Chem 4:170 - Advanced Inorganic Chemistry (Fall 2013)  
(Tuesday/Thursday 11:00 - 12:15 pm in W55 CB) 

Instructor: Prof. Edward Gillan    Email: edward-gillan@uiowa.edu    Phone: 335-1308  

Office hours (W325 CB): Mon./Wed. 10:00-11:30 am and by appointment [tentative]  

Textbook resource site: http://www.whfreeman.com/Catalog/product/inorganicchemistry-fifthedition-shriver  

Other references (Sciences Lib.): Inorganic Chemistry 3rd ed. (Housecroft/Sharpe), Inorganic Chemistry 4th ed. (Huheey/Keiter2), Inorganic Chemistry 2nd ed. (Miessler/Tarr), Chemical Appl. of Group Theory 3rd ed. (Cotton)  

ICON course site: Announcements, copies of handouts, problem set/exam solutions, individual points.  

Grading:  
1) 10 independent problem sets (10 pts each) = 100 points (10 x 2 % = 20 %)  
2) 2 in-class exams (100 pts each) = 200 points (2 x 20 % = 40 %)  
3) Written journal article critique (end of semester) = 50 points (10 %)  
4) Cumulative final exam = 150 points (30 %)  

Total possible = 500 points  

 Approx. dates (PS due) | Topics covered | Approx. S&A text chapters  
------------------------|----------------|--------------------------  
Aug. 27, 29             | Atomic orbitals & properties, periodic trends | Chp. 1  
Sept. 3, 5 (PS1)        | Covalent bonding & geometry, VB theory | Chp. 2  
Sept. 10, 12 (PS2), 17  | MO theory, molec. symmetry, point groups | Chp. 2, Chp. 6  
Sept. 19 (PS3), 24      | Group theory applications and vibrations | Chp. 6 and handouts  
Sept. 26 (PS4), Oct. 1  | Group theory applied to bonds & MOs | Chp. 6 and handouts  
Oct. 3 (PS5), 10        | Solid-state structures | Chp. 3  
Oct. 15                 | Ionic bonding and thermodynamics | Chp. 3  
Oct. 17 (PS6), 22       | Properties of solids and band theory | Chp. 3, part of Chp. 24; handouts  
Oct. 24 (PS7)           | Acid/base chemistry, solvation, halides | Chp. 4  
Oct. 29, 31             | Molecular rings, cages, and clusters | parts of Chps. 13, 14, 15, 16  
Nov. 5 (PS8), 7         | Intro to transition metal TM complexes | Chp. 7  
Nov. 12 (PS9)           | Coordination chem., mechanisms | Chp. 7  

Monday, October 8th: First In-Class Exam (PS #1-5, through group theory)  
Oct. 15                 | Ionic bonding and thermodynamics | Chp. 3  
Oct. 17 (PS6), 22       | Properties of solids and band theory | Chp. 3, part of Chp. 24; handouts  
Oct. 24 (PS7)           | Acid/base chemistry, solvation, halides | Chp. 4  
Oct. 29, 31             | Molecular rings, cages, and clusters | parts of Chps. 13, 14, 15, 16  
Nov. 5 (PS8), 7         | Intro to transition metal TM complexes | Chp. 7  
Nov. 12 (PS9)           | Coordination chem., mechanisms | Chp. 7  

Thursday, November 14th: Second In-Class Exam (PS #6-9, includes intro TM content)  
Nov. 19, 21             | Spectroscopic analysis of TM complexes | Chp. 20  

November 26, 28 - no class for Thanksgiving Recess  
Dec. 3                  | Magnetism in inorganic systems | Chp. 20  
Dec. 5 (PS10)           | Kinetics of ligand substitution on metals | Chp. 21  
Dec. 10, 12 (paper)     | Organometallic reactions and (bio)catalysis | Chp. 22 (parts of Chp. 26 & 27)  

Cumulative Final Exam – Exam time/date to be announced later by Registrar’s Office.  

