

Principles of Chemistry II, Chemistry 1220, Spring Semester 2017

Section 1, M W F, 8:30-9:20 AM, ESLC 130

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Office Hours:	Mon. and Wed., 1:00-2:30 PM, other times by appt.
Text:	" <i>Chemistry: The Central Science</i> ", the latest edition is 13 th ed., 2015; Brown, Lemay & Bursten, ISBN 0321910419. A previous edition of this text (9 th , 10 th , 11 th , or 12 th ed.) will work just fine for this course and chemistry 1220 and can be purchased for a fraction of the price of the current edition. Older edition ISBN numbers are: 12 th edition, 0321696727; 11 th edition, 0136006175; 10 th edition, 0131096869; 9 th edition, 0130669970.
Prerequisite	Math 1050 or higher, Chemistry 1210
Course description	Chemistry 1220 is the second of a two semester sequence of general chemistry for students in the physical and biological sciences and engineering. The course will cover topics presented in chapters 14-24 (12 th ed.) or chapters 14-25 (11 th and earlier ed.) of the Brown, Lemay and Bursten text.
Recitation	All students must register for and attend a section of recitation listed in the course schedule. Recitation sections consist of groups of about 30 students and are administered by teaching assistants. The recitation setting is designed to develop problem solving skills needed for the class examinations, and to assess your understanding of concepts covered during previous class sessions. For assessment, there is a <u>graded component to recitations</u> . Recitation sections will begin during the second week of classes.
iclickers	Iclickers will be used for lecture participation, assessment, and student feedback. You will need to have your iclicker registered by beginning of class Friday, January 13 . To register your iclicker, use the link in the navigation bar of the canvas course home page (see below). Iclickers registered for fall semester do not need to be re-registered for spring semester.
Learning Management System	Canvas instructure will be used for the management of Chem. 1210. Importantly, <i>you will take your chapter quizzes on line using Canvas</i> . To log on to Canvas, go to the web address: canvas.usu.edu . Your USERNAME is your BANNER login and your default PASSWORD is your BANNER password. Canvas has many useful features (your assignment scores, a chat room, discussion page, mail, etc.) and you should take the time to explore them from within our course page. I will provide more instructions on using Canvas in class.
Class resources	My class resources, including chapter self tests, lecture overheads, lecture recordings, tutorials, recorded solutions, multimedia, practice exams, and current exam keys are posted on the following page (the link is also provided in Canvas): http://ensignchemistry.com/chemistry1220/preview/chemistry1220resources/resources.htm The username and password for accessing the resources will be provided in class, and also posted on our Canvas course page. <i>Accessing and using these resources is essential for your success in chemistry 1220.</i>

Supplemental	Supplemental instruction (S.I.) will be provided for this course as follows:
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Instruction And UTF	Colton Cowan (colton.cowan@aggiemail.usu.edu), T 6:30-7:20 PM, MAIN 115 and R 7:30-8:20 PM, MAIN 121 Michael Flores [michael.flores@aggiemail.usu.edu], M and W, 6:00 to 6:50 PM, WIDT007 Bronson Kunzler (bronsonkunzler@gmail.com) has been assigned as an undergraduate teaching fellow (UTF) for this class. Bronson will hold weekly office hours in WIDT226 to provide personal help and tutoring. Times are: M and F, 1:30-2:45 PM and T 9:30 – 10:30 AM
Chapter self tests (non-graded)	There will be an end of chapter (non-graded) self test consisting of ~40-50 questions for each chapter. You should work each question of the self tests as homework, according to the schedule on the “recordings” resource page, and watch my recorded solutions as necessary, in order to master the concepts from each chapter.
On line quizzes (graded)	There will be 10 chapter quizzes offered throughout the semester. Each quiz counts 10 points, is open book and consists of between 10 and 15 questions. You will take the quizzes on line through Canvas. You will have 30 minutes to take each quiz. You may repeat a given quiz up to four additional times during the availability period (indicated in Canvas) to improve your grade on that particular quiz. 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. The deadlines for completing all attempts of the quizzes are posted in canvas. It is your responsibility to make sure all quiz attempts are taken by the deadlines. Extensions of the quiz deadlines will only be made for documented illness or emergency and with advance notification to me ahead of the quiz deadline.
Midterm Exams (graded)	Three hourly exams (100 points each) consisting of 25 multiple choice questions will be given during class on the dates indicated on the course schedule. 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 quizzes. You are strongly encouraged to work the on-line chapter self tests, take the quizzes the full five times, and work the posted practice exams.
On line make-up exam (can substitute for lowest midterm score)	An optional “make-up exam”, covering all of the material covered on midterms 1-3 and worth 100 points, will be offered officially during week 14. The exam may also be taken during no test week (week 15) if you choose to take it then. If you score <i>higher</i> on this exam than on your lowest of three midterms, the score will replace the lowest midterm score. If you score <i>lower</i> on the make-up exam than on all three of your in-class midterms, then this exam score will not count. The make- up exam is to be taken in the USU testing center. More information about the make-up exam will be provided in class and in Canvas.
Final exam	The final exam (200 points) will be given in the USU testing center during finals week. The final exam will consist of 50 questions, and contain both a “new material” section (80 points, material covered since exam 3) and a “comprehensive portion” (120 points, material covered on exams 1-3).
Missed exams and recitation	If you miss one of the three in-class midterms due to illness or emergency, I will offer you the opportunity to take an exam covering the same material to

