CHM 3400: Physical Chemistry (for the Biosciences)

Spring Semester 2018 (3 credits)

Instructor:	Nicolas Polfer, 311C Chemistry Lab Building (CLB), polfer@chem.ufl.edu, 392-0492
Office hours:	**M** (9:35-10:25 am), **T** (4:05-4:55 pm), **F** (3:00-3:50 pm) **CLB 313**
Lectures:	**M**,**W**,**F** 2nd period (8:30-9:20 am) **LEI 207**
Office hours: (Matt Bell)	m.bell04@ufl.edu **W** (11:45-12:35) **R** (12:50-1:40 pm) and **F** (1:55-2:45 pm) **CLB 313**
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 (May 3rd). The exams will cover homework problems and will emphasize understanding of the lecture material and problem solving. All exams will be closed book. **Only for the final exam**: you can bring one hand-written letter-size sheet (double-sided) with your own notes with formulae etc. that aid understanding of the course. **Exam I** Mon Feb 19th in class **Exam II** Mon Apr 9th in class **Final comprehensive exam** Wed May 3rd

5:30-7:30 pm, 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 100 point (9x11 + 1): 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.

Total = (2x100) + 200 + 100 = 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. 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. Polfer 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.

The class material can be found on the e-learning website http://elearning.ufl.edu/

Tentative Lecture Schedule CHM 3400

Date	Topic	Textbook	HW
M 01/08	**1.** Foundation of quantum mechanics	**11** (401-414)	
W 01/10	**2.** Heisenberg uncertainty principle, Schroedinger equation	**11** (414-426)	
F 01/12	**3.** Atomic orbitals and periodic table	**11** (426-439)	
M 01/15	*No class (MLK Day)*		
W 01/17	**4.** The chemical bond	**12** (447-458)	
F 01/19	**5.** Molecular orbital theory	**12** (458-468)	
M 01/22	**6.** Coordination compounds	**12** (469-483)	
W 01/24	**7.** Spectroscopy: fundamentals and micro-wave	**14** (513-526)	**H1**
F 01/26	*ipython workshop*		
M 01/29	**8.** Infrared and electronic spectroscopy	**14** (527-539)	
W 01/31	**9.** Magnetic resonance	**14** (539-554)	**H2**
F 02/02	**10.** Luminescence, lasers, optical activity	**14** (554-568)	
M 02/05	**11.** Ideal and real gases	**2** (7-21)	
W 02/07	**12.** Kinetic gas theory	**2** (21-25)	**H3**
F 02/09	**13.** Maxwell distribution laws and molecular collisions	**2** (25-31)	
M 02/12	**14.** First Law of Thermodynamics	**3** (39-49)	
W 02/14	**15.** Heat capacity and gas expansions	**3** (49-59)	
F 02/16	**16.** Calorimetry	**3** (59-74)	**H4**
M 02/19	**Exam I (in-class)**		
W 02/21	**17.** Second Law of Thermodynamics: Entropy	**4** (81-86)	
F 02/23	**18.** Second Law of Thermodynamics: Carnot engine, entropy change	**4** (87-95)	
M 02/26	**19.** Third Law of Thermodynamics,	**4** (95-110)	

	Gibbs free energy		
W 02/28	**20.** Phase equilibria	**4** (110-117)	
F 03/02	**21.** Ideal solutions, chem. potential	**5** (127-131)	**H5**
M 03/05	*No class (spring break)*		
W 03/07	*No class (spring break)*		
F 03/09	*No class (spring break)*		
M 03/12	**22.** Thermodynamics of mixing, real solutions	**5** (131-142)	
W 03/14	**23.** Colligative properties	**5** (142-154)	
F 03/16	**24.** Electrolyte solutions	**5** (154-170)	
M 03/19	**25.** Colligative properties of electrolyte solutions, biological membranes	**5** (170-181)	**H6**
W 03/21	**26.** Chemical equilibrium	**6** (193-203)	
F 03/23	**27.** Ligand binding to macromolecules	**6** (209-217)	
M 03/26	**28.** Bioenergetics	**6** (217-229)	
W 03/28	**29.** Electrochemistry	**7** (sel. p.)	**H7**
F 03/30	**30.** Chemical kinetics	**9** (311-324)	
M 04/02	**31.** Molecularity of reaction	**9** (324-332)	
W 04/04	**32.** Effect of temperature and PES	**9** (332-336)	**H8**
F 04/06	**33.** Reaction rate theories, reactions in solution	**9** (336-342, 346-349)	
M 04/09	**Exam II (in-class)**		
W 04/11	*Fitting data workshop*		
F 04/13	**34.** Enzyme catalysis (guest lecture)	**10** (363-372)	
M 04/16	**35.** Photochemistry and photosynthesis	**15** (575-586)	
W 04/18	**36.** Vision and biological effects of radiation	**15** (586-594)	
F 04/20	*Scientific paper review*		**H9**
M 04/23	Review lecture I		
W 04/25	Review lecture II		

W 05/03 **Final exam**