CH301H – Principles of Chemistry I: Honors
Fall 2015, Unique 49310
Tuesday / Thursday 11 am – 12:30 pm, WEL 2.312

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

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TA Office Hours: Monday and Wednesday, 3-4 pm, WEL 2.306A

Required Textbook: *Principles of Modern Chemistry*, 6th, 7th, or 8th editions
Oxtoby, Gillis, and Campion

Webpage: http://webb.cm.utexas.edu/courses/CH301H_Fall_2015_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 had good chemistry preparation at the high school level and who wish to develop significantly more insight into the physical principles underlying the science of chemistry. After a brief review of classical bonding, we will study the foundations of quantum mechanics and apply these concepts to atomic and molecular structure, chemical bonding, and the experimental and theoretical methods that are used by modern chemists to study these phenomena. Near the end of the semester we will study the fundamental principles of classical and statistical thermodynamics.

The goal of this semester is to learn how atomic and molecular structures, defined by quantum mechanics, cause the physical properties of molecules that are observed in experiments. Significant questions that are addressed throughout the semester include:

- What experimental results can only be explained if energy is quantized, not continuous?
- How does the structure of the atom determine the structure of molecules?
- How does molecular structure generate the physical properties of molecules measured in experiments?

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

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 models 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 via clicker response system 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 to 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, closed-note quizzes given in class on Tuesday. Quiz dates are given on the schedule below. This quiz will be given during the last 15 to 20 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. During the exam, you may use any resource that does not have a heartbeat and cannot connect to a cellular or wireless network. 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 9 December 2015, 2-5 pm, in a location TBA.

Exam Wrappers: After each of our 4 semester exams, you must submit a self-evaluation of your preparation and performance for the exam. This exercise is intended to help you identify and correct specific obstacles that prevent you from doing your best work on graded assignments.

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. Sometime this semester, I would like you to attend at least one 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 this seminar describing the topic, the person giving it, why you thought it would be interesting, and what you learned. You may turn this in any time this semester, but it must be submitted by the beginning of class on Tuesday, 24 November.

Grades:		
	Quizzes:	250 pts (5 at 50 pts each)
	Exams:	400 pts (4 at 100 pts each)
	Final:	300 pts
	Exam Wrappers:	40 (4 at 10 pts each)
	Seminar Attendance:	10 pts

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

This course will not use fractional (+/-) grading.

Extra Credit: Three extra credit assignments worth 5 points each will be given throughout the semester.

CH108: CH108 (Conference Course – Intensive Chemistry Seminar) is a supplemental honors level enrichment and enhancement seminar that follows the course schedule of CH301H. 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 CH301H, I strongly encourage you to do so.

CH108 meets Monday / Wednesday 5:00 – 6:15 pm in CBA 4.308 (Unique 49600). The first class day will be 2 September 2015.

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 will be subject to 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	27 Aug	Introduction, the structure of the atom	1.4, A-B	HW1-2	
2	1 Sept	Potential energy and ionization energy	3.3-3.4		
	3 Sept	Electron affinity and electronegativity	3.5-3.6		
3	8 Sept	Ionic and covalent bonding	3.8-3.9	HW3	**Quiz 1**
	10 Sept	Lewis dot structures, VSEPR	3.10-3.11		
4	15 Sept	**EXAM 1**		HW4	**EXAM 1**
	17 Sept	Waves and quantization of energy	4.1-4.2		
5	22 Sept	The Bohr model	4.3-4.4	HW5	**EC 1**
	24 Sept	de Broglie, Heisenberg, and Schrodinger	4.4-4.5		**Exam wrap. 1**
6	29 Sept	The Schrodinger Equation	4.5-4.6	HW6	**Quiz 2**
	1 Oct	The Hydrogen atom	5.1		
7	6 Oct	**EXAM 2**		HW7	**EXAM 2**
	8 Oct	Orbitals	5.1		
8	13 Oct	Many electron atoms, QM, and the PT	5.3-5.5	HW8	**Quiz 3**
	15 Oct	Diatomics	6.2-6.4		**Exam wrap. 2**
9	20 Oct	Heteronuclear diatomics	6.5-6.7	HW9	**Quiz 4**
	22 Oct	Polyatomics	6.9-6.10		
10	27 Oct	**EXAM 3**		HW10	**EXAM 3**
	29 Oct	Organic molecules	6.10		
11	3 Nov	Organic Molecules continued	7.2-7.6	HW11	**EC 2**
	5 Nov	Ideal gas law	9.1-9.4		**Exam wrap. 3**
12	10 Nov	Ideal gas law continued	9.5-9.7	HW12	**Quiz 5**
	12 Nov	Intermolecular forces	10.1-10.2		
13	17 Nov	**EXAM 4**		HW13	**EXAM 4**
	19 Nov	First law of thermodynamics	Chap. 12		
14	24 Nov	First law	Chap. 12	HW14	**EC3**
					Seminar sum.
	26 Nov	**Thanksgiving, no class**			
15	1 Dec	Second law of thermodynamics	Chap. 13	HW15	**Quiz 6**
					Exam wrap. 4
	3 Dec	Second law	Chap. 13		

FINAL EXAM: Wednesday, 9 December, 2 – 5 pm. Location TBA