**Organometallics**

**CHEM365**

**Keene State College**

**Fall 2017**

**Course:** Organometallics (CHEM365)

**Times:** Tuesday and Thursdays 10:00-11:45 AM

**Location:**  Science Center Room 201

**Instructor:** Professor Brian J. Anderson

**Office:** Science Center 234

**Email:** [banderson1@keene.edu](mailto:banderson1@keene.edu)

**Phone:** 603-358-2560, or 8-2560 from a campus phone

**Office Hours:** Wednesday 1:00-2:00 pm, Thursday 12:00-1:00 pm, Friday 9:00-10:00 am, by appointment, or anytime my door is open. Please stop by, I’m here to help you!

**Course Materials**

**Website: Canvas:** <https://keene.instructure.com/> I will post the syllabus, lecture slides, assignments, grades, and other class material. It is expected you will check Canvas at least once a day for announcements and assignments.

**Textbook:** None!!

**Web Resources:**

1. **The Chemistry LibreTexts Library** (<https://chem.libretexts.org/> ), a project funded by the National Science Foundation and UC Davis. This is a great resource for all of chemistry, here is a direct link to the section on Organometallic Chemistry:
2. **The *Organometallic HyperTextbook*** is another free online text that covers many of the key topics we will cover. It also includes sample problems on many topics (with answers!): <http://www.ilpi.com/organomet/>
3. ***Wikibooks Inorganic Chemistry***: <https://en.wikibooks.org/wiki/Introduction_to_Inorganic_Chemistry>
4. Textbooks written for College of Saint Benedict/Saint John’s University integrated chemistry courses: <http://employees.csbsju.edu/cschaller/srobi.htm> . Especially, parts 3 and 4.

**Course Description**

**KSC Catalog**: “This course introduces the organometallic chemistry of the transition metals and main group elements with emphasis on common structural features and basic reaction types. The role of organometallic complexes in catalysis is also explored.”

**Emergency Academic Procedures:**

In the event the College is impacted by an emergency situation students are responsible for regularly checking their KSC e-mail and Canvas for information from their instructors and/or the College.

**Grading**

A breakdown of assignments and grades are shown below along with a grading scale. Details of assignments will be given in class or on Canvas.

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| **Assignment** | **Weight** |
| In Class Worksheets | 20% |
| Literature Homework | 10% |
| Problem Sets | 25% |
| Midterm Exam | 15% |
| Final Exam | 15% |
| Final Paper/Presentation | 15% |

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| **Grading Scale** | | | |
| 4.0 (A) | 90.0-100 | 2.0 (C) | 70.0-74.9 |
| 3.5 (AB) | 85.0-89.9 | 1.5 (CD) | 65.0-69.9 |
| 3.0 (B) | 80.0-84.9 | 1.0 (D) | 60.0-64.9 |
| 2.5 (BC) | 75.0-79.9 | 0.0 (F) | < 60 |

**Attendance Policy**

All exams and in class worksheets-based activities must be taken at the prescribed time except for good reason (e.g. class field trips, away games) and must be cleared with me in advance (except for serious situations which could not be anticipated). Going away early for vacation or having other assignments are not good reasons; you know when you will have exams and assignments, plan ahead. **Make up exams will only be given for college sponsored events or official excuses. In class activities cannot be made up for unexcused absences.**

**Attendance is mandatory** for this course. As stated in the KSC academic policies (<http://www.keene.edu/registrar/policy/attendance/)> “A student who misses in excess of three weeks of classes prior to the eleventh week of the semester (for any reason whatsoever) must withdraw from the course. The student must follow the regular withdrawal procedure. The faculty member may waive this policy at his or her discretion, but if the faculty member wishes to enforce the policy, he/she will inform the student in writing, who then must initiate the withdrawal. A student so notified who fails to withdraw from the course will be given an F for the course.”

