CHEM101 : General Chemistry A

General Information

Author:	• Corey Jamieson
Attachments:	GCC DE Addendum CHEM 101.pdf Distance Education (DE) Individual Course Addendum Form - CHEM_101 COR 3:10:2021 Code 4:27:2021.pdf
Course Code (CB01) :	CHEM101
Course Title (CB02) :	General Chemistry A
Department:	CHEM
Proposal Start:	Spring 2026
TOP Code (CB03) :	(1905.00) Chemistry, General
CIP Code:	(40.0501) Chemistry, General.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000321378
Curriculum Committee Approval Date:	02/26/2025
Board of Trustees Approval Date:	04/22/2025
Last Cyclical Review Date:	03/01/2021
Course Description and Course Note:	CHEM 101 explores foundational concepts of the composition and behavior of matter. Topics include physical and chemical properties, chemical reactions, stoichiometry, atomic structure, quantum theory, chemical bonding, and the characteristics of solids, liquids, and gases. Emphasis is placed on developing a conceptual framework for understanding matter at the molecular level. This course serves as the first semester of a two-part sequence in general chemistry.
Justification:	Content Change
Academic Career:	• Credit
Mode of Delivery:	• In-Person • Hybrid
Author:	No value
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	• Chemistry
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

☐ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

Not Applicable

Transferability

Transferable to both UC and CSU

Transferability Status

Approved

Cal-GETC	Area	Status	Approval Date	Comparable Course
Area 5A: Physical Science	Physical Science	Approved	09/02/2025	No Comparable Course defined.
Area 5C: Laboratory	Laboratory	Approved	09/02/2025	

GCC General Education Requirements	Area	Status	Approval Date	Comparable Course
Area 5: Natural Sciences	Natural Sciences	Approved	09/02/2025	No Comparable Course defined.

C-ID	Area	Status	Approval Date	Comparable Course
CHEM	Chemistry	Approved	02/17/2015	CHEM 110 - General Chemistry for Science Majors I, with Lab

Units and Hours

Summary

Minimum Credit Units (CB07)	5
Maximum Credit Units (CB06)	5
Total Course In-Class (Contact) Hours	162
Total Course Out-of-Class Hours	108
Total Student Learning Hours	270

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	3	6
Laboratory Hours	6	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	54
Laboratory	108
Studio	0
Total	162
Course Out-of-Class Hours	
Lecture	108
Laboratory	0
Studio	0
Total	108

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Prerequisites, Corequisites, Recommended Corequisites, and Recommended Preparation

Prerequisite

CHEM110 - Elements Of General Chemistry (in-development)

Objectives

- Use dimensional analysis to solve quantitative problems and check answers to make sure they are physically reasonable as applied to unit conversions, stoichiometry, and gas laws.
- Apply IUPAC naming rules to acids, ionic compounds, and molecular compounds.
- Clearly explain qualitative chemical concepts and trends.

- Perform laboratory experiments using appropriate techniques and safety procedures.
- Describe, model, and analyze microscopic behavior to explain macroscopic properties as applied to chemical bonding, gas laws, atomic theory, acids, bases, nuclear chemistry, and oxidation-reduction.

OR

Prerequisite

1 year of laboratory-based high school chemistry with a grade of "C" or better and a satisfactory score on the Chemistry Placement Exam.

AND

Prerequisite

Placement as determined by the college's multiple measures assessment process or completion of a course taught at or above the level of intermediate algebra.

Entry Standards

Entry Standards	Description
No value	No value

Course Limitations

Cross Listed or Equivalent Course	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Methods of Instruction	Laboratory
Methods of Instruction	Demonstrations

Out of Class Assignments

- Laboratory reports
- Supplementary readings from handouts

- Library research

Methods of Evaluation	Rationale
Exam/Quiz/Test	Minimum of four one-hour exams
Exam/Quiz/Test	Quizzes
Report	Laboratory reports
Exam/Quiz/Test	Final exam

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Paul Flowers, Klaus Theopold, Richard Langley, William R. Robinson	Chemistry 2e	OpenStax, Rice University	2025	9781947172616

Other Instructional Materials (i.e. OER, handouts)

No Value

Learning Outcomes

Course Objectives

Evaluate past and present atomic theories with respect to experimental observations.

