Chemistry 6620/4611 **Advanced Inorganic Chemistry I**

Lecturer **Adam S. Veige: veige@chem.ufl.edu** 392-9844
CLB 412b
M, W, F period 3, or by appointment.

Lecture Hours M, W, F Period 4

Textbook Miessler, G. L. and Tarr, D. A., *Inorganic Chemistry 5th Ed.*

Helpful Text Shriver, Atkins, *Inorganic Chemistry, any edition.*
Cotton, Wilkinson, Gauss, *Advanced Inorganic Chemistry*
Cotton, *Chemical Applications of Group Theory*

Grading Midterm Exam (**2**)
Oral Presentation
Final Exam
Problem Sets (~**10**)

Midterm Exam 1, 2	240
Oral Presentation	60
Problem Sets 10	100
Final Exam	200
Total	600

600-525 A, 524-495 A−, 494-472 B+, 471-448 B, 447-425 B−, 424- 403 C+,
402-379 C, 378-356 C−, 355-332 D+, 331-309 D, 308-287 D−, 286-0 E

Note: you have two weeks to request a re-grade of an exam or problem set. After two weeks the score will be final. Warning: I photocopy exams and problems sets and will check with the copy prior to re-grading.

To review the current UF grade point equivalencies go to:
http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html

Examinations Exams: Thursday, October 9th 4:00 – 6:00 pm, and Thursday November 13th 4:00 – 6:00 pm.
Final Exam: Thursday December 18th 12:30 – 2:30.

Oral Presentation **"What kind of chemist am I?"** You will be given 3 x 5 cards to write notes on during the semester. The purpose of the cards is to capture fleeting thoughts and ideas. You will be required to read the primary literature casually during the semester and as thoughts, ideas, questions, data, factoids, tidbits enter your mind you will write them on the card. At

the end of the semester, if you are diligent, the cards will tell you what kind of chemist you are and what your interests are. Another interesting side effect is the cards may reveal a proposal idea that can be developed later. At the end of the semester you will give a 15 minute presentation titled "What kind of chemist am I?" The presentation will include scans of the cards and a discussion of the details. I expect the discussion component of the presentation to be rigorous and reflect the underlying chemistry principles learned throughout the course.

Here I include links to common journals with an emphasis on Inorganic Chemistry.

- Science
- Nature

- American Chemical Society Journals
  - Journal of the American Chemical Society
  - Inorganic Chemistry
  - Organometallics
  - Accounts of Chemical Research
  - Chemical Reviews

- Wiley InterScience
  - Angewandte Chemie International Edition
  - European Journal of Inorganic Chemistry
  - Chemistry - A European Journal

- Royal Society of Chemistry Journals
  - Dalton Transactions
  - Chemical Communications
  - Chemical Society Reviews

- Elsevier Science Direct Chemistry Journals
  - Journal of Organometallic Chemistry
  - Polyhedron
  - Inorganica Chemica Acta
  - Journal of Inorganic Biochemistry
  - Journal of Molecular Catalysis A: Chemical
  - Coordination Chemistry Reviews
  - International Journal of Hydrogen Energy

- Proceedings of the National Academy of Sciences
- Bulletin of the Chemical Society of Japan
- Journal of Biological Inorganic Chemistry
- Journal of Chemical Education
- Nature Chemistry

Missed Exams **No make-up exams will be provided.** Arrangements will be made for students that have official UF travel conflicts. Notification and documentation must be provided one week in advance (no exceptions).

Accommodation for Students with Disabilities Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

Lecture Chemistry 6620/4611 will survey modern inorganic/organometallic concepts of bonding, reactivity, and physical properties.

Objectives of Course 1) Students entering this class have significantly different backgrounds in Inorganic Chemistry. One objective is to provide a baseline of fundamental principles for everyone.
2) Another objective is to sharpen critical thinking skills. This course has very little regurgitation of information. Instead, an emphasis is placed on employing knowledge to solving problems.
3) A technical objective is for each student to develop a working knowledge of group theory and its application to Inorganic Chemistry problems.
4) Provide a general foundation for the structure and bonding of Inorganic Molecules.

Problem Sets Problem sets will be assigned at intervals of approximately one week. Problem Sets are due at the beginning of class. Problem sets handed in immediately after class but on the same day will be assigned a grade of M (5 pts). Problem sets handed in after the due date will not be graded (0 pts) Solutions will be provided.

Grading: Problem sets will be graded as follows
Satisfactory: S (10 pts)
Marginal: M (5 pts)
Unsatisfactory: U (0 pts)

Satisfactory (S) problems were attempted and there is an obvious understanding of the material demonstrated. (i.e. just attempting a question is not satisfactory)
Marginal (M) grade will be assigned for sloppy work, not attempting a problem, if a significant portion is incorrect.
Unsatisfactory (U) majority of the problem sets is incorrect.

Class Attendance Class attendance is mandatory since some discussion may diverge from the text.

UF Policies: **UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES:** Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive; therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php.

NETIQUETTE: COMMUNICATION COURTESY: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats.

Other Information:

Honor Code: http://www.chem.ufl.edu/~itl/honor.html
Disabilities: http://www.chem.ufl.edu/~itl/disabilities.html
Counseling: http://www.chem.ufl.edu/~itl/counseling.html

Honesty Policy All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

UF Counseling Services Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.

- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.

Chemistry 6620/4611: Advanced Inorganic Chemistry I
Course Information

Review:

Chapter 2
Section I. Atomic Structure
a) Schrödinger Equation and Solutions
b) Electron Configuration
c) Periodic Trends

Chapter 3
Section II. Molecular Structure and Symmetry
a) Lewis Structure
b) VSEPR

Chapter 4
Section III. Symmetry Expanded
a) Symmetry Elements and Operations
b) Point Groups
c) Character Tables
d) Reducible and Irreducible Representations

Chapter 5 and 6
Section IV. Molecular Orbitals
a) Hybridization
b) Complications
c) Diatomics, Heterodiatomics
d) Acid-Base Reactions (MO Predictions)
e) MO theory applied to main group elements

Chapter 9
Section VI. Transition Metal Coordination Compounds
a) Coordination Number & Geometries
b) Ligand Basis Sets Expanded
c) Effective Atomic Ligands (Electron counting)

Chapter 10 and 11
Section VII. Electronic Spectra of Complexes
a) Crystal Field Theory
b) Ligand field Theory
b) MO theory applied to transition metal complexes expanded
c) Metal-Metal Bonds

Chapter 12
Section VIII. Substitution Processes
a) Lability
b) Dissociative & Interchange
c) Associative & Interchange
d) electron transfer

Topics if time permitting.
a) Crystal Structures
b) Defects
c) Band Structure
d) Transition metal photochemistry
e) redox active (non-innocent ligands)