A N alys I s of Equili Br ium Sys Te ms

7	14.01	53	126.9	35	79.90	52	127.6
Nitrogen		Iodine		Bromine		Tellurium	

Winter 2017   **Chem 2011**

Instructor- Dr. Debbie Gale Mitchell (please call me "Dr. Mitchell")
Email- debbie.mitchell@du.edu
Office: BW 213/ AAC 350/Science and Engineering Center
🐦 **@heydebigale**

Lectures: M, W, F 8:00-8:50 AM Olin 105, Tue BAUD 101
Office Hours (Science and Engineering Center): TBA. **If you need to meet with me privately regarding a grade (or for any other reason), please set up an appointment with me via email.****

Required Course Items:

Text: *Quantitative Chemical Analysis*, 9th Ed., by Daniel C. Harris (*QCA*). You are NOT required to have the 9th edition of the textbook. An older edition of this book will work just fine. However, the lecture schedule below corresponds to the 9th edition of the book.   You are responsible for this material.
An additional General Chemistry text is recommended.   We will have supplemental reading assignments out of OpenStax:
<u>Chemistry</u> OpenStax College, 1st Ed. OpenStax is a **creative commons** publisher. This means that you can access your text book for **FREE**! Textbook content produced by OpenStax College is licensed under a <u>Creative Commons Attribution License 4.0</u> license.
You can access the text for free here: https://openstaxcollege.org/textbooks/chemistry
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 own calculator.

Course Objectives:

- Understand the sources of error and uncertainty in chemical analysis
- Identify chemical species that exist in aqueous solutions based on equilibria principles
- Understand the significant role equilibria has on biological and environmental systems
- Understand principles and applications of zero- and first-order kinetics
- Understand quantitative relations in chemical reactions such as acid-base neutralization
- Understand relationship between equilibria and other chemical/physical properties.

Components of this Course:

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 mixing traditional lectures with online lectures to spend more time during class actively working through materials. Typically, we will have a more traditional lecture on Monday, and you will be required to watch an online lecture prior to Wednesday and Friday's lecture. I recommend taking hand-written notes while watching the online lectures to help absorb the material. You will be given journal questions to help gauge your comprehension   **IMPORTANT**- Even on the active classroom days, some new material will be introduced during class time. You will get the most out of this class by coming to class.
While in class we will work problem sets that I create and we will often use EXCEL. So, please bring your laptop!

Readings: Assigned reading should be completed prior to lecture. Scheduled reading is listed in the schedule below.

Weekly Assignments: Each week, problems related to the lecture material will be assigned. These assignments will be posted on Canvas. Assignments will be due every Friday at 6 PM. Late assignments will be accepted for 50% credit.

Chemistry Infographic/Information Literacy: This quarter we will be spending some time discussing information literacy. You will be asked to create an infographic similar to infographics found at www.compoundchem.com. For this infographic you will work in pairs. The details of this assignment can be found on canvas.

Math Review Quiz: This course requires a significant familiarity with algebra & trigonometry. The first day of class, each of you will take a Math test to gauge your ability before you move forward. If you do not get at least an 80% on the quiz, you will have to redo the quiz and explain in words each of your answers. The purpose of this math review quiz is not to be a barrier to any of you. Rather, this is just a way for me to understand how I can best help you as an instructor.

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

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	100 points
Infographic	100 points
Math Review	10 points
Quizzes/in-class work	90 points
Exam 1	100 points
Exam 2	100 points
Exam 3	100 points
Final Exam	100 points
TOTAL	**700 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 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 and on the Science and Engineering Center portfolio site: http://portfolio.du.edu/sec
(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 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
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

Other Policies

Students with Disability/Medical Accommodations

If you qualify for academic accommodations because of a disability or medical issue please submit a Faculty Letter to me from **Disability Services Program** (DSP) in a timely manner so that your needs may be addressed. DSP is located on the 4th floor of Ruffatto Hall; 1999 E. Evans Ave.303.871. / 2372 / 2278/ 7432. Information is also available on line at http://www.du.edu/disability/dsp; see the *Handbook for Students with Disabilities*.

Students with Caregiving Responsibilities

If you are a students who has caregiving responsibilities (caring for a child, parent, or other dependent) and need accommodations, please let me know.   I am happy to give accommodations to students who need them based on responsibilities outside of the classroom.

Title IX

Gender violence can happen to anyone regardless of race, class, age, appearance, gender identity, or sexual orientation. The University of Denver is committed to providing an environment free of discrimination on the basis of sex (gender), including sexual misconduct, sexual assault, relationship violence, and stalking. The Center for Advocacy, Prevention and Empowerment (CAPE) provides programs and resources to help promote healthy relationships, teach non-violence and equality, and foster a respectful and safe environment for all members of the University of Denver community. All services are confidential and free of charge.
For assistance during business hours, call 303-871-3853 and ask to speak to the Director of CAPE. After hours, please call the Emergency & Crisis Dispatch Line at 303-871-3000and ask to speak to the CAPE advocate on call.

Religious Accommodations Policy

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. You must notify me by the end of the first week of classes if you have any conflicts that may require an absence. It is your responsibility to make arrangements with me in advance to make up any missed work or in-class material.

