Chapter 1

1. Identify ionic and covalent bonds
2. Apply octet rule
3. Draw Lewis structures
4. Formal charge
5. Resonance - what is it
6. Filling of atomic orbitals (aufbau, Hund's rules, etc,)
7. MO - formation of bonding and anti-bonding
8. Hybridization
9. Restricted rotation about C=C - cis and trans
10. VSPER - apply
11. Bond line formulas

Chapter 2

1. Hydrocarbons , including benzene
2. Polarity of bonds, and dipole moments
3. Functional groups
4. Intermolecular forces - types, including H bonds
5. Solubility
6. IR - six frequencies and why

Chapter 3

1. Bond breaking - homolytic and heterolytic
2. Bronsted acids
3. Lewis acids
4. Acidity, Ka and pKa
    a. Relative strengths of acids and bases
5. Nucleophiles and electrophiles
6. Enthalpy, entropy, and free energy change

Chapter 4

1. Petroleum as source of alkanes, refining, octane number
2. Names of first 10 alkanes
3. Homologous series, trends of bp, mp etc
4. Branched alkanes
5. Constitutional isomers
6. IUPAC nomenclature - alkanes, alkenes, alcohols, cyclic and bicyclic
7. Rotation about single bonds - staggered vs eclipsed
    a. Anti vs gauche butanes

    b. Newman projections
8. Stereoisomers - definition, cis and trans
9. Ring stain - sources
10. Cyclic alkanes - cis and trans isomers
11. Conformation and stabilities of cyclohexane and its derivatives
    a. Energetics
12. Ring strain - sources and applications
13. 3 reactions
14. C-13 use for number of unique carbon atoms