Principles of Chemistry II

CHEM 1220

Spring 2022

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 *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 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, Wednesdays, Thursdays, and Fridays from 12:00-12:50 in room SC-214
For the best lecture experience, read the indicated textbook chapter *before* viewing each lecture

	Date	Topic	Chapter
Week 1	M, Jan. 10	Intermolecular Forces and Liquid Properties	12.1-12.2
		Phase Changes and Heating Curves	12.3
	W, Jan. 12	Vapor Pressure and Phase Diagrams	12.4-12.5
	R, Jan. 13	Classifying Solids and Unit Cells	12.6-12.7
	F, Jan. 14	Solvation and Saturation	13.1-13.2
Week 2	M, Jan. 17	**Martin Luther King Day - No Class!**	
	W, Jan. 19	Concentration Units	13.3
	R, Jan. 20	Colligative Properties	13.4-13.5
	F, Jan. 21	**Catch-up/Review Day** - Midterm Exam 1 (Ch. 12–13)	
Week 3	M, Jan. 24	Rates and Rate Laws	14.1-14.2
	W, Jan. 26	Integrated Rate Laws	14.3
	R, Jan. 27	Temperature and Activation Energy	14.4
		Reaction Mechanisms and Catalysis	14.5-14.6
	F, Jan. 28	Equilibrium Constants	15.1-15.2

	Date	Topic	Chapter
Week 4	M, Jan. 31	Equilibrium Expressions and Q	15.3-15.4
	W, Feb. 2	ICE Tables	15.5
	R, Feb. 3	Le Châtelier's Principle	15.6
	F, Feb. 4	Acid and Base Reactions	16.1-16.2
Week 5	M, Feb. 7	Autoionization and pH	16.3-16.4
	W, Feb. 9	Weak Acids and Bases	16.5
	R, Feb. 10	Polyprotic Acids and Salts	16.6-16.7
	F, Feb. 11	Acid Strength and Lewis Acids	16.8-16.9
Week 6	M, Feb. 14	**Catch-up/Review Day** - Midterm Exam 2 (Ch. 14–16)	
	W, Feb. 16	Buffers and the H-H Equation	17.1-17.2
	R, Feb. 17	Strong Acid/Base Titrations	17.3
	F, Feb. 18	Weak Acid/Base Titrations	17.4-17.5
Week 7	M, Feb. 21	**President's Day - No Class!**	
	W, Feb. 23	Solubility	17.6-17.7
	R, Feb. 24	Precipitation and Q	17.8
	F, Feb. 25	Metal Ions and Complexation	17.9-17.10
Week 8	M, Feb. 28	**Spring Break - No Class!**	
	W, Mar. 2	**Spring Break - No Class!**	
	R, Mar. 3	**Spring Break - No Class!**	
	F, Mar. 4	**Spring Break - No Class!**	
Week 9	M, Mar. 7	Entropy and Spontaneity	18.1
	W, Mar. 9	Entropy Changes and Temperature	18.2-18.3
	R, Mar. 10	Gibbs Energy and Temperature	18.4-18.5
	F, Mar. 11	Gibbs Energy and Equilibrium	18.6

	Date	Topic	Chapter
Week 10	M, Mar. 14	Redox Reactions	19.1-19.3
	W, Mar. 16	Voltaic Cells	19.4-19.5
	R, Mar. 17	Free Energy and Cell Potential	19.6
	F, Mar. 18	Nernst Equation and Applications	19.7
Week 11	M, Mar. 21	Electrochemical Cell Applications	19.8-19.9
	W, Mar. 23	**Catch-up/Review Day** - Midterm Exam 3 (Ch. 17–19)	
	R, Mar. 24	Radioactivity	20.1-20.2
	F, Mar. 25	Half-Life and Radiometric Dating	20.3-20.4
Week 12	M, Mar. 28	Fission and Fusion	20.5
	W, Mar. 30	**Festival of Excellence - No Class!**	
	R, Mar. 31	Energy and Nuclear Reactions	20.6-20.7
	F, Apr. 1	Hydrocarbons	21.1-21.2
Week 13	M, Apr. 4	Isomers	21.3
	W, Apr. 6	Classes of Organic Compounds	21.4-21.5
	R, Apr. 7	Polymers	21.6
	F, Apr. 8	Transition Metals	22.1-22.2
Week 14	M, Apr. 11	Coordination Compounds	22.3
	W, Apr. 13	Nomenclature and Isomerism	22.4-22.5
	R, Apr. 14	Crystal Field Theory and Spectroscopy	22.6-22.7
	F, Apr. 15	**Catch-up/Review Day** - Midterm Exam 4 (Ch. 20–22)	
Week 15	M, Apr. 18	Carbohydrates	23.1-23.2
	W, Apr. 20	Lipids	23.3
	R, Apr. 21	Amino Acids	23.4
	F, Apr. 22	Nucleic Acids	23.5
Finals Week	T, Apr. 26	**Final Exam** – 11:00-12:50 *Bring a Scantron and a Pencil!*	

Course Requirements

Grades will be based on the following items:

4 Midterm Exams 40%

Final Exam 15%

Quizzes 15%

Online Homework 15%

Daily Textbook Homework 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 either in class or as a "take-home" quiz. The purpose of these quizzes is to provide practice for the exams and to encourage punctual attendance.

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.

Daily 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.

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 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 this 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, and for the intellectual property policy, information about procedures, and what constitutes acceptable behavior. From University policy 6.33: "The University defines plagiarism as intentionally or carelessly presenting the work of another as one's own. It includes submitting an assignment purporting to be the student's original work which has wholly or in part been created by another person, or cutting and pasting of source material..."

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/1097/p2p-and-copyright-infringement

LINK Statement: SUU faculty and staff care about the success of our students. In addition to your professor, numerous services are available to assist you with the achievement of your educational goals. SUU's LINK system may be used by faculty to notify you and/or your advisors of their concern for your progress and provide references to campus services as appropriate.

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 My SUU Voice feedback by going here: https://www.suu.edu/suusa/voice Likewise, you can learn more about SUUSA's Executive Council here (https://www.suu.edu/suusa/executive-council/) and about indivdual SUUSA's Student Sentors here (https://www.suu.edu/suusa/senate/)

University Policies and Recommendations Regarding COVID-19: Southern Utah University has compiled a collection of information, policies, and recommendations related to COVID-19 at suu.edu/coronavirus/
I dearly want this semester to go smoothly vis-à-vis COVID-19, and I assume you all do as well. Toward that end, I encourage you all to exercise all reasonable precaution to prevent the spread of the coronavirus. This includes using the testing and self-reporting resources at the link above. It may interest some of you to know that, for my part, I have been vaccinated with two doses of the Moderna vaccine, and more recently received a Pfizer booster. I will wear a mask on campus when appropriate. I will *not* be wearing a mask as I lecture, since clear communication is my primary goal in the classroom.

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