

Physical Biochemistry (CHEM 305)

Fall Semester 2016

Instructor: Jan Florián

Office: Flanner Hall, room 314B (enter through the room 314A)
Telephone: 508-3785
Email: jfloria@luc.edu
Lecture: Mo, We, Fri, 8:15 – 9:05 AM, Cudahy 207
Discussion: Mo 9:20 – 10:10 PM, Cuneo 210
Office Hours: We 2:00 – 3:00 PM

Textbook: “*Physical Chemistry: Principles and Applications in Biological Sciences*” 5th edition, by Tinoco, Sauer, Wang, Puglisi, Harbison and Rovnyak, Pearson Education Inc. 2014, ISBN-10: 0-13-605606-7

Required Materials:

1. “Mastering Chemistry online learning system for Tinoco 5th edition.
2. A calculator capable of scientific notation.

Course Overview: Physical chemistry is a set of general principles and experimental methods for exploring chemical and biological systems. In this class, we will learn and discuss these principles and methods, while emphasizing their molecular interpretation and biochemical applications. We will cover chapters 2 – 5 and 7 – 9 and 11 – 14 of Tinoco’s text; a tentative schedule of lecture topics accompanies this syllabus. Your attendance at lecture and discussion is expected. The correct answers of the exam questions may require knowledge of all information presented in the lecture, discussion, textbook, and Mastering, as well as the necessary general chemistry, physical, and mathematical prerequisites. It is recommended that you read (and think about) appropriate chapter of the textbook prior to the lecture covering that chapter, and ask the questions relevant to the covered material during the lecture and the discussion.

Course/Instructor Evaluation (IDEA): After the withdrawal deadline and up to the last day of final exams, students will be given the opportunity to evaluate both the instructor and the course by using an online survey. The essential IDEA objectives for this course are (1) learning fundamental principles and theories that relate to biochemistry, and (2) learning to apply what you know from the course to solving problems.

Homeworks: Homework problems use the *Mastering Chemistry* online learning system. You will need to buy the access code and register at <http://masteringchemistry.com/site/register/new-students.html> before accessing the homeworks for the first time. During the registration, select your textbook, school, and the course id **LUCPBIOCHEM2016**. Homework assignments will be due every Mo at 10:59 PM. Due date may be postponed, for excused absences that last five or more days.

Exams: Two 50 minute mid-semester exams and one 120 minute final exam will be given during semester. The final exam is cumulative. No make-up exams will be administered for mid-semester exams. Students who miss a mid-semester for valid reasons will receive the percent score for the missed exam that will be calculated as the weighted average of his percent scores from other mid-semester exam (0.36 weight) and final exam (0.64 weight). For the absence to be classified as having valid reason, students must notify the instructor about their absence before the exam and provide valid excuse (e.g. a doctor’s note) that covers the exam day. The doctor’s note must be signed and contain legible name, hospital/office address and phone number and the reason for the absence. If the student disagrees with her/his score for the exam, she/he must request re-grading within one week from the day he/she received the graded exam. The exam questions will originate from end-of-chapter problems (and their small variations), Mastering, or a college general chemistry textbook.

Grading scheme: Your grade will be calculated using grading points that you earned in two mid-semester exams, final exam and homework assignments: 100% score from the better of your two mid-semester exams = 30 grading points, 100% score from the weaker of your two mid-semester exams = 15 grading points, 100% score from the final exam = 40 grading points, and 100% on the homework problems = 15 grading points (note that your weakest mid-term exam result will be carry a lower weight).

Letter grades for the class will be calculated using both a fixed scale and a Gaussian scale. The scale that yields a better letter grade will determine your final letter grade.

Fixed scale

A = 102 – 85 grading points; A⁻ = 85 - 80; B⁺ = 80 - 75; B = 75 - 70; B⁻ = 69 - 65; C⁺ = 65 - 60; C = 60 - 55; C⁻ = 55 - 50; D⁺ = 50 - 45; D = 45 - 40; F = Less than 40 grading points.

