Physical Chemistry II (CHEM 302)
Spring 2013
Lecture: Tu, Th 10:00 - 11:15 AM, Dumbach Hall - 120
Discussion: Tu, Th 11:30 - 12:20 PM, Dumbach Hall - 236

Instructor:	Jan Florián
Office:	Flanner Hall (FH)-314B
Office Hours:	Wedn 2:00-3:00 PM and immediately after each class
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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:

1. Peter Atkins, Julio de Paula, and Ronald Friedman, Quanta, Matter and Change: A Molecular Approach to Physical Chemistry, W. H. Freeman, New York 2009, ISBN: 0-7167-6117-3

3. a calculator capable of scientific notation but not capable of being programmed or drawing graphs

Recommended books: Student solutions manual, ISBN978-0-1995-5907-7

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

Grading

Class activity	Maximum number of grading points
Quizes	30
Midterm exam	30
Final exam	60
Correction	-20 (the lowest of 2/3 of Quizes, 2/3 of Midterm exam or 1/3 of the final exam score)
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: Midterm and final exams will be cumulative. Make-up exams will be allowed for excused absences. For the absence to be deemed excused, a doctors note or other evidence must be presented to the instructor that covers the day of the exam and the period between the exam and the day this evidence was presented to the instructor. Students with unexcused exam absence will receive zero points for the missed exam. 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.

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	Class	Topic	Textbook reading assignment (page)
15-Jan	1	QM postulates and formalism I	1 - 21, 50 - 51
17-Jan	2	QM postulates and formalism II, Quiz 1 - Fundamentals	22 - 29
22-Jan	3	QM postulates and formalism III, Quiz 2 – Math background 1 - 2	30 - 40
24-Jan	4	Commutators, Uncertainty principle	41 - 49
29-Jan	5	Nanosystems 1 - Particle in a box, Quiz 3 - QM postulates and formalism	52 - 61
31-Jan	6	Nanosystems 1 - Vibrational motion	61 - 67, 69 - 75
5-Feb	7	Complex numbers, Nanosystems 2 - QM motion in 2-D and 3-D, Quiz 4 – Nanosystems 1	76-82
7-Feb	8	Nanosystems 2 - Rotational motion, angular momentum, spin	82 - 96
12-Feb	9	Hydrogenic atoms, Quiz 5 – Complex numbers and Nanosystems 2	97 - 108
14-Feb	10	Spectroscopic transitions	108 - 114
19-Feb	11	Many-electron atoms 1, Quiz 6 – Hydrogenic atoms and spectroscopic transitions	114 - 122
21-Feb	12	Vectors, Many-electron atoms 2	122 - 136
25-Feb	13	Chemical bond 1, Quiz 7 – Vectors and Many-electron atoms	137 - 146
27-Feb	14	Chemical bond 2, Matrix algebra	146-157, 168-171
5-Mar		Spring break	
7-Mar		Spring break	
12-Mar	15	Hückel approximation, Quiz 8 – Chemical bond 1&2, Matrix algebra	157 - 167
14-Mar	16	Computational chemistry	172 - 195
19-Mar	17	Midterm exam	1 - 195
21-Mar	18	Molecular symmetry 1	196 - 204
26-Mar	19	Molecular symmetry 2	204 - 219
28-Mar	20	Molecular assemblies 1 – intermolecular interactions	220 - 229
2-Apr	21	Molecular assemblies 2 - liquids, Quiz 9 – Hückel approximation, Molecular symmetry	229-237, 244-253
4-Apr	22	Electric and magnetic properties of solids	276 - 286
9-Apr	23	Fourier series, Rotational spectra, Quiz 10 – Molecular assemblies and properties of solids	293-308, 310 - 312
11-Apr	24	Vibrational spectra	313 - 337
16-Apr	25	Electronic spectroscopy 1	338 - 350
18-Apr	26	Electronic spectroscopy 2	350 - 370
23-Apr	27	Magnetic resonance 1	371 - 386
25-Apr	28	Magnetic resonance 2	386 - 408
1-May		Final Exam, Dumbach 120, 1 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 Blackboard.