CHEM 316
Advanced topics in Inorganic Chemistry
Fall 2004

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Class meeting time and location: M, W, 2:40-4:00, Dana 300

Course Description CHEM 316. Advanced Topics in Inorganic Chemistry. A study of selected advanced topics in inorganic chemistry. Emphasis is placed on the application of group theory to the elucidation of electronic structure. Selected topics may also include bioinorganic chemistry, inorganic materials, and inorganic reaction mechanisms. Opportunities for critical reading of the current literature are also presented.

Text: Robert Carter Molecular Symmetry

Grading: Your grade for this course will be determined based on your grades on each of twelve assigned sets of homework problems (70%), and either your own independent work (30 %) or your grade on the final exam (30 %). It is expected that students will come to every class well prepared to discuss the assigned material. There will be no in-class exams during the semester. The final exam will be given during the regularly scheduled exam period, Tuesday December 14th 1:15. The final is required if you do not do the independent project.

A problem set will be assigned each Monday. The completed problem set is due the following Monday at the beginning of class. Students may consult each other on the problem sets, but it is expected that each student will do his or her own work.

Homework: You are responsible for doing all assigned problems each week (and handing them in) but only publicly presenting a subset of the assigned problems (you'll be told ahead of time which subset is yours). Your homework grade will reflect both how well you did the work and how well you presented it to the class

Independent Project: This year you will have the option of doing an independent project in inorganic chemistry or taking a comprehensive final exam in the course. If you elect to do the independent project, you will pick a topic in inorganic chemistry that you would like to study. Each week you will spend some time reading and thinking about the topic you have assigned yourself. You and I will meet once per week for thirty minutes (let's set up a regular time to do this) to discuss your work for the week. The key to making this part of the course successful is that you pick a manageable and focused area to work in. You might pick a single textbook and select to work through a few chapters. Or you might pick an assortment of article – I'd strongly suggest no more than one per week – and read the articles thoroughly. I'd like you to have a focus to

your reading, even if it is a broad as "I'd like to learn more about solid state chemistry" so that when you talk to me and talk to your classmates, you can present your work in a context that makes it clear how you are progressing in your own goal. There are plenty of potential topics. I'll throw out a few ideas just to get you thinking: the use of metals in medicine, organometallic chemistry, photochemistry, aqueous geochemistry, bioinorganic chemistry, solid state chemistry, reaction mechanisms in inorganic chemistry (at a more advanced level than in 215), specific classes of inorganic materials. You decide on the way you want to document your work. Do you want to write an article summary each week? Would you like to assign yourself some homework problems and then do them? Would you prefer to write one paper that is due at the end of the semester? We'll discuss how your work should be graded. We'll set us a time to meet for half an hour each week to discuss your project.

Schedule:

Class Meeting Week of:	**Group theory topic**
September 6	Overview of course – expectations in an advanced science seminar
September 13	Symmetry in chemistry, symmetry elements, symmetry operations CH. 1
September 20	Point groups CH. 2
September 27	Basic definitions from group theory, group multiplication tables CH. 3
October 4	Irreducible representations and character tables CH. 3
October 11	Representations of geometric transformation - symmetry operations as matrices Supplemental material
October 18	Symmetry and Molecular Orbital Theory CH. 4
October 25	Symmetry and Molecular Orbital Theory Supplemental material
November 1	Group theory and Ligand Field Theory CH. 7
November 8	Symmetry and spectroscopy CH. 6
November 15	Symmetry and spectroscopy Supplemental material
November 29	Comprehensive problem set
December 6	Comprehensive problem set