Describe chemical processes using chemical equations.

Describe the relationship between matter and energy and the conversion between the two.

Analyze modern theories of atomic motion, especially as they apply to gases.

Use quantum theory to predict electronic structures of the atom.

Analyze the properties of elements and identify trends for the classification of the elements into groups.

Apply bonding theories to describe the nature of ions and molecules.

Demonstrate the proper use of laboratory equipment and the ability to handle chemicals safely.

Describe the scientific method and apply it to the development of the science of chemistry.

Demonstrate an understanding of intermolecular forces and apply those forces to the nature of solids and liquids.

SLOs

Solve quantitative chemistry problems and demonstrate reasoning clearly and completely as applied to stoichiometry, molarity, gas laws, and thermodynamics.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.
	Use quantitative and/or analytical mathematical skills to solve problems and to interpret, evaluate, and process information and data to draw logical conclusions and support claims.
GEOL Geology AS-T Degree	Apply reasoning to evaluate hypotheses and theories; analyze, interpret, and present research evidence
	Develop foundational knowledge to be able to use evidence-based approaches to explore and evaluate global issues such as natural disaster preparation, energy, resources, and climate
BIOL Biological Sciences A.S. Degree	Critically examine biological data and present their findings.
CHEM Physical Science: Chemistry A.S. Degree	Demonstrate their understanding of common conceptual situation in the physical sciences; and be able solve quantitative problems in the physical science
	Explain the difference between evidence and theory in science and cite an example in their explanation
	Use instruments and computers to accurately measure, graph, and analyze physical situations
BIOL Biology AS-T	Describe and demonstrate correct use of biology laboratory equipment, and be well-qualified as transfer students to a four-year university biology program.
Physical Sciences Physical Science A.A. Degree	Explain the difference between evidence and theory in science and cite an example in their explanation.
ILOs General Education	apply reasoning to evaluate hypotheses and theories
	examine causality or associations between or among variables of the natural world
CHEM Chemistry	compare and contrast the general chemistry performance exam taken at Glendale Community College with the national performance norm, reported by the American Chemical Society.

Write balanced general chemical equations, net ionic equations, and classify reaction type.

Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.

GEOL Geology AS-T Degree	Apply reasoning to evaluate hypotheses and theories; analyze, interpret, and present research evidence
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CHEM Physical Science: Chemistry A.S. Degree	Demonstrate their understanding of common conceptual situation in the physical sciences; and be able solve quantitative problems in the physical science
	Explain the difference between evidence and theory in science and cite an example in their explanation
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Perform laboratory experiments correctly using appropriate techniques and safety procedures. Expected Outcome Performance: 70.0

GEOL Geology AS-T Degree	Apply reasoning to evaluate hypotheses and theories; analyze, interpret, and present research evidence
	Develop foundational knowledge to be able to use evidence-based approaches to explore and evaluate global issues such as natural disaster preparation, energy, resources, and climate
ILOs Core ILOs	Demonstrate depth of knowledge in a course, discipline, or vocation by applying practical knowledge, skills, abilities, theories, or methodologies to solve unique problems.
CHEM Physical Science: Chemistry A.S. Degree	Demonstrate their understanding of common conceptual situation in the physical sciences; and be able solve quantitative problems in the physical science
	Explain the difference between evidence and theory in science and cite an example in their explanation
	Use instruments and computers to accurately measure, graph, and analyze physical situations
BIOL Biological Sciences A.S. Degree	Describe and demonstrate correct use of basic biology laboratory equipment.
BIOL Biology AS-T	Describe and demonstrate correct use of biology laboratory equipment, and be well-qualified as transfer students to a four-year university biology program.
Physical Sciences Physical Science A.A. Degree	Explain the difference between evidence and theory in science and cite an example in their explanation.
	Use instruments and computers to accurately measure, graph, and analyze physical properties (these instruments will include calipers, micrometers, mass balances, spectrometers, interferometers, and digital oscilloscopes depending upon which courses the student had taken).
CHEM Chemistry	compare and contrast the general chemistry performance exam taken at Glendale Community College with the national performance norm, reported by the American Chemical Society.
ILOs General Education	examine causality or associations between or among variables of the natural world

