

PRINCIPLES OF CHEMISTRY II

CHEM 1220

Spring 2025

Instructor:	Matthew Rowley	Office Hours:	Daily 10:00 am – 11:00 am
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Please include the course number in the subject line of all correspondence.

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 1225 – Principles of Chemistry Lab II

Required Course Materials:

Access to *Mastering Chemistry* online homework and *Chemistry the Central Science* digital textbook

A link to register for these digital resources will be posted on the Canvas site for the course

Recommended Supplementary Materials:

Preparing for Your ACS Examination in General Chemistry: The Official Guide by Eubanks and Eubanks (ISBN: 978-0-970-80420-4)

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

Class will meet on Mondays, Tuesdays, Wednesdays, and Fridays from 2:00-2:50 in room SC 130 (Science Center)

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

	Date	Topic	Chapter
Week 1	W, Jan. 8	Comparison: Gases, Liquids, and Solids	11.1
		Intermolecular Forces	11.2
	F, Jan. 10	Select Properties of Liquids	11.3
Week 2	M, Jan. 13	Phase Changes	11.4
	T, Jan. 14	Vapor Pressure	11.5
	W, Jan. 15	Phase Diagrams	11.6
	F, Jan. 17	Liquid Crystals	11.7
		Classification and Structure of Solids	12.1
Week 3	M, Jan. 20	Martin Luther King Day - No Class!	
	T, Jan. 21	Metallic Solids	12.2
		Metallic Bonding	12.3
	W, Jan. 22	Ionic Solids	12.4
		Molecular and Covalent Network Solids	12.5
		Polymers	12.6
	F, Jan. 24	Nanomaterials	12.7

	Date	Topic	Chapter
Week 4	M, Jan. 27	The Solution Process	13.1
	T, Jan. 28	Saturated Solutions and Solubility	13.2
		Factors Affecting Solubility	13.3
	W, Jan. 29	Expressing Solution Concentration	13.4
	F, Jan. 31	Colligative Properties	13.5
		Colloids	13.6
Week 5	M, Feb. 3	Reaction Rates	14.1
	T, Feb. 4	Rate Laws: Initial Rate Method	14.2
	W, Feb. 5	Integrated Rate Laws	14.3
	F, Feb. 7	Temperature and Rate: Arrhenius Equation	14.4
Week 6	M, Feb. 10	Reaction Mechanisms	14.5
		Catalysis	14.6
	T, Feb. 11	The Concept of Chemical Equilibrium	15.1
		The Equilibrium Constant	15.2
	W, Feb. 12	Using Equilibrium Constants	15.3
		Heterogeneous Equilibria	15.4
	F, Feb. 14	Calculating Equilibrium Constants	15.5
Week 7	M, Feb. 17	President's Day - No Class!	
	T, Feb. 18	Some Applications of Equilibrium Constants	15.6
	W, Feb. 19	Le Châtelier's Principle	15.7
	F, Feb. 21	Classifications of Acids and Bases	16.1
Week 8	M, Feb. 24	Conjugate Acid-Base Pairs	16.2
		The Autoionization of Water	16.3
		The pH Scale	16.4
	W, Feb. 26	Strong Acids and Bases	16.5
		Weak Acids and Bases	16.6-7
	F, Feb. 28	Relationships Between K_a and K_b	16.8

	Date	Topic	Chapter
Week 9	M, Mar. 3	Acid-Base Properties of Salt Solutions	16.9
		Acid-Base Behavior and Chemical Structure	16.10
	T, Mar. 4	The Common-Ion Effect	17.1
	W, Mar. 5	Buffers	17.2
	F, Mar. 7	Acid-Base Titrations	17.3
Week 10	Spring Break - No Class!		
Week 11	M, Mar. 17	Solubility Equilibria	17.4
		Factors that Affect Solubility	17.5
	T, Mar. 18	Precipitation and Separation of Ions	17.6
		Qualitative Analysis for Metallic Elements	17.7
	W, Mar. 19	Chemistry of the Environment	18.1-5
	F, Mar. 21	Spontaneous Processes	19.1
Week 12	M, Mar. 24	Entropy and the Second Law of Thermodynamics	19.2
	T, Mar. 25	The Molecular Interpretation Entropy and the Third Law	19.3
	W, Mar. 26	Entropy Changes in Chemical Reactions	19.4
	F, Mar. 28	Gibbs Free Energy and Temperature	19.5-6
Week 13	M, Mar. 31	Free Energy and the Equilibrium Constant	19.7
	T, Apr. 1	Festival of Excellence - No Class!	
	W, Apr. 2	Oxidation States and Redox Reactions	20.1
	F, Apr. 4	Balancing Redox Equations	20.2
Week 14	M, Apr. 7	Voltaic Cells	20.3
	T, Apr. 8	Cell Potentials Under Standard Conditions	20.4
	W, Apr. 9	Free Energy and Redox Reactions	20.5
	F, Apr. 11	Cell Potentials Under Nonstandard Conditions	20.6

