

Autumn 2017

Chem 1010

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

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Office: BW 213/ AAC 350/Science and Engineering Center

 **@heydebigale** (I tweet about chemistry, come follow along!)

Lectures: M, W, R, F 9:00-9:50 AM Olin 105

Office Hours (in Science and Engineering Center): TBA!

Required Course Items:

Text: Connect Chemistry with LearnSmart and eBook - *Chemistry: The Molecular Nature of Matter and Change, 7th Edition, Silberberg, McGraw-Hill Publishers* - \$95 (6 Months) or \$130 (2 Years) (ISBN-13 9781259224706 or 9780073545707).

****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). 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 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!

Course Objectives:

- Relate atomic spectra to electron transitions
- Predict trends in atomic properties
- Predict molecular shapes and polarity
- Apply molecular bonding theories
- Complete stoichiometry calculations
- Balance complex equations
- Relate pH to molar concentrations of acids and bases
- Calculate heats of reaction of chemical reactions


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.

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 each day. I recommend taking notes while watching the online lectures to help absorb the material. There will be a quiz associated with each online lecture posted in canvas to gauge comprehension. You will also be required to complete a weekly journal assignment. 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 Sapling problems. So, please bring your laptop!

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.

Chemistry Art: You have the opportunity to earn up to 5 extra credit **exam**(!!!) points by submitting a piece of art that explains or is inspired by a topic in this course. Any medium of art is welcome: drawing, poetry, music, knit items, sculpture, origami, etc. The key elements of this assignment is that you create an ORIGINAL piece of work (no stealing please!) and that you can explain the connection between your art and a concept in this general chemistry course. We will be sharing your creations internally (through canvas). See canvas for more details on this assignment.

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](https://twitter.com/SELCatDU) 

Exams:

- a) There will be three 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
Quizzes	100 points (Both online and in-class)
Exam 1	100 points
Exam 2	100 points
Exam 3	100 points
Final Exam	100 points
TOTAL	800 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. Complaints 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 from 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.

Formula for Success (a partial list):

- 1.) Study topics in textbook before class
- 2.) Attend class regularly and participate!!
- 3.) Be ready to ask questions... and ask them!
- 4.) Take notes on content learned in lecture
- 5.) Follow to-do list on Canvas.
- 6.) Study with other students in the class
- 7.) Get help from course instructor
- 8.) Don't get behind

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.

LECTURE SCHEDULE (CONNECT problem set due dates in red, recitation dates in blue)

DATE	TOPIC	READING	PROBLEM SETS
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WEEK 1 – MATTER AND ATOMIC STRUCTURE

Sep 11	Course Introduction	1.2 – 1.5**	Access Connect
13	Historical Perspective of Matter	2.1 – 2.6	
14	Recitation/Quiz		
15	Nature of Light and Atomic Spectra	7.1 – 7.2	
16			Problem Set 1

WEEK 2 - QUANTUM-MECHANICAL MODEL OF THE ATOM

18	Nature of Light and Atomic Spectra	7.1 – 7.2	
20	Quantum-Mechanical Model	7.3	
21	Recitation/Quiz		
22	Quantum Numbers	7.4, 8.1	
23			Problem Set 2

WEEK 3 – PERIODICITY OF THE ELEMENTS

25	Periodic Trends	8.2 – 8.3	
27	Chemical Reactivity	8.4	
28*	Exam 1 Review		Problem Set 3
29	HOUR EXAM I (Covers Sep. 12 - 28)		

WEEK 4 – CHEMICAL BONDING AND ELECTRONEGATIVITY

Oct 2	Lewis Symbols and Ionic Bonding	9.1 - 9.2, 2.8	
4	Covalent Bonding and Nomenclature	9.3, 2.8	
5	Recitation/Quiz		
6	Bond Polarity and Lewis Structures	9.5, 10.1	
7			Problem Set 4

WEEK 5 - LEWIS STRUCTURES AND MOLECULAR SHAPE

9	VSEPR Theory	10.2	
11	Molecular Shape and Polarity	10.3, 12.3 [†]	

12 [Recitation/Quiz](#)

13 Valence Bond Theory and Hybrid Orbitals 11.1

14 Problem Set 5

WEEK 6 - COVALENT BONDING THEORIES

16 Orbital Overlap and MO Theory 11.2 – 11.3

18 Molecular Orbital Theory -continued-

19* [Exam II Review](#) Problem Set 6

20 **HOOR EXAM II** (Covers Oct 3 – Oct 19)

WEEK 7 – Introduction to Chemical Reactions, STOICHIOMETRY AND AQUEOUS CHEMISTRY

23 The Mole and Balancing Equations 3.1, 3.3**

25 Chemical Problem Solving and % Yields 3.4**

26 [Recitation/Quiz](#)

27 Properties of Water and Aqueous Solutions 12.5[†], 4.1

28 Problem Set 7

WEEK 8 – ACID-BASE AND OXIDATION-REDUCTION (REDOX) REACTIONS

30 Precipitation Reactions 4.2 – 4.3

Nov 1 Acid-Base Chemistry 4.4, 2.8

2 [Recitation/Quiz](#)

3 Redox Reactions 4.5 – 4.6

4 Problem Set 8

WEEK 9 – GASES

6 The Ideal Gas Law 5.1 – 5.3

8 Kinetic Theory of Gases 5.4 – 5.5

9* [Exam III Review](#) Problem Set 9

10 **HOOR EXAM III** (Covers Oct 27 - Nov 9)

WEEK 10 – THERMOCHEMISTRY

13 Enthalpy and Calorimetry 6.1 – 6.3

15 Hess's Law and Heats of Reaction 6.4 – 6.6

16 Final Exam Review

Problem Set 10

17 Final Review

Nov 18 (Saturday!) **FINAL EXAM: 8AM to 9:50AM** (Cumulative)

* Problem set due Thursdays of exam weeks.

** Review Material

‡ Chapter 12.3 and 12.5, only responsible for what is in lecture