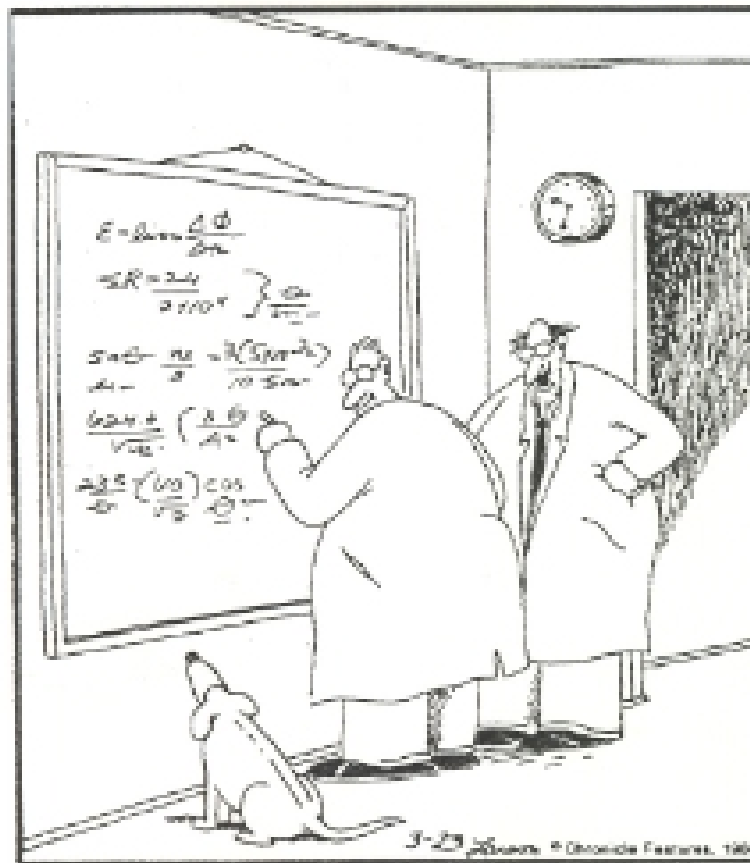


Welcome to Chem. 327

THE FAR SIDE

By GARY LARSON



"Ohhhhhh . . . Look at that, Schuster . . .
Dogs are so cute when they try to comprehend
quantum mechanics."

CHEMISTRY 327

Section 501

Full, 2009

<u>Instructor:</u>	Prof. R. L. Watson - 219 Cyclotron Institute, 845-1411, watson@comp.tamu.edu
<u>Textbook:</u>	Physical Chemistry , Robert J. Silbey, Robert A. Alberty, and Moungi G. Bawendi, 4th Edition (John Wiley & Sons, Inc.)
<u>Reference Books:</u>	Physical Chemistry , Peter Atkins and Julio de Paula, 7 th edition (W. H. Freeman and Co.) Quantum Chemistry & Spectroscopy , Thomas Engel (Pearson Benjamin Cummings) Physical Chemistry , Ira N. Levine, 5 th Edition (McGraw-Hill)
<u>Lecture Notes:</u>	The lecture notes are available on the web page for Chem. 327- Watson which may be reached at http://cyclotron.tamu.edu/watson/ch327 .
<u>Grading:</u>	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.

<u>Examination Dates:</u>	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

<u>Lecture notes heading</u>	<u>Lecture notes page</u>	<u>Textbook</u>
I. Introduction to Quantum Theory	I-1	Ch. 9, p. 295
A. Historical perspective	I-1	
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	
5. Operators and observables	I-30	p. 304
6. The commutator	I-33	p. 321
<i>Review questions</i>	I-34	
<i>Formulas</i>	I-36	
II. Applications of Quantum Theory	II-1	
A. The free particle	II-1	
B. The particle in a box - Translational motion	II-3	p. 311
1. One dimension	II-3	
2. Two dimensions	II-6	
C. Barrier penetration	II-9	p. 338
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	
2. The angular momentum operator L_z	II-24	p. 331
F. Rotation on a sphere	II-26	p. 331