

CHEM 1220 – Principles of Chemistry II

Syllabus

Instructor: Dr. Shawn M. Miller

Fall Term, 2016

Email: shawn.miller@usu.edu

Office Hours: Monday/Friday 2:30 PM-
3:30 PM

Widtsoe 339

Course Lecture Times & Locations:

Section (CRN)	Time	Day	Location
Lecture 001 (41101)	1:30 PM to 2:20 AM	M/W/F	Widtsoe Hall 007
Recitation 501 (41105)	1:30 PM to 2:20 PM	T	Engineering Laboratory 248
Recitation 502 (41110)	8:30 AM to 9:20 AM	F	Health Phys Ed & Rec 116
Recitation 503 (41111)	9:30 AM to 10:20 AM	F	Health Phys Ed & Rec 114A
Recitation 504 (41112)	10:30 AM to 11:20 AM	F	Health Phys Ed & Rec 116

Prerequisite:

No prerequisites

Required Materials:

Text: Brown, LeMay, Bursten, Murphy, Woodward, Stoltzfus *Chemistry: The Central Science*, 13th ed.; Pearson Education, Inc. (ISBN: 978-0-321-91041-7)

iclicker: iclicker 2s are required for use in Lecture. You will need to have your iclicker registered by beginning of class. To register your iclicker, use the link in the navigation bar of the CANVAS course home page.

Calculator: A non-programmable scientific calculator is recommended for use in Lecture and on Exams. Programmable calculators (TI-80 and above or similar) are not permitted on the Exams. Other electronic devices, including phones, are not permitted during Exams.

Supplementary Instruction:

Supplemental instruction (S.I.) will be provided for this course. The S.I. instructor and the times and locations of their sessions are:

Noah Thackeray (noah.thackeray@aggiemail.usu.edu): T 7:30 PM – 8:20 PM, ENGR 302
R 6:30 PM – 7:20 PM, ENGR 302

Course Overview

Chem 1220 is a Lecture course that meets three times a week. It is the second of a two-semester course sequence for science and engineering students. There will be assigned online Sapling Learning homework sets assigned to each chapter and there will be an online CANVAS Quiz at the end of each week. There will be three 50-minute in-Lecture Exams in addition to a Final exam.

Course Learning Objectives

CHEM 1220 is a course designed to continue the education process began in Chem 1210. By reading the textbook prior to the Lecture period, you will obtain a basic understanding of the upcoming Lectures' topics. By attending, taking notes during, and asking questions during Lecture periods, you will expand and refine your understanding of the course material. You will demonstrate proficiency of the course material through weekly in-Lecture clicker questions, Recitation worksheets, online CANVAS Quizzes, and online Sapling Learning homework problem sets. You will demonstrate mastery of the course material through Midterm Exams and a Final Exam.

By the end of this course, you will be able to...

- ...list key fundamental chemistry theories and principles related to reaction kinetics, chemical equilibrium, acids and bases, solubility, thermodynamics, electrochemistry, fundamental nuclear chemistry, fundamental inorganic chemistry, fundamental organic and biological chemistry, recall their meaning, and differentiate between related, but distinct, ideas. For example, students will be able to list all discussed types of rate plots (zero-, first-, and second-order), recall why they are different, and be able to differentiate between them.
- ...use fundamental chemistry theories and principles to explain or predict a result when presented with a chemistry scenario. For example, students will be able to say what happens to the pH of an acidic solution when a base is added to that solution.
- ...identify the appropriate equation, equations, or problem-solving tool needed to solve a chemistry problem and then use algebra and other fundamental mathematical skills to solve the problem. For example, students will be able to set up and utilize equilibrium constant expressions to determine the concentration of a compound at equilibrium.

A detailed set of Learning Objectives for each chapter is located at the end of this syllabus.

You will prepare for and practice achieving these objectives by...

- ...reading the textbook while taking notes.
- ...attending and taking notes during Lecture periods.
- ...completing weekly online Sapling Learning homework sets.

- ...taking weekly graded online CANVAS Post-Week Quizzes.
- ...asking for help via Office Hours, Piazza, or e-mail.

You will be assessed on how you have achieved these objectives using...

- ...one Getting Started online CANVAS Quiz.
- ...the aforementioned online Sapling Learning homework sets.
- ...the aforementioned online CANVAS Quizzes.
- ...three Midterm Exams.
- ...one Final Exam.

Course Communication

Piazza is a free online system designed for students to have access to rapid and efficient help from classmates, TAs, and the instructor simultaneously. **Piazza is not to be used to convey personal information.** Email the instructor or your TA directly if you need to discuss personal information. Questions involving student personal information will not be answered unless sent via a “myid@usu.edu” address.

