

UNIVERSITY OF CALGARY
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
WINTER 2014

COURSE: CHEMISTRY 531 – Advanced Inorganic Chemistry I

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	MWF	10:00-10:50	SS012	Dr. Shimizu	SB 403	220-5347	gshimizu@ucalgary.ca	TuW 1-2

TEXTBOOK: *None required Chem 331 and 333 texts (Housecroft, Huheey) will be beneficial as well as R. Crabtree, 2005, The Organometallic Chemistry of the Transition Metals, 4th (or 3rd) Ed.*

TOPICS COVERED:**A. Organometallic Chemistry**

Review- Molecular Orbital (MO) Theory and Oh complexes with σ -/ π -donor ligands

Electron counting/Ligand survey

18 electron rule

C=O bond strength in carbonyl complexes

Hydride complexes and spectroscopy; Di-hydrogen as ligand

Phosphines: Steric and Electronic Effects

Multinuclear NMR

Alkyl & Aryl Ligands

π -Bonded Organic Ligands: Alkenes & Alkynes, Allyls, 1,3-Butadiene & Cyclobutadiene, Arenes & Cyclopentadiene

Schrock Carbenes (Alkylidenes); N-Heterocyclic Carbenes (NHCs)

B. Organometallic Reactions at Metal Centers

Ligand Substitution Reactions in Organometallic Complexes

Ligand Substitution Reactions in Metal Carbonyl Complexes

Oxidative Addition

Oxidative Coupling/ Reductive Elimination

Alkyl / Hydride Migratory Insertion; β -Hydride elimination;

Catalysis; Catalytic Cycle; Heterogeneous vs. Homogeneous Catalysis

Alkene Hydrogenation; Hydroformylation

Monsanto Synthesis; Alkene Oligomerization; Alkene & Alkyne Metathesis

C. Inorganic Materials

Metal oxide structures

Methods of solid state characterization (calorimetry, X-ray diffraction, thermogravimetry, electron microscopy)

Electronic conduction

Porous Solids

Metal organic frameworks