Physical Chemistry II (CHEM 302)
Spring 2016
Lecture: Tu, Th 10:00 - 11:15 AM, Flanner Hall - 105
Discussion: We 8:15 – 9:05 AM, Flanner Hall - 105

Instructor:	Jan Florián
Office:	Flanner Hall (FH)-314B
Office Hours:	We 2:00-3:00 PM
Phone:	(773) 508-3785
Email:	jfloria@luc.edu

Course Objectives

Part 1: Quantum Mechanics and Atomic Structure

1. Understand the basic concepts of quantum mechanics and underlying mathematics
2. Apply quantum mechanics to the study of atomic structure

Part 2: The Chemical Bond

3. Apply quantum mechanics to the study of molecular structure

Part 3: Foundations of Chemical Spectroscopy

4. Understand how light interacts with matter on the molecular level
5. Understand the relationship between quantum mechanics and spectroscopy.

Required Materials:

Physical Chemistry, Atkins & De Paula, W.H. Freeman, 10th Edition

A simple calculator (i.e. calculator not capable of being programmed or drawing graphs)

Recommended books: Applied Mathematics for Physical Chemistry 3rd ed. by James R. Barrante

Grading

Class activity	Maximum number of grading points
Quizes	20
Exam 1	20
Exam 2	20
Final exam	50
Activity	10
Correction	-20 (the lowest of: Quiz total score, Exam 1 score, Exam 2 score or 2/5 of the final exam score; in other words, a significant part of your weakest exam score will be disregarded).
Total	100

Letter grades for the class will be assigned using the following scale

Earned Grading Points	Letter Grade	Earned Grading Points	Letter Grade
> 80	A	44 – 50	C
74 – 80	A-	38 – 44	C-
68 – 74	B+	32 – 38	D+
62 – 68	B	26 – 32	D
56 – 62	B-	26 or less	F
50 – 56	C+		

Exams: The two midterm exams and the final exams will be cumulative. Make-up exams will not be allowed. 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. Only non-programmable scientific calculators (e.g. TI-30XA) will be allowed during the exam. Students must follow the seating assignments.

Activity ('nice') points: One nice point will be issued for successfully solving a problem on the board during the discussion. Additional nice points may be issued for exceptional creativity in solving problems on quizzes and exams. Students may decide anytime prior to the final exam to opt-out of the activity points and choose instead to increase (by 10 grading points) the maximum number of points that they can obtain from the final exam. This decision must be conveyed to the instructor by email. The issuance of nice points is fully at the discretion of the instructor and cannot be disputed by the students.

Ethical Considerations: *Students will not collaborate on any exams or quizzes. Only those materials and devices permitted by the instructor may be used to assist in examinations. Students will not represent the work of others as their own. Any student caught cheating during an exam will be reported to the Deans office and will receive zero points for the given exam.*

Class preparation: In order to understand the material presented during lectures and discussions, it is important to come to the class with good background knowledge. This can be achieved by reading (and thinking about) material in the textbook, reviewing appropriate material from calculus, physics and general chemistry classes, and solving end-of-chapter problems. It is recommended that students devote to the preparation for this class a minimum of two hours every day.

Tentative Schedule

Date	Lecture topics	Reading
19-Jan	QM postulates and formalism I	Chapter 7A
21-Jan	QM postulates and formalism II	Chapter 7B
26-Jan	QM postulates and formalism III, **Quiz 1** (Chapter 7A&B)	Chapter 7C
28-Jan	Particle in a box	Chapter 8A
2-Feb	QM motion in 2-D and 3-D, Tunneling	Chapter 8A
4-Jan	Vibrational motion	Chapter 8B
9-Feb	Rotational motion **Quiz 2** (Chapter 8A&B)	Chapter 8C
11-Feb	Rotational motion in 3D, angular momentum, spin	
16-Feb	**Exam 1** (Chapters 7 & 8)	review
18-Feb	Hydrogenic atoms and spectroscopic transitions	Chapter 9A
23-Feb	Many-electron atoms	Chapter 9B
25-Feb	Atomic spectra	Chapter 9C
1-Mar	Valence-bond theory, **Quiz 3**	Chapter 10A
3-Mar	Molecular orbital theory	Chapter 10B
	Spring break (March 7 – 12)	
15-Mar	Diatomic molecules	Chapter10B&C
17-Mar	Polyatomic molecules, The Huckel approximation	Chapter 10E
22-Mar	Molecular Symmetry	Chapter 11A
24-Mar	Group Theory	Chapter 11B
29-Mar	Applications of Symmetry	Chapter 11C
31-Mar	Molecular spectroscopy 1, **Quiz 4**	Chapter 12A
5-Apr	Molecular rotation and microwave spectroscopy	Chapter 12B&C
7-Apr	Molecular vibrations, IR and Raman spectroscopy	Chapter 12D
12-Apr	Vibrational spectroscopy of polyatomic molecules	Chaper 12E
14-Apr	**Exam 2** (Chapters 7 – 12)	review
19-Apr	Electronic spectra	Chapter 13A
21-Apr	Fluorescence and phosphorescence	Chapter 13B
26-Apr	Magnetic resonance – general principles	Chapter 14A&B
28-Apr	NMR & EPR spectra	Chapter 14C&D
3-May	Final Exam, FH-105, 1-3 pm	

Note: The instructor reserves the right to make changes to the schedule. Any changes to exam dates will be announced in class and on Sakai.