

Chemistry 441**Elements of Physical Chemistry****Fall 2007**

Professor Gene Lamm

Lecture: Tuesday and Thursday 11:00 to 12:15, Room 128 Natural Science Building.

Office: Room 250, Chemistry Building, Thursdays 2:00-4:00, or by appointment.

email: glamm@louisville.edu

Recitation: Jessica Koehler, Tuesday, 2:00 to 2:50, Room 110 Natural Science Building.

This syllabus may be adjusted due to time constraints, missed classes, or similar reasons.

Text: Physical Chemistry for the Biosciences, Raymond Chang, University Science Books, Sausalito, 2005

Grading: 4 exams (30 pts. each), problem sets (10 pts. total), lowest exam grade dropped.

A: 88-100

B: 75-87

C: 63-74

D: 50-62

F: 0-50

Course requirements: CHEM 202, and PHYS 222 or 229, and MATH 206. Credit will not be given for this course and CHEM 465-466. 3 credit hours: 3 class lecture hours and 1 recitation hour per week.

Objectives: This course is designed for B.A. chemistry majors or B.S. chemistry majors with a business concentration. The general topics covered in this one-semester undergraduate course in physical chemistry are thermodynamics, kinetics and quantum theory with applications to biophysical systems. Emphasis is placed on a clear, conceptual understanding of the physical ideas involved as well as their description within the framework of basic calculus.

Important dates for the fall semester:

August 20: Classes begin

September 3: Labor Day holiday

October 8-9: Fall Break

October 11: Last day to withdraw from a course

November 21-25: Thanksgiving holiday

December 3: Last day of classes

December 4: Reading Day

December 5-11: Final examinations

December 13: Commencement

Chem 441 Schedule

This schedule is **tentative**. Topics within chapters may not be discussed in textbook order, nor may all topics in a chapter be covered. (**PS** = problem set, to be turned in during Recitation.)

Week 1

| | | | | | |
|------|----|----|------------|---|--|
| Aug. | Tu | 21 | Chapter 2: | Systems; ideal gases; kinetic theory of gases | |
| | Th | 23 | Chapter 3: | First law; work and heat; enthalpy | |

Week 2

| | | | | | |
|--|----|----|------------|-------------------------------|--|
| | Tu | 28 | Chapter 3: | Heat capacity; gas expansions | |
| | Th | 30 | Chapter 3: | Calorimetry; thermochemistry | |

Week 3

| | | | | | |
|-------|----|---|------------|--------------------------------|-----------------|
| Sept. | Tu | 4 | Chapter 4: | Entropy; second law; third law | PS 1 due |
| | Th | 6 | Chapter 4: | Gibbs and Helmholtz energies | |

Week 4

| | | | | | |
|--|----|----|-------------|------------------|-----------------|
| | Tu | 11 | Chapter 4: | Phase equilibria | PS 2 due |
| | Th | 13 | Exam review | Ch. 2, 3, 4 | |

Week 5

| | | | | | |
|--|----|----|---------------------------|--|--|
| | Tu | 18 | Exam 1 (30 points) | | |
| | Th | 20 | Chapter 5: | Ideal solutions, Raoult's and Henry's Laws | |

Week 6

| | | | | | |
|--|----|----|------------|--|--|
| | Tu | 25 | Chapter 5: | Thermodynamics of mixing; colligative properties | |
| | Th | 27 | Chapter 5: | Electrolytes; membranes | |

Week 7

| | | | | | |
|------|----|---|------------|--|-----------------|
| Oct. | Tu | 2 | Chapter 6: | Chemical equilibria of gases and solutions | PS 3 due |
| | Th | 4 | Chapter 6: | Ligand binding; bioenergetics | |

Week 8

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|--|----|----|-----------------------|----------------------|--|
| | Tu | 9 | Mid-term Break | | |
| | Th | 11 | Chapter 8: | Acid-base equilibria | |

Week 9

| | | | | | |
|--|----|----|---------------------------|-----------|-----------------|
| | Tu | 16 | Exam review | Ch. 5,6 8 | PS 4 due |
| | Th | 18 | Exam 2 (30 points) | | |

Week 10

| | | | |
|----|----|------------|---|
| Tu | 23 | Chapter 9: | Chemical kinetics; reaction order; molecularity |
| Th | 25 | Chapter 9: | Potential energy surfaces; reaction rate theory |

Week 11

| | | | |
|---------|----|-------------|---------------------------------------|
| Tu | 30 | Chapter 10: | Catalysis; enzyme kinetics |
| Nov. Th | 1 | Chapter 11: | Quantum theory; wave-particle duality |

Week 12

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|----|---|---------------|--|-----------------|
| Tu | 6 | Chapter 11: | Schrödinger equation and review ch. 9-11 | PS 5 due |
| Th | 8 | Exam 3 | | |

Week 13

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|----|----|-------------|-----------------------|-----------------|
| Tu | 13 | Chapter 12: | Chemical bonds | PS 6 due |
| Th | 15 | Chapter 13: | Intermolecular forces | |

Week 14

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|----|----|---------------------------|-----------------------------------|
| Tu | 20 | Chapter 14: | Spectroscopy (MW, IR, electronic) |
| Th | 22 | Thanksgiving break | |

Week 15

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|----|----|---------------|-----------------------------------|-----------------|
| Tu | 27 | Chapter 14: | Spectroscopy and review ch. 12-14 | PS 7 due |
| Th | 29 | Exam 4 | | |

No final exam will be given.