quizzes	substitute for the missed exam. If you miss a recitation quiz for illness or emergency, arrange to make up the quiz with your recitation leader. If at all possible I should be notified of the absence and reason <u>before</u> the scheduled midterm or quiz. Missed exams or quizzes may require written documentation from a doctor or other authority at my discretion.
Grading	<p>A total of 650 points are possible in Chem. 1220 and are distributed as follows:</p> <p>Total of 3 midterms, or best two midterms and the on-line make-up exam..... 300 pts. 10 on-line quizzes @ 10 points each..... 100 pts. Comprehensive Final Exam (F, May 6, 7:30-9:20 AM, ESLC130) 200 pts. Recitation (best 10 of 12 sessions@5 pts each)..... 50 pts. ----- Total points..... 650 points</p> <p>In addition, to encourage you to attend, prepare for, and be attentive during lectures, you may earn up to 8 points extra credit based on correct responses to the questions I will ask in lectures using the iclicker system. Iclicker extra credit points.....8 points</p> <p>In terms of final assignment of grades, you are <i>guaranteed</i> the following grades if your final class percentage lies within the indicated ranges:</p> <p>A/A- 100 to 88.0% (93.0 % or above is a guaranteed straight “A”) B+/B/B- <88.0 to 77.0% C+/C/C- <77.0 to 60.0% D+/D <60.0 to 50.0%</p> <p>Based on the overall class average, the percentage cuts for the various grades may shift lower than the above cuts. In other words, better grade may be assigned for <u>lower</u> percentages than those indicated above, a scenario that is <i>to your favor</i>. However, the percentages will <u>never shift higher</u> 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 general, in order for grade breaks to be dropped lower than those indicated above, the overall class average on all assignments would be below 75%.</p>
Course Withdrawal:	Withdrawal from the course after January 30 will result in a “W” notation being placed on your transcript. No withdrawal is permitted after March 23.
Provisions:	The administration of Chem 1220 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=7&navoid=1310
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 iclicker personal response system 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 1220. 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.

