

**UNIVERSITY COLLEGE OF THE FRASER VALLEY**

**COURSE INFORMATION**

**DISCIPLINE/DEPARTMENT:** Chemistry

**IMPLEMENTATION DATE:** June 1994

**Course Revised Implementation Date:** September 2002

**Course to be Reviewed:** September 2006

Chemistry 221

Inorganic Chemistry

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**SUBJECT/NUMBER OF COURSE**

**DESCRIPTIVE TITLE**

**UCFV CREDITS**

**CALENDAR DESCRIPTION:** This course concentrates on the chemistry of non-transition elements and their compounds, with emphasis on symmetry, bonding, periodic properties and the descriptive chemistry of selected groups. The experiments performed in the laboratory component of the course will be directly related to the topics discussed during lectures. (CHEM 221, 222, and 231 are intended for students who wish to take majors or minors in chemistry, or take a combined honours program involving chemistry and another science subject).

**RATIONALE:**

**COURSE PREREQUISITES:** CHEM 112

**COURSE COREQUISITES:** None

<b>HOURS PER TERM FOR EACH STUDENT</b>	<b>Lecture</b>	<b>42</b>	<b>hrs</b>	<b>Student Directed</b>	
	<b>Laboratory</b>	<b>32</b>	<b>hrs</b>	<b>Learning</b>	<b>hrs</b>
	<b>Seminar</b>	<b>15</b>	<b>hrs</b>	<b>Other - specify:</b>	
	<b>Field Experience</b>		<b>hrs</b>	<u><b>Tutorials &amp; lab</b></u>	<b>24 hrs</b>
				<b>TOTAL</b>	<b>98 HRS</b>

**MAXIMUM ENROLMENT:** 24

**Is transfer credit requested?**  Yes  No

**AUTHORIZATION SIGNATURES:**

**Course Designer(s):** Dr. N.S. Dance **Chairperson:** T. Cooper  
**Curriculum Committee**

**Department Head:** Noham Weinberg **Dean:** J. Snodgrass

**PAC: Approval in Principle** \_\_\_\_\_ **PAC: Final Approval:** October 24, 2001  
**(Date)** **(Date)**

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**SYNONYMOUS COURSES:**

(a) replaces     N/A      
                  (course #)

(b) cannot take     N/A     for further credit  
                  (course #)

**SUPPLIES/MATERIALS:**

Laboratory supplies required.

**TEXTBOOKS, REFERENCES, MATERIALS** (List reading resources elsewhere)

**Inorganic Chemistry**, 2<sup>nd</sup> Ed., Shriver, Atkins and Langford. Publisher: W.H. Freeman, ISBN 0-7167-2079-5  
**UCFV Laboratory Manual for Chemistry 221.**

**OBJECTIVES:**

The course is designed to enable students to:

1. Relate theories of bonding and structure to the properties of inorganic materials.
2. Perform laboratory work safely and with care and precision.
3. Interpret laboratory results in terms of theoretical material covered in the course, and to understand the relationship between experimental and theoretical science.

**METHODS:**

Presentation of the course will be interrelated theory classes ("lectures"), discussion periods ("seminars"), and laboratory sessions. Audio visual aids will be used where appropriate, and students will be given instruction in the use of various instrumental techniques, and in the use of an academic library.

**STUDENT EVALUATION PROCEDURE:**

Evaluation will be based on the following system:

First in-term test	20%
Second in-term test	20%
Laboratory (reports and technique)	25%
Final examination	35%

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**COURSE CONTENT:**

1. Theories of Atomic Structure. Introduction to wave mechanics.
2. Theories of Bonding. Application of VSEPR theory, molecular orbital theory, valence bond theory to inorganic systems.
3. The Solid State. Metals, ionic solids, covalent solids, silicates and semi-conductors. Radius Ratio rules and calculation of Lattice Energy of an Ionic Compound.
4. Chemical Properties of Main-Group Elements and their Compounds, in Relation to the Periodic Table.
5. Thermodynamic and Kinetic Effects in Main-Group Chemistry.
6. Descriptive Main-Group Chemistry.  
Selected topics will concentrate on the chemistry of:
  - (a) hydrogen
  - (b) Group 14
  - (c) Group 16
  - (d) Electron-deficient compounds.
  - (e) Recent advances in inorganic chemistry.

**LABORATORY EXPERIMENTS** 8 or 9 labs will be chosen from the following:

- |               |  |
|---------------|--|
| Experiment 1. | Preparation and Thermal Decomposition of an Electron-deficient Compound, $[\text{C}_6\text{H}_5)_3\text{P}]_2\text{CuBH}_4$ .              |
| Experiment 2. | Preparation of Tin(IV) Iodide and Two Derivatives, $[\text{Et}_4\text{N}]_2[\text{SnI}_4\text{Cl}_2]$ and $\text{SnI}_4(\text{PPh}_3)_2$ . |
| Experiment 3. | Preparation and NMR of Tris(2,4-pentanedionato) silicon hydrogendichloride.  |
| Experiment 4. | Preparation and Spectroscopy of $\text{Ph}_4\text{Sn}$ and derivatives.  |
| Experiment 5. | Infra-Red Spectroscopy of Deutero-Substituted Compounds.   |
| Experiment 6. | Preparation of $(\text{EtOPh})_2\text{Te}$ and $(\text{EtOPh})_2\text{TeCl}_2$ .   |
| Experiment 7. | Spectroscopy (Ir, NMR, and Mass spec) of $(\text{EtOPh})_2\text{Te}$ and $(\text{EtOPh})_2\text{TeCl}_2$ .                                 |
| Experiment 8. | Preparation of Silicone Polymers.  |
| Experiment 9. | Relative Stability of Tin(IV) and Lead(IV). Preparation of Ammonium Hexachlorostannate(IV) and Ammonium Hexachloroplumbate(IV).            |