Statistical Thermodynamics and Chemical Dynamics
Chemistry 332 –Fall 2016
MWF 9-9:50 Chem 301

Instructor

Arthur Glasfeld, Chem 410, ext. 7679, glasfeld@reed.edu
Office hours MTuW 2-3 PM (I am generally free afternoons this semester)

Texts

Required (but available on reserve as well):
Dill and Bromberg, *Molecular Driving Forces* 2nd Edition

Reserve:
Solutions Manual to Molecular Driving Forces (also available in Chem Lounge)
Hanson and Green, *Introduction to Molecular Thermodynamics*
McQuarrie and Simon, *Molecular Thermodynamics*
Shell, *Thermodynamics and Statistical Mechanics*

Evaluation

Midterm Exams (**9/28, 11/2 and 12/5** – Please mark these dates!)
These will be 50 minutes in length, to be taken in class with an equations sheet

Final Exam (Date to be announced, do not make departure plans prior to **12/15**)
Three hours long. Cumulative exam covering the entire semester. Same rules as the midterms.

Problem Sets - Due Wednesdays in class. No late work will be accepted without a valid excuse. Note that problems will be posted for each day's lecture, and the full problem set for each week will be posted on Friday.

Academic Collaboration

All work submitted during this course is expected to reflect the effort of the individual whose name appears on top of the page. You are encouraged to work with friends, tutors and instructors on problem. However, when the time comes to write this work up for submission, it must be <u>your</u> work, reflecting your individual understanding of the problems at hand. All exams are to be taken closed book, closed notes except for an equations sheet and without any collaboration. In using a calculator, you may not use programmed equations or graphing functions during the exam period.

Course Strategy

Your understanding of the course material will principally be derived from your ability to solve problems using principles and equations developed in lecture and in the text. Thermodynamics is a detail-oriented subject and requires careful reading and extensive self-testing against problems. I urge you to work 3-4 problems per lecture *in addition to those on the problem set* and to use the reserve texts, on-line resources and whatever else comes to hand (especially office hours) to master the material. All of this material will make sense, but not after a single exposure in lecture.

Lecture Schedule

The course will cover the following topics:

Week of	**Lecture Topic**	**Textbook**
8/29	Review, Probability, Combinatorics and Distributions	Ch. 1
9/5	**Labor Day**, Extrema & the First Law	Ch. 2 & 3
9/12	Techniques in multivariable calc., Second Law	Ch. 4 & 5
9/19	Equilibria, quasi-static processes, heat capacity	Ch. 6 & 7
9/26	Cycles, pathways, free energy (**Exam #1 on 9/28**)	Ch. 7 & 8
10/3	Enthalpy, Fundamental Eqs, Maxwell relationships	Ch. 8 & 9
10/10	Boltzmann distribution, Partition function	Ch. 10
10/24	Intro to quantum, molecular partition functions	Ch. 11
10/31	Temperature and heat capacity (**Exam #2 on 11/2)**	Ch. 12
11/7	Statistical approach to equilibrium	Ch. 13
11/14	Phase changes, solutions	Ch. 14 & 15
11/21	Rate laws and mechanism, **Thanksgiving**	Ch. 19*
11/28	Theory of reaction kinetics	Ch. 19*
12/5	**(Exam #3 on 12/5)**, experimental kinetics	Ch. 19*

*I'll have some outside readings for these lectures.