Honor Code/Academic Integrity

All work submitted in this course must be your own and produced exclusively for this course. The use of sources (ideas, quotations, paraphrases) must be properly acknowledged and documented. For the consequences of violating the Academic Misconduct policy, refer to the University of Denver website on the Honor Code (www.du.edu/honorcode). See alsohttp://www.du.edu/studentconduct for general information about conduct expectations from the Office of Student Conduct.

Student Athletes

If you are a student-athlete, you should inform me of any class days to be missed due to DU sponsored varsity athletic events in which you are participating. Please provide me with an absence policy form by the end of the first week of class. You will need to make up any missed lectures, assignments, and/or exams.

Use of Technology in the Classroom

Access to the Internet can be a valuable aid to the classroom learning environment. You may be encouraged to use a laptop, smart phone, or other device to explore concepts related to course discussions and in-class activity. Keep in mind, however, that these technologies can be distracting – not only for you, but to others in the class. Please avoid the temptation of Facebook, texting, or other off-topic diversions.

Tentative Lecture Schedule (Winter 2017)

DATE	Lect #	TOPIC	Read-9th Ed	Read-8th Ed
WEEK 1	**EXPERIMENTAL ERROR AND STATISTICS**			
January 3	**Math Review Quiz**			
4	1	Introduction/Types of Error	3.1–3.5	3.1–3.5
6	2	Gaussian Distribution, CI	4.1–4.3	4.1–4.3
WEEK 2	**AQUEOUS SOLUTIONS AND INTRO TO EQUILIBRIA**			
Jan 9	3	Calibration Curves	4.4–4.9	4.4–4.9
10	**Information Literacy/Literature Searching**			
11	4	Q test, statistical significance	4.4–4.9	4.4–4.9
13	5	Intro to Equilibria, Thermodynamics	6.1-6.4, **OS** 13.1-13.4	6.1-6.4, **OS** 13.1-13.4
WEEK 3	**LECHATELIER'S PRINCIPLE**			
Jan 16	**Martin Luther King Jr day-NO CLASS**			
17	**Adobe Illustrator Workshop**			
18	6	ICE Tables	**OS:**13.4	**OS:**13.4
20	7	LeChatelier's/ Common Ion Effect	6.2–6.3	6.2–6.3
WEEK 4	**INTRO TO ACIDS AND BASES**			
Jan 23	**HOUR EXAM I** (Covers Lectures 1–7)			
24	**Adobe Illustrator Workshop**			
25	8	Solubility Equilibria	6.3, **OS:**15.1	6.3, **OS:**15.1
27	9	Acid/Base Review, pH, pOH, etc.	6.5–6.7 **OS:**14.1–14.4	6.5–6.7 **OS:**14.1–14.4
WEEK 5	**TITRATIONS & EQUILIBRIA OF ACIDS AND BASES**			
Jan 30	10	Weak Acids, pKa scale	6.5–6.7	6.5–6.7
31	**Weak Acid Practice**			
Feb 1	11	Introduction to Titrations	7.1–7.5	10.1–10.6
3	12	Systematic Treatment of Equilibria & Activity	8.1–8.5	7.1–8.5
WEEK 6	**ACID BASE EQUILIBRIA**			
Feb 6	13	Dilute Strong Acid/Base	9.1	8.1
7	**Exam II Review**			
8	14	Weak Acid/Base Equilibria	9.1–9.4	8.1–8.4
10	**HOUR EXAM II** (Covers Lectures 1–14)			
WEEK 7	**COMPLEX EQUILIBRIA**			
Feb 13	15	Buffers/Henderson-Hasselbach	9.5	8.5
14	**Buffers Practice**			
15	16	Diprotic acids and bases/buffers	10.1–10.2	9.1–9.2
17	17	Polyprotic acids and buffers	10.3–10.6	9.3–9.6
WEEK 8	**CHELATION EQUILIBRIA & INTRO TO KINETICS**			
Feb 20	18	Titrations, monoprotic and polyprotic	11.1–11.6,11.10	10.1–10.6, 10.1
21	**Titrations Practice**			
22	19	Titrations, continued	11.1–11.6,11.10	10.1–10.6, 10.10
24	20	EDTA Titrations, Complex Equilib	6.4, 12.1–12.3	6.4, 11.1–11.3
WEEK 9	**KINETICS … CONTINUED**			
Feb 27	21	Intro to Kinetics, reaction rates	**OS:** 12.1–12.3	**OS:** 12.1–12.3
28	**Exam III Review**			
Mar 1	22	Rate Laws	**OS:** 12.3	**OS:** 12.3
Mar 3	**HOUR EXAM III** (Covers Lectures 1–21)			
WEEK 10	**KINETIC THEORIES AND MECHANISMS**			
Mar 6	23	Integrated Rate Laws	**OS:** 12.4	**OS:** 12.4
7	**Kinetics Practice**			
8	24	Mechanisms and Catalysts	**OS:** 12.6–12.7	**OS:** 12.6–12.7
10	**REVIEW FOR FINAL**			
March 14 (Tuesday) FINAL EXAM (OLIN 105): 8AM to 9:50AM (Cumulative)				