

# PRINCIPLES OF CHEMISTRY I

CHEM 1210

Fall 2023

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<b>Instructor:</b>	Matthew Rowley	<b>Office Hours:</b>	MWRF 10:00 am – 11:00 am
<b>Telephone:</b>	(435) 586-7875		T 1:00 pm – 2:00 pm
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Please include the course number in the subject line of all correspondence.

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## Course Description

This is an introductory chemistry course designed for students in engineering, physical science, pre-medical, pre-dental, pre-pharmacy, or pre-veterinary medicine. It is for all students who need more than one year of chemistry, and presents the foundational principles on which all other chemistry courses build.

**General Education:** This course is required for beginning Chemistry majors requiring more than one year of chemistry. It can also be taken by other students to fulfill the General Education (GE) requirements for “Knowledge Area:Physical Science (P).” The principles of chemistry underlie much of modern society. Students will explore the basic principles of chemistry, allowing them to better understand the world around them at a basic level. This will prepare students to be informed citizens of the modern world in topics such as medicine, materials, energy and pollution.

**Prerequisites:** A proficient understanding of algebra will be required for this course. Either MATH 1050 (College Algebra), or a background of algebra from high school will suffice.

**Concurrent requisite:** CHEM 1215 – Principles of Chemistry Lab I

### Required Course Materials:

Access to *Achieve* online homework and Interactive General Chemistry digital textbook (details below)

### Recommended Supplementary Materials:

*Preparing for Your ACS Examination in General Chemistry: The Official Guide* Sold in our department office to fund Chem Club activities

### Student Learning Outcomes:

**Knowledge of the Physical and Natural World** Students will recall, interpret, compare, explain, and apply chemistry terminology and theory

**Quantitative Literacy** Students will use chemical equations, graphs, and tables to interpret and communicate chemical information.

**Inquiry and Analysis** Students will solve complex chemical problems.

**Critical Thinking** Students will make decisions based on conceptualizing, applying, and analyzing information from different sources.

## Tentative Schedule

This class will meet on Mondays, Tuesdays, Wednesdays, and Fridays from 3:00 – 3:50 in room 228 of the Science Center (SC).

For the best lecture experience, read the indicated textbook chapter *before* each lecture.

	Date	Topic	Chapter
Week 1	W, Aug. 30	Classification and Properties of Matter and Energy	1.1-1.3
	F, Sep. 1	The Scientific Method	1.4
Week 2	M, Sep. 4	<b>Labor Day - No Class!</b>	
	T, Sep. 5	Units and Significant Digits	1.5-1.6
	W, Sep. 6	Dimensional Analysis, Density, and Temperature	1.7-1.9
	F, Sep. 8	Chemical Symbols and Chemical Combination	2.1-2.2
Week 3	M, Sep. 11	The History of the Atom and Atomic Structure	2.3-2.4
	T, Sep. 12	Atomic Masses and the Periodic Table	2.5-2.6
	W, Sep. 13	Formulas and Names – Binary Covalent Compounds	3.1-3.2
	F, Sep. 15	Formulas and Names – Ionic Compounds	3.3-3.4
Week 4	M, Sep. 18	Naming Acids and Nomenclature Review	3.5-3.6
	T, Sep. 19	The Mole and Molar Mass	3.7-3.8
	W, Sep. 20	Percent Composition and Empirical Formulas	3.9-3.10
	F, Sep. 22	Molecular Formulas and Combustion Analysis	3.11-3.12

	Date	Topic	Chapter
Week 5	M, Sep. 25	Chemical Equations and Reactions	4.1-4.2
	T, Sep. 26	Compounds in Aqueous Solution and Precipitation Reactions	4.3-4.4
	W, Sep. 27	Acid-Base Reactions	4.5
	F, Sep. 29	Oxidation States and Redox Reactions	4.6-4.7
Week 6	M, Oct. 2	Calculations for Chemical Reactions	5.1-5.2
	T, Oct. 3	Limiting Quantities and Yields	5.3-5.4
	W, Oct. 4	Definition and Uses of Molarity	5.5-5.6
	F, Oct. 6	Calculations Involving Other Quantities	5.7
Week 7	M, Oct. 9	Calculations with Net Ionic Equations	5.8
	T, Oct. 10	Titration	5.9
	W, Oct. 11	Energy, Heat, and Work	6.1-6.3
	F, Oct. 13	Enthalpy and Specific Heat	6.4-6.5
Week 8	M, Oct. 16	<b>Fall Break - No Class!</b>	
	T, Oct. 17	<b>Fall Break - No Class!</b>	
	W, Oct. 18	Calorimetry: Measuring Energy Changes	6.6
	F, Oct. 20	Enthalpy in Chemical Reactions	6.7
Week 9	M, Oct. 23	Standard Enthalpies of Formation	6.8
	T, Oct. 24	Gas Pressure and Simple Gas Laws	7.1-7.3
	W, Oct. 25	The Combined Gas Law and the Ideal Gas Law	7.4-7.6
	F, Oct. 27	Partial Pressures, Molar Mass, and Density of gases	7.7-7.8
Week 10	M, Oct. 30	Gas Reactions and the Kinetic Molecular Theory	7.9-7.10
	T, Oct. 31	Movement of Gas Particles	7.11
	W, Nov. 1	Behavior of Real Gases	7.12
	F, Nov. 3	Light and the Bohr Model of the Atom	8.1-8.2

