CHM 3400-P341: Physical Chemistry (for the Biosciences)

Fall Semester 2024 (3 credits)

Instructor:	David Wei, 311D Chemistry Lab Building (CLB), wei@chem.ufl.edu, 352-392-2050
Lectures:	M, W, F 2nd period (8:30 AM-9:20 AM) Location: LEI207
Office hours:	M (1-2 PM), F (1-2 PM) or by appointment Location: CLB311D outside round table
Aims:	To provide students with a solid understanding of the concepts of physical chemistry and their application to chemical and biological systems.
Textbook:	Physical Chemistry for the Biosciences, by Raymond Chang; University Science Books, Sausalito, CA. ISBN #1-891389-33-5.
Homework:	Problem sets will be made available throughout the semester, which will be graded. Assignments should be hand-written or printed and turned in **on the due date**. Please write your name and UFID clearly on each page.
Exams:	The course consists of **three** in-class exams during the semester as well as a comprehensive final. The exams will emphasize understanding of the lecture materials and problem-solving. All exams will be closed book. **Only for the final exam**: you can bring one hand-written letter-size sheet with your notes with formulas, which aid understanding of the course. **Exam I**: Friday, September 27 in class **Exam II**: Friday, October 25 in class **Exam III**: Friday, November 22 in class **Final comprehensive exam**: Thursday. December 12 10:00 AM-12:00 PM LEI207.

Grading:	The in-class exams are worth 100 points. **You are allowed to choose two higher scores to be counted in your final grade**. The final comprehensive exam is worth 200 pts. The total points for homework are 100 pts: each is worth the maximum point if turned in on time, and late submission will incur a 2 pts deduction per day. The assignments will also be graded for content. **Total = 100+100 + 200 + 100 = 500 points** **Proposed Grade Levels:** A: 450 – 500 A-: 420 – 449 B+: 390 – 419 B: 360 – 389 B-: 340 – 359 C+: 320 – 339 C: 300 – 319 C-: 280 – 299 D+: 265 – 279 D: 250 – 264 E: 249 and below
Course policies:	Attendance will not be recorded, but participation in lectures and demonstration periods is important in assimilating the course material. 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 no later than 1 week prior to the exam date. 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.
Canvas e-learning site	All communications must be done through the e-learning site, including homework, deadlines, grades, and announcements. It is your responsibility to check this site for updates. Please do not email the instructor's personal email accounts.
Online course evaluation:	Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/.

Tentative Lecture Schedule CHM 3400

Introduction
Ideal and real gases
Kinetic gas theory
Maxwell distribution laws and molecular collisions
First Law of Thermodynamics
Heat capacity and gas expansions
Calorimetry
Second Law of Thermodynamics: Entropy
Second Law of Thermodynamics: Entropy
Second Law of Thermodynamics: Carnot engine, entropy change
Third Law of Thermodynamics, Gibbs free energy
Phase equilibria
Ideal solutions, chem. potential
Colligative properties
Thermodynamics of mixing, real solutions
Electrolyte solutions
Colligative properties of electrolyte solutions, biological membranes
Chemical equilibrium
Ligand binding to macromolecules
Bioenergetics
Electrochemistry
Chemical kinetics
Molecularity of reaction
Effect of temperature and PES
Reaction rate theories, reactions in solution
Enzyme catalysis
Enzyme catalysis II
Foundation of quantum mechanics
Heisenberg uncertainty principle, Schrödinger equation
Atomic orbitals and periodic table
The chemical bond
Molecular orbital theory
Coordination compounds
Spectroscopy: fundamentals and micro-wave
Infrared and electronic spectroscopy
Magnetic resonance
Luminescence, lasers, optical activity