General Chemistry I for Science Majors

Matter and Measurement

- Elements and periodic table organization
- Chemical/physical and intensive/extensive properties
- SI and metric systems
- Scientific notation
- Derived units of volume and density
- Accuracy, precision and significant figures
- Dimensional analysis

Atoms, Molecules and Ions

- Law of mass conservation
- Law of definite proportions
- Dalton's atomic theory
- Atomic composition--electrons, protons and neutrons
- Atomic mass, atomic number and isotopic symbols
- Compounds and mixtures
- Predicting ionic and molecular compounds based on bond type
- Naming acids and bases
- Naming ionic and molecular compounds

Formulas, Equations, and Moles

- Balancing chemical equations
- The mole & molar mass
- Molecular mass
- Stoichiometry
- Mass relationships in chemical equations
- Yields of chemical reactions

- Limiting reactants
- Percent Composition
- Reactions in Aqueous Solution
- Salt dissociation and net ionic equations
- Strong and weak acids and bases
- Assigning oxidation numbers
- Definitions of redox
- Balancing redox reactions (this is NOT covered in later chapters)

Atomic structure

- Shell structure of atoms, orbital shapes, orbital energies in H and many-electron atoms as applied to Electron configurations
- Atomic spectroscopy
- Periodic table

Ions and Ionic bonding

- Electronic configuration of ions, octet rule
- Properties related with ions: IP, EA, change in radius
- Ionic solids: crystal lattice
- Ionic bonding: energetic contributions to ionic bond
- Chemistry of alkali metals, alkaline earth metals and halogens

Covalent Bonds and Molecular Structure

- Physical origin of the covalent bond
- Comparison of covalent and ionic bonds
- Polar covalent bonds
- Electronegativity

- Lewis structures
- Formal charges
- Resonance structures/hybridization
- VSEPR model for predicting the shape of molecules

Thermochemistry: Chemical energy

- Temperature
- Heat
- Calorimetry
- Heat capacity
- Work & Heat
- Energy
- Internal energy
- Enthalpy
- Hess's law
- Heat of formation

Gases

- Gasses and gas pressure
- Kelvin Temperature Scale
- The gas laws
- The ideal gas law
- Gas stoichiometry
- Partial pressures and Dalton's Law
- Kinetic molecular theory of gasses