


General Chemistry II
CHEM 1020-3 (CRN 2737)
Winter Quarter, 2020

Instructor: Dr. J. Alex Huffman
Office: SGM 180
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Class Time: MWF, 9:00 – 9:50 AM – Sturm Hall, Room 453
Recitation: Th, 9:00 – 9:50 AM – Sturm Hall, Room 453
Office Hours: To be determined (via survey) and announced during first week
Help Room: Staffed by learning assistants (LAs) throughout the week in Anderson Academic Commons.
See here for more information and schedules: <http://portfolio.du.edu/sec>  @SELCatDU

REQUIRED COURSE ITEMS

Textbook: *Chemistry: The Molecular Nature of Matter and Change, 8th Edition, Silberberg & Amateis, McGraw-Hill Publishers*
McGraw-Hill Connect Chemistry with LearnSmart (comes with eBook)

Calculator: You will need an inexpensive calculator that has the capability for square roots, logarithms, and exponents. You are responsible for understanding how to perform these operations on your calculator. **Please bring your calculator with you to every class.** Electronics with WiFi (laptops, cell phones, etc.) will NOT be allowed during exams or quizzes.

COURSE DESCRIPTION

Chemistry 1020 is the second quarter in the General Chemistry series. With CHEM 1010, this course will provide a broad basis for the fundamental knowledge needed to succeed in higher-level chemistry courses (organic chemistry, analytical chemistry, environmental chemistry, and physical chemistry) as well as a solid foundation for many other disciplines. CHEM 1010 is a pre-requisite for this course, and it is assumed that you have taken this course (or equivalent) prior to taking CHEM 1020. If your situation is slightly different, you may have to put in a little more work at the beginning of the course until you have the necessary background.

The lectures will be somewhat general and it will be up to YOU to fill in the gaps to truly understand the details. **BOTTOM LINE:** Pace yourself and continuously work from beginning to end. Even if you think a topic is easy, I recommend that you put in extra time to make sure you understand the details that may not be presented in lecture. Students who have learned to work at a steady pace have been shown to perform better (and not be as stressed at the end!). Generally speaking, students are expected to put in 2-3 hrs outside of class per credit (this is why 12 hrs is considered a “full load”). CHEM 1020 is a 3-hr course, so the class is designed such that ~ 6-9 hrs of your time outside of class is devoted to this course!

COURSE OBJECTIVES & KEY SKILLS

- 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
- 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.
- 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.
- 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.
- 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.
- 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.
- Practice systematic logic and problem-solving


LECTURE

The format of the class meetings will follow traditional lecture format on MWF. I will summarize new material and present illustrations and examples. You will be encouraged to practice problems during and after lectures. I will NOT be able to identify and describe every detail you read in the text and any supplemental materials. You will be expected to finish and understand assigned readings even if I have not gone over that material in great detail. However, I will emphasize important topics covered in the reading as well as problem solving strategies when appropriate. Please stop me at any time if you have questions.

The Thursday (Th) recitation meeting will be devoted to review, problem solving, group activities, in-class assignments and quizzes. No new lecture material will be covered on these days. However, material from the lecture will be explored in greater detail. *Assignments for credit may be given and worked during recitation.*

OFFICE HOURS & HELP CENTER

I will post hours when I will be available in my office for questions or issues related, or unrelated, to the course. These hours may be changed, if necessary, during the quarter, but this will be announced.

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. They offer support for both lecture and laboratory courses for certain courses, CHEM 1020 included. Their 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 them Twitter for the most up-to-date announcements:  @SELCatDUREADING

You are encouraged to compete the assigned reading prior to the class lecture and often again after the lecture. In addition, you are also encouraged to attempt the example exercises throughout the text while completing the assigned reading. I recommend that you understand the material and how to solve the sample problems before proceeding to the next section. At the end of each chapter, a summary of important equations and terms is provided that should prove helpful in preparation for quizzes and exams.

HOMework ASSIGNMENTS

Homework (HW) problems will be assigned to be worked and turned in weekly. The tentative due dates are listed in the syllabus schedule. Unless otherwise discussed, homework will always be due by 6 AM on the assigned day. Homework will generally be due Monday morning unless otherwise stated. Homework will generally be assigned via the McGraw-Hill *Connect* online platform that comes as a part of the physical or e-book options of the text. These HW assignments will each be worth 20 points, for a total of 200 points or 20% of the course grade. It is likely that not all questions in a given assignment will be graded.

