B.A. Junior Year – Spring Semester

CEM 384 Introductory Physical Chemistry II

Description: Physical chemistry of microscopic systems: quantum mechanics, spectroscopy.

Credit: 3 credits (3 hours lecture and 1 hour recitation per week)

Prerequisite: (CEM 383) Not open to students with credit in CEM 392 or CEM 461.

Lecture Topics:

1. Failures of Classical Physics (Blackbody Radiation; Photoelectric Effect; Electron Diffraction; Atomic Spectra; Bohr Model of the Hydrogen Atom; Heat Capacities)
2. Foundations of Quantum Mechanics (Heisenberg's Uncertainty Relation; Wave-Particle Duality; Schrödinger's Equations; Wave Functions)
3. Exactly Solvable Models (Particle in a Box, Harmonic Oscillator, and Rigid Rotator)
4. Hydrogen and Hydrogenic Atoms
5. Many Electron Atoms (Pauli Principle, Hund's Rules, Aufbau Principle, Periodic Trends)
6. Chemical Bonding (Valence Bond Theory; Molecular Orbital Theory; Homonuclear and Heteronuclear Diatomics; Symmetry; Polyatomic Molecules)
7. Spectroscopy (Rotational; Infrared and Raman; Vibrational-Rotational; Electronic; Lasers)
8. Magnetic Resonance Spectroscopy (ESR, NMR, MRI)
9. Cohesion and Structure (Intermolecular Forces; Hydrogen Bonding)
10. Solids (Lattice Energy, Crystal Structure, Diffraction)