



Autumn 2021

Chem 1010-03

**Professor- Dr. Debbie Gale Mitchell (please call me “Dr. Mitchell”)**

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**Official Lecture Time: T/R 10AM-10:50**

**Office Hours (through Science and Engineering Center): TBA!**

## **COURSE OBJECTIVES**

After General Chemistry, you should be able to do the following:

- 1.) Describe and apply essential concepts in the following areas including:
  - a. Atomic/Electronic Structure: Demonstrate foundational knowledge of the quantum nature of electrons and light. Relate atomic spectra to electronic transitions.
  - b. Periodic Table: identify the connection between the quantum model and the structure of the periodic table. Recognize and predict periodic trends.
  - c. Bonding Theories: Including Lewis, VSEPR, VBT, and MO theory. Identify when a bonding theory is most appropriate for a situation. Predict molecular shapes and polarity by applying VSEPR and electronegativity. Recognize different types of intermolecular interactions
  - d. Stoichiometry: Identify and Balance different types of complex chemical reactions. Use stoichiometry to be able to predict amounts of products or reactants necessary for a reaction. Be able to design how to make and dilute solutions with a specific concentration.
  - e. Heat & Thermodynamics: Describe and apply the first law of thermodynamics.  
Calculate heats of reactions from both a theoretical standpoint and using calorimetry.
- 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, 9<sup>th</sup> 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 5<sup>th</sup> or 6<sup>th</sup> editions of the Silberberg text if you wish (The Connect Plus account is still required). Used copies cost about \$15 – 50 on Amazon.

**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 final.

## COURSE COMPONENTS:

**Lectures (Online & in-person):** A lecture schedule is below. For this course we will often be watching online lectures prior to our scheduled class meetings. It is your responsibility to watch the lectures before class. You will also be taking notes while watching the online lectures to help absorb the material (see Summary Notes below). You will also be required to submit a weekly reflection along with the notetaking assignment. Our scheduled class time will be dedicated time to discussion & going through problems associated with material in online lecture.

**Readings:** 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 weekly journal assignment.

**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. For each week, you will be starting your notes by summarizing your prior knowledge on a particular topic. 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.

**Small Group Sessions/Group work:** This quarter, you will have the opportunity to meet with me each week in a small group. I will be splitting your class into 12 groups with 5-6 students in each group. You can sign up for your group in canvas.

**Group Project:** This quarter we are studying many of the different models or theories in chemistry. In this group project you will have the opportunity to deeply examine one model with your group. The details of this assignment are posted on canvas.

**Weekly Reflections:** Each week you will complete a weekly reflection after turning in your Summary Notes. The weekly reflection is to help me keep track of what all of you are having questions on. What are you not understanding, etc.

**Kahoot/In-class Participation:** This quarter we will be using 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.

**Buffer Points:** You will have the opportunity to collect Buffer points this quarter by sharing summary notes, sharing class notes, or participating in class & small group sessions. Buffer points will be used if you are borderline (or “on the bubble”) between two grades (A-/B+) to help bump you up to that higher grade. These points are NOT extra credit.

### Quizzes & Final:

- a) There will be 5 (bi-weekly) quizzes worth 50 points each administered through Canvas.
- b) There will be one optional cumulative final at the end of week 10. The cumulative final will be worth 100 points. The cumulative final quiz will be optional. You may decide to take the final if you would like to boost your grade. I will assign you the highest grade (I will only use the final grade if it improves your grade).
- d) **All quizzes 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.**

## Grade Breakdown:

Homework	150 points	
Notes/Reflection	100 points	(90% participation will get full credit in this category)
Weekly Group Work	100 points	
Group Project	100 points	
Quizzes	250 points	
Final Exam*	100 points	*Optional
<b>TOTAL</b>	<b>800 points</b>	<b>(700 points if you decide to not take the final)</b>

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.

## RESOURCES/ADVICE

It is important to acknowledge the difficult challenge that you are currently facing in the 2020/2021 academic year. Learning during a pandemic is incredibly challenging and I want to honor and acknowledge that. Because of the challenges we are currently facing, all the deadlines in this class will be soft. Please try and follow the deadlines, but there will be no penalty if you need to turn work in late. If you need any additional support, please do not hesitate to contact me: [debbie.mitchell@du.edu](mailto:debbie.mitchell@du.edu). I will do my best to work with each of you.

## Help

Students who need help in this class have several options:

- (1) The Science and Engineering Learning Center, typically located on the first floor of the library, but currently located on Zoom, is a great resource! TAs are available throughout the week to answer questions on both lecture and lab material.
- (2) Take advantage of office hours! If you cannot make office hours, please email me to set up 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.

