

CHM 4411, Physical Chemistry 1: Chemical Thermodynamics and Transport Fall 2011

"In this house, we obey the laws of thermodynamics!"

-Homer J Simpson

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Office Hours: Mon & Wed, 2nd Period; Thurs, 4th Period

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Objectives: In this course you will learn the physical and mathematical bases of macroscopic and statistical thermodynamics and applications to chemical systems.

Texts: There is no required text. **You should find a good Physical Chemistry textbook for reference.** It does not have to be new or even the most recent edition. Recommendations include Atkins; Engel and Reid; Alberty and Silbey; Barrow; etc. Avoid texts that are aimed at a "biochemistry" audience, as these tend to be less rigorous. You will need to read about topics and work additional problems to become proficient.

Grade Distribution:

Exams:	4 @ 200 pts.	800 pts.
Homework:	~10 weighted to 200 pts. total	200 pts.
Quizzes	~10 weighted to 200 pts. total	200 pts.
Total		1200 pts.

Grading Scale (in % using usual rounding conventions for fractions):

Letter Grade	Percentage	Letter Grade	Percentage	Letter Grade	Percentage
A	≥90	B-	≥68	D+	≥53
A-	≥84	C+	≥64	D	≥50
B+	≥78	C	≥60	E	<50
B	≥72	C-	≥56		

Tips for Success: This course is not easy. It may very well be one of the hardest courses you take while an undergrad. However, with attention you can pass this course and *<gap>* actually learn something! Firstly, please be on time to lectures. Since I am not assigning material directly from a text, the material comes exclusively from lecture notes. If you must miss a lecture, be sure to acquire the notes from a classmate. Remember, 2 hours is a lot of material to miss. If you must show up late, please be courteous to your instructor and fellow students by not being disruptive.

My lectures will only go so far toward teaching you this material. On a daily basis you should read the material and work problems. Work all assigned problems more than once. Practice on other problems. When you get graded material back, rework the problems. Try to find different ways to get the correct answer. Practice is crucial to mastering this material.

This subject matter is very mathematical. You will have to call upon the Calculus that you probably haven't had to use for several years. Dust off your old Calculus text and make friends with it again. Don't get bogged down in the math. Understand the concepts and fill in the blanks later.

Finally, be sure to maintain a positive attitude. Thermodynamics can be a little dry. I will do everything in my power to make it interesting for you. No matter how boring and tedious you find the material, remember that the universe runs on thermodynamics.

Course Mechanics: Homework will be assigned periodically, and will generally comprise 10 problems. Be sure to show your work on homework assignments. No work = no credit. Homework must be submitted on paper. No e-mailed assignments will be accepted. I will always be available to answer questions during office hours. If you need to speak with me outside of office hours, please make an appointment. The final homework grade will be based on a scale of 100 points. Each assignment will be equally weighted.

There will be in-classes quizzes throughout the semester. These are intended to indicate problem areas before they are encountered on exams. Be sure to understand the quiz questions completely. Quizzes, when scheduled, will be given at the beginning of class and last for 15 minutes. *No make-up quizzes will be given.* Be warned that I may employ "pop quizzes" if I feel the need to give you a nudge. The final quiz grade will be based on a scale of 200 points. Each quiz will be equally weighted.

There will be four (4) exams through the course of the semester, each worth 200 points. The first three exams will be during regular class time, and are *tentatively* scheduled for September 15, October 13, and November 10. The final exam will be on December 14, at 7:20 AM. *No make-up exams will be given.* If you must miss an exam, you must make arrangements at least three business days prior.

During quizzes and exams, you are expected to do your own work. I do not require that you use a non-programmable calculator; however, I reserve the right to require you to reset it if warranted. Students may not share calculators. Cell phones, mp3 players, personal computers, and all other electronic/wireless devices are prohibited during quizzes and exams. *Violations will result in a grade of zero on the assignment.*

Students with Disabilities:

Appropriate accommodations will be provided, according to the policy at www.chem.ufl.edu/~itl/disabilities.html.

Academic Honesty:

Students are expected to obey the University of Florida Honor Code, detailed at www.chem.ufl.edu/~itl/honor.html. Violations will be reported to the Office of Student Judicial Affairs.

The sale or transfer of graded or ungraded course materials to another student for use in this course (current or future semesters) is in violation of the Honor Code. All violations will be reported.

Schedule of Lecture Topics: The following broad topics will be covered through the semester, as time permits. Each will be subdivided into additional parts. Exam material will be clearly delineated at least one week prior to the exam.

1. **Fundamentals and Gas Laws:** Math review, ideal and real gases, and kinetic theory
2. **The First Law:** Energy, Work, Legendre Transforms, and Thermochemistry
3. **The Second Law:** Entropy, Direction, and Free Energies
4. **Equilibrium and Transitions:** Chemical equilibrium, phases, and phase changes
5. **Equilibrium and Solutions:** Activities, acid/base reactions, electrochemistry, solubility, and transport
6. **Statistical Thermodynamics:** Distributions, Ensembles, partition functions, and the Third Law