Apply knowledge of the electronic structure of atoms to bonding, shape, and polarity. Expected Outcome Performance: 70.0

ILOs Core ILOs	Analyze and solve problems using critical, logical, and creative thinking; ask questions, pursue a line of inquiry, and derive conclusions; cultivate creativity that leads to innovative ideas.

GEOL Geology AS-T Degree	Apply reasoning to evaluate hypotheses and theories; analyze, interpret, and present research evidence
	Develop foundational knowledge to be able to use evidence-based approaches to explore and evaluate global issues such as natural disaster preparation, energy, resources, and climate
BIOL Biological Sciences A.S. Degree	Critically examine biological data and present their findings.
CHEM Physical Science: Chemistry A.S. Degree	Demonstrate their understanding of common conceptual situation in the physical sciences; and be able solve quantitative problems in the physical science
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Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Fundamental Definitions and Conversions of Units (5.3 Hours)

- Matter and energy
- Mass and weight

- Properties of substances
- Elements and compounds
- SI and derived units
- Temperature scales
- Significant figures
- Scientific notation
- Factor-label method (or dimensional analysis) for problem solving

Atomic Structure (5.3 Hours)
- Structure of the atom
- Atomic mass, atomic number, isotopes
- The mole
- Chemical formulas
- Empirical and molecular formulas
- The laws of chemical combination
- Properties of waves and light

Periodic Table (5.3 Hours)
- Development
- Relationship to electron configuration
- Relationship to periodic properties
- Relationship to chemical properties

Nomenclature (5.3 Hours)
- Assigning oxidation numbers
- Binary compounds
- Acids

Chemical Reactions and Stoichiometry (5.3 Hours)
- Writing equations
- Types of reactions
- Stoichiometric calculations
- Limiting reactants
- Molarity
- Acid/base titrations

Thermochemistry (**5.3 Hours**)
- Definitions
- Calorimetry
- Energy changes in chemical reactions
- Hess' Law
- Enthalpies of solution

Gas Laws and Properties (**5.3 Hours**)
- Pressure
- Boyle's, Charles', and Avogadro's Laws
- The Kinetic Molecular Theory
- The ideal gas law
- Stoichiometry involving gasses
- Dalton's Law
- Diffusion, effusion, and Graham's Law
- Deviation from ideal behavior

Chemical Bonding (5.3 Hours)
- Ionic compounds, Born-Haber Cycle, lattice energy
- Lewis structures, the octet rule, formal charge
- The covalent bond
- Resonance
- Bond energies
- Molecular geometry: VSPER, VP and MO theories
- Dipole moments

Liquids and Solids (11.6 Hours)

- The hydrogen bond
- Bonding in metals
- Weak intermolecular forces
- The liquid state
- Crystal structure
- Phase changes and phase diagrams

Total Hours: 54

Laboratory/Studio Content

Laboratory Safety and Best Practices (8 hours)

- **Topics:**
  - Importance of laboratory safety
  - Understanding and interpreting safety symbols (flammable, corrosive, toxic, etc.)
  - Proper use of personal protective equipment (PPE): goggles, gloves, lab coats
  - Safe handling, storage, and disposal of chemicals
  - Emergency procedures: eye wash stations, safety showers, fire extinguishers
  - Handling and reporting accidents or spills
  - Laboratory hygiene and behavior (no food or drinks, proper clothing)
  - Understanding Safety Data Sheets (SDS)
- **Activities:**
  - Lab tour to identify safety equipment and exits
  - Demonstration of proper waste disposal techniques

Introduction to Chemistry and Matter (10 hours)

