

UNIVERSITY OF CALGARY
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
FALL 2015

COURSE: CHEMISTRY 331, Inorganic Chemistry: Main Group Elements

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	MWF	13:00-13:50	ES 162	Dr. R. Roesler	SB 339	220-5366	roesler@ucalgary.ca	M 11:00 - 12:00 W 15:00 - 16:00

Desire 2 Learn (D2L) course name: <https://d2l.ucalgary.ca/d2l/home/106989>
Departmental Office: SA 229, 220-5341, uginfo@chem.ucalgary.ca

TEXTBOOK: Gary L. Miessler, Paul J. Fischer, Donald A. Tarr., "Inorganic Chemistry", Pearson, Fifth Edition (2014).

TOPICS COVERED AND SUGGESTED READING:

COURSE CONTENTS	Lectures^a	Chapter in Textbook <i>(not all sections will be covered)</i>
ORIGIN OF THE ELEMENTS	1	N/A
ELECTRONIC STRUCTURE OF THE ATOM	2, 3	Chapter 1
Basics Atomic Orbitals Penetration and Shielding Periodic Trends		
BONDING MODELS: DISCRETE STRUCTURES	4 through 7	Chapter 2
Lewis Structures VSEPR Theory Valence Bond Theory Molecular Orbital Theory: Diatomic Molecules		
BONDING MODELS: MOLECULAR SYMMETRY	8 through 12	Chapter 3 and 5
Symmetry Operations and Symmetry Elements Point Groups and Group Theory Vibrational Spectroscopy Molecular Orbital Theory: Polyatomic Molecules		
BONDING MODELS: EXTENDED STRUCTURES	13 through 17	Chapter 6
Packing of Spheres The Unit Cell Metallic and Ionic Lattices Semiconductors: Band Theory Lattice Energy Born-Haber Cycle		
MAIN GROUP ELEMENTS: GENERAL PRINCIPLES	18, 19	N/A
Electronegativity Valence Oxidation number/state Coordination Number		

d- and f-Block Contraction
CHEMISTRY OF THE MAIN GROUP ELEMENTS

20 through 32

Group 1	
Hydrogen	Chapter 10
Alkali Metals	Chapter 11
Complex Ions: Crown Ethers and Cryptands	
Lithium Batteries: Primary and Secondary	
Group 2	Chapter 12
Water Hardness	
Group 13	
Boron	Chapter 13
Electron Deficient Compounds	
Lewis Acidity	
Positive Hyperconjugation	
Boranes and Carboranes	
Wade-Mingos Rules	
Al, Ga, In, Tl	Chapter 13
Inert pair Effect	
Chemical Vapor Deposition	
Group 14	Chapter 14
Carbon Allotropes	
Si, Ge, Sn, Pb	
Hypervalent Compounds	
Semiconductor Grade Silicon	
Negative Hyperconjugation	
Group 15	Chapter 15
Nitrogen	
P, As, Sb, Bi	
Lewis Basicity	
Multiple bonds to oxygen	
Group 16	Chapter 16
Oxygen	
S, Se, Te, Po	
Group 17	Chapter 17
Group 18	Chapter 18
Xenon	

^a The number of lectures allocated to each topic is TENTATIVE