

PHYSICAL CHEMISTRY – Quantum and Spectroscopy (Chmy 371-001)

FALL 2009 TENTATIVE SYLLABUS

MWF 0700 - 0800 SCI 218

INSTRUCTOR: Dr. Will Wickun (Office: SCI 215, X2027; william.wickun@msubillings.edu)

OFFICE HOURS: TBA (anytime my door is open or by appointment)

TEXT: Physical Chemistry, 8th ed., Peter Atkins and Julio de Paula (2006)

<u>Class</u>	<u>Chapter</u>	<u>Topic</u>
1	11	Failures of classical physics; duality
2		The Schrödinger equation; Born interpretation
3		Operators and observables
4		Superposition and expectation values
5	12	Particle in a box; 1-D, 2-D; tunneling
6		Vibrational energy levels and wave functions
7		Rotation in 2-D and 3-D
8		Electron spin
9		EXAMINATION #1 Friday 2 Oct
10	13	Structure & spectra of hydrogenic atoms
11		Atomic orbitals, energies; transitions & selection rules
12		Orbital approximation; SCF orbitals
13		Singlet & triplets states; spin-orbit coupling
14	14	Term symbols; selection rules; effect of mag fields
15		Valence bond theory: hydrogen molecule; diatomics
16		VB theory: polyatomics
17		Molecular orbital theory: H molecule ion; diatomics
18		MO theory: notation; heteronuclear diatomics
19		Molecular orbitals for polyatomic systems
20		Review day
21		
22	16	Spectroscopy 1: techniques; intensities; linewidths
23		Veteran's Day – No classes
24	17	Rotational levels; transitions; Raman; nuclear statistics
25		Molecular vibrations; selections rules; anharmonicity
26		Vib-rot spectra; vibrational Raman spectra of diatomics
27		Normal modes of polyatomics; spectra; vibrational Raman
28		Spectroscopy 1: wrap-up
29		Spectroscopy 2: Characteristics of electronic transitions
30		Fluorescence; phosphorescence; dissociation; predissociation
31		Lasers: principles, examples, applications
32		Spectroscopy 2: wrap-up
33		

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34	18	Spectroscopy 3: Magnetic resonance; energies; shifts
35		Magnetic vector; linewidths; nuclear Overhauser effect
36		Spectroscopy 3: wrap-up

GRADING:

Examinations 1-3	60%
Homework	20%

Scale

100 - 90%	A
89 - 80%	B
79 - 65%	C
64 - 55%	D

HOMEWORK: Homework will be assigned weekly. Answers for homework from the text are provided in the back of the text and I will provide detailed solutions for other problems.