

# CHEM 225/221: 2008 Syllabus

## Quantum Mechanics

1. Classical versus quantum systems.
2. Postulates of quantum mechanics.
  - (a) Operators and operator algebra.
  - (b) Uncertainty relation.
3. Exactly solvable quantum systems.
  - (a) Free particle in one, two and three dimensions.
  - (b) Free particle in a one, two and three dimensional box.
  - (c) Harmonic oscillator.
    - i. Tunneling and zero point energy.
  - (d) Particle on a ring.
  - (e) Particle on a sphere.
  - (f) Hydrogen atom.
4. Multi-electron systems
  - (a) Helium and the independent electron approximation
  - (b) Term symbols.
  - (c) Perturbation theory and the variational theorem.
  - (d) The electronic structure of molecules.
  - (e) Chemical bonding.
  - (f) Molecular orbitals.
  - (g) Spectroscopy.