For academic questions, rather than emailing questions about course material to the instructor and hope for a quick response, you are strongly encouraged to post your questions on Piazza. The instructor, TAs, and students can answer the question on Piazza, making it more likely that someone can answer your question quickly. Maybe you’ll even get lucky and someone will have already asked the question you were going to ask and got it answered! Students are not to provide complete answers or explanations, but are encouraged to guide their fellow students to complete answers or explanations. You have the option of posting anonymously to each other, but the instructor and TAs will always be able to see your identity. Enroll in the course by following the instructions in Canvas or by creating a Piazza account by going to <https://piazza.com/signup>, searching for “Chem 1220”, and enrolling as a student.

You are always welcome to e-mail your TA and the instructor with questions. Please include your full name and A-Number in your email. We will attempt to respond to your e-mails in a timely manner, but we have responsibilities outside of the course that may prevent us from doing so, and we ask you to exercise patience after sending e-mail. When contacting the instructor or TAs by email, it is recommended that you use your “myid@usu.edu” address with a descriptive subject line beginning with “CHEM 1220” to avoid your email being filtered as junk mail.

In conjunction with the online help, a schedule of TA office hours will be posted on the CHEM 1220 course syllabus within the first week of class. The instructor will hold regular office hours as listed in this syllabus as well as by request.

Course announcements will be made using CANVAS and the course Piazza page. Do not

expect to receive regular mass emails from the instructor. **You are expected to check CANVAS and/or Piazza at least once a day and are responsible for any information found in the announcements.** “But I did not know” will not be an acceptable excuse for being unaware of important information located in course announcements.

Getting Started in the course

Read the course syllabus. Once that is done, your first assessment is a “Getting Started” online quiz located on CANVAS that will cover course policy as discussed in the syllabus. This Quiz opens at the start of the course and remains open until 8:00 AM on Monday, September 12. The Getting Started quiz will be graded immediately upon completion and may be attempted an unlimited number of times. Correct answers will not be shown upon completion of the Getting Started Quiz, but you will be able to view your responses. If multiple attempts are made, the **latest** score will be accepted. **If you see no score in your Gradebook, no attempt was submitted.** The Getting Started Quiz score cannot be dropped.

Qualified students with disabilities may be eligible for reasonable accommodations. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, 797-2444 voice, 797-0740 TTY. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.

Lectures and Recitations

It is assumed that you read textbook sections, as outlined in the schedule at the end of this syllabus, prior to discussing them in Lecture. You are strongly encouraged to take notes while reading the textbook and then supplement those notes with Lecture. Reading the chapter ahead of time will grant you familiarity with the topic, and the Lecture periods will refine that familiarity into understanding and allow you an opportunity to ask questions to clarify concepts and rectify misconceptions. Blank Lecture presentations available for printout will be available on Canvas. Additionally, Lectures will be recorded and available on Canvas for later viewing.

Prior to each Lecture period, you have the opportunity to complete a Pre-Lecture survey. These surveys are anonymous and have no effect on course grades. These surveys are designed to give you a venue to provide feedback on what topic(s) should be focused on during the next Lecture period.

You must be registered for a recitation section (CHEM 1220 sections 501-504). Recitations will involve guided, group problem sessions. Participation in each Recitation is worth 5 points. The lowest Recitation score will be dropped, resulting in a total of 50 points for Recitations to be applied to the final grade. Camden DeBruler (camden.debruler@gmail.com) will be your recitation leader.

iClicker Questions

iClicker questions will be asked through the Lecture period and will be used as a way to assess class understanding of topics by providing immediate feedback to both the instructor and you. These questions must be answered individually, but consulting your notes and discussions with your classmates are allowed. It is your responsibility to register you iClicker either through the iClicker service on Canvas or at iclicker.com, and to remember to bring your iClicker, in working order, to class each day. iClicker questions will be utilized on Day 1, but student performance will not be recorded until the third Lecture period on Friday, September 2.

To encourage you to attend, prepare for, and be attentive during lectures, you **may earn up to 16 points extra credit** via iClicker questions. 8 of those points are allocated to participating in iClicker questions, and the remaining 8 points are allocated to answering iClicker questions correctly. The amount of extra credit awarded will be based on the percentage of iClicker questions answered by each student based on the total number of questions asked and the percentage of correct answered to iClicker questions based on the total number of questions asked. For example, if a student answers 75% of all iClicker questions, they will receive 6 extra credit points. If a student answers 50% of all iClicker questions correctly, they will be awarded an additional 4 extra credit points.

Homework

There will be 11 on-line homework sets, administered through Sapling Learning (accessed through Canvas) and must be completed on your own time. Each homework set, which is worth 11 points, will be start on Monday at 1:30 PM and will be open until the due date the following Monday at 1:00 PM. The homework sets will involve a variety of interactive questions. You may use your textbook and notes, but it is suggested you attempt the problems alone at first. You can have as many attempts as necessary for each problem, but 5% will be deducted for each incorrect answer. You have an entire week, 24/7, to take the quizzes. The lowest Sapling Learning score will be dropped t the end of the course.