Independent work and grading: A grader will score the problem sets, but any questions or issues with scores received for course assignments should be directed to Prof. Gillan. General class distributions and individual scores will be periodically posted on the class ICON website and estimated midterm grades may be obtained from Prof. Gillan. The final grade distribution for this advanced undergraduate/graduate level course will be approximately A (25%), B (45%), C (25%), D/F (5%). Within each grade level, +/- letter grades will be given.
General discussion with classmates on the inorganic concepts in problem set exercises is very useful and encouraged, but all problem set answers must be independently determined and in your own words! Anyone discovered copying answers from a source other than their own head will be subject to severe academic penalties.

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**College of Liberal Arts and Sciences (CLAS) and University Policies and Procedures**

**Administrative Home.** The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Student Academic Handbook (www.clas.uiowa.edu/students/handbook/).

**Electronic Communication.** University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondence - Ops Manual, III.15.2 k.11 (www.uiowa.edu/~our/opmanual/iii/15.htm#152). Instructors will typically respond to student questions sent via e-mail within two working days.

**Accommodations for Disabilities.** Any student seeking academic accommodations should first register with Student Disability Services and then contact Prof. Gillan to make specific arrangements. See www.uiowa.edu/~sds/ for more information.

**Academic Honesty.** The College of Liberal Arts and Sciences expects all students to do their own work, as stated in the CLAS Code of Academic Honesty (http://clas.uiowa.edu/students/handbook/academic-fraud-honor-code). Instructors may fail any assignment that shows evidence of plagiarism or other forms of cheating. Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled.

**Student Classroom Behavior.** The ability to learn is lessened when students engage in inappropriate classroom behavior, distracting others; such behaviors are a violation of the Code of Student Life. When disruptive activity occurs, a University instructor has the authority to determine classroom seating patterns and to request that a student exit immediately for the remainder of the period. One-day suspensions are reported to appropriate departmental, collegiate, and and Dean of Students) http://dos.uiowa.edu/policy-list/current/student-responsibilities-6/code-of-student-life-2013-2014-academic-year.

**CLAS Final Examination Policies.** The dates and times for final examinations for each class are announced around the fifth week of the semester by the Registrar and posted on their web site. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on remaining on the UI campus through the final examination period.

**Making a Suggestion or a Complaint.** Students with a suggestion or complaint should first visit with the course instructor to discuss their concerns about the course, TAs, lectures, or exams. Complaints and appeals regarding this course, its instructors, or its TAs can be filed with the Department of Chemistry Departmental Executive Officer (DEO) at the administrative offices, Room E331 CB (335-1350). Complaints must be made within six months of the incident. See the CLAS Student Academic Handbook for more details (web link above).

**Understanding Sexual Harassment.** Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy (www.uiowa.edu/~eod/policies/sexual-harassment-guide/index.html).

**Reacting Safely to Severe Weather.** In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over (similarly true for building fire alarms). For more information on Hawk Alert and the siren warning system, visit the Public Safety web site (http://police.uiowa.edu/stay-informed/emergency-communication/).
Information for ordering optional inorganic/organometallic molecular model kits

This is an optional course item that is a useful alternative to organic model kits (greater than 4 bonds!)

Darling Models (www.darlingmodels.com)

Go to Individual Orders category and order Kit #4 ISBN 978-09648837-5-8 (price for one kit ~ $22).

MOLECULAR VISIONSTM INORGANIC-ORGANOMETALLIC model set of 132 pieces with a 9"x4.5"x4" corrugated box.

Atom centers incorporating the octahedral piece.

Optical isomers of a tris-ethylendiamine complex

Modeling organometallic ligands:
  a. Benzene ligand; b. Tetrahapto ligand; c. Allyl ligand; d. Cyclopentadienyl ligand
  e. Biscobalt alkyne