The homework assignments are a critical piece of the course. If you diligently work on these assignments and understand them thoroughly, you are likely to do well in the course.

OTHER GRADED ASSIGNMENTS

Supplementary assignments will periodically be assigned. These will total 10% of the overall course grade and will focus on work done during recitation and/or LearnSmart assignments accessible through the McGraw-Hill *Connect* platform. The total points for the additional assignments will be 100 points, or 10% of the total course grade.

EXAMS

Four (4) exams will be given during the quarter: three hour exams and a final. Exam problems will be similar to those given in the weekly homework and to those found on optional, supplemental problem sets. The lowest score from the three hour-exams will be automatically dropped, and only the top two (2) hour-exam scores will be counted towards the final course grade. **Under NO circumstances may the final be dropped or taken early.**

If you will be out of town for a University sanctioned function (e.g. athletic team or music group), you are responsible for making arrangements with Dr. Huffman at least one week in advance to take an hour exam early. **Only in extremely extenuating circumstances, and with required documentation (e.g., letter from Student Health), will a make-up hour exam be given.**

GRADES

At the end of the quarter, you will be graded according to your performance on assignments and examinations. Cooperative learning is encouraged. Your final grade will be determined by the percentage with the following components and scale. I will not grade on a curve, but grades in other course sections will be monitored and grades may be slightly increased if necessary in some cases.

Component	Approx. Points (Each)	Approx. Points (Total)	Approx. Percentage (Total)
Weekly homework (Connect)	20	200	20%
LearnSmart + Misc. Assignments		100	10%
Hour Exams (top 2 of 3 scores at 20% each)	200	400	40%
Final Exam	300	300	30%
<i>Total</i>	-	<i>1000</i>	<i>100%</i>

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

IMPORTANT DATES

January 6: Classes begin, Winter Quarter

January 12: Last day to drop classes for full refund or without W

January 20: Martin Luther King Jr. Holiday (no class)

* **March 2: Last day to drop** (for "W"), requires approval (8th week)

March 16: Last day of classes

March 17 (TUESDAY): Final Exam, 8:00 – 9:50 AM

DU Academic Calendar: <http://www.du.edu/registrar/calendar/index.html>

CELLULAR PHONE AND MOBILE DEVICE POLICY

I respect the need for each individual to stay in contact with family and friends. The use of mobile devices, however, is disruptive to the learning environment. Thus, I request that the ringers of all cellular phones and other mobile devices be muted during class. If an emergency arises, and you need to make a call on your phone, I request that you quietly leave the room and conduct your conversation out in the hallway.

LECTURE AND TESTING ACCOMODATIONS

I will make every effort to accommodate students diagnosed with a learning disability. I will do this in complete confidence. I request that any student requiring these accommodations inform me the first week of class. For further information, please see the University Disability Services' website:

<http://www.du.edu/disability/dsp/index.html>.

RELIGIOUS ACCOMODATION

University policy grants students excused absences from class or other organized activities or observance of religious holy days, unless the accommodation would create an undue hardship. Faculty are asked to be responsive to requests when students contact them *in advance* to request such an excused absence. Students are responsible for completing assignments given during their absence, but should be given an opportunity to make up work missed because of religious observance.

Once a student has registered for a class, the student is expected to examine the course syllabus for potential conflicts with holy days and to notify the instructor by the end of the first week of classes of any conflicts that may require an absence (including any required additional preparation/travel time). The student is also expected to remind the faculty member in advance of the missed class, and to make arrangements in advance (with the faculty member) to make up any missed work or in-class material within a reasonable amount of time.

See: http://www.du.edu/studentlife/religiouslife/DU_religious_accommodations_policy.html

ACADEMIC DISHONESTY & STUDENT SUPPORT

While I advocate collaborative learning and teamwork, I also firmly believe that each individual should maintain the highest ethical standards in all of life's endeavors. As such, I support and will strictly enforce the Honor Code of the University of Denver. See links for specific links below:

Pioneer Pledge: <http://www.du.edu/studentlife/ccs/pledge.html>

Honor Code Statement: http://www.du.edu/studentlife/ccs/honor_code_2011-2012.pdf

I also understand that every student has unique personal and educational needs. I will do my best to help you learn or appropriately facilitate your ability to work through personal issues. Please see the Office of Student Life (<http://www.du.edu/studentlife/ccs/index.html>), including the Pioneer Care program (<http://www.du.edu/studentlife/care/>), for more detailed resources.

