

CHM 3400: Physical Chemistry (for the Biosciences)

Fall Semester 2011 (3 credits)

- Instructor:** David Wei, 311D Chemistry Lab Building (CLB), wei@chem.ufl.edu, 352-392-2050
- Office hours:** W(12:35-1:35 pm), F(10:45-11:45 am) 311 CLB
- Lectures:** M,W,F 5th period (11:45 am-12:35) 207 LEI
- TA: Joe Duchene** jduchene@chem.ufl.edu
Office Hours: T (9:30-10:30 am) and TH (9:30-10:30 am) 313 CLB
- Aims:** To provide students with a solid understanding of the concepts of Physical Chemistry and their application to chemical and biological systems.
- Text book:** Physical Chemistry for the Biosciences, by Raymond Chang; University Science Books, Sausalito, CA. ISBN #1-891389-33-5.
- Home work:** Problem sets will be made available throughout the semester, which will be graded.
- Exams:** The course consists of two in-class exams during the semester as well as a comprehensive final. The exams will cover homework problems and will emphasize understanding of the lecture material and problem solving. There will be no make-up exams. All exams will be closed book.
Only for the final exam: you can bring one hand-written letter-size sheet with your own notes with formulae etc. that aid understanding of the course.
Exam I: Mon SEP 26 in class
Exam II: Mon Oct 31 in class
Final comprehensive exam: Tue Dec 13

7:30-9:30 am, 207 LEI.

Grading:

The in-class exams are worth 100 points (2x100 = 200 pts max). The final comprehensive exam is worth 200 pts. The total points for homework are 80 point: each one is worth maximum point if turned in on time, and turning in late will cost 2 points per day. The homework assignments will also be graded for content. In addition there will be 20 points for in-class quiz.

Total = (2x100) + 200 + 80 + 20 = 500 points

Proposed Grade Levels:

A: 461 – 500

A-: 441 - 460

B+: 421 - 440

B: 401 – 420

B-: 381 - 400

C+: 361 - 380

C: 341 - 360

C-: 321 - 340

D+: 301 - 320

D: 281 - 300

D-: 261 - 280

E: 260 and below

Course policies:

Attendance will not be recorded, but participation in lectures and demonstration periods is important in assimilating the course material and there will be in-class quiz that counts 20 points for your final score. Since exams are during normal class hours, make-up exams are granted **solely** at the discretion of the instructor. Any request for make-up exams should have a legitimate excuse, and be made to Dr. Wei as far in advance as possible. Students should also familiarize themselves with the UF Student Honor Code posted on the web at www.chem.ufl.edu/~itl/honor.html. Students with disabilities must first register with the Dean of Students Office; the Dean of the

Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation.

Miscellaneous: Requests for letters of recommendation should only be made after the final exam.

Tentative Lecture Schedule CHM 3400

| Date | Topic | Textbook | HW |
|---------|---|-------------|----|
| M 08/22 | Introduction | 1 | |
| W 08/24 | Ideal and real gases | 2 (7-21) | |
| F 08/26 | Kinetic gas theory | 2 (21-25) | |
| M 08/29 | Maxwell distribution laws and molecular collisions | 2 (25-31) | |
| W 08/31 | First Law of Thermodynamics | 3 (39-49) | |
| F 09/02 | Heat capacity and gas expansions | 3 (49-59) | |
| M 09/05 | <i>No class (Labor Day)</i> | | |
| W 09/07 | Calorimetry | 3 (59-74) | H1 |
| F 09/09 | Second Law of Thermodynamics: Entropy | 4 (81-86) | |
| M 09/12 | Second Law of Thermodynamics: Carnot engine, entropy change | 4 (87-95) | |
| W 09/14 | Third Law of Thermodynamics, Gibbs free energy | 4 (95-110) | |
| F 09/16 | Phase equilibria | 4 (110-117) | |
| M 09/19 | Ideal solutions, chem. potential | 5 (127-131) | |
| W 09/21 | Thermodynamics of mixing, real solutions | 5 (131-142) | H2 |
| F 09/23 | Colligative properties | 5 (142-154) | |
| M 09/26 | EXAM I (in-class) | | |
| W 09/28 | Electrolyte solutions | 5 (154-170) | |
| F 09/30 | Colligative properties of electrolyte solutions, biological membranes | 5 (170-181) | |
| M 10/03 | Chemical equilibrium | 6 (193-203) | |
| W 10/05 | Ligand binding to macromolecules | 6 (209-217) | |
| F 10/07 | Bioenergetics | 6 (217-229) | H3 |
| M 10/10 | Electrochemistry | 7 (sel. p.) | |
| W 10/12 | Chemical kinetics | 9 (311-324) | |
| F 10/14 | Molecularity of reaction | 9 (324-332) | |
| M 10/17 | Effect of temperature and PES | 9 (332-336) | |

| | | | |
|----------------|---|-----------------------------|-----------|
| W 10/19 | Reaction rate theories, reactions in solution | 9 (336-342, 346-349) | |
| F 10/21 | Enzyme catalysis | 10 (363-372) | |
| M 10/24 | Allosteric interactions and pH | 10 (382-396) | H4 |
| W 10/26 | Foundation of quantum mechanics | 11 (401-414) | |
| F 10/28 | Heisenberg uncertainty principle, Schroedinger equation | 11 (414-426) | |
| M 10/31 | Exam II (in-class) | | |
| W 11/02 | Atomic orbitals and periodic table | 11 (426-439) | |
| F 11/04 | <i>No class (UF homecoming)</i> | | |
| M 11/07 | The chemical bond | 12 (447-458) | |
| W 11/09 | Molecular orbital theory | 12 (458-468) | H5 |
| F 11/11 | <i>No class (UF holiday)</i> | | |
| M 11/14 | Coordination compounds | 12 (469-483) | |
| W 11/16 | Spectroscopy: fundamentals and micro-wave | 14 (513-526) | |
| F 11/18 | Infrared and electronic spectroscopy | 14 (527-539) | |
| M 11/21 | Magnetic resonance | 14 (539-554) | |
| W 11/23 | Luminescence, lasers, optical activity | 14 (554-568) | |
| F 11/25 | <i>No class (Thanksgiving)</i> | | |
| M 11/28 | Photochemistry and photosynthesis | 15 (575-586) | H6 |
| W 11/30 | Vision and biological effects of radiation | 15 (586-594) | |
| F 12/02 | Macromolecules | 16 (599-608) | |
| M 12/05 | Review lecture I | | |
| W 12/07 | Review lecture II | | |
| | | | |
| T 12/13 | 7:30-9:30am Final exam | | |
| | | | |