Principles of Chemistry 1, Chemistry 1210, Fall 2021

Section 2

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Office Hours:	Office hours will held by appointment. Please visit the Calendly link provided in Canvas to schedule a time to meet at your convenience. Office hours can be held in-person or via Zoom. Please note your preference when you schedule an appointment. Please also check out the office hours offered by the undergraduate teaching fellows (UTFs) for the course.
Required Materials:	Textbook (Choose One): • Brown, LeMay & Bursten. Chemistry: The Central Science. Pearson Education. The newest edition is the 14th edition, but **an older edition will work just fine for this course and for Chemistry 1220 (and will save you some $$$).** **or** • Dr. Ensign's online textbook- FREE (ensignchemistry.com/chem1/textbook.html). The username and password to access the website/textbook is available on Canvas. **or** • Openstax textbook: https://openstax.org/details/books/chemistry-2e Scientific Calculator
Prerequisite	Previous or concurrent enrollment in Math 1050 or higher.
Course description	Chemistry 1210 is the first of a two-semester sequence of general chemistry for students in the physical and biological sciences and engineering.

Canvas	All lectures (pre-recorded), course materials, and graded assignments (quizzes and exams) will be available through Canvas. For questions regarding your Canvas account or password, or any other technical support, please refer to the information below.
	
	• http://canvas.usu.edu
	  ○ Your username is your A#, and your password is your global password (the same one you use for Banner or Aggiemail).
	• For Canvas, passwords, or any other computer-related technical support, please refer to the information below.
	  ○ 435 797-4357 (797-HELP)
	  ○ 877 878-8325
	  ○ http://it.usu.edu
	  ○ servicedesk@usu.edu

Lectures	

	Chemistry 1210 is a four-credit class, meaning there are four "50 minute" contact hours per week. Three of these contact hours are the MWF in-class lectures. Prior to Covid, students also met weekly in smaller recitation sections with teaching assistants (TAs) for the fourth contact hour. Due to expanding enrollment in the laboratory classes, the TAs previously assigned to recitations have now been assigned to laboratories, and recitations were eliminated. Due to this, the fourth weekly contact hour has now been switched to an out of class, on-line lecture to be watched on the Thursdays indicated on the syllabus. For the weeks where exams are given, there is no Thursday lecture. Use the class schedule to see the weeks where you will watch the out of class 50 minute lectures. Details on the content and location of online lectures will be provided in class.
Course Communication	Course announcements will be made via the class Canvas page. **You are responsible for checking Canvas at least once a day for new announcements! An even better approach would be to set up Canvas announcements to go straight to your email.** Please feel free to email me with questions! I try to maintain a 24-hour response time during the week and a 48 to 72 -hour response time on weekends. Often, I can respond much faster, however you should not plan to send last minute questions regarding quizzes or exams (ie. at 10pm on the evening that a quiz is due) and expect a rapid response. Office hours are offered by appointment for your convenience. Please visit the Calendly link provided in Canvas to schedule an appointment.
Piazza	For academic questions, I would prefer that you post your questions on Piazza (quiz questions are allowed). You will most likely also get a quicker response this way. The link to Piazza is located on the Canvas navigation list. Piazza is a free, online system where students can ask and answer questions. Not only will I be able to answer your questions, but TA's and other students will be able to offer answers as well. (I always double check that answers provided by students are correct and will provide clarification if needed). **Before you send a question, double check that someone else has not already asked it on Piazza, you may have an answer already waiting for you!** You also have the option to post anonymously on Piazza, although please be aware that as an instructor I will be able to see your identity. It is expected that your communication on Piazza will be respectful and considerate, no harassment of any kind will be tolerated. Piazza is not the forum to discuss personal information. If you have personal concerns, please email me directly.
Course Resources	My class resources including lecture notes, lecture recordings (both pre-recorded and current semester), and practice exams are all located in Canvas.
Chapter Self-Test Problems (Non-graded)	There is a set of self-test problems for each chapter covered in CHEM 1210. The self-tests are available as a Canvas practice quiz and as a PDF. Both written (on Canvas) and recorded (ensignchemistry.com) solutions are available for each self-test. Suggested homework problems are listed as an accompaniment to each lecture on the course schedule. Appropriate problems will also be provided in lecture. **Mastery of problems solving skills is essential for your success in CHEM 1210. You should work all self-test problems and refer to the provided solutions as necessary.**

