

Chemistry 211
Fall 2009
Course Syllabus

Molecular Symmetry

symmetry operations and point groups
representations and character tables

Atomic Structure

Atomic orbitals - hydrogen-like wavefunctions - symmetry of orbitals
Energy levels and many electron atoms
Configurations and the Periodic Table - an atomic structural view
Periodic trends - ionization energies, electron affinities, electronegativities

Covalent Bonding in Inorganic Systems

Localized bond approach
Orbitals, overlap and hybridization
M.O. theory
symmetry considerations in bonding - σ , π and δ bonds
Homonuclear and heteronuclear diatomics
Delocalized bonding
3c-2e bonds
Triatomic and AB₃ systems

Introduction to Coordination Compounds

Coordinate covalence and coordination number
Ligands of various types
Coordination geometries of different coordination numbers
Isomerism and chirality in coordination compounds

Main Group Chemistry - covalent chemistry surrounding carbon

Hydrogen
The inorganic chemistry of carbon
A silicon world
 electronic structure of semiconductors
 silicates and silicones
Boron, Group 3 elements and electron deficient compounds
A brief survey of other main group elements

Coordination Chemistry. I - Bonding

Crystal field theory, symmetry and MO theory
Crystal field stabilization energy and electronic spectra
 LS coupling, CF splittings and correlation diagrams
The 18e⁻ rule in organometallic chemistry and counting electrons

Coordination Chemistry. II - Reactions and Mechanisms

Substitution - associative and dissociative
Representative chemistry of Co(III) and Pt(II)
Lability and Inertness
Electron transfer - inner and outer sphere
Photochemistry and metal complexes for solar energy conversion
Electron transfer in metalloenzymes and FeS clusters