

**Chem 301 – Physical Chemistry I**  
**Fall 2010 Syllabus**

- Instructor:** Kristin L. Wustholz  
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(757) 221-2675
- Office Hours:**  
Monday 11:00 – 12:30 pm  
Thursday 9:30 – 11:00 am  
(and by appointment)
- Textbook:** Physical Chemistry, 2<sup>nd</sup> Edition by Thomas Engel and Philip Reid, Prentice Hall, New York (2010).  
Physical Chemistry, 2<sup>nd</sup> Edition Student Solutions Manual (optional)
- Lectures:** MWF 10:00 – 10:50 am, Blow Memorial Hall 331
- Learning Goals:** In this course we will examine two major topics in physical chemistry: thermodynamics and statistical mechanics. Specific learning goals are to: (1) understand and apply the laws of thermodynamics, which describe the behavior of matter and the transformation between different forms of energy on a macroscopic scale, (2) use quantum mechanics to describe the energetics of simple systems including the particle in a box, and (3) use statistical mechanics to derive thermodynamic properties from the microscopic, molecular perspective. Throughout the class, an emphasis is placed on connecting physical-chemistry concepts to the “real world” and current research in the field.
- Exams:** There will be three midterm exams and a comprehensive final exam. Midterms will be given on Thursday evenings at 7:00 – 9:00 pm in ISC 1127 during the time slot reserved for Chem 391 and Chem 309 labs. Make-up exams are not typically permitted. However, excused absences that are submitted in writing and in advance will be accommodated.
- Problem Sets:** Learning physical chemistry is all about working the problems. To encourage you in this direction, 10 problem sets will be assigned and evaluated throughout the semester. You are strongly encouraged to work together on the problem sets. Groups consisting of 2 – 4 students should submit one copy of the completed problem set with the first page listing the name and corresponding signature of each contributor. Your signature indicates that you are seeking credit for an equal contribution to the problem set. Problems will be graded for completion and occasionally, for accuracy. Late work will not be graded.
- Evaluation:** Your grade will be computed from the total points in this course, which are earned as follows:
- |                     |                       |
|---------------------|-----------------------|
| Midterm Exams (60%) | 3 x 200 pts = 600 pts |
| Final Exam (25%)    | 1 x 250 pts = 250 pts |
| Problem Sets (15%)  | 10 x 15 pts = 150 pts |
- Although there is not a formal participation component of your evaluation, it is essential that you are an active participant in the course. Be inquisitive, ask questions, work the problems (then work them again), and come to office hours.

**Chem301 Approximate Course Schedule:**

<b>Week</b>	<b>Topics</b>	<b>Reading</b>	<b>Important Dates</b>
8/25	Why Thermodynamics? Thermodynamics Definitions	1.1-1.2,1.4-1.5	
8/30	The 1 <sup>st</sup> Law, Work, Heat, Internal Energy, and Enthalpy	2.1-2.10	PS1 due 9/3
9/6	Importance of State Functions Thermochemistry	3.1-3.5 4.1-4.5	PS2 due 9/10
9/13	Entropy and the 2 <sup>nd</sup> Law	5.1-5.7	PS3 due 9/17
9/20	Absolute Entropy and the 3 <sup>rd</sup> Law Gibbs and Helmholtz Energies	5.8-5.9 6.1-6.2	Review: 9/22, in class <b>Exam 1: 9/23, 7 – 9 pm</b>
9/27	Equilibrium and Spontaneity: Gibbs Energy of Mixtures and Reactions	6.3-6.8, 6.10	PS4 due 10/1
10/4	Relative Stability of Phases, Phase Diagrams	8.1-8.3, 8.5-8.6, 9.1-9.4	PS5 due 10/8
10/13	Two-Component Phase Diagrams Why Quantum Mechanics?	9.10 12.1-12.4, 12.5-12.7	No class 10/11 PS6 due 10/15
10/18	The Schrödinger Equation, Wave Functions, Probability	13.2-13.5, 14.1-14.5	PS7 due 10/22
10/25	Particle in a Box Basic Probability Theory	15.2 29.1-29.2	Review: 10/27, in class <b>Exam 2: 10/28, 7 – 9 pm</b>
11/1	Microstates, Configurations, and the Boltzmann Distribution	29.3-29.4, 29.6, 30.1-30.2	PS8 due 11/5
11/8	Partition Functions	30.4, 13.1, 31.1-31.5, 31.7-31.10	PS9 due 11/12
11/15	Statistical Thermodynamics: Internal Energy, Heat Capacity, Entropy	32.1-32.5	Review: 11/17, in class <b>Exam 3: 11/18, 7 – 9 pm</b>
11/22	Statistical Thermodynamics (con't)	32.6	No class 11/24, 11/26
11/29	Chemical Equilibrium, Summary PChem Jeopardy	32.7	PS10 due Jeopardy: 12/3, in class

**Final Exam: Friday, 12/10, 2:00 – 5:00 pm**