Supplemental Instruction	The supplemental instruction leaders will hold structured review sessions twice a week that review the material from the current week's lectures via Zoom. Dates/times and contact information will be announced on Canvas. You may attend any SI sessions that you wish. The SI instructor for this course is: Em Haroldsen Emily Hull Ethan Meredith
Undergraduate Teaching Fellow	The UTF for this course will hold weekly office hours. Dates/times and contact information will be announced on Canvas. Kami Morgan Mike Deming Ethan Harris
Online Quizzes (Graded)	There will be 12 graded on line quizzes (and an initial "pre-test" quiz) offered throughout the semester. The pre-test quiz will contain 10 questions and be worth 10 points based on completion only. The pre-test should be taken without the use of outside resources. Each graded quiz thereafter counts for 10 points and is open book/open notes. You will take the quizzes on line through Canvas. **Quizzes are to be taken during the availability periods indicated on the class schedule and within Canvas and will not be available after the due date.** If you wish to use previous quiz attempts to review or study for exams, all attempts of a quiz must be taken by the quiz deadline. Quizzes will usually consist of 10 questions, worth 1 point each. You will have 60 minutes to take each quiz. You may repeat a given quiz up to four additional times to improve your grade on that particular quiz, if you wish. Your highest score for the five attempts will be recorded. Note that each time you take a quiz you will receive a slightly different version, covering the same concepts but with different questions. **I encourage you to take each quiz the full five times, as the problem solving skills you will gain from taking the quizzes multiple times will be very beneficial in preparing for the exams. Remember, there is no penalty for repeating a quiz; <u>your highest score of all attempts is the one that will be entered into the gradebook.</u>** Your highest 12 of 13 online quiz scores will be counted for 120 points total.
Week in Review Quizzes (Graded)	Multiple choice quizzes, consisting of 5 questions worth 1 point each, will be given on-line through Canvas at the conclusion of the weeks indicated on the class syllabus. These quizzes contain questions related to concepts covered in class for that week's lectures. These quizzes will be available from Friday through Sunday of a given week, are timed (30 minutes), and may be taken only once. These week in review quizzes are to encourage you to keep up with the lecture material (including the weekly on-line lecture).
Midterm Exams	Four midterm exams (100 points each) will be taken from within Canvas at a USU

(graded)	testing center during a two-day availability period. The exams are based on material covered in class and closely match the difficulty level and content of the practice exams, chapter self-tests, and graded online quizzes. You are strongly encouraged to work the online chapter self-tests, take the quizzes the full five times, and work the practice exams posted in Canvas as part of your exam preparation. Your best three of four midterm exams scores will count towards your final grade.
Midterm exam second chance (retake) to raises your midterm score (Extra Credit)	After the exam availability window closes, and after detailed exam results are released, you will have two days to "retake" the exam on your own computer in an open book format to increase your exam score. About 25% of the questions on the "retake" exam will be identical, and the remainder will test the same concepts as on the questions from your midterm but with changes in numbers, wording, etc. I recommend printing out your exam results ahead of the exam retake, and reworking any questions you missed, so you can get the corresponding questions right when you complete the retake exam. The purpose of the retake exercise is to allow you to correct errors/mistakes you made on the original exam, and get the questions right on your second attempt. The point value for the exam retake will be determined by the class average on the exam. If the exam average is 73% or higher, the exam retake will be worth a maximum of two points added to your original exam score. If the exam average is less than 73%, the retake will be worth "75 minus the exam average". The points you receive on the retake will be added to your original exam score to increase your exam score by that number. For example, if the average on exam 1 is 67%, the retake will be worth (75 – 67) = 8 points total. If your original score was 74/100 (74%), and you retake the exam and score 93.75% (7.5/8), the 7.5 points will be added to your original score giving you 81.5/100. If you score 100/100 and retake the exam and score 100% (8/8), your score will be adjusted to 108/100.
Final exam	The comprehensive final exam (200 points) will be given in the USU testing center during finals week. The final exam will consist of both a "new material" section (100 points, material covered from exam 4) and a "comprehensive portion" (100 points, material covered on exams 1-4).
Course Flexibility (Life Happens)	Life happens. In order to provide some flexibility, the following course provisions (as detailed in other locations in the syllabus) are available to all students: 1. Your lowest quiz score is dropped and the best 12 of 13 quizzes (1 pre-test quiz and 12 chapter quizzes) count towards your final grade. In addition, a comprehensive make-up quiz will also be offered at the end of the semester that can replace your next lowest quiz score or missed quiz. 2. Your lowest MIDTERM exam score is dropped. (Note: You CANNOT drop your final exam score.) 3. An additional eight points of extra credit can be earned by correctly answering the iClicker questions asked during lectures. The extra credit will be calculated as follows • (# of questions answered correctly/total # of lecture questions) x 8

Grading

A total of 670 points are possible in Chem. 1210 and are distributed as follows:

Best 3 of 4 midterm exams	300 pts.
On-line Quizzes (best 12 of 13 @ 10 points each)	120 pts.
Week in Review Quizzes (10 @ 5 points each)	50 pts.
Comprehensive Final Exam	200 pts.
Total points	670 points

In addition, to encourage you to attend, prepare for, and be attentive during lectures, you may earn up to 8 points of additional extra credit based on correct responses to the questions I will ask in lectures using the iClicker system.

