



Winter 2020

Chem 1020

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 @heydebigale

Lectures: T/R, noon-1:50 PM BAUD 101

Office Hours (in Science and Engineering Center): TBA, see portfolio.du.edu/SEC

COURSE OBJECTIVES

After general chemistry II you should be able to do the following:

1.) Describe & apply essential concepts in the following areas:

- a.) Thermodynamics: Describe & apply the 1st, 2nd, and 3rd laws of thermodynamics. Students will be able to calculate enthalpy/entropy/Gibb's free energy and relate these calculations to laboratory predictions and measurements
- b.) Equilibria & Thermodynamics: Relate Gibb's free energy to the spontaneity of a reaction and calculating the equilibrium constant. Equilibria will be applied to Solubility problems.
- c.) Acid & Base Equilibria: Predict the extent of a reaction applied to acids & bases. Students will be able to predict the pH of a solution with strong, weak, and polyprotic acids & bases.
- d.) Buffer Solutions: Demonstrate foundational knowledge of buffers both in our world, especially in a biological context. Students will be able to derive and apply the Henderson-Hasselbach equation to make predictions about buffer solutions, and to design buffers. Determine principle species at a specific pH.
- e.) Titrations. Demonstrate foundational knowledge of the uses of titrations as an analytical tool to gain information about an unknown solution. Students will be able to apply their knowledge of acid/base chemistry & buffer solutions to predict/calculate pH at any point along the titration curve.
- f.) Kinetics: Describe the factors that affect the speed of a chemical reaction. Demonstrate understanding of the connection and also differences between thermodynamics and kinetics of a chemical reaction. Determine the order of a chemical reaction through experimental methods as well as theoretical mechanisms.

2.) Develop a growth mindset: Demonstrates significant effort. Acknowledge personal growth in various contexts and applications in chemistry

REQUIRED COURSE ITEMS

Text: Connect Chemistry with LearnSmart and eBook - *Chemistry: The Molecular Nature of Matter and Change, 8th Edition, Silberberg, McGraw-Hill Publishers* ****I recommend you purchase directly from McGraw-Hill.**

No paper text is required but you can buy a used copy of the 5th or 6th editions of the Silberberg text if you wish (The Connect Plus account is still required).

Calculator: An inexpensive calculator is required. It should have the capabilities for square roots, logarithms, and exponential (scientific) notation operations. The calculator will be used for homework, quizzes, and exams. **Bring your calculator to class each day to work problems.** You are responsible for understanding how to use your calculator. If you need a calculator, please come and talk to me!

Canvas: canvas.du.edu will be the website that you can find all of the online aspects of this course. Please look at the weekly checklist to keep track of tasks.

Kahoot: We will use Kahoot (kahoot.com) as a polling software. Kahoot is a FREE app that you can download to your phone or you can use from a laptop. There will also be opportunities for in-class participation points such as quizzes. 10% of your participation points will be dropped, so as long as you attend 90% of class, you will get 100% of your participation credit. University excused absences or health issues will also be honored.

Lectures (Online and In-Class): A lecture schedule is below. For this course we will be watching an online lecture prior to our scheduled class meetings. It is your responsibility to watch this lecture before class. You will also be required to take notes while watching online lectures & reading text to help absorb the material (see Summary Notes below). You will also be required to complete a semi-weekly reading/video reflection. Our scheduled class time will be dedicated time to go through problems associated with material in online lecture.

While in class we will work problem sets that I create and we may also allocate some time working through Connect problems. So, please bring your laptop!

Readings & Reading Reflection: Assigned reading should be completed prior to lecture. Scheduled reading is listed in the schedule below. As mentioned above, you will be asked to reflect on your reading through a 2x/week reading reflection. This reflection will be graded based on effort, not on accuracy.

Homework: Each week you will be assigned a homework set through McGraw-Hill Connect. You are given 7 attempts on each problem, but unlimited attempts if you want to re-do the assignment. These homework assignments are due every Saturday at 11:59 PM.

Summary Notes: You will be turning in summary notes for each week covering the reading/online lectures that you are watching on your own time (individual space). For each week, you will be starting your notes by summarizing your prior knowledge on a particular topic. Some weeks you will be given a “prior knowledge sketch” prompt to start out your summary notes. Key Terms will be given that must be highlighted in your summary notes. For certain weeks, I may ask for diagrams and drawings. You will turn in these notes on Canvas. You will also be required to complete reflections each week (due Wednesday night) where I will ask what you are struggling with the most to help guide Thursday’s class.

Buffer Points: In this course you will have the opportunity to earn Buffer Points by participating in class, winning Kahoot quizzes, posting notes online, attending office hours, etc. Buffer Points are NOT extra credit points. Buffer points may help you at the end of the quarter if you have a final grade that is near a division (89% when a 90% is required for an A–). If you have collected substantial buffer points, AND have a final grade near a division, you will be bumped up to the next highest grade.

Exams:

- a) There will be two one-hour midterm exams and a two-hour final exam.
- b) If anyone for any reason had to take the exam outside of the scheduled time, arrangements need to be made with the instructor at least one week in advance. Instructor approval of the situation is necessary for any adjustment in exam schedule to occur.

