

## CHM 6621: Inorganic Reaction Mechanism & Energetics

**Spring 2019**    **Location: CLB 414**    **MWF 9:35AM – 10:25AM**

**Instructor:** Leslie Murray

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**Office:** CLB 410B

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**Office Hours:** TR 1:00-2:00PM

### Course Description and Objective

To provide training in the theoretical concepts underlying fundamental and contemporary organometallic chemistry.

### Texts

Hartwig, John F., *Organotransition Metal Chemistry From Bonding to Catalysis*, 1<sup>st</sup> Ed.

Jordan, Robert B., *Reaction Mechanisms of Inorganic and Organometallic Reactions*, 3<sup>rd</sup> Ed.

### Recommended or Reserve Texts

1. Albright, T. A., Burdette, J. K., and Whangbo, M.-H. *Orbital Interactions in Chemistry*, 2<sup>nd</sup> Ed.
2. Rorabacher, D. B. and Endicott, J. F., *Mechanistic Aspects of Inorganic Reactions*
3. Basolo, F. and Pearson, R. G., *Mechanisms of Inorganic Reactions*
4. Langford, C. H. and Gray, H. B., *Ligand Substitution Processes*
5. Wilkins, R. G. *Kinetics and Mechanism of Reactions of Transition Metal Complexes* 2<sup>nd</sup> Ed.
6. Espenson, J. H., *Chemical Kinetics and Reaction Mechanisms*, 2<sup>nd</sup> Ed.

### Grades

Grades will be based on

Exam #1: 125 points

Exam #2: 125 points

Final/Exam #3: 200 points

Problem Sets: 50 points

**Total: 500 points**

For information on UF's Grading Policy, see:

<http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html> and

<http://www.isis.ufl.edu/minusgrades.html>

### Problem Sets

Over the course of the semester between five (5) and ten (10) problem sets will be assigned. Typically, these homework assignments will be assigned on the last day of class for that particular week, and due at the beginning of the next class period. Problem sets are open-notes and open-book. You are encouraged to work on problem sets in groups, but you will need to be prepared to explain solutions to all problems individually at the board in class.

### Exams

Exams cover all lectures and reading assignments. It is the student's responsibility to ask questions if they do not understand lecture or reading materials. Exams will be in-class and held regular class meeting time. Make-up exams will only be provided in the event of an approved absence (e.g., conference attendance) or under extraordinary circumstances (e.g., medical emergencies). See the university guidelines on absence for more information.

### Attendance and Absence Policy

Attendance will not be included in student assessment but is **strongly** advised as the in-class discussion may diverge from the text.

### Academic Honesty

Students are required to be honest in their coursework. Any act of academic dishonesty will be reported to the Dean of Students, and may result in failure of the assignment in question and/or the course. For University of Florida's honor code, see <http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php>.

### Accommodations for Students with Disabilities

Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. Contact the Disability Resources Center (<http://www.dso.ufl.edu/drc/>) for information about available resources for students with disabilities.

### **Other Resources: U Matter, We Care**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

### **Course Outline (subject to change)**

#### **I Chemistry of Organotransition Metal Compounds**

Structure and Bonding  
Ligand Substitution Reactions  
Oxidative Addition and Reductive Elimination  
Insertion and Elimination Reactions  
Nucleophilic and Electrophilic Attacks on Ligands  
Metallacycles and Metathesis

#### **II Catalytic Organometallic Reactions**

Hydrogenation  
Polymerization of Alkenes and Alkynes  
Water-Gas Shift Reaction  
Carbonylation and Hydroformylation  
Fischer-Tropsch Chemistry  
Cross-coupling Reactions  
Olefin Metathesis  
C–H Activation

#### **III Main Group Organometallic Chemistry**

Frustrated Lewis Pairs - reactivity and catalysis  
Group 13 complexes - reactivity  
Group 14 complexes – reactivity  
Group 15 complexes – reactivity and catalysis

#### **IV Special Topics (time permitting)**

These topics will be chosen in consultation with the class; please be prepared to lobby for your interests and