

**CHEMISTRY 327**

Section 501

Fall, 2009

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- Textbook: **Physical Chemistry**, Robert J. Silbey, Robert A. Alberty, and  
Moungi G. Bawendi, 4th Edition (John Wiley & Sons, Inc.)
- Reference Books: **Physical Chemistry**, Peter Atkins and Julio de Paula, 7<sup>th</sup> edition  
(W. H. Freeman and Co.)  
**Quantum Chemistry & Spectroscopy**, Thomas Engel (Pearson  
Benjamin Cummings)  
**Physical Chemistry**, Ira N. Levine, 5<sup>th</sup> Edition (McGraw-Hill)
- Lecture Notes: The lecture notes are available on the web page for Chem. 327-  
Watson which may be reached at  
<http://cyclotron.tamu.edu/watson/ch327>.
- Grading:
- |                    |                      |
|--------------------|----------------------|
| Hour Examinations; | 3 x 100 = 300 points |
| Final Examination; | = 100 points         |
| <u>Homework*</u>   | = 70 points          |
| Total              | = 470 points         |

*\* Credit on each homework problem requires demonstration of (a) a diligent effort to arrive at a solution and (b) a fundamentally correct approach.*

- Examination Dates:
- |                 |                                  |
|-----------------|----------------------------------|
| Hour Exam I -   | Wednesday, September 30          |
| Hour Exam II -  | Wednesday, October 28            |
| Hour Exam III - | Wednesday, December 2            |
| Final Exam -    | Monday, December 14 (8:00-10:00) |

**Note:** You must take all three examinations and the final to receive a grade in this course.

## Syllabus

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B. Failures of classical mechanics	I-3	p. 296
1. Black body radiation	I-3	p. 340
2. The photoelectric effect	I-15	
3. Compton scattering	I-17	
4. Wave properties of particles	I-18	
5. The Bohr model	I-20	
C. The development of quantum theory	I-23	
1. The uncertainty principle	I-23	p. 299
2. The Schrödinger equation	I-24	p. 301
3. Interpretation of the wavefunction	I-25	
4. Mathematical behavior of the wavefunction	I-29	
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B. The particle in a box - Translational motion	II-3	p. 311
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2. Two dimensions	II-6	
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D. The harmonic oscillator - Vibrational motion	II-13	p. 322
E. Motion of a particle on a circle - Rotation in a plane	II-20	p. 329
1. Quantum theory treatment	II-21	
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F. Rotation on a sphere	II-26	p. 331
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3. Electron configurations	III-25	p. 377
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A. The $H_2^+$ molecule	IV-1	p. 398
1. Preliminary considerations	IV-1	
2. The Schrödinger equation for $H_2^+$	IV-3	
3. Molecular orbital description of $H_2^+$	IV-6	
B. The variation method	IV-9	p. 400
C. Molecular orbitals for homonuclear diatomic molecules	IV-16	p. 407-416
D. Term symbols for diatomic molecules	IV-21	p. 410
E. Heteronuclear diatomic molecules	IV-24	
F. Valence bond method	IV-26	p. 416
G. Polyatomic molecules	IV-27	
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