Gaussian scale (M denotes a median value, and σ denotes standard deviation):

Earned Grading Points	Letter Grade	Earned Grading Points	Letter Grade
M – 0.2 σ to M + 0.2 σ	C+	M – 0.5 σ to M – 0.2 σ	C+
M + 0.2 σ to M + 0.5 σ	B-	M – 0.8 σ to M – 0.5 σ	C-
M + 0.5 σ to M + 0.8 σ	B	M – 1.1 σ to M – 0.8 σ	D+
M + 0.8 σ to M + 1.1 σ	B+	M – 1.4 σ to M – 1.1 σ	D
M + 1.1 σ to M + 1.4 σ	A-	less than (M – 1.4 σ)	F
More than (M + 1.4 σ)	A		

Midterm grade: Your midterm grading points will be based on your first midterm exam (0.6 weight) and homework (0.4 weight).

Activity ('nice') points: Correct answers of instructor's questions during lectures and discussions, insightful points or questions from the students that complement the lecture or discussion, correct corrections of substantial errors made by the instructor, and correct solution of the problems on the board during the discussion may receive appreciation from the instructor in the form of a 'nice' point. Nice points awarded for student questions are limited to one point per one student per one lecture. Each student can submit only two questions or one error correction per lecture that can be considered for issuing a nice point. A student must claim his/her nice points with the instructor at the end of the class in which the points were issued (i.e. leaving class early will result in a loss of all nice points issued to the student during that class). **10 students with highest number of nice points at the end of semester will receive two extra grading points, 10 additional students with the next highest number of nice points will receive one extra grading point.** These extra grading points will be added to students total grading point score, which he/she earned from exams and homework, after the median and standard deviation values were calculated. The issuance of nice points is fully at the discretion of the instructor and cannot be disputed by the students. However, the issuance of nice points and extra grading points can be stopped any time during semester by the petition signed by more than 50% of the total number of students enrolled in the class at the day when the petition was delivered to the instructor.

Ethical Considerations:

Students will not collaborate on any exam or homework. Only those devices and materials permitted by the instructor may be used to assist in examinations. Students will not represent the work or nice points of others as their own. During the examinations, students must follow the seating arrangement determined by the instructor. Any student caught cheating during exam, or student who modifies his/her exam after it was returned back to him/her for inspection will be reported to the Deans office and will receive zero points for the given exam.

Tentative Schedule (exact exam dates and coverage will be announced in class and on Sakai)

Week 1	Ch 2: The first law of thermodynamics, enthalpy, bond energies, molecular interpretations.
Week 2	Ch 3: Labor day. The second law of thermodynamics, entropy, Gibbs and Hemholtz free energy.
Week 3	Ch 3,4: Noncovalent interactions. Free energy and chemical equilibria, biochemical applications of thermodynamics.
Week 4	Ch 5: Statistical foundations of biophysical chemistry, statistical thermodynamics.
Week 5	Ch 7: Exam 1. Electrochemistry, biological redox reactions.
Week 6	Ch 8: Motions of biological macromolecules.
Week 7	Ch 9: Mid-semester break. Rates of chemical reactions, reaction mechanisms, rate laws.
Week 8	Ch 9: Transition-state theory, Marcus theory.
Week 9	Ch 11: Foundations of quantum mechanics, Schrodinger equation.
Week 10	Ch 11: Particle –in-a-box, harmonic oscillator, electronic structure of atoms. Last-day to drop the class.
Week 11	Ch 12: Exam 2. Biomolecular structures and interactions.
Week 12	Ch 12, 13: Molecular dynamics, electromagnetic spectrum, optical spectroscopy.
Week 13	Ch 13: Fluorescence and phosphorescence, infrared and Raman spectroscopy. Thanksgiving break.
Week 14	Ch 14: Nuclear magnetic resonance, nuclear spin.
Week 15	Ch 14: Relaxation mechanisms, multidimensional NMR spectroscopy.

Final Exam, Thursday December 15, 9:00 – 11:00 AM, Cudahy 207