- c) If any student is a member of the DSP or LEP programs and feels they need special accommodations for exams, please contact the instructor.
- d) **All exams will be comprehensive encompassing lecture materials, assignments, and in-class assignments. The exams are designed to test your ability to apply the concepts covered in the lecture.**
- e) **If your grade on your final exam is higher than one of your midterm exams, your final exam will be counted twice to replace your lowest midterm grade.**

GRADING

The breakdown of the course grades is as follows:

Homework	200 points	
Participation	100 points	(90% participation will get full credit in this category)
Read. Ref. & Quizzes	100 points	
Exam 1	200 points	
Exam 2	200 points	
Final Exam	200 points	
TOTAL	1000 points	

Grades will be based on the following approximate grade scale:

94%	A	74%	C
90%	A-	70%	C-
87%	B+	67%	D+
84%	B	64%	D
80%	B-	60%	D-
77%	C+	<60%	F

Students who earn at least 94% of the possible points are guaranteed an A in this class; however, it may not be necessary to earn 94% to receive an A since this scale may be modified downward at the discretion of the instructor. Scores will be recorded on Canvas as they are graded. Each student should check Canvas frequently to make sure scores are recorded correctly. Corrections on grading or recording errors should be made within two weeks of each exam.

Help

Students who need help in this class have several options:

- (1) The Science and Engineering Learning Center, located on the first floor of the library, is a great resource! TAs are available throughout the week to answer questions on both lecture and lab material. A schedule is available on canvas.
- (2) The instructor has office hours for consultation. If you cannot make the set office hours, you can schedule an appointment.
- (3) Peers (Study Groups): Take opportunities to help those around you and to ask for help. You can learn a lot you're your fellow classmates. If you come to the Science and Engineering Learning Center, perhaps you will find a group of classmates to study with!

TAs and the instructor are willing to help anyone in need. There is no excuse for not getting help. Your best help may come from your fellow students. Meeting regularly with a study group, for discussing ideas and working together on homework will be one of the best helps in learning and understanding the material. Even if you don't think you need the help from others, you will often find that teachers learn more than the students.

Science and Engineering Center: Need extra help? The Science and Engineering Learning Center is a collaborative space staffed by undergraduate and graduate learning assistants (LAs) trained to assist students with some first and second year biology, chemistry, physics, computer science and engineering courses. We offer support for both lecture and laboratory courses for chemistry, physics, and engineering courses and lecture only for computer science and biology. Our goal is to help students grow as problem solvers by assisting with homework sets, lab reports, and

preparing for exams. The Science and Engineering Learning Center is **not** a one-on-one tutoring center, but is rather a support system where students can get guidance from LAs as well as their peers. This center is open to all DU students. All services are free. Located in the north-west corner of the first floor of the Anderson Academic Commons (west of the writing center). See <http://portfolio.du.edu/sec> for a complete schedule. Please also follow on Twitter for the most up-to-date announcements:  @SELCatDU

Academic Honesty in General Chemistry:

- 1.) You are encouraged to study with other students in preparing for exams and discussing assigned problems to be submitted as homework.
- 2.) However, each student is required to provide their own work on homework and exams. Copying an exam or homework is a violation that will not be tolerated in this class, and a zero will be given for the assignment or exam. Repeated offences will result in failure of the course.

Tenative LECTURE SCHEDULE

DATE	TOPIC	READING	PROBLEM SETS
WEEK 1 – REVIEW & INTRO TO SPONTANEOUS CHANGE			
Jan 7	Course Introduction, Enthalpy	Review Ch. 6	
9	Spontaneous Change/Entropy	20.1–20.2	Problem Set 1
WEEK 2 – ENTROPY & GIBB’S FREE ENERGY			
14	Entropy & Free Energy	20.2–20.3	
16	Free Energy & Equilibria Intro	20.4 & 17.1	Problem Set 2
WEEK 3 – INTRO TO EQUILIBRIA			
21	Equilibrium Constants/Rxn Quotient	17.2-17.4	
23	ICE tables & Le’Chatlier’s Principle	17.5-17.6	Problem Set 3
WEEK 4 – ACID-BASE EQUILIBRIA			
28	Acid-Base Equilibria, Intro to Ka	18.1	
30	HOUR EXAM 1 (Covers Chapters 6, 17, 18.1, & 20) Problem set 4 (due Wed)		
WEEK 5 – ACID-BASE EQUILIBRIA CONTINUED			
Feb 4	Weak Acid Equilibria	18.2-18.4	
6	Weak Base Equilibria, properties of A&B 1	8.5-18.8	Problem Set 5
WEEK 6 – BUFFERS AND TITRATION CURVES			
11	Buffer Solutions, HH Equation	19.1	
13	Titrations, continued	19.2	Problem Set 6
WEEK 7 – SOLUBILITY & pH			
18	Solubility Equilibria, Ksp	19.3	
20	Complex Ion Equilibria, Kf	19.4	Problem Set 7
WEEK 8 – KINETICS			
25	HOUR EXAM 2 (Covers Chapters 6, 17, 18, 19 & 20)		
27	Intro to Kinetics & Reaction Rates	16.1–16.2	Problem Set 8
WEEK 9 – KINETICS			
April 3	Rate Laws	16.3–16.4	
5	Theories of Chemical Kinetics	16.5	Problem Set 9
WEEK 10 – KINETICS			
10	Reaction Mechanisms	16.6	
12	Catalysis & Final Review	16.7	Problem Set 10
March 17 (Tuesday) FINAL EXAM: noon-2PM (Cumulative)			