chem 110 Laboratory Manual

**Publisher**

NVC Reproduction Services

**Year**

08-12-2013

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**SECTION G - Diversity, Equity and Inclusivity****How does your course and/or course outline of record reflect strategies for accommodating and engaging diverse student populations, advancing equitable outcomes, and fostering inclusion for all students?**

This course supports diverse student populations through the use of multiple representations of concepts, varied applications, and technology. Strategies may also include collaborative learning, transparent assessment practices, low-cost resources, and opportunities for students to connect course material to their own experiences, fostering equitable outcomes and an inclusive classroom environment.

**Course Codes (Admin Only)****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