CH302H – Principles of Chemistry II: Honors
Spring 2016, Unique 49420
Tuesday / Thursday 11 am – 12:30 pm, WEL 2.312

Instructor: Dr. Lauren Webb
WEL 3.212B
lwebb@cm.utexas.edu
512-471-9361

Office Hours: Monday and Tuesday, 12:30 – 1:30 pm, or by appointment

Teaching Assistant: Josh Slocum
WEL 3.306
jsrun50@gmail.com
512-471-7851

TA Office Hours: Monday and Wednesday, 4:00 – 5:00 pm, WEL 2.306A

Required Textbook: *Principles of Modern Chemistry*, 7th edition
Oxtoby, Gillis, and Campion

Webpage: http://webb.cm.utexas.edu/courses/CH302H_Spring_2016_home.html

Course material, including the syllabus, daily lecture summaries, homework problems and solution keys, quiz solution keys, exam solution keys, and practice exams will be available on the course webpage. We will use Canvas's grade center to post grades. I will periodically communicate important class announcements to you through email. It is very important that you update your UT directory information with the email that you check most often. I will also post these class announcements on the course webpage.

Course Objective: This course is an advanced exploration of the principles and foundations of modern chemistry. This course is intended for students who have successfully completed CH301 or CH301H. We will begin the semester with a comprehensive study of fundamental principles of classical thermodynamics. We will then apply these principles to the study of chemical equilibrium, focusing on acids and bases, solutions and solubilities, and electrochemistry. Near the end of the semester, we will investigate the rates of chemical reactions. Significant questions that we will ask throughout the course include:

- How does a thermodynamic system do work, and how can it achieve the maximum amount of work possible?
- Where will a thermodynamics system come to rest (i.e. where is equilibrium)?
- If the resting point is not convenient or the desired outcome, what can we do to the system to change that point?
- How fast is that resting point achieved, and how can we change this?

Throughout the course, I will encourage you to engage the ways that science in general and chemistry in particular effect your daily life.

Quantitative Reasoning: This course carries the Quantitative Reasoning flag. Quantitative Reasoning courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real- world problems.

Core Curriculum Objectives: This course may be used to fulfill three hours of the natural science and technology (Part I or Part II) component of the university core curriculum and addresses the following four core objectives established by the Texas Higher Education Coordinating Board: communication skills, critical thinking skills, teamwork, and empirical and quantitative skills.

Communication skills: Students will work in class, on homework and on exams to apply scientific model to explain empirical data as well as to use models to predict physical and chemical change. Students will be able to connect mathematical formulas and graphical representations to communicate scientific concepts.

Critical Thinking: Students are presented with many opportunities to use critical thinking skills to solve problems both in class and on graded homework assignments. These skills are assessed on the exams.

Teamwork: Students work in small groups in class on guided group activities designed to help the student come to a deeper understanding of the content and to "discover" chemical principles via the process of inquiry. Outside of class students are encouraged to continue working in groups on better understand homework assignments.

Quantitative Skills: Students are required to calculate answers based on their understanding of scientific laws and derived equations. These methods include skills in manipulating units, understanding and applying the concept of ratios, proportionality, rearranging algebraically to solve for a specified unknown, understanding and applying rates of change, interpreting equations using physical models. These skills are assessed on the exams.

Lectures and Attendance: I will not be taking attendance, but I will also not be posting lecture notes. You may compare and copy lecture notes from classmates to make sure you have an accurate and complete set of notes for yourself, but I strongly discourage you from relying on others for your notes. To supplement your own note-taking, I will post daily summaries of what I consider to be the most important points from that day's lecture, but these will not be comprehensive.

Quizzes and Homework: There will be 6 closed-book quizzes given in class on Tuesdays. Quiz dates are given on the schedule below. This quiz will be given during the last 10 to 15 minutes of class and must be turned in when the class period ends at 12:15 pm. Your lowest score will be dropped. To help you prepare for these quizzes, each week I will post homework problems and the corresponding solution keys. It is up to you to practice these problems; we will not be collecting your answers, but if you don't do the homework you will probably find the quizzes very unpleasant. Your textbook is another wonderful source of practice problems.

Exams: There will be four 75 min open-book, open-note exams that will be given during the normal class time. Exam dates are noted on the schedule below, so plan now. There will be no makeup exams and no dropped scores. If you must miss an exam due to observance of religious holidays, you are required by the University to notify the instructor at least 14 days in advance. Otherwise, you can only make up an exam by providing documented proof of a major life trauma or emergency and only after consultation with the instructor. Semester exams will focus on material introduced since the previous exam; however, the subject that we are studying this semester is inherently cumulative, so you will be expected to be familiar with material not covered explicitly on each exam.

Exam Rooms: The class will be split into different rooms on exam days. Rooms will be announced the week before, so please take note.

Final Exam: A 3 hr final exam will be given on 17 May 2016, 9 am – 12 pm, in a location TBD.