TENTATIVE SCHEDULE

	Week #	Lecture #	Date	Week-day	Topic	Reading Section (9th Edition)	HW Due Date (Mon 7 am)
Exam #1 Material	1	1	Jan 6	M	Course Intro; Review enthalpy, ΔH	6.4, 6.6	
		2	Jan 8	W	Entropy, ΔS , and 2nd Law (Intro)	20.1 - 20.2	
		R1	Jan 9	Th	Recitation	-	
		3	Jan 10	F	ΔS and the 2nd Law (Math)	20.2 - 20.3	
	2	4	Jan 13	M	2nd Law and Gibbs' Free Energy, ΔG	20.3	HW 1
		5	Jan 15	W	Intro to equilibrium; K and manipulations	17.1 - 17.2	
		R2	Jan 16	Th	Recitation	-	
		6	Jan 17	F	Reaction quotient, Q; Kc and Kp	17.3 - 17.4	
	3	-	Jan 20	M	Martin Luther King Jr. Holiday (No Class)	-	HW 2
		7	Jan 22	W	Equilibrium and Free Energy	20.4	
		R3	Jan 23	Th	Recitation	-	
		8	Jan 24	F	Equilibrium - K, Q, and ΔG	20.4	
Exam #2 Material	4	9	Jan 27	M	Disturbing equilibrium (Le Chat)	17.6	HW 3
		E	Jan 29	W	Exam #1 (Lectures 1-8; HW1-3)	-	
		R4	Jan 30	Th	Recitation	-	
		10	Jan 31	F	Equilibrium - Solving equilibrium problems, ICE tables	17.5	
	5	11	Feb 3	M	Equilibrium - Solving equilibrium problems, ICE tables	17.5	HW 4
		12	Feb 5	W	Acid-base, pH definition; Water autoprotolysis	18.1 - 18.2	
		R5	Feb 6	Th	Recitation	-	
		13	Feb 7	F	Acid-base - Ka, Kb, Bronsted acids, Conjugate acids/bases	18.3	
	6	14	Feb 10	M	Acid-base - Quantitative problems	18.4	HW 5
		15	Feb 12	W	Weak base equilibria and acid/base properties	18.5 - 18.8	
		R6	Feb 13	Th	Recitation	-	
		16	Feb 14	F	Buffers I	19.1	
Exam #3 Material	7	E	Feb 17	M	Exam #2 (Lectures 9-15; HW4-6)	-	HW 6
		17	Feb 19	W	Buffers II	19.1	
		R7	Feb 20	Th	Recitation	-	
		18	Feb 21	F	Titrations I	19.2	
	8	19	Feb 24	M	Titrations II	19.2	HW 7
		20	Feb 26	W	Equilibria of sparingly soluble salts (Ksp)	19.3	
		R8	Feb 27	Th	Recitation	-	
		21	Feb 28	F	Equilibria of complexions (Kf)	19.4	
Extra Material for Final	9	E	Mar 2	M	Exam #3 (Lectures 16-21; HW7-8)		HW 8
		22	Mar 4	W	Kinetics - Intro, reaction rate	16.1 - 16.2	
		R9	Mar 5	Th	Recitation	-	
		23	Mar 6	F	Kinetics - Rate law	16.3	
	10	24	Mar 9	M	Kinetics - Integrated rate law	16.4	HW 9
		25	Mar 11	W	Kinetics - Activation energy / temperature / Arrhenius	16.5	
		R10	Mar 12	Th	Recitation	-	
		26	Mar 13	F	Kinetics - Mechanisms	16.6 - 16.7	
	11	27	Mar 16	M	Kinetics - Catalysis + Course review	-	HW 10
		E	Mar 17	Tu	FINAL EXAM (Kinetics + Cumulative), 8:00 - 9:50 AM		

Important Notes:

- Schedule is approximate. Dates of hour exams may be changed, but with appropriate notice.