	Date	Topic	Chapter
Week 15	M, Apr. 14	Batteries and Fuel Cells	20.7
	T, Apr. 15	Corrosion and Electrolysis	20.8-9
	W, Apr. 16	Nuclear Chemistry Fundamentals	21.1-4
	F, Apr. 18	Nuclear Chemistry in the Real World	21.5-9
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Finals Week	R, Apr. 24	Final Exam 11:00-12:50 Bring a pencil and a scantron sheet	

Course Requirements

Grades will be based on the following items:

4 Midterm Exams 40%

Final Exam 15%

Quizzes 15%

Online Homework 15%

Online Dynamic Study Modules 15%

Final Grades will be assigned according to the following grade scale:

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

Midterm Exams: There are four midterm exams administered in the testing center through Canvas. Each exam is to be completed in a two-hour session during the indicated week unless prior arrangements have been made. A sparse resource sheet will be provided for each exam, but students should prepare by memorizing appropriate formulas, tables, etc.

Final Exam: The final exam is a comprehensive and nationally normalized exam prepared by the American Chemical Society.

Quizzes: Quizzes will be given at the beginning of most days. The purpose of these quizzes is to provide practice for the exams (since I am the author of both quizzes and exams) and to encourage punctual attendance.

Online Homework: The Mastering Chemistry online homework assignments are short, daily exercises that are usually selected from the end-of-chapter questions in our textbook. These assignments allow for multiple tries at each question, with lots of hints, feedback, and other study aids to assist the student.

Online Dynamic Study Modules: The Online Dynamic Study Modules are also accessed through Mastering Chemistry, but are a very different type of assignment. Questions are randomly selected from a pool and presented to the student until mastery of each important topic is demonstrated. These assignments each cover an entire chapter, and so they may take some time to complete.

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

Late Work Policy: Textbook 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 smartphone. 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 this calculator exclusively while doing homework will ensure that you are proficient with it for use during exams.

Academic Credit: According to the federal definition of a Carnegie credit hour: A credit hour of work is the equivalent of approximately 60 minutes of class time or independent study work. A minimum of 45 hours of work by each student is required for each unit of credit. Credit is earned only when course requirements are met. One (1) credit hour is equivalent to 15 contact hours of lecture, discussion, testing, evaluation, or seminar, as well as 30 hours of student

homework. An equivalent amount of work is expected for laboratory work, internships, practica, studio, and other academic work leading to the awarding of credit hours. Credit granted for individual courses, labs, or studio classes range from 0.5 to 15 credit hours per semester.

Academic Freedom: SUU is operated for the common good of the greater community it serves. The common good depends upon the free search for truth and its free exposition. Academic Freedom is the right of faculty to study, discuss, investigate, teach, and publish. Academic Freedom is essential to these purposes and applies to both teaching and research.

Academic Freedom in the realm of teaching is fundamental for the protection of the rights of the faculty member and of you, the student, with respect to the free pursuit of learning and discovery. Faculty members possess the right to full freedom in the classroom in discussing their subjects. They may present any controversial material relevant to their courses and their intended learning outcomes, but they shall take care not to introduce into their teaching controversial materials which have no relation to the subject being taught or the intended learning outcomes for the course.

As such, students enrolled in any course at SUU may encounter topics, perspectives, and ideas that are unfamiliar or controversial, with the educational intent of providing a meaningful learning environment that fosters your growth and development. These parameters related to Academic Freedom are included in SUU [Policy 6.6](#).

Academic Misconduct: Scholastic honesty is expected of all students. Dishonesty will not be tolerated and will be prosecuted to the fullest extent (see [SUU Policy 6.33](#)). You are expected to have read and understood the current SUU student conduct code ([SUU Policy 11.2](#)) regarding student responsibilities and rights, the intellectual property policy ([SUU Policy 5.52](#)), information about procedures, and what constitutes acceptable behavior.

Please Note: The use of websites or services that sell essays is a violation of these policies; likewise, the use of websites or services that provide answers to assignments, quizzes, or tests is also a violation of these policies. Regarding the use of Generative Artificial Intelligence (AI), you should check with your individual course instructor.

ADA Statement: Students with medical, psychological, learning, or other disabilities desiring academic adjustments, accommodations, or auxiliary aids will need to contact the [Disability Resource Center](#), located in Room 206F of the Sharwan Smith Center or by phone at (435) 865-8042. The Disability Resource Center determines eligibility for and authorizes the provision of services.