(# of questions answered correctly/total # of lecture questions) x 8 = …….max of 8 points

In terms of final assignment of grades, you are *guaranteed* the following grades if your final class percentage lies within the indicated ranges:

Name:	Range:	
A	100 %	to 93.0%
A-	< 93.0 %	to 88.0%
B+	< 88.0 %	to 85.0%
B	< 85.0 %	to 81.0%
B-	< 81.0 %	to 77.0%
C+	< 77.0 %	to 73.0%
C	< 73.0 %	to 66.0%
C-	< 66.0 %	to 60.0%
D+	< 60.0 %	to 56.0%
D	< 56.0 %	to 50.0%
F	< 50.0 %	to 0.0%

This is the grading scheme currently set in Canvas with the guaranteed breaks. Note that percentages **DO NOT ROUND** to these values: for example, a 92.99% average will **not** round to 93.0, and will result in an "A-" grade. To earn an "A", your average must be 93.00% or better. If the overall class average on all assignments at the conclusion of the semester is less than 73%, the **percentage cuts for the various grades may shift lower than the breaks shown at left.** In other words, better grade may be assigned for lower percentages than those indicated above, a scenario that is *to your favor*. However, the percentages will never shift higher than the above, so you are assured the indicated or a higher grade, depending on the class average at the conclusion of the course. **In an effort to be fair and consistent to all students, Grade breaks will not be shifted based on individual student petitions.**

* This syllabus serves as a statement of intent and serves and an agreement between the instructor and the student. Every effort will be made to avoid changes to the syllabus, but the possibility exists that unforeseen events could make changes to the syllabus necessary.

Academic Integrity

You are expected to do your own work. Academic dishonesty is not tolerated, and violations of academic integrity will be reported to the Office of Student Affairs. If you feel the need to cheat due to difficult circumstances, please reach out to me first. I can provide resources to assist in your learning and to help you get back on track.

Provisions:	The administration of Chem 1210 will adhere strictly to the academic policies outlined in the most recent USU General Catalog, which can be found here: http://catalog.usu.edu/content.php?catoid=12&navoid=3139 http://www.usu.edu/provost/faculty-life/syllabus.cfm
Course assessment	Students in this class are expected to develop proficiency in the principles listed on the class schedule and the attached "Learning Objectives" list. Questions provided on midterms, quizzes, and through the use of the embedded quizzes in lectures will be used to assess your understanding of these principles. The formats to be used for assessment will include instructor-designed questions. Please note that assessment is a tool used by the Department of Chemistry and Biochemistry to improve the quality of instruction and proficiency of our students. Your grade will be based on your performance on the assignments indicated above, some of which will be used for course assessment.

In accordance with the Americans with Disabilities Act, reasonable accommodations will be provided for all persons with disabilities in order to ensure equal participation in Chem 1210. In cooperation with the Disability Resource Center, reasonable accommodation will be provided for students with disabilities. Please meet with the instructor during the first week of class to make arrangements. Alternative format print materials, large print, audio, diskette or Braille, will be available through the Disability Resource Center.

IDEA Objectives

1. Gaining a basic understanding of the subject (e.g., factual knowledge, methods, principles, generalizations, theories).
2. Learning to apply course material (to improve thinking, problem solving, and decisions).
3. Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course.
4. Learning appropriate methods for collection, analyzing, and interpreting numerical information.

