CHEM 425/425L

Synthesis and Analysis of Inorganic Compounds

Instructor: Oscar Navarro, Ph.D.

Contact: office: Bilger 236
email: oscarnf@hawaii.edu

Office hours: Students are encouraged to meet with the instructor for questions, additional information or any other related matter. Office hours are every lecture day, one hour after the lecture, no appointment required. Any other time can be scheduled by appointment.

Teaching Assistants: Marina Chong, Brant Landers

Class and lab location: Bilger Hall, 335 (lecture) and Bilger Addition 217 (lab)

Class and lab time: MWF 11:30 am-12:20 pm (lecture), 1:30-6:20 pm (lab)

Required textbook: "Inorganic Experiments" 3rd ed. Woollins, J. D., Ed. (2010). Wiley.
ISBN: 978-3-527-32472-9

Other resources: "Inorganic Chemistry" 4th Ed. by Shriver, Atkins (2006). Freeman, ISBN: 978-0-7167-4878-6.
"Organometallic Chemistry" by Spessard, Miessler (1997). Prentice-Hall, ISBN: 0-13-640178-3.
"Advanced Organic Chemistry" 6th Ed. by March, Smith (2007). Wiley, ISBN: 0-471-72091-7.
"ACS Style Guide" 3rd Ed. Coghill, Garson, Eds. (2006).
Wiley, ISBN: 0-841-23999-1.

Course description: This is a writing-intensive, upper-level division course that focuses on the synthesis of inorganic and organometallic compounds and their characterization with a variety of analytical techniques. The course has two distinctive parts: a theoretical one in which principles of analytical techniques are explained and an experimental one in which the students apply those techniques to characterize the inorganic compounds they are making in the lab sessions. The writing intensive component of the course will be graded on the basis of the quality of the lab reports.

Course objectives:

- To introduce students to advanced analytical techniques for the characterization of inorganic compounds, and relate already known techniques for the same purpose
- To establish relations between learned theoretical concepts and results obtained in the lab
- To develop strategies for effective use of scientific writing

- To provide the student a scientific basis to help him/her developing a critical, educated approach to chemical experimentation

Student learning outcomes: Students who complete this course will be able to:

- Synthesize and manipulate a variety of inorganic compounds by using common experimental techniques
- Know, define and describe the most common techniques to characterize those and related compounds
- Explain the physical and chemical basis for a variety of analytical techniques
- Predict, collect, interpret and justify the results of those analytical techniques to elucidate the structure and composition of a compound
- Select the appropriate characterization technique(s) depending on the different characteristics of the compound
- Organize ideas and results and prepare scientific reports
- Criticize and summarize current articles in the chemical literature

Number of credit hours: 2 for CHEM 425, 3 for CHEM 425L

Prerequisites: Chem 351, Chem 422

Student Responsibility: It is the student's responsibility to put forth the effort required to learn the material and to become competent with it. Reading the corresponding experiment and trying to understand the concepts before going to the classroom is highly encouraged. Lectures will be presented in PowerPoint, unless otherwise noted. The PowerPoint files will be uploaded at the MyUH webpage of the course in order to make them available for the students, so they can be printed out and brought to class to take notes. The handout for the following lecture should be brought in case we advance to it earlier than expected.

Course Policies:

1- There will be no makeup exams. If you miss an exam and have a valid excuse, the weighing of the other assignments will be adjusted accordingly.
2- Regular attendance in lecture is highly recommended. The aim of the lecture session is to guide you in your studies and to clarify, emphasize and illustrate the important (and sometimes subtle) concepts. Topics not included in the text will be covered in class and will appear in the tests. You are responsible for all information relayed in class whether you attend or not.
3- Academic dishonesty will not be tolerated. Cheating in the form of copying, plagiarism, altering information or using cribs on exams will result in judicial proceedings in accordance with the University of Hawaii's policy on academic dishonesty.

Safety

The use of goggles or safety glasses **AT ALL TIMES** when in the laboratory is mandatory and closed-toe shoes must be worn. *There are no exceptions to this rule*. The location of fire extinguishers, safety shower and eyewash will be showed by the TA. If you are injured during the lab, report immediately the incident to your TA.

Grading and Student Evaluation: There will be no grading curves.
CHEM 425: midterm test (50%), final test (50%).
CHEM 425L: Lab reports (50%), midterm test (20%), final test (20%), TA evaluation (10%)

Students with Disabilities
The University of Hawaii is an equal opportunity/affirmative action institution, dedicated to teaching all students and reaching all learners. It is our commitment to make our lectures and classrooms accessible to all students. If you have a disability and have not voluntarily disclosed its nature and the support you need, you are invited to contact the KOKUA Program of UH (http://www.hawaii.edu/kokua/, phone (808) 956-7511), or talk with the instructor in order to get any accommodation you might need to take the course. This information will be kept confidential. Please do this as early in the course as possible.

TENTATIVE LECTURE SCHEDULE

Date Lecture	Experiment
Week 1 Aug 22th M Introduction W Report composition F Group theory applied to IChem	Introduction, safety and check-in
Week 2 Aug 29st Group theory applied to IChem	Exp 2.11 (IR application)
Week 3 Sep 5th M Labor day Holiday Group theory applied to IChem	Exp 2.11 (IR application)
Week 4 Sep 12th IR spectroscopy	Exp 3.6 (IR application)
Week 5 Sep 19th IR spectroscopy	Exp 3.6 (IR application)
Week 6 Sept 26th Raman spectroscopy NMR spectroscopy	Exp 2.12 (IR application)
Week 7 Oct 3th NMR spectroscopy	Exp 2.13 (IR, NMR)
Week 8 Oct 10th M NMR spectroscopy W **Test 1 (experimental)** F **Test 1(lecture)**	NO LABS

Week 9 Oct 17th
M Schlenk techniques/glovebox — Exp $(PR_3)Pd(allyl)Cl$
W Exp $(PR_3)Pd(allyl)Cl$
F Exp $(PR_3)Pd(allyl)Cl$

Week 10 Oct 24th
EPR — Exp $(PR_3)Pd(allyl)Cl$
Mössbauer spectroscopy

Week 11 Oct 31st
Chromatography — Exp 3.14 (mp, chromatography)

Week 12 Nov 7th
Magnetic susceptibility — Exp 3.14 (mp, chromatography)
F *Veterans Day Holiday*

Week 13 Nov 14th
Thermal methods — Exp 3.8 (IR, NMR)

Week 14 Nov 21rd
TBD — Catch up day (Tuesday)
F *Thanksgiving Break*

Week 15 Nov 28th
Diffraction methods — Exp 3.8 (NMR, IR)

Week 16 Dec 5th
M Review
W **Test 2 (experimental)** — NO LABS

Week 17
F **Dec 16th** 12:00-2 pm **Final test (lecture)**