OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)

UNIVERSITY OF THE FRASER VALLEY

COURSE IMPLEMENTATION DATE: January 1995
COURSE REVISED IMPLEMENTATION DATE: September 2013
COURSE TO BE REVIEWED: September 2018
(six years after UEC approval) *(month, year)*

OFFICIAL UNDERGRADUATE COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department – see course syllabus available from instructor

CHEM 420	Faculty of Science, Chemistry	3
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS

Advanced Inorganic Chemistry
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course concentrates on organo-transition metal chemistry, with emphasis on bonding theories, the 18-electron rule, and cluster compounds. Emphasis is also placed on the role of organometallic complexes in organic syntheses and catalytic processes.

Note: Students planning to take CHEM 325 should do so in the same semester as either CHEM 320 or CHEM 420.

Note: Students with credit for CHEM 421 cannot take this course for further credit.

PREREQUISITES: CHEM 320
COREQUISITES:
PRE or COREQUISITES:

SYNONYMOUS COURSE(S):
(a) Replaces: **CHEM 421**
(b) Cross-listed with:
(c) Cannot take: for further credit.

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: **45**

STRUCTURE OF HOURS:

Lectures:	**45**	Hrs
Seminar:		Hrs
Laboratory:		Hrs
Field experience:		Hrs
Student directed learning:		Hrs
Other (specify):		Hrs

TRAINING DAY-BASED INSTRUCTION:
Length of course:
Hours per day:

OTHER:
Maximum enrolment: **24**
Expected frequency of course offerings: Every two years
(every semester, annually, every other year, etc.)

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☐ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☐ Yes	☒ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☐ Yes	☒ No

Course designer(s): **Nigel Dance**

Department Head:	**David Fenske**	Date approved:	**April 27, 2012**
Supporting area consultation		Date of meeting:	**June 15, 2012**
Curriculum Committee chair:	**David Fenske**	Date approved:	**June 22, 2012**
Dean/Associate VP:	**Lucila Lee**	Date approved:	**September 7, 2012**
Undergraduate Education Committee (UEC) approval		Date of meeting:	**October 26, 2012**

LEARNING OUTCOMES:

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

1. Critically discuss the relative stability of different organometallic compounds by reference to the 18 electron rule.
2. Describe the ligand-metal bonding in organometallic compounds using Molecular Orbital theory.
3. Critically discuss the evidence for different mechanisms of ligand exchange and other reactions of organo-metallic compounds.
4. Explain the unifying nature of the isolobal concept.
5. Critically compare the nature of boron-cluster and organometallic cluster compounds using the 18 electron rule and the isolobal concept.
6. Interpret NMR spectra of organometallic compounds in terms of structure and fluxionality.
7. Synthesize models of IR spectra of metal carbonyl compounds by consideration of group theory and the nature of metal ligand bonding.

METHODS: *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Presentation of the course will be by inter-related theory classes (lectures) and discussion periods. Audio-visual aids will be used where appropriate.

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

☒ Examination(s) ☐ Portfolio assessment ☐ Interview(s)

☐ Other (specify):

☐ PLAR cannot be awarded for this course for the following reason(s):

TEXTBOOKS, REFERENCES, MATERIALS: *[Textbook selection varies by instructor. Examples for this course might be:]*

"Organometallic Chemistry," G.O. Spessard and G.L. Miessler, current edition,

SUPPLIES / MATERIALS:

STUDENT EVALUATION: *[An example of student evaluation for this course might be:]*

In-term tests	30%
Problem sets	10%
Oral or written presentations	20%
Final examination	40%

COURSE CONTENT: *[Course content varies by instructor. An example of course content might be:]*

- Theories of bonding; molecular orbital description of bonding in organometallics; the 18-electron rule; hard and soft ligands.
- The use of spectroscopic techniques in characterizing organometallic compounds; timescales of various physical techniques and fluxionality.
- Bonding of common ligands, such as carbon monoxide, hydride, phosphine, alkene, and carbene, in organo-transition metal compounds.
- Boron-cluster and metal-cluster compounds; methods of electron counting.
- The isolobal concept and its applications.
- Arene-transition metal complexes.
- The role of organo-transition metal complexes in organic synthesis.