**Syllabus**

***CHEM 3503, Inorganic Chemistry I***

**Course Description**

Symmetry, identification of Raman and infrared active vibrations, symmetry-adapted molecular orbital theory of polyatomic molecules, electron-deficient bonding, bonding in coordination complexes, solid-state bonding, ionic lattices. Laboratory will introduce the student to a range of synthetic techniques and physical methods of characterization.

**Prerequisite**

CHEM 2501

**Preclusion**

CHEM 3507 (3503)

**Lectures**

Tuesday and Thursday

2:35 pm – 4:055 pm

Tory Building 208

The lectures will be offered in person only.

**Tutorial**

Wednesday

1:35 pm – 2:25 pm

Tory Building 240

The tutorial will be offered in person only. I will take up the previous week’s assignment in the tutorial, as well as answer any questions that you have. Please email your questions in advance so I can offer a considered (and coherent) answer.

**Drop-In Hours**

Monday and Thursday

9:00 am – 9:30 am

Steacie Building 203b

**Laboratory**

The lab is run by Daniel Sun, and he has an extensive website about it on Brightspace.

**Exams**

In-Term: to be determined

Final: to be determined

**Grading Scheme**

CHEM 3503: the lab is 30% of your mark.

The other 70% is split up as follows:

Assignments 14%

In-term exam 21%

Final exam 35%

For CHEM 3507, there is no lab.

The course is split up as follows:

Assignments 20%

In-term exam 30%

Final exam 50%

**Text**

Gary L. Miessler, Paul J. Fischer, Donald A. Tarr, Inorganic Chemistry, 5th edition, Pearson, ISBN: 978-0321812001

**Topics**

* Inorganic Chemistry
	+ Coordination, nomenclature, and isomerisation
	+ Electron counting and the 18 and 16 electron rules
	+ Thermodynamics of complex formation: formation constants, enthalpy, and entropy
	+ Steric effects and ligand basicity (pKa)
	+ Hard-Soft Acid-Base Theory
	+ The chelate effect
* Coordination Chemistry
	+ Crystal field theory and crystal field stabilization energy
	+ Strong field and weak field ligands; low spin and high spin electron configurations
	+ Term symbols
	+ Microstate analysis and the d-orbitals
	+ Ligand field spectroscopy
	+ Russell-Saunders coupling terms, ligand field terms, correlation diagrams
	+ Assignment of d-d transitions using Tanabe-Sugano diagrams
	+ Determination of d-orbital splitting energies
	+ Repulsion terms and the nephelauxetic effect
* Symmetry and Group Theory
	+ Symmetry elements
	+ Symmetry point groups of molecules
	+ Character tables, symmetry labels
* Molecular Orbitals
	+ Fragment molecular orbital theory
	+ Molecular Orbital (MO) theory and non-directed symmetry adapted LCAOs
	+ application to organic and main group compounds
	+ Symmetry labelled molecular orbital schemes
	+ Molecular orbital theory of transition metal complexes, symmetry labelled MO schemes, the effect of a ligand’s pi-acceptor or pi-donor properties on d-orbital splitting
	+ Paramagnetism and magnetic moment, and the determination of the number of unpaired electrons
* Motion
	+ Chemical applications: chirality, IR and Raman spectroscopy

***Survivors of Sexual Violence***

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated and is survivors are supported through academic accommodations as per Carleton’s Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

***Requests for Academic Accommodation***

You may need special arrangements to meet your academic obligations during the term. Please contact your instructor with any requests for academic accommodation (pregnancy, religion, disability, etc.) during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

For an accommodation request, the processes can be found here:

carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

***Academic Accommodations for Students with Disabilities***

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting an accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. carleton.ca/pmc

***Accommodation for Student Activities***

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline

**Caveat**

Obviously, I reserve the right to make adjustments or changes throughout the semester. Remember that you are responsible to learn about these changes, which will be posted on this website.