See the following instructions for Sapling Learning enrollment. **Remember to input your A-number correctly or you cannot be given credit for the Homework assignments.**

Registering for Sapling

For instructions on how to enroll in Sapling Learning, please proceed to <http://www2.saplinglearning.com/help/higher-education-us/accounts-and-registration>.

Once you have registered and enrolled, you can log in at any time to complete or review your homework assignments. During sign up or throughout the term, if you have any technical problems or grading issues, send an email to support@saplinglearning.com explaining the issue. The Sapling Learning support team is almost always faster and better able to resolve issues than your instructor.

Inputting A-number

- 1) Click "Profile" on the left hand menu
- 2) Click "Edit Profile" from the top menu
- 3) Click "Show Advanced" on right side
- 4) Scroll to the bottom
- 5) In put your A-number, as A##### (capital A), in the box labeled "ID number"
- 6) Click "Update Profile"

Quizzes

At the end of every week, with the exception of the week containing Thanksgiving Break, a Post-Week Quiz worth 10 points will be released. The Quiz will open at 2:30 PM every Friday and will be due the following Monday at 1:00 PM. There are two exceptions to this schedule: Post-Week Quizzes 12 and 14. Post-week Quizzes 12 and 14, due to the scheduling of Exams and University holidays, will be open on Wednesday at 2:30 PM and close on Friday at 1:00 PM. This means that weeks 12 and 15 will have two Post-week Quizzes due in the same week.

Post-Week Quizzes will be 30 minutes long and will contain questions about material covered in the previous week. You may use your textbook and notes when taking the Post-Week Quiz, but you must work alone. You should treat Post-Week Quizzes as practice for the Exams, as both the timed aspect is common with Exams and you should expect some of the questions on Post-Week Quizzes to make an appearance in some form on the Exams. Their use as a study tool is why Post-Week Quizzes 12 and 14 are due on Friday instead of Monday, as they should be used to study for Exam 3 and the Final exam, respectively. You may take each Post-Week Quiz twice to account for any technical difficulties you encounter, such as losing power or logging out accidentally. The correct answers for the Quiz will not be shown until after the due date. After successfully completing the Quiz, you may choose to retake the Quiz to try and maximize your score, but note that only the **last** attempt will be accepted. Therefore, if your second attempt at the Quiz has a lower score than the first attempt, the second attempt's score is still what will be counted as your score for the Quiz. The lowest two Post-Week Quiz scores will be dropped at the end of the course.

Examinations

There will be three in-class 50-minute Exams, worth 100 points each, that will be administered according to the following schedule:

First Exam:	Wednesday, September 28
Second Exam:	Wednesday, October 26
Third Exam:	Monday, November 21

These Examinations will consist of 25 multiple choice questions worth 4 points each.

Make-up Exams for missed Exams may be granted upon petitioning the instructor only in the following situations: 1) documented and acceptable excuses for illness when verified by a doctor's note; 2) a family emergency when verified by a note from your academic advisor; 3) a regularly scheduled university-sanctioned conflict, such as a sports competition the student is

participating in, but only when the instructor is notified well in advance of the conflict and verified with a note from the person in charge of the activity containing the specific reasons for the absence. Absences due to reasons not considered by the university to be excused absences, such as weddings, are not eligible for make-up Exams.

Students arriving late to the Exam will forfeit the lost time. No other materials (including, but not limited to, music playing devices, headphones, cellular phones, textbooks, course notes, calculators, etc.) are permitted.

A Final Examination will be held on Monday, December 12 from 1:30 PM to 3:20 PM.

Academic Integrity

All Utah State University academic integrity policies are strictly enforced. All students at Utah State University agree to be bound by the following Honor Pledge “I pledge, on my honor, to conduct myself with the foremost level of academic integrity.” See the following for further information: <https://studentconduct.usu.edu/studentcode/article5>. Students found guilty of academic misconduct on any assignment will, **at minimum, be given a zero for the assignment and have the full value of that assignment deducted from their final course grade**. Actions up to and including a failing grade for the course are options available to the instructor.

Grading

The total score for each type of assignment represent totals after appropriate lowest scores have been dropped.

Getting Started Quiz	20	Percentage of Points Earned	Grade
Recitation Worksheets	50	88 – 100	A-, A
Chapter Homework Problems	110	77 – 87	B-, B, B+
Post-Week Quizzes	120	60 – 76	C-, C, C+
First Exam	100	50 – 59	D, D+
Second Exam	100	< 50	F
Third Exam	100		
Final Exam	200		
<hr/> Total points	800		

Final course scores will be rounded to the nearest whole number.