Chemistry 1220 Syllabus, Spring 2017, Dr. Scott Ensign

Week	Day	Date	Lecture	Topic	Chapter	Recitation	Quiz
1	M	1/9	1	Course intro, Reaction rates	14	none	none
	W	1/11	2	Concentration and rates	14		
	F	1/13	3	activation energy (iclicker use begins)	14		
2	M	1/16		Holiday: Martin Luther King Jr. Day	14	recitations meet, except M	1 (14)
	W	1/18	4	Reaction mechanism	14		
	F	1/20	5	Equilibrium	15		
3	M	1/23	6	Equilibrium constants	15	all*	2 (15)
	W	1/25	7	Le Chatelier's Principle	15		
	F	1/27	8	Water, Acid/Base	16		
4	M	1/30	9	pH, strong acids/bases (<i>drop deadline w/o "W"</i>)	16	all*	
	W	2/1	10	Weak acids/bases, Ka, Kb	16		
	F	2/3	11	Buffers	16		
5	M	2/6	12	catch up, prepare for exam 1	16	all*	3 (16)
	W	2/8	Exam 1 (Ch. 14-16) T-R testing center				
	F	2/10	13	Common ions	17		
6	M	2/13	14	Buffers, acid-base	17	all*	
	W	2/15	15	Titrations	17		
	F	2/17	16	Solubility	17		
7	M	2/20		Holiday: President's day		no recitations	4 (17)
	T	2/21	17	Solubility (cont) (note TUESDAY date)	17		
	W	2/22	18	Spontaneous processes	19		
	F	2/24	19	Entropy and the second law	19		
8	M	2/27	20	Entropy in reactions	19	all*	
	W	3/1	21	Gibb's free energy	19		
	F	3/3	22	Free energy	19		
9	M	3/13	23	catch up, prepare for Exam 2		all*	5 (19)
	W	3/15	Exam 2 (Ch. 17 and 19) T-R testing center				
	F	3/17	24	Redox reactions	20		
10	M	3/20	25	voltaic cells	20	all*	
	W	3/22	26	EMF	20		
	F	3/24	27	Batteries	20		
11	M	3/27	28	Electrolysis	21	all*	6 (20)
	W	3/29	29	Radioactivity	21		
	F	3/31	30	Nuclear decay	21		
12	M	4/3	31	Energy considerations	21	all*	7 (21)
	W	4/5	32	periodic concepts	22		
	F	4/7	33	noble gases/halogens/oxygen	22		
13	M	4/10	34	catch up, prepare for Exam 3		all*	8 (22)
	W	4/12	Exam 3 (Chaps. 20-22) T-R testing center				
	F	4/14	35	metals	23(23,24)		
14	M	4/17	36	coordination complexes	23(23,24)	all*	9 (23)
	W	4/19	37	isomers, colors and magnets	23(23,24)		
	F	4/21	38	organics-functional groups	24(25)		
15	M	4/24	39	organics	24(25)	all*	10 (24)
	W	4/26	40	peptides/sugars/nucleic acids	24(25)		
	F	4/28	41	catch up, Prepare for final exam			
Finals week 5/1-5/5				Final Exam, schedule at USU testing center			
*recitation weeks with an asterisk will be graded							
for BLB 12th edition chapters 23 and 24 are combined as chapter 22, and organic chemistry is chapter 24. For earlier editions chapters 23-25 cover the material in chapters 23-24 of the 12th edition							

Chemistry 1220 Learning objectives

- Describe reaction rates in terms of zero, 1st, 2nd, 3rd order processes
- Describe reaction rates as a function of temperature
- Predict reaction half-lives given initial conditions
- Differentiate between the plots of 1st order and 2nd order reactions
- Describe the action of catalysis on a chemical reaction
- Describe reactions in terms of elementary steps and rate-determining steps
- Write equilibrium constant expressions
- Perform calculations of concentrations, pressures using K_{eq} information
- Predict the direction of a reaction using the reaction quotient
- Explain Le Chatelier's Principle
- Cite essential definitions of acids and bases
- Utilize the autoionization of water to define pH and pOH, K_w , pK_w
- Employ K_a , K_b values to calculate pH, pOH of solutions of weak acids, weak bases, and salts -
- - Describe chemical factors that contribute to the strength of acids and bases
- Apply concepts of the Common Ion effect to design and construct acid/base buffer systems - - -
- Calculate acid/base titration curves and predict end-point conditions
- Describe and apply K_{sp} values to determine solubility of inorganic solids
- Describe the precipitation and separation of ions utilizing K_{sp} information
- Describe and apply concepts of chemical spontaneity and the 2nd Law of Thermodynamics - - -
- Describe and apply the concepts of entropy to chemical reactions
- Use Gibb's Free Energy to predict chemical equilibrium
- Balance chemical reactions that involve changes in oxidation states
- Express oxidation/reduction in terms of half reactions
- Describe voltaic cells and calculate potentials using standard reduction potentials
- Predict the spontaneity of oxidation/reduction reactions
- Employ the Nernst Equation to calculate cell potentials and chemical concentrations
- Describe the essential reactions related to common battery systems and fuel cells in use today -
- Describe the chemical reactions of corrosion
- Describe and differentiate between fundamental types of radioactivity and radioactive processes - Predict nuclear stability based on proton/neutron ratios
- Apply 1st order kinetics for radioactive decay
- Compare the energetic and mass aspects of nuclear fission and nuclear fusion
- Describe the fundamental aspects of the reactivity of non-metal elements
- Identify the major chemical processes for purifying iron, steel, aluminum, copper, and sodium
- - Describe the structure and bonding in simple coordination complexes of transition metals like Fe, Cu
- Predict simple electronic configurations for transition metal ions using the periodic table
- Predict magnetism using simple models of Crystal Field Theory
- Discuss how the color of transition metal complexes is related to d-orbital splitting
- Identify and draw the structure of hydrocarbon alkanes, alkenes, alkynes, and aromatics
- Identify and draw the organic functional groups ethers, aldehydes, ketones, acids, esters, and amides