Seminar Attendance: As an undergraduate at a R1 university, you are now a member of a community of scholars that is creating new knowledge about the world. During your undergraduate career, your most significant education will almost certainly not come from a classroom or textbook (although those provide your foundation), but rather from experiential learning through independent research or exploration. Scholars communicate new discoveries in a variety of ways, but one of the most important is through seminars and talks. Here in CNS, we are fortunate to have the option of attending an incredible number of seminars of original research on every topic imaginable. Twice this semester, I would like you to attend a seminar of original research in CNS. Pick a topic that you think might be interesting to you, and see what you learn. You must turn in a one-page summary of each seminar describing the topic, the person giving it, why you thought it would be interesting, and what you learned. Summaries must be turned in by the beginning of class on 10 March and 5 May (although you may turn them in earlier if you wish).

Grades:

Quizzes:	250 pts (5 at 50 pts. each)
Exams:	400 pts (4 at 100 pts. each)
Final:	300 pts
Seminar summary:	50 pts (2 at 25 pts. each)

Grade: A = 850 and above
B = 700-849
C = 550-699
ntg < 549

Extra Credit: Four extra credit assignments worth 5 points each will be given throughout the semester. I strongly advise you take advantage of any opportunity for extra credit!

CH108: CH108 (Conference Course – Intensive Chemistry Seminar) is a supplemental honors level enrichment and enhancement seminar that follows the course schedule of CH302H. CH108 is intended to develop your problem solving skills by working through comprehensive honors level problems in a group setting with immediate feedback from the instructor and TAs. This is

a 1 credit course that is graded on a Pass / Fail basis. Although it is not required for you to be enrolled in CH108 while taking CH302H, I strongly encourage you to do so.

CH108 meets Monday / Wednesday 5:00 – 6:15 pm in WEL 2.304 (Unique 49810). The first class day will be 25 January 2016.

Students with Disabilities: The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-6441 TTY. Any student with a documented physical or cognitive disability who requires academic accommodations should do this as soon as possible to request an official letter outlining authorized accommodations for this course. If the accommodation involves testing, you must remind the instructor at least 5 business days before the scheduled exam.

Honor Code: "As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity." The core values of the University are Learning, Discovery, Freedom, Leadership, Individual Opportunity, and Responsibility.

Cheating will not be tolerated in this course. Since such dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. When taking quizzes and exams, you may not use any electronic material to assist you except for a calculator for completing arithmetic. If any form of scholastic dishonesty is discovered, the student will receive a grade of 0 for that assignment and be reported immediately to Student Judicial Services in the Office of the Dean of Students, where the student may be subject to additional disciplinary penalties including the possibility of failure in this course and/or dismissal from the University.

Schedule: The following is an outline and approximate schedule for topics covered this semester. The quiz and exam dates will not change. Any changes to the topic schedule will be reviewed in class. Chapter headings are from the 7th edition of our textbook.

Week	Date	Topic	Book	HW	Evaluation
1	19 Jan.	Intro., 1st law, thermochemistry	12.6	HW1	
	21 Jan.	Review of entropy	13.1-13.5		
2	26 Jan.	Carnot cycle, 3rd law, standard states	13.6-13.8	HW2	**Quiz 1**
	28 Jan.	Introduction to free energy	13.7		
3	2 Feb.	**EXAM 1**		HW3	**EXAm 1**
	4 Feb.	Free energy and equilibrium	14.1-14.5		**EC 1**
4	9 Feb.	Phase transition	Chap. 10	HW4	
	11 Feb.	Equilibrium in condensed and gas phases	14.3-14.5		
5	16 Feb.	Direction of equilibrium, Q, Le Chatelier	14.6-14.7	HW5	**Quiz 2**
	18 Feb.	Solutions, ideal and otherwise	11.1-11.6		
6	23 Feb.	**EXAM 2**		HW6	**EXAM 2**
	25 Feb.	Colligative Properties	11.5		**EC 2**
7	1 Mar.	Introduction to acids and bases	15.1	HW7	
	3 Mar.	Strong and weak acids and bases	15.2-15.4		
8	8 Mar.	Buffers and titrations	15.5-15.6	HW8	**Quiz 3**
	10 Mar.	Review and catch up			**Seminar 1 review due**
		SPRING BREAK, 14-18 MARCH			
9	22 Mar.	Polyprotic acids and bases	15.7-15.8	HW9	
	24 Mar.	Equilibrium and solubility	16.1-16.3		
10	29 Mar.	**EXAM 3**		HW10	**EXAM 3**
	31 Mar.	pH, ionic strength, and complex ions	16.4-16.6		**EC 3**
11	5 Apr.	Introduction to electrochemistry	17.1-17.2	HW11	
	7 Apr.	pH, Nernst	17.4		
12	12 Apr.	Batteries, fuel cells, and other examples	17.5-17.6	HW12	**Quiz 4**
	14 Apr.	Corrosion	17.7		
13	19 Apr.	**EXAM 4**		HW13	**EXAM 4**
	21 Apr.	Rates and rate laws	18.1-18.2		**EC 4**
14	26 Apr.	Reaction mechanisms	18.3-18.4	HW14	**Quiz 5**
	28 Apr.	Diffusion controlled reactions and catalysis	18.7-18.8		
15	3 May	Biological examples of reaction rates	18.8	HW15	**Quiz 6**
	5 May	Review and catch up			**Seminar 2 review due**

FINAL EXAM: Wednesday, 17 May 2016, 9 am – 12 pm. Location TBA