Course Assessment

Approximately halfway through the course, the instructor will solicit feedback through an anonymous survey on Canvas. The purpose of the survey will be to determine student opinions of the course up to that point and ask for suggestions on what could be done to improve the course for the rest of the semester and in subsequent semesters. The instructor will know who completed the survey, but will be unable to match survey responses to students. Each student who responds to the survey will be granted 4 extra credit points.

Fall 2016 Schedule

Please look carefully at the following schedule for the correct order of Lectures. Note that this schedule is approximate and may adjust slightly depending on course pace.

Red text denotes the days Exams will be proctored. **Blue text** denotes holidays where Lecture will not be held. Note that the first Post-Week Quiz (P-Quiz) will be due on Monday, September 5, which is a holiday.

Week	Day	Lecture	Topic	Chapter	Recitation	Assignments Due	
1	M	8/29	1	Course intro, Reaction rates	14	none	
	W	8/31	2	Concentration and rates	14		
	F	9/2	3	activation energy	14		
2	M	9/5	Labor Day			all	P-Quiz 1
	W	9/7	4	Reaction mechanism	14		
	F	9/9	5	Equilibrium	15		
3	M	9/12	6	Equilibrium constants	15	all	HW 1/P-Quiz 2
	W	9/14	7	Le Chatelier's Principle	15		
	F	9/16	8	Water, Acid/Base	16		
4	M	9/19	9	pH, strong acids/bases	16	all	HW 2/P-Quiz 3
	W	9/21	10	Weak acids/bases, K_a , K_b	16		
	F	9/23	11	Buffers	16		
5	M	9/26	12	catch up, prepare for exam 1	16	none	HW 3/P-Quiz 4
	W	9/28	First Exam (Ch 14-16)				
	F	9/30	13	Common ions	17		
6	M	10/3	14	Buffers, acid-base	17	all	P-Quiz 5
	W	10/5	15	Titrations	17		
	F	10/7	16	Solubility	17		
7	M	10/10	17	Solubility (cont)	17	all	HW 4/P-Quiz 6
	W	10/12	18	Spontaneous processes	19		
	F	10/14	19	Entropy and the second law	19		
8	M	10/17	20	Entropy in reactions	19	all	HW 5/P-Quiz 7
	W	10/19	21	Gibb's Free Energy	19		
	R	10/20	22	Gibb's Free Energy	19		
	F	10/21	Fall Break (Meet on Thurs., Ch 19)				
9	M	10/24	23	catch up, prepare for Exam 2		none	HW 6/P-Quiz 8
	W	10/26	Second Exam (Ch 17-19)				
	F	10/28	24	Redox reactions	20		
10	M	10/31	25	voltaic cells	20	all	P-Quiz 9
	W	11/2	26	EMF	20		
	F	11/4	27	Batteries	20		
11	M	11/7	28	Electrolysis	21	all	HW 7/P-Quiz 10
	W	11/9	29	Radioactivity, nuclear decay	21		
	F	11/11	30	Energy considerations	21		
12	M	11/14	31	periodic concepts	22	all	HW 8/P-Quiz 11
	W	11/16	32	noble gases/halogens/oxygen	22		
	F	11/18	33	catch up, prepare for Exam 3			P-Quiz 12
13	M	11/21	Third Exam (Ch 20-22)			none	
	W	11/23	Thanksgiving Break				
	F	11/25					
14	M	11/28	34	metals, coordination complexes	23(23,24)	all	HW 9
	W	11/30	35	isomers, colors and magnets	23(23,24)		
	F	12/2	36	organics-functional groups	24(25)		
15	M	12/5	37	organics	24(25)	all	HW 10/P-Quiz 13
	W	12/7	38	peptides/sugars/nucleic acids	24(25)		
	F	12/9	39	catch up, Prepare for final exam			P-Quiz 14
16	M	12/12	Final Exam 1:30 – 3:20 PM, Widtsoe 007				HW 11

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

Chapter Learning Objectives

Chapt 14: 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

Chapt 15: 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

Chapt 16: 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

Chapt 17: 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

Chapt 19: 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

Chapt 20: 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

Describe the chemical reactions of corrosion

Chapt 21: 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

Chapt 22: Describe the fundamental aspects of the reactivity of non-metal elements, including hydrogen, the Noble gases, the halogens

Chapt 23: 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

Chapt 24: Identify and draw the structure of hydrocarbon alkanes, alkenes, alkynes, and aromatics

Identify and draw the functional groups ethers, aldehydes, ketones, acids, esters, and amides

Identify the chemical structure of amino acids and polypeptides

Identify the chemical structure of carbohydrates sugars and fats

Identify the chemical structure of nucleic acids and DNA, RNA