# Chem 345 Lecture Outline – Fall Semester 2010 Part I

***Week 1, Lecture 1***
***August 23rd (Chapter 1 and General Chem Review)***

1. Course Introduction (PowerPoint on Website)
2. First Worksheet – Lewis structures and & formal charge
    a. Formal charge = #Valence electrons – lone pair (non bonding electrons) – ½ of all covalently bonded electrons
    b. Drawing Lewis structures (first worksheet)

***Week 1, Lecture 2***
***August 25th***

1. First Worksheet – Lewis structures and & formal charge
    a. Covalent & ionic bonding
    b. Formal charge = #Valence electrons – lone pair (non bonding electrons) – ½ of all covalently bonded electrons
    c. Drawing Lewis structures (first worksheet)
        1. methane, ammonia, molecular oxygen (as diradical)
2. Period Table and electronic configuration
        1. Nobel gas electronic configuration
        2. valence and core electrons
        3. electronegativity

1. Begin Chapter 1 & General Chem Review
    a. Molecular geometry (tetrahedral, trigonal planar, linear)
        1. borane, methane, ammonia, water, HF, $CO_2$
        2. how to draw using wedge & dash
    b. Lewis Acids & Bases
        1. Curved arrow notation (bond making/breaking)
            1. $F:^- + BF_3 \rightarrow BF_4(^-)$ new covalent bond
            2. $Li\cdot + Cl\cdot \quad Li^+Cl^-$ new ionic bond (a salt)

***Week 1, Lecture 3***
***August 27th***

    c. Molecular geometry & Lewis structures
        i. ethane, carbon tetrachloride, cyclopropane, ozone, sulfuric & phosphoric acids
    d. Atomic structure, read through Chapter 1, review from general chemistry
    e. The nature of the covalent bond
        ii. Diatomic hydrogen
            1. hydrogen radical, proton, hydride
        iii. Average bond length
            1. potential energy diagram
        iv. Bond dissociation energy (BDE)
            1. $H_2 \rightarrow 2H\cdot$
        v. Orbital overlap & valence bond theory
        vi. Bonding molecular orbitals of $H_2$
            1. two “parent” 1s orbitals overlap to form a “child” molecular orbital that maintains characteristics of the parents