

# CHM4411 - Physical Chemistry: Thermochemistry and Kinetics

**Instructor:** Prof. John F. Stanton (NPB 2336, LEI 240I), johnstanton@ufl.edu)

**Office Hours:** T 12-2, W 5-7 (or by appointment)

**Teaching Assistant  $\alpha$ :** Moneesha Ravi (LEI 240)

**Office Hours:** TBA

**Teaching Assistant  $\beta$ :** Rohit Rana (LEI 240)

**Office Hours:** TBA

**Suggested Textbook:** P.W. Atkins *Physical Chemistry*

## Course Schedule

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Week	Dates	Material
<b>Fundamental Theory of Thermodynamics</b>		
I	Aug 20 <sup>†</sup> ,22	Energy concepts, simple systems, and profound fundamentals
II	Aug 27,29	Equations of state and thermodynamic variables
III	Sep 3 <sup>†‡</sup> ,5	First law: heat, work and energy conservation
IV	Sep 10,12	More on the first law
V	Sep 17 <sup>†‡</sup> ,19*	Entropy and the second law (quite interesting)
VI	Sep 24,26	More on the second law
VII	Oct 1 <sup>†‡</sup> ,3	Yet more on the second law, and the “third law”
<b>Applications of the Fundamentals</b>		
VIII	Oct 8,10	Clapeyron Equation and Phase Equilibria
IX	Oct 15 <sup>†‡</sup> ,17	Solutions and multicomponent phase equilibria
X	Oct 22, 24*	More on solutions, and colligative properties
XI	Oct 29 <sup>†‡</sup> ,31	Chemical equilibrium, which you already know
XII	Nov 5,7	Thermo meets quantum: an introduction to statistical thermodynamics
<b>Likely Extra Topics</b>		
XIII	Nov 12 <sup>†‡</sup> ,14	Some interesting things about chemical reactions
XIV	Nov 19,21*	Introduction to kinetic principles
XV	Nov 26 <sup>†‡</sup>	The Michaelis-Menton model of enzyme kinetics
XVI	Dec 3	Final exam

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† - Homework assignments will be passed out.

‡ - Homework assignments will be collected.

\* - Hour examination will be administered.

## Scope of Material

CHM4411 is a first course in physical chemistry, emphasizing the (very important) subject of thermodynamics. After studying the fundamental principles of the field, concepts will be applied to processes involving gases and condensed phases as well as to the treatment of reactive systems. Later in the semester, some aspects of chemical rate theory, statistical thermodynamics and quantum mechanics will be presented. The purpose of introducing these subjects is largely to familiarize students with basic ideas that will be encountered in future physical chemistry classes, and to underscore the importance of a wide array of physics in understanding molecular processes.

## Homework

All homework problems will be assigned every other Tuesday throughout the semester and are due *at the beginning of class* two weeks later. For each problem set, students will be responsible for all lecture material from (roughly) the two weeks prior to the week that the assignment is due in class. As an example, the problems assigned on the Tuesday of Week V will be due in class on the Tuesday of Week VII, and will mostly cover material from Weeks V, VI and VII. Solution sets will be posted on Piazza shortly after the homeworks are turned in.

## Examinations

There will be three in-class hour examinations given on Thursdays, and the course will conclude with a comprehensive final examination on the last day of class. For the most part, hour exams will focus on material covered since the previous exam. However, the nature of subject is such that *each exam is effectively comprehensive* (the fundamentals learned early in the course will be used throughout the term). Consequently – for better or worse – all of the exams are something like a "final" in the sense that you can't just forget what you learned in September when you take an exam in November. All examinations – including the final – *are of the open-book, open-note variety, but don't equate this with "easy"!!*

Take note of the exam dates *now* and plan things such as medical school interviews accordingly. I rarely give make-up exams, and do so only for very good reasons (medical emergencies, death of relatives, religious holidays *etc.*).

## Class Website

The class website is hosted on piazza, from which you have obtained this syllabus. In addition to posting notes, homework and exam solutions, and so on, piazza is also an extremely useful resource for asking questions outside of class and/or office hours. This system has been quite effective and popular since I started to use it a few years ago, and you are encouraged to answer the questions of your classmates if you are able. The as-yet-unnamed TAs and I will also answer questions in a time frame ranging from "right away" to a few days, but all of you are encouraged to help each other and post answers if you think that they are correct. Both the TA and I will monitor the goings on, and will intercede with corrections when and if warranted.

## Grading Policy

The basis for grades in CHM 4411 will be performance on the hour exams, the final exam and the homework assignments. Only the five highest homework scores will be counted. The distribution of points is as follows:

Homework	200
Hour Exam I	200
Hour Exam II	200
Hour Exam III	200
Final Exam	200
Total	1000

Generally, the overall class median (the score for which an equal number of students are above and below) serves as the dividing line between the A,B range and the C,D,E range. The median tends to be somewhere in the range 700-750. I tend to give more B's and C's than anything else; A's are reserved for the students who perform significantly better than average, and D's are reserved for those who perform significantly worse than average. It takes a truly determined and motivated student to receive an E in the course. If you take all of the exams and receive at least 10 (out of a possible 40) points on all seven homeworks, you are guaranteed to receive at least a D in the class, although it is hard to recall a student who satisfied these criteria and did not get at least a C. If the class performs significantly better than usual, I will guarantee a B grade to any student earning more than 750 points in the course.

## Disabilities

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)) by providing appropriate documentation. Once registered, students will receive an accommodation letter, which must be presented to the instructor when requesting accommodations. Students with disabilities should follow this procedure as early as possible in the semester.

## Counseling

The University of Florida provides counseling services for students, staff, and faculty. See <http://www.counsel.ufl.edu/> or call (352) 392-1575 during regular service hours (8am - 5pm). For other hours or on weekends call the Alachua County Crisis Center (264-6789). Students may also call the clinician on-call at Student Mental Health for phone callback and consultation at (352) 392-1171.

## Honor Code

This class will operate under the policies of the student honor code, which can be found at: <http://www.registrar.ufl.edu/catalog/policies/students.html>. The students, instructor, and TAs are honor-bound to comply with the Honors Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.