Chemistry 1210 Learning Objectives

Define matter and classify it from the level of mixtures and compounds to elements.
Differentiate physical and chemical properties and changes and intensive and extensive properties.
List and define the base SI units of mass, length, time, temperature and amount of a substance, and manipulate the base units to give derived SI units.
Use the principles of dimensional analysis and conversion factors to convert quantities expressed in one unit to another unit.
Express numbers in different units by using the prefix and exponential notation methods.
Explain the difference between precision and accuracy, and relate these terms to the concept and usage of significant figures in experimental measurements.
Explain the atomic theory of matter, emphasizing the composition of the atom, and what defines the identity of a given element.
Explain the relative sizes, masses, and charges of the proton, neutron, and electron, and how they assemble to form an atom.
Define the term isotope, and be able to discern the subatomic composition of an atom given its atomic and mass numbers. Represent the atom using the element symbol with superscript and subscript denoting the composition.
Use the Periodic Table to rationalize similarities and differences of elements, including physical and chemical properties and reactivity. Predict common ion charges of group 1A, 2A, 3A, 6A, and 7A elements based on position in the periodic table.
Name and predict ions formed from the elements, and recognize and be able to name common polyatomic cations and anions.
Differentiate between ionic and molecular compounds, and empirical and molecular formulas. (1)
Given the chemical formula for an ionic compound or molecule, provide a proper unambiguous systematic name for the compound. Conversely, given the compound name, write the single chemical formula that matches the name.
Given the reactants and products for a chemical equation, balance the equation using whole number coefficients.
Recognize the following common chemical reactions: combustion, decomposition, combination. (1)
Given the atomic weights and relative abundances of naturally occurring isotopes, calculate the average atomic weight of an element.
Use average atomic weights from the Periodic Table to calculate formula weights and molecular weights for compounds.
Use the concepts of the mol, molar mass and Avogadro's number and conversion factors derived from their relationships to interconvert between mass, mols, and numbers of particles for atoms and molecules.
Explain the basis for the "mass defect" seen when an experimentally determined molar mass for an atom is compared to the sums of the masses of the subatomic particles in that atom.
Use the stoichiometric relationships between atoms in molecules, and the stoichiometric coefifficients on reactants and products in chemical reactions, to interconvert between numbers of particles, mols, and masses within compounds and for chemical changes.
Given the molar mass of an unknown compound and its elemental composition in mass percent, determine the empirical and molecular formulas for the compound.
Given a chemical reaction and masses of reactants, determine the limiting reagent if the reaction goes to completion, and calculate the masses of products formed and excess reagent remaining at the conclusion of the reaction.
Understand solution composition and the terms solvent and solute.
Differentiate between weak and strong electroytes and nonelectrolytes.

Define and differentiate strong and weak acids and bases.
Define "solubility" and "miscibility" and understand the factors that make a solute soluble in water.
Define and write representative equations for aqueous reactions involving neutralization, precipitation, gas generation, and oxidation/reduction.
Define and write representative equations for molecular equations, complete ionic equations, net ionic equations.
Recognize spectator ions in aqueous reactions.
Define solution concentration in units of molarity and use dimensional analysis to interconvert molarity, mass, mols, and volume.
Define energy in terms of work and radiation (heat), and differentiate the following types of energy and the terms that relate to it: kinetic, potential, thermal, chemical energy; conservation of mass, system and surroundings, state function.
Describe energies, energy changes and associated signs referenced relative to the system of interest.
Define enthalpy and exothermic and endothermic reactions.
Determine the enthalpy for a reaction given information from a standard table of enthalpies of formation or using specific heat and calorimetry data.
Apply Hess' law to determine enthalpies of reaction.
Describe the properties of electromagnetic radiation, and use the appropriate equations that interrelate energy, frequency, wavelength, Planck's constant, and the speed of light.
Explain the concept of "photons" and "quanta" and the dual nature of radiant energy.
Explain the Bohr model of the hydrogen atom and use the Rydberg equation to determine the energies associated with electronic transitions.
Explain the dual nature of matter (wave and particle).
Explain how the Heisenberg uncertainty principle and Schrodinger models relate to electronic structure.
Describe electronic structure in terms of orbitals, with associated quantum numbers n, l, m_l, and m_s and how these quantum numbers relate to the energies, shapes, orientations, and spins of electrons in atoms.
Use the above principles of quantum chemistry together with the Pauli exclusion principle and Hunds rule to predict the electronic configurations of multielectron atoms.
Predict periodic properties, including relative sizes of atoms, ionization energies, and electron affinities using the principles outlined in class.
Understand and describe chemical bonding at the level presented in class, with particular emphasis on understanding and applying the following terms/concepts: Lewis symbols and atoms, Ionic bonding, Lattice energy, isoelectronic series, covalent bonding, electronegativity and bond polarity, Lewis structures, formal charges, resonance, octet violations, bond strengths, oxidation numbers.
Apply valence shell electron pair repulsion theory to properly drawn Lewis structures to predict bond angles and geometries about atoms in molecules.
Use valence bond theory to describe covalent bonding in terms of orbital overlaps and hybridizations.
Describe the properties of a gas in terms of the variables P, V, n, and T.
Use the Ideal gas law to interconvert between P, V, n, and T for a gas.
Understand and explain Kinetic-molecular theory.
Explain the factors that lead to non-ideal behavior for a gas.
Understand and identify the intermolecular forces important in different solids and liquids.
Describe the processes by which states of matter are changed.
Define vapor pressure and boiling point.
Interpret heating curves and phase diagrams for a compound.
Understand the solution process in terms of thermodynamics.
Explain the factors that affect solubility of a solute.
Understand and explain the different colligative properties and use the proper mathematical equations to quantitatively describe these effects.