**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. This center is open to all DU students. All services are free. Typically, the SEC is 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.

### Academic Honesty in General Chemistry:

- 1.) To protect privacy and intellectual property rights, course videos, student discussions, and other course materials may be used solely for the purposes of individual or group study with other students enrolled in the class in that quarter. They may not be reproduced or shared in any way (including electronically or posting in any web environment) with those not in the class in that quarter, except with explicit permission. Students who violate this policy will be reported to The Office of Student Rights & Responsibilities and may be subject to both legal sanctions for violations of copyright law and disciplinary action under Student Rights & Responsibilities Policies.
- 2.) Can I work with someone on that assignment? Please use the following table to help you know which assignments you can collaborate, and which assignments you should be doing independently:

Activity	% of final grade	Is collaboration appropriate?
Homework	18.75%	Yes! You are encouraged to discuss the homework with others in your class. However, the homework you submit should represent your own work.
Notes/Reflection	12.5%	Yes! You are encouraged to discuss the content & notes with other students. However, the notes/reflections you submit should represent your own work.
Weekly Group Work	12.5%	Yes! You will be working on these activities collaboratively & will have just one submission from the entire group for each activity/assignment.
Group Project (x1)	12.5%	Yes! You will be working on this project collaboratively & will submit one assignment from the whole group.
Quizzes (x5)	31.25%	No, these quizzes should be entirely your own work. It is not appropriate to discuss the questions with ANYONE inside or outside the class. Students who post to any web environment (such as Chegg/Course Hero) will be reported to The Office of Students Rights & Responsibilities. You will also receive an automatic zero on the assignment.
Final Exam (x1)	12.5%	The final exam should be entirely your own work. It is not appropriate to discuss the questions with ANYONE inside or outside the class. Students who post to any web environment (such as Chegg/Course Hero) will be reported to The Office of Students Rights & Responsibilities. You will also receive an automatic zero on the assignment.

<b>DATE</b>	<b>TOPIC</b>	<b>READING</b>	<b>PROBLEM SETS</b>
<b>WEEK 1 – DIMENSIONAL ANALYSIS &amp; INTRO TO MODELS</b>			
Sep 14	Introduction to Models in Chemistry	1.1–1.2 & 2.3–2.5	
16	Dimensional Analysis	1.3–1.4 & 3.1	Problem Set 1
<b>WEEK 2 – QUANTUM MECHANICS &amp; ATOMIC STRUCTURE</b>			
21	Dual Nature of Light & Matter	7.1–7.3	
23	Schrodinger Model, Quantum Numbers	7.4, 8.1	Problem Set 2
<b>WEEK 3 – ELECTRON CONFIGURATION &amp; PERIODIC TABLE</b>			
28	Electron Configuration & Periodicity	8.2–8.4	
30	Intro to Bonding	2.7 & 9.1–9.3	Problem Set 3
<b>WEEK 4 – BONDING MODELS</b>			
Oct 5	Bond Energy & Electronegativity	9.4–9.5	
7	Lewis Dot Structures	10.1	
<b>WEEK 5 – BONDING MODELS, continued</b>			
12	Shape of Molecules (VSEPR) & Polarity	10.2–10.3	
14	Valence Bond Theory & MO Theory	11.1–11.3	Problem Set 5
<b>WEEK 6 – FINISH BONDING MODELS &amp; INTRO TO CHEMICAL RXNS</b>			
19	MO Theory	11.3	
21	Stoichiometry & the Mole	3.1	Problem Set 6
<b>WEEK 7 – STOICHIOMETRY &amp; CHEMICAL RXNS</b>			
26	Stoichiometry, continued	3.2–3.4	
28	Water as a Solvent & precipitation rxns	4.1–4.2	Problem Set 7
<b>WEEK 8 – CHEM RXNS &amp; INTRO TO GASES</b>			
Nov 2	Acid Base Rxns & Redox Rxns	4.3–4.4	
4	Pressure & Intro to Gas Laws	5.1–5.3	Problem Set 8
<b>WEEK 9 – KINETICS</b>			
9	Ideal Gas Law & Kinetic Molecular Theory	5.4–5.6	
11	Thermochemistry & Enthalpy	6.1–6.3	Problem Set 9
<b>WEEK 10 – KINETICS</b>			
16	State Functions & Hess's Law	6.4–6.6	
18	Final Review	———	Problem Set 10