

CH353 – Physical Chemistry I
Spring 2015, Unique 51170
Tuesday / Thursday, 12:30-2 pm, WEL 1.308

Instructor: Dr. Lauren Webb
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Office Hours: Monday 3-4 pm and Thursday 2-3 pm, or by appointment

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TA Office Hours: Monday, 4-5 pm (Jason)
Thursday 11 am – 12 pm (Andrew)
Office hours will be held in BUR 228

Recommended Textbook: *Physical Chemistry: A Molecular Approach*
Donald A. McQuarrie and John D. Simon

Webpage: http://webb.cm.utexas.edu/courses/CH353_Spring_2015_home.html

Course material, including the syllabus, daily lecture summaries, homework problems and solution keys, quiz solution keys, and exam solution keys 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 introduction to chemical and statistical thermodynamics. We will begin by studying the fundamental principles of the field with detailed development of the laws of thermodynamics and their connection to molecular properties of a chemical system. We will then apply these concepts to explore physical and chemical equilibrium, solutions and mixtures, and reactive systems. Near the end of the course we will briefly explore chemical kinetics. 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 thermodynamic system come to rest (i.e. where is equilibrium)?
- If the resting point is not convenient or is not 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 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.

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: There will be six closed-book, closed-note 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 1:45 pm. Each quiz will be worth 50 points; your lowest quiz grade will be replaced with your cumulative Top Hat grade (explained below). 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; I 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 exams that will be given during the normal class time. For these exams, you may use any resource that does not have a heartbeat and cannot be connected to the internet. Your textbook and class notes will probably be the most helpful resources for you. 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 material that we are covering this semester is inherently cumulative, so you will be expected to remember material not covered explicitly on each exam. A 3 hr final exam will be given on 18 May 2015 at 9:00 am in a location TBA.

Top Hat: I will periodically ask in-class questions which you may receive credit for answering correctly through Top Hat, a replacement of the traditional Clicker or iClicker device. Top Hat questions will test your knowledge of the material, your comfort with the homework assignments, and your ability to solve problem on the fly. You will earn 2 pts for each Top Hat question correctly answered. Your cumulative Top Hat score will replace your lowest quiz score at the end of the semester.

You must have a "smart" device in class to run the Top Hat software, such as a smartphone (on either iOS or Android platforms), tablet, iPod, or laptop. You must purchase a subscription for the Top Hat software; we recommend you purchase a 5-year subscription for \$38, which will

cover as many courses as you wish for that period. You will receive an email invitation to the Top Hat service. Click on the link there to complete your registration for this course.

Grades:	Quizzes:	300 pts (6 at 50 pts. each)
	Exams:	400 pts (4 at 100 pts. each)
	Final:	300 pts

We will use two possible grading schemes in this course, depending on the final class mean score.

Possibility 1) IF THE FINAL CLASS MEAN SCORE REMAINS ABOVE 700:

Grade: A = 850 and above

B = 700-849

C = 550-699

ntg < 549

Possibility 2) IF THE FINAL CLASS MEAN SCORE DROPS BELOW 700:

Grades above the mean will receive A's and B's. Grades at and below the mean will receive C's, D's, and F's.

I will show grade distributions following each exam to give you an idea of your standing relative to the class mean. This class will not use fractional grading (i.e. +/- grades).

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 512-471-6259, 512-471-6441 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 me 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 course outline will be reviewed in class. More specific topic headings and chapter sections are given on the course website. (M&S = McQuarrie and Simon Chapter; HW = Homework)

Week	Date	Topic	M&S	HW	Evaluation
1	20 Jan	Introduction, ideal gases	16	HW1	
	22 Jan	Nonideal gases, IM forces	16		
2	27 Jan	The first law	19	HW2	Quiz 1
	29 Jan	The first law	19		
3	3 Feb	Thermochemistry	19	HW3	Quiz 2
	5 Feb	Spontaneous change	20		
4	10 Feb	EXAM 1		HW4	EXAM 1
	12 Feb	The second law	21		
5	17 Feb	The third law and free energy	22	HW5	Extra Credit 1
	19 Feb	Free energy	22		
6	24 Feb	Free energy	22	HW6	Quiz 3
	26 Feb	Chemical potential	22		
7	3 March	EXAM 2		HW7	EXAM 2
	5 March	Physical equilibrium	23		
8	10 March	Physical equilibrium	23	HW8	Extra Credit 2
	12 March	Mixtures and solutions	24-25		
Spring Break, 16-20 March					
9	24 March	Composition diagrams	24-25	HW9	Extra Credit 3
	26 March	Nonideal solutions	24-25		
10	31 March	Chemical equilibrium	26	HW10	Quiz 4
	2 April	Chemical equilibrium	26		
11	7 April	EXAM 3		HW11	EXAM 3
	9 April	Statistical thermodynamics	17-18		
12	14 April	Statistical thermodynamics	17-18	HW12	Extra Credit 4
	16 April	Statistical thermodynamics	17-18		
13	21 April	Kinetic model of gases	27	HW13	Quiz 5
	23 April	Maxwell-Boltzmann distribution	27		
14	28 April	EXAM 4		HW14	EXAM 4
	30 April	Rate laws	28		
15	5 May	Elementary reactions	28	HW15	Quiz 6
	7 May	Detailed balance, SSA, FE	29		

FINAL EXAM: Monday, 18 May, 9:00 am. Location TBA.