	Date	Topic	Chapter
Week 11	M, Nov. 6	Electron Shells, Subshells, and Orbitals	8.3
	T, Nov. 7	Energy-Level Diagrams and Electron Configurations	8.4-8.5
	W, Nov. 8	Quantum Numbers	8.6
	F, Nov. 10	Valence Electrons and Atomic/Ionic Sizes	9.1-9.2
Week 12	M, Nov. 13	Ionization Energy and Electron Affinity	9.3
	T, Nov. 14	Ionic Bonding and Lattice Energy	9.4-9.5
	W, Nov. 15	Formation of Covalent Bonds	10.1
	F, Nov. 17	Lewis Structures	10.2
Week 13	M, Nov. 20	<b>Thanksgiving Break - No Class!</b>	
	T, Nov. 21	<b>Thanksgiving Break - No Class!</b>	
	W, Nov. 22	<b>Thanksgiving Break - No Class!</b>	
	F, Nov. 24	<b>Thanksgiving Break - No Class!</b>	
Week 14	M, Nov. 27	Resonance and Formal Charges	10.3
	T, Nov. 28	Exceptions to the Octet Rule	10.4
	W, Nov. 29	Polar Bonds and Bond Enthalpy	10.5-10.6
	F, Dec. 1	VSEPR and Molecular Geometry	11.1
Week 15	M, Dec. 4	Polar and Nonpolar Molecules	11.2
	T, Dec. 5	Valence Bond Theory	11.3
	W, Dec. 6	Using Valence Bond Theory	11.4
	F, Dec. 8	Molecular Orbital Theory	11.5
Finals Week	T, Dec. 12	<b>Final Exam 3:00–4:50 pm: Bring a pencil and scantron</b>	

## Course Requirements

Grades will be based on the following items:

**Online Homework** 15%

**Textbook Homework** 15%

**Quizzes** 10%

**4 Midterm Exams** 40%

**Final Exam** 20%

Final Grades will be assigned according to the following scale:

Percentage	Grade		Percentage	Grade
93.0-100	A		73.0-77.0	C
90.0-93.0	A-		70.0-73.0	C-
87.0-90.0	B+		67.0-70.0	D+
83.0-87.0	B		63.0-67.0	D
80.0-83.0	B-		60.0-63.0	D-
77.0-80.0	C+		< 60.0	F

**Midterm Exams:** There are four midterm exams, to be completed in class on the designated day unless prior arrangements have been made. It is departmental policy that exams not be returned, although students can examine the questions in my office after they have been graded.

**Final Exam:** The final exam is comprehensive. The final is produced by the American Chemical Society, and the instructor will not have access to the exam prior to its administration. Therefore, it is to your advantage to learn as much as possible throughout the semester. The test is multiple choice and a 100-question scantron will be required.

**Quizzes:** Quizzes will be given at the beginning of most days. The purpose of these quizzes is to provide practice for the exams and to encourage punctual attendance.

**Textbook Homework:** Most days will end with an assignment of a few problems from our textbook. These problems mostly have solutions in the back of the book, so you are encouraged to check your work and try to correct your answers if wrong. The assignments are graded on participation only, and are intended to encourage daily engagement with the material.

**Achieve Online Homework:** The Achieve online homework assignments are organized by chapter and are of substantial length. I recommend completing the assignments in multiple sessions (Achieve saves your work), as we cover new material each day. You can find a link to sign up for Achieve in our Canvas course.

**Attendance Policy:** Students are expected to attend class. If you must miss class, contact the instructor

**Late Work Policy:** Homework and take-home quizzes will be due on a day when class is regularly scheduled. All work is to be turned in at the *beginning* of the class period, and late work will not be accepted. Please note that online homework has due-dates at 11:55 pm, and will not be available after that time

**Make-up Work Policy:** In general, there will be no opportunity to make up missed work, including in-class quizzes. If you must miss class, please do any assigned work in advance, and arrange to turn it in early

## Miscellany

**Scientific Calculator:** There are many different ways to calculate figures during homework. It is tempting to rely on Online resources such as <http://www.wolframalpha.com>, or to simply use a calculator application on a smart phone. During exams, however, any devices capable of connecting to the Internet will *not* be allowed. You will instead need a scientific calculator capable of performing exponentiation and logarithms for the exams. Using such a calculator exclusively while doing homework will ensure that you are familiar with it for use during exams.

**Academic Integrity:** Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the student handbook (published by Student Services) regarding student responsibilities and rights, the intellectual property policy, and for information about procedures and what constitutes acceptable on-campus behavior. In short any time a student presents the words, results, analysis, or conclusions of another without proper attribution will be considered a violation of academic integrity.

**ADA Policy:** Students with medical, psychological, learning, or other disabilities desiring academic adjustments, accommodations, or auxiliary aids will need to contact the Southern Utah University Coordinator of Services for Students with Disabilities (SSD), in Room 206F of the Sharwan Smith Center or phone (435) 865-8022. SSD determines eligibility for and authorizes the provision of services.

**Emergency Management Statement:** In case of emergency, the university's Emergency Notification System (ENS) will be activated. Students are encouraged to maintain updated contact information using the link on the homepage of the *mySUU* portal. In addition, students are encouraged to familiarize themselves with the Emergency Response Protocols posted in each classroom. Detailed information about the university's emergency management plan can be found at: <http://www.suu.edu/emergency>

**HEOA Compliance Statement:** The sharing of copyrighted material through peer-to-peer (P2P) file sharing, except as provided under U.S. copyright law, is prohibited by law. Detailed information can be found at: <https://help.suu.edu/article/1096/heoa-compliance-plan>

**Disclaimer:** Information contained in this syllabus, other than the grading, late assignments, make up work and attendance policies, may be subject to change with advance notice, as deemed appropriate by the instructor.