If your instructor requires attendance, you may need to seek an ADA accommodation to request an exception to this attendance policy. Please contact the Disability Resource Center to determine what, if any, ADA accommodations are reasonable and appropriate.

Non-Discrimination Statement: SUU is committed to fostering an inclusive community of lifelong learners and believes our university's encompassing of different views, beliefs, and identities makes us stronger, more innovative, and better prepared for the global society.

SUU does not discriminate on the basis of race, religion, color, national origin, citizenship, sex (including sex discrimination and sexual harassment), sexual orientation, gender identity, age, ancestry, disability status, pregnancy, pregnancy-related conditions, genetic information, military status, veteran status, or other bases protected by applicable law in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. SUU strives to cultivate a campus environment that encourages freedom of expression from diverse viewpoints. We encourage all to dialogue within a spirit of respect, civility, and decency. For additional information on non-discrimination, please see [Policy 5.27](#) and/or visit: <https://www.suu.edu/nondiscrimination>.

Pregnancy: Students who are or become pregnant during this course may receive reasonable modifications to facilitate continued access and participation in the course. Pregnancy and related conditions are broadly defined to include pregnancy, childbirth, termination of pregnancy, lactation, related medical conditions, and recovery. To obtain reasonable modifications, please make a request to: title9@suu.edu. To learn more visit: <https://www.suu.edu/titleix/pregnancy.html>.

Mandatory Reporting: University policy ([SUU Policy 5.60](#)) requires instructors to report disclosures received from students that indicate they have been subjected to sexual misconduct/harassment. The University defines sexual harassment consistent with Federal Regulations ([34 C.F.R. Part 106, Subpart D](#)) to include quid pro quo, hostile environment harassment, sexual assault, dating violence, domestic violence, and stalking. When students communicate this information to an instructor in-person, by email, or within writing assignments, the instructor will report that to the Title IX Coordinator to ensure students receive support from the Title IX Office. A reporting form is available at <https://cm.maxient.com/reportingform.php?SouthernUtahUniv>

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: For a full set of Higher Education Opportunity Act (HEOA) compliance statements, please visit <https://www.suu.edu/heoa>. The sharing of copyrighted material through peer-to-peer (P2P) file sharing, except as provided under U.S. copyright law, is prohibited by law; additional information can be found at <https://my.suu.edu/help/article/1096/heoa-compliance-plan>. You are also expected to comply with policies regarding intellectual property ([SUU Policy 5.52](#)) and copyright ([SUU Policy 5.54](#)).

SUUSA Statement: As a student at SUU, you have representation from the SUU Student Association (SUUSA) which advocates for student interests and helps work as a liaison between

the students and the university administration. You can submit MySUU Voice feedback by going to <https://www.suu.edu/suusa/voice>. Likewise, you can learn more about SUUSA's Executive Council at <https://www.suu.edu/suusa/executive-council> and about all of SUUSA's Student Senators at <https://www.suu.edu/suusa/senate>. If you have any specific concerns regarding any of your courses, please contact the SUUSA VP of Academics at: suusa_academicsvp@suu.edu.

Thriving Thunderbirds: Mental health is essential for your academic success. If you are struggling with mental health issues, SUU provides resources, support, and services to help you. Please visit <https://www.suu.edu/mentalhealth> for access to these valuable resources.

If you need assistance navigating any of the resources, please contact [Counseling and Psychological Services](#), the [Dean of Students' Office](#), or the [Health and Wellness Center](#).

Writing Center: The SUU Undergraduate Writing Center invites all students to the Writing Center in Braithwaite Center 101 where qualified peer tutors are ready to help with any stage of the writing process. Fall hours start September 3: M-Th 8 am–9 pm, F 8 am–5 pm, and Saturday 11 am–3 pm. All appointments are free, and both in-person and Zoom appointments are available. To schedule, visit our website at <https://www.suu.edu/hss/writingcenter>.

Land Acknowledgement Statement: SUU wishes to acknowledge and honor the Indigenous communities of this region as original possessors, stewards, and inhabitants of this Too'veep (land), and recognize that the University is situated on the traditional homelands of the Nung'wu (Southern Paiute People). We recognize that these lands have deeply rooted spiritual, cultural, and historical significance to the Southern Paiutes. We offer gratitude for the land itself, for the collaborative and resilient nature of the Southern Paiute people, and for the continuous opportunity to study, learn, work, and build community. SUU works towards building meaningful relationships with Native Nations and Indigenous communities through academic pursuits, partnerships, historical recognitions, community service, and student success efforts.

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