SYLLABUS

COURSE: CHEMISTRY 325
Physical Chemistry I - Thermodynamics and Kinetics
Fall Semester, 2015
MWF 1:30-2:35 p.m. R 12:30 – 1:20 p.m. (Labs TBA)

INSTRUCTOR: Dr. D. C. Gleason-Rohrer
Office Hours -- R 1:30 – 6:30 pm and by appointment

TEXT: Thermodynamics, Statistical Thermodynamics, & Kinetics, 3rd Edition, Thomas Engel and Philip Reid, San Francisco, Pearson / Benjamin Cummings, 2013.

DESCRIPTION: The first part of this course is designed to direct students through a detailed study of the fundamentals of thermodynamics. The course content in this part will center on the laws of thermodynamics with particular attention given to the application of these laws to chemical systems. This part will include the study of such concepts as heat, work, enthalpy, entropy, standard states, phase diagrams, colligative properties, free energy, and equilibrium. The second part of the course will focus on the fundamentals of chemical kinetics, and reaction dynamics.

LEARNING OUTCOMES: By the end of the course students will be able to:

1) Define and use the concepts of internal energy, enthalpy, entropy, and Gibbs energy to characterize equilibrium and predict the direction of spontaneous change.
2) Use simplifying models to represent complex physical and/or chemical systems for the purpose of fundamental analysis.
3) Use the laws of thermodynamics, the concepts of chemical kinetics, and techniques from calculus, to solve physical and chemical problems appropriate for the undergraduate chemistry major. Students will also acquire and/or improve specific skills useful for future work in science or science related fields. In particular students will: collect accurate and useful data; analyze such data using graphical techniques, spreadsheets and other appropriate computer software; and draw meaningful conclusions from experimental results and present those in cogent written and oral form.

PROGRAM LEARNING OUTCOMES: CHEM PLO 2 (UV-vis) and BCHM PLO 3 (UV-vis) will be assessed directly by faculty laboratory instructors' observation of students' use of instruments.

ATTENDANCE: You are expected to be at all scheduled meetings of the lecture and lab. Missing class will not only diminish your chances of understanding course content, but it will have a negative impact on your course grade.

HOMEWORK: Much of the material in this course is best learned by working problems. Therefore, problem sets will be assigned regularly. A typical assignment will be composed of two

types of problems — work problems and quiz problems. Work problems will be graded with a +, ✓, or --, and students may collaborate on these problems. Quiz problems are mini take-home exams and every student is expected to do these problems individually.

LABORATORY: Laboratory experiences are part of this course. Some of these will be computer-based simulations and the rest will be actual laboratory experiments. Lab work will be done by teams of students but laboratory reports must be prepared and submitted individually. Further information regarding the labs is contained in a separate laboratory syllabus.

GRADING: Grade points will be earned according to the following breakdown:

Exams (3)	50%
Homework & Class Participation	25%
Lab Reports	25%

Grades will be assigned according to the following approximate scale. Plus and minus grades are assigned within these brackets.

Approximate	85 - 100%	A
Grading	75 - 85%	B
Scale	65 - 75%	C
	55 - 65%	D
	0 - 55%	F

CLASS SCHEDULE:

Session	Topics	Readings
1	Fundamental Concepts of Thermodynamics	Ch. 1
2-5	The First Law	Ch. 2
6-10	Internal Energy and Enthalpy	Ch. 3
11-12	Thermochemistry	Ch. 4
13-19	The Second Law and Entropy	Ch. 5
Oct. 5	**EXAM #1 (Chapters 1-5)**	
21-25	Chemical Equilibrium	Ch. 6
26,27	Properties of Real Gases	Ch. 7
28-30	Phase Diagrams	Ch. 8
31-35	Ideal and Real Solutions	Ch. 9
36	Electrolyte Solutions	Ch. 10
37	The Boltzmann Distribution	Ch. 13
Nov. 6	**EXAM #2 (Chapters 1-10)**	
39-42	Kinetic Theory of Gases	Ch. 16 (Ch. 12)
43-45	Transport Phenomena	Ch. 17
46-51	Elementary Chemical Kinetics	Ch. 18
52-55	Complex Reaction Mechanisms	Ch. 19
FINAL EXAMINATION, MONDAY, DECEMBER 14, 1:30 p.m.		