UNIVERSITY OF THE FRASER VALLEY

ORIGINAL COURSE IMPLEMENTATION DATE: June 1994
REVISED COURSE IMPLEMENTATION DATE: September 2019
COURSE TO BE REVIEWED (six years after UEC approval)**:** October 2022
Course outline form version: 10/27/2017

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: CHEM 221	**Number of Credits:** 4 Course credit policy (105)

Course Full Title: Inorganic Chemistry
Course Short Title:
(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)

Faculty: Faculty of Science	**Department (or program if no department):** Chemistry

Calendar Description:

Exploring chemistry of the elements and their inorganic compounds through fundamental concepts: periodicity of properties, molecular orbitals, valence, ionization potential, electron affinity, electronegativity, oxidation states, bonding and structures of inorganic solids, and coordination complexes.

Prerequisites (or NONE):	CHEM 114.
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	

Antirequisite Courses *(Cannot be taken for additional credit.)*
Former course code/number:
Cross-listed with:
Dual-listed with:
Equivalent course(s):
(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar hours	45
Tutorials/workshops	
Supervised laboratory hours	45
Experiential (field experience, practicum, internship, etc.)	
Supervised online activities	
Other contact hours:	
Total hours	**90**

Labs to be scheduled independent of lecture hours: ☐ No ☒ Yes

Special Topics
This course is offered with different topics:
☒ No ☐ Yes *(Double-click on box to select it as checked.)*
If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit
(The specific topic will be recorded when offered.)

Transfer Credit
Transfer credit already exists: *(See **bctransferguide.ca**.)*
☐ No ☒ Yes
Submit outline for (re)articulation:
☐ No ☒ Yes *(If yes, fill in transfer credit form.)*

Grading System
☒ Letter Grades ☐ Credit/No Credit

Expected Frequency of Course Offerings:
Annually
(Every semester, Fall only, annually, every other Fall, etc.)

Department / Program Head or Director: Dr. Cory Beshara	**Date approved:**	May 18, 2018
Faculty Council approval	**Date approved:**	September 7, 2018
Dean/Associate VP: Dr. Lucy Lee	**Date approved:**	September 7, 2018
Campus-Wide Consultation (CWC)	**Date of posting:**	October 19, 2018
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	October 26, 2018

Learning Outcomes:

Upon successful completion of this course, students will be able to:

1. Describe periodic trends (i.e., radii, ionization energy, electronegativity) observed across the periodic table.
2. Apply theories of bonding to describe the properties of inorganic molecules and materials.
3. Describe and predict ionic solid structures based on the periodic trends of the constituent atoms.
4. Apply Crystal Field Theory to rationalize the geometric and electronic structures of transition metal complexes.
5. Correlate experimental results (i.e., photoelectron, UV-Vis spectroscopies, magnetism) with the electronic structure of an inorganic compound.
6. Perform the synthesis and characterization of inorganic compounds in a laboratory safely with care and precision.
7. Interpret laboratory results to establish a connection between experimental and theoretical science.

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion.)*

The course material will be delivered through in-person lectures, in-class problem solving exercises, and out-of-class problem sets and assignments. Weekly laboratory sessions provide hands-on training in inorganic synthetic and characterization techniques.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials *(If more space is required, download Supplemental Texts and Resource Materials form.)*

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Housecroft, C.E., Sharpe, A.G.	Inorganic Chemistry	☒	Pearson	
2.		UFV Lab Manual	☐		
3.			☐		
4.			☐		
5.			☐		

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Laboratory supplies required.

Typical Evaluation Methods and Weighting

Final exam:	40%	Assignments:	10%	Field experience:	%	Portfolio:	%
Midterm exam:	30%	Project:	%	Practicum:	%	Other:	%
Quizzes/tests:	%	Lab work:	20%	Shop work:	%	Total:	100%

Details (if necessary):

Typical Course Content and Topics

1. Electronic structure of Atoms – Atomic orbitals, effective nuclear charge
2. Theories of Atomic Structure and Periodic Trends (i.e., Atomic radii, ionization energy, electronegativity)
3. Covalent bonding and molecular structures – Valence bond theory, VSEPR Theory, Orbital hybridization
4. Molecular Orbital (MO) Theory – Homonuclear diatomics, heteronuclear diatomics, polyatomics
5. Photoelectron Spectroscopy
6. Ionic Solids – Structures, lattice energy calculation
7. Chemistry of Hydrogen
8. Coordination Chemistry – Coordination Number, nomenclature, electronic configuration of transition metal complexes, spin states
9. Crystal Field Theory – Optical (UV-Vis) spectroscopy, magnetism

Typical Laboratory Experiments

1. Qualitative Analysis: Reactions of Transition Metals
2. Infrared Spectroscopy: Coordination by Polyatomic Ions
3. Coordination Chemistry – Werner Complexes
4. Coordination Chemistry – Linkage Isomers
5. Preparation of Compounds with Unusual Oxidation States
6. Synthesis of an Electron-deficient Compound
7. Preparation of an Organosilicon Polymer