

**Chemistry 3890**  
**Honors Physical Chemistry I**  
**Fall 2011**

Course syllabus

LAST REVISED: August 23, 2011

1. **The need for Quantum Mechanics** (brief review)
2. **Classical mechanics** (brief review)
3. **The wavefunction and the Schrödinger equation**
4. **Solving the Schrödinger equation**
5. **Particle in a box**
6. **Free particle**
7. **Barrier problems**
8. **QM operators, eigenvalues & eigenfunctions**
9. **Quantum states and measurement**
10. **Harmonic oscillator**
11. **QM in 3 dimensions: Cartesian coordinates**
12. **QM in 3 dimensions: Spherical polar coordinates**
13. **Rotational energy & angular momentum**
14. **2-particle systems & central forces**
15. **Hydrogen atom**
16. **Angular momentum & magnetic fields**
17. **Indistinguishable particles**
18. **Approximation methods: Variational principle**
19. **Approximation methods: Perturbation theory**
20. **Chemical bonding & QM**
21. **Spectroscopy: general aspects**
22. **Spectroscopy of diatomic molecules**