**Department of Chemistry Syllabus**

This syllabi is advisory only. For details on a particular instructor's syllabus (including books), consult the instructor's course page. For a list of what courses are being taught each quarter, refer to the Courses page. *Every instructor has prerogative to teach the course as they see fit and ultimately the instructor's syllabus supersedes all others.*

**CHE124B - Main Group Element Chemistry**

Approved:

Suggested Textbook: (actual textbook varies by instructor; check your instructor)

N.N. Greenwood, A. Earnshaw: Chemistry of the Elements, 2nd Edition, Butterworth-Heinemann, Oxford, 1997, ISBN: 0750633654

C. E. Housecroft, A. G. Sharpe, *Inorganic Chemistry*, Prentice Hall, 3rd edition, December **2007**, Paperback, ISBN 0131755536, $170

Suggested Schedule:

Main Group Element Trends (Size, Ionization Energies, …)

Groups: (Occurrence, Production, Uses, Group Trends, Special Topics)

Group 1: Hydrogen and Hydrides

Group 1: Li, Na, K, Rb, Cs, Electrides and Alkalides

Group 17: F, Cl, Br, I; Trends of Covalent Bond Strengths

Group 18: He, Ne, Ar, Kr, Xe; Compounds.

Group 2: Be, Mg, Ca, Sr, Ba; Water Softening

Group 16: O, S, Se, Te; Singlet Oxygen, Ozone Depletion, Oxoacids, Superacids.

Group 13: B, Al, Ga, In, Tl; Boranes and Carboranes; Wade Rules, 3c-2e bonds.

Group 15: N, P, As, Sb, Bi; Fluxionality, Inert Pair Effect

Group 14: C, Si, Ge, Sn, Pb; Fullerenes, Carbon Nanotubes, Greenhouse Effect, Zeolites, (Mak, Zhou, p313), Silicone

Organometallic Chemistry of the Main Group Elements (if time permits)

Additional Notes: Evaluation consists of 10 min quiz on select Fridays (one selected problem from homework): 25% of grade, a midterm exam (25% of grade), and a final exam (50% of grade).

Learning Goals:

This second installment in the 124 series covers the production, structure and reactivity of the main group elements and their compounds. Students learn to classify elements into electron poor, electron rich and electron normal, and to rationalize trends in size and electronegativity, bonding preferences. Structures, electron configurations and preferred oxidation states of the elements are covered, as are syntheses, and properties of their compounds, including organometallic ones. Students also learn to balance chemical equations in terms of electrons and stoichiometry, and they are introduced to the concepts of hard and soft acids and bases.