Chemistry 6170
Inorganic Chemistry
Fall 2011

Class Meets:

MoSE 1222, MWF 10:05-10:55 AM

Textbooks:

Shriver and Atkins Inorganic Chemistry, 5th Ed. by P. Atkins *et al.* (required)
Symmetry and Spectroscopy: An Introduction to Vibrational and Electronic Spectroscopy by D.C. Harris and M.D. Bertolucci (recommended)

Instructor:

[redacted] (please include CHEM 6170 in the subject line)
[redacted]
Office: MoSE G022

Office Hours:

Wednesday 4:00-5:00; other times by appointment

Course Materials:

All course materials will be made available on the web at T-Square.

Hour Exams:

Exam 1	Friday, 9/16
Exam 2	Friday, 10/14
Exam 3	Friday, 11/18

All hour exams will be given in class.

Final Exam:

Friday, 12/16, 11:30 AM – 2:20 PM, location TBA

Conflict Period: Saturday 12/17, 9:00 AM – 11:50 AM, location TBA

Make-up Exams:

Make-up exams will only be given as required by the Institute's General Catalog, Rules and Regulations, Section 4B3, and then only when arrangements have been made **at least one week prior to the exam** that must be missed because of a scheduled Institute activity. If you must miss an exam, please see me as soon as possible. Do not make travel arrangements that preclude taking the final exam at the scheduled time. All students except those with a conflict as defined by the Registrar must take the final exam at the regularly scheduled time.

Learning Disabilities:

It is the responsibility of any student with a certified learning disability to request special accommodation if it is desired. Such requests must be made well in advance of the time that the accommodation is required and a letter of documentation from the ADAPTS office must be presented at the time of any request.

Grading Policies:

Course grades will be determined based on problem sets, hour exams and the final exam according to the following distribution:

8 problem sets, 2 pts each:	16 pts
3 hour exams, 18 pts each:	54 pts
Final Exam:	30 pts

After the return of each graded assignment or exam, I will announce an estimate of how scores correspond to letter grades. There is no predetermined distribution curve: I will record an A for everyone who does excellent work, a C for anyone who does mediocre work, and so forth.
Re-grades of hour exams must be requested within one week of the date that the graded exams are returned to students. Please email questions to joseph.sadighi@chemistry.gatech.edu with CHEM 6170 in the subject line.

Academic Honesty:

I expect all students to adhere strictly to the Georgia Tech Academic Honor Code. For questions involving any Academic Honor Code issues, please see the information at honor.gatech.edu, or feel free to ask me.

I will supply all information required for exams. The use of electronic devices other than non-programmable calculators during exams and quizzes is not allowed. Consultation with classmates or reference to texts or other documents during exams is cheating. Passing off another student's work as one's own, in any way, is cheating. It is a direct violation of the GT Academic Honor Code, and will be dealt with accordingly.

Questions, Complaints, Comments, Suggestions, Etc.:

Please make me aware of any issues that arise. Feel free to contact me in person, or by a note left in my mailbox or sent via e-mail. For any communication concerning the class, please identify yourself by name in the e-mail, and include CHEM 6170 in the subject line. I will do my best to answer questions, and address any problems, promptly.

Syllabus:

Reading assignments will be announced in class.

The lecture schedule is planned, but subject to change.

I. Bonding

1.	Mon, 8/22	Course Overview; Valence bond and VSEPR approach.
2.	Wed, 8/24	Bonding in linear small molecules.
3.	Fri, 8/26	Bonding in linear small molecules, continued.

4. Mon, 8/29 Molecular symmetry: Symmetry operations and Symmetry elements. PS1 due.
5. Wed, 8/31 Point group assignments for 3D objects and molecules.
6. Fri, 9/2 Character tables.

Mon, 9/5 No class: Institute Holiday.

7. Wed, 9/7 Intro to SALCs; MO theory for water.
8. Fri, 9/9 Matrix representations.
9. Mon, 9/12 MO theory for NH_3. PS2 due.
10. Wed, 9/14 Intro to vibrational spectroscopy.
11. Fri, 9/16 Vibrational spectroscopy, continued.
11. Mon, 9/19 First Hour Exam – covers material through Lecture 9.
12. Wed, 9/21 Acid-Base chemistry and frontier MO interactions: Brønsted Acids and Bases.
13. Fri, 9/23 Acid-Base chemistry and frontier MO interactions: Lewis Acids and Bases.
14. Mon, 9/26 Intro to coordination chemistry. PS3 due.
15. Wed, 9/28 Pi-donors and acceptors: High-spin vs low-spin complexes.
16. Fri, 9/30 Bonding in tetrahedral and square planar geometry.
17. Mon, 10/3 Intro to electronic spectra: Free ions.
18. Wed, 10/5 Electronic spectra: d-d transitions.
19. Fri, 10/7 Electronic spectra: Charge transfer transitions.

II. Reaction Mechanisms and Catalysis

20. Mon, 10/10 Ligand Substitution Mechanisms. PS4 due.
21. Wed, 10/12 Ligand Substitution Mechanisms, continued.

Fri, 10/14 Second Hour Exam – covers Lectures 10-19.

Mon, 10/17 No class – Fall recess.

22. Wed, 10/19 Ligand Substitution Mechanisms in Square Planar Complexes.
23. Fri, 10/21 Redox mechanisms: Outer-sphere vs Inner-sphere.
24. Mon, 10/24 Synthesis of metal-carbon σ-bonds.
25. Wed, 10/26 Synthesis of metal-carbon bonds, cont'd; Oxidative addition.
26. Fri, 10/28 Oxidative addition and reductive elimination, cont'd.
27. Mon, 10/31 β-Hydride elimination from metal alkyls.
28. Wed, 11/2 Abstraction reactions of ligand C–H bonds; metal alkylidenes and carbenes.
29. Fri, 11/4 Olefin metathesis.
30. Mon, 11/7 Class canceled.
31. Wed, 11/9 1,1- and 1,2-insertion reactions.
32. Fri, 11/11 Ziegler-Natta polymerization.

33. Mon, 11/14 Hydrogenation and related catalysis. PS6 due.

IV. Bioinorganic and Bioinspired Chemistry.

34. Wed, 11/16 Dioxygen activation.
    Fri, 11/18 Third Hour exam – covers lectures 20-33.
35. Mon, 11/21 Photosynthesis.
36. Wed, 11/23 Water-splitting in synthetic systems.
    Fri, 11/25 No class: Thanksgiving break.
37. Mon, 11/28 Biological C-H bond activation.
38. Wed, 11/30 Synthetic C-H bond activation.
39. Fri, 12/2 Biological nitrogen fixation.
40. Mon, 12/5 Synthetic nitrogen fixation. PS8 due.
41. Wed, 12/7 Biological CO_2 fixation.
42. Fri, 12/9 Synthetic CO_2 fixation.