- **Topics:**
  - Definition and importance of chemistry
  - Scientific method and measurements
  - Units of measurement (SI units, metric system, conversions)
  - Classification of matter (elements, compounds, mixtures)
  - Physical and chemical properties
  - States of matter and phase changes
- **Experiments:**
  - Observing physical and chemical changes
  - Measuring mass, volume, and density of various substances
  - Graphing in Excel

Atomic Structure and Periodic Table (10 hours)

- **Topics:**
  - Atomic theory and structure of atoms
  - Subatomic particles (protons, neutrons, electrons)
  - Atomic number, mass number, isotopes
  - The periodic table: organization and trends (atomic radius, ionization energy, electronegativity)
- **Experiments:**
  - Building atomic models
  - Investigating periodic trends (e.g., reactivity of metals)
  - Spectrometry

Chemical Bonding and Molecular Structure (10 hours)

- **Topics:**
  - Ionic and covalent bonding
  - Lewis structures and resonance
  - VSEPR theory and molecular geometry
  - Polarity of molecules
- **Experiments:**
  - Constructing molecular models to visualize geometry
  - Exploring properties of polar and nonpolar substances

Chemical Reactions and Stoichiometry (10 hours)

- **Topics:**
  - Types of chemical reactions (synthesis, decomposition, single replacement, double replacement, combustion)
  - Writing and balancing chemical equations

    - Moles and molar mass
    - Stoichiometric calculations (mole-to-mole conversions, limiting reactants)
- **Experiments:**
    - Observing types of chemical reactions
    - Determining stoichiometric ratios
    - Finding empirical formula

Thermochemistry and Energy in Reactions (10 hours)

- **Topics:**
    - Energy, heat, and work
    - Endothermic and exothermic reactions
    - First law of thermodynamics
    - Calorimetry and enthalpy changes
- **Experiments:**
    - Calorimetry lab (measuring the heat change in a chemical reaction)
    - Hess's Law

The Gas Laws and Properties of Gases (10 hours)

- **Topics:**
    - Properties of gases and gas laws (Boyle's, Charles's, Avogadro's, Ideal Gas Law)
    - Kinetic molecular theory
    - Gas stoichiometry
- **Experiments:**
    - Determining the molar volume of a gas

Solutions and Their Properties (10 hours)

- **Topics:**
    - Types of solutions and solubility
    - Concentration units (molarity, percent by mass, etc.)
    - Factors affecting solubility
    - Colligative properties (boiling point elevation, freezing point depression)
- **Experiments:**
    - Preparing and diluting solutions
    - Investigating the effect of solutes on freezing and boiling points

Acids, Bases, and pH (10 hours)

- **Topics:**
    - Properties of acids and bases
    - Arrhenius, Bronsted-Lowry, and Lewis definitions
    - The pH scale and calculations
    - Acid-base titration
- **Experiments:**
    - Measuring the pH of various substances
    - Performing a titration to determine the concentration of an acid/base

Chemical Equilibrium (10 hours)

- **Topics:**
    - Dynamic nature of chemical equilibrium
    - Le Chatelier's Principle
    - Calculating equilibrium constants (Kc and Kp)
- **Experiments:**
    - Observing shifts in equilibrium in a reversible reaction
    - Investigating the effect of concentration changes on equilibrium

Introduction to Thermodynamics and Kinetics (10 hours)

- **Topics:**
    - Basic concepts of entropy and free energy
    - Introduction to reaction rates and factors affecting rates
- **Experiments:**
    - Exploring the effect of temperature on reaction rate
    - Simple kinetic experiments

Total hours: 108

Additional Information

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Is it possible this course will have a material fee?

No Value

I have contacted my library liaison (https://campusguides.glendale.edu/faculty/liaisons):

No Value

What term(s) will this course be offered?

No Value

Will any additional resources be needed for this course? (Click all that apply)

No Value

If additional resources are needed, add a brief description and cost in the box provided.

No Value

Resources

Did you contact your departmental library liaison?

No

If yes, who is your departmental library liason?

No Value

Did you contact the DEIA liaison?

No

Were there any DEIA changes made to this outline?

No

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

No Value

If additional resources are needed, add a brief description and cost in the box provided.

No Value