**Deadlines**

**All deadlines for assignments will be strictly enforced**, unless previously cleared with the instructor. In class worksheets and homework will not be accepted if they are late. Any other material turned in late will immediately result in an automatic 15% reduction of grade. An additional 10% will be lost for each day the assignment is late. ***No assignments will be accepted past 1 week of the due date.***

For example, if an assignment is due on a Friday but not turned in until Tuesday, the grade of the assignment will be reduced by 45 %, so a score of a 85 would be reduced to a 47.

**Academic Integrity**

All students will be held strictly accountable for adhering to Keene State College's policies regarding academic integrity (<http://www.keene.edu/policy/academichonesty.cfm>). **Academic dishonesty, whether intentional or not, will result in a failure for the course and a formal charge reported to the Dean of Sciences.**  Students and the instructor will be required to be respectful of everyone in the classroom. Cell phone use is strictly prohibited and frowned upon. **Plagiarism in any and all forms is taken very seriously and forbidden.** The work you turn in must be of your own original production, and proper citation and referencing is mandatory. If you are unsure what constitutes plagiarism consult the student handbook or your instructor.

**Students with Special Needs**

If there are students in the class who have a disability and need accommodations, please see me in private to discuss the accommodation needed. We will work with the office of disability services to coordinate proper accommodations for your needs.  For more information, please visit their website at (<http://www.keene.edu/disabilitysvs/>). We should have this discussion as soon as possible before getting too far into the semester.

**Course Outcomes**

***Students enrolled in this course are expected to:***

* Have a basic understanding of fundamental principles of organotransition-metal chemistry and how chemical properties are affected by metals and ligands
* Be able to use knowledge of structure and bonding to understand stability and reactivity of organometallic complexes
* Develop understanding of fundamental reaction types and mechanisms and how to combine these to understand efficient catalytic processes
* Understand important applications of organometallic homogenous catalysis in the production of large-scale-(bulk) and smaller-scale (fine-chemicals) productions
* Apply knowledge from differing areas of chemistry such as organic, inorganic, biochemistry, and physical chemistry towards chemical problems
* Learn to find and read primary literature and investigate some of the current research within the field of organometallic chemistry.
* Be able to read, understand, and communicate recent advances in the field of organometallic chemistry and explain the significance of these results.

**Tentative Schedule**

Note: Most lectures will include in-class worksheets that will be collected at the end of class or the start of the next class. No make-ups will be given for in-class worksheets and no late assignments will be accepted without prior approval of the instructor. Additionally, please see Canvas for more information on readings to go with class lectures.

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| **Lecture Dates** | **Topics (See Canvas for Links for reading)** | **Important assignments/dates** |
| 8/29, 8/31 | * Introduction to organometallics * History of organometallics |  |
| 9/5, 9,7 | * Acid Base Chemistry * Coordination Chemistry | Scifinder and Chemdraw hmwk due  Lit: Frustrated Acid Bases |
| 9/12, 9/14 | * 18-electron rule * Introduction to metal-ligand bonding | Lit: Chelating Ligands |
| 9/19, 9/21 | * Carbonyl and similar ligands * Pi complexes. Ferrocene | Lit: Nitrogen Fixation |
| 9/26, 9/28 | * Phosphines * Carbon ligands |  |
| 10/3, 10/5 | * Ligand Substitution * Oxidative addition/Reductive elimination | Lit: C-H Activation |
| 10/10, 10/12 | * Reactions at the ligand * Problem solving day |  |
| 10/17, 10/19 | * TBA * Midterm Exam | **October 19: Midterm Exam** |
| 10/24, 10/26 | C-C Coupling Reactions |  |
| 10/31, 11/2 | Hydroformylation |  |
| 11/7, 11/9 | Hydrogenation | Mini Presentation: C-C Coupling  November 7: Paper Topic Due |
| 11/14, 11/16 | Olefin Metathesis Polymerizations |  |
| 11/21 | Olefin Metathesis Polymerizations | November 21: Rough Draft Due |
| 11/28, 11/30 | Ziegler-Natta Polymerizations |  |
| 12/5, 12/7 | Student Presentations | **Final Presentation Due** |
| 12/12 | FINAL EXAM- Tuesday 10:30AM-12:30PM | **December 2: Final Exam** |