CHEMISTRY 220: INORGANIC CHEMISTRY
COURSE OUTLINE
WINTER 2003

A. General Information

Instructor: Neil Meanwell Office: F348B **Telephone**: 370-3448

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Office Hours: Mon: 10:30 - 11:30 am and 1:30 - 2:30 pm, Tuesday: 10:30 - 11:30 am and 12:30 - 1:30 pm, Wednesday: 10:30 - 11:30 am, Friday: 10:30 - 11:30 am. Otherwise, by appointment.

Scheduled Lectures: Monday (F 334) 9:30 - 10:20 am, Tuesday (F 201) 9:30 - 10:20 am, Wednesday (F334) 9:30 - 10:20 am.

Scheduled Labs: Tuesday 2:30 - 5:20 pm in F 356.

B. Course Textbook *Inorganic Chemistry*, Catherine E. Housecroft and Alan G. Sharpe, Prentice Hall (ISBN 0-582-31080-6). Available from the Camosun Bookstore.

C. Lecture Material

The course will cover the following chapters in the textbook.

Topic

1. Introduction (Chapter 1)

Fundamental particles, atomic number, mass number, and isotopes.
Quantum theory, orbitals of the hydrogen atom and quantum numbers,

Multi-electron atoms and electron configuration, the periodic table, ionisation energies and electron affinities, Lewis structures, valence bond theory, molecular orbital theory, octet rule, electronegativity, dipole moments, MO theory for heteronuclear diatomic molecules, isoelectronic molecules, molecular shape and the VSEPR model, geometrical isomerism.

2. Structure and Bonding

Localised bond approach - Lewis structures, valence bond theory, resonance, hybridisation, VSEPR. Delocalised approach - molecular orbital theory of diatomic and polyatomic molecules, band theory of solids. Contrasting valence bond and molecular orbital theories.

3. d-Block Chemistry: General Considerations (Chapter 19)
Topic overview, ground state electronic configurations, physical properties, reactivity of the metals. Characteristic properties including colour, paramagnetism, complex formation, variable oxidation states. Electroneutrality principle, coordination numbers, isomerism in d-block metal complexes.

4. d-Block Chemistry: Coordination Complexes (Chapter 20)
High- and low-spin states, bonding in d-block metal complexes, crystal field theory, molecular orbital theory, ligand field theory, electronic spectra, magnetic properties, thermodynamic aspects including ligand field stabilisation energies (LFSE), Irving-Williams series, oxidation states in aqueous solution.

5. Chemistry of the d-block Elements: the First Row Metals (Chapter 21)
Introduction occurrence, extraction and uses, overview of physical properties, selected chemistry of the elements scandium to zinc.

6. Homogeneous and Heterogeneous Catalysis (Chapter 26)

Introduction and definitions. Introductory concepts. Homogeneous catalysis and industrial applications. Heterogeneous catalysis.

7. Chemistry of the Group 14 Elements (Chapter 13)

Introduction, occurrence, extraction and uses. Physical properties, allotropes of carbon. Structural and chemical properties of silicon, germanium, tin and lead. Hydrides, carbides, halides and complex halides, oxides, oxoacids and hydroxides. Silicones, sulphides, cyanogen and silicon nitride, aqueous solution chemistry.

8. Chemistry of the Group 18 Elements (Chapter 17)

Introduction, occurrence, extraction and uses, compounds of xenon, krypton and radon.

9. The Trace Metals of Life (Chapter 28)

General terminology, metal storage and transport, dealing with dioxygen, including hemoglobin, myoglobin, cytochromes P-450, biological redox processes, role of zinc.

Note: the above description of the course material is intentionally very brief. A more detailed description is given at the beginning of the course text under "Table of Contents". I will follow the text very closely but may at times hand out additional notes to supplement the book.

D. Assignments

Assignments questions will be set from the relevant chapters in the text as well as some additional questions of my own. The assignments will keep pace with the lectures. Your answers will not be marked but solutions will be posted outside my office. It is **highly recommended** that you do these assignments as they will prepare you very well for the exams.

E. Exams

You will be required to take the following exams:

Midterm 1 Week 7. A written exam of 120 minutes duration covering the material presented in the first six weeks of the course. Written during the lab period of Week 7.

Midterm 2 Week 12. A written exam of 120 minutes duration covering the material presented from Week 6 to Week 12 of the course. Written during the lab period of Week 12.

Final Exam - In the week following the end of the semester. A written exam of 180 minutes duration covering **all** the material presented in the course.

F. Laboratory Work

You will be required to perform a laboratory experiment each week of the semester except for the first and last weeks and when midterms are scheduled. More details will be given during the introductory lab meeting given in the first week.

G. Course Mark

The course mark is derived in the following manner:

2 Midterms	(@ 20%)	40%
Final		35%
Labs		25%

If it is advantageous to the student the theory mark will be solely derived from the final examination. Also, if you score lower in one or more of the midterms than the final exam, then the lower score(s) will be dropped and replaced by an equal weighting from the final exam mark.

H .The Letter grade

The following scale is used:

>95 A+	80-84 B+	65-69 C+	50-59 D	0-49 F
90-94 A	75-79 B	60-64 C		
85-89 A-	70-74 B-			

Notes

1. You must score a **minimum of 50%** on lab marks to be permitted to take the final exam.

2. You must pass both the lecture portion and the laboratory portion in order to pass the course.