Instructor: Rory Waterman
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Lecture: MWF 12:00–12:50, Votey 305

Office hours: Fridays 1:00–2:00 pm.
I also have some odd Tuesdays from 1:00–3:00 pm blocked, but you are welcome to stop by my office as needed or make an appointment.

Course outline: I. A skirmish with kinetics
II. Transition metals and ligands
III. Reaction types
IV. Synthetic considerations
V. Catalysis

Course description: Organometallics, rigorously defined, deals with the interactions between metals and carbon-based molecules. The rich chemistry associated with metal complexes and main-group ligands has widened this description, and the old editorial score of the journal *Organometallics* summarizes, albeit not concisely, the breadth of the field:

> For the purposes of this journal, an "organometallic" compound will be defined as one in which there is a bonding interaction (ionic or covalent, localized or delocalized) between one or more carbon atoms of an organic group or molecule and a main group, transition, lanthanide, or actinide metal atom (or atoms). Following longstanding tradition, organic derivatives of the metalloids (boron, silicon, germanium, arsenic, and tellurium) will be included in this definition. Furthermore, manuscripts dealing with metal-containing compounds which do not contain metal-carbon bonds will be considered as well if there is a close relationship between the subject matter and the principles and practice of organometallic chemistry. Such compounds may include, inter alia, representatives from the following classes: molecular metal hydrides; metal alkoxides, thiolates, amides, and phosphides; metal complexes containing organo-group 15 and 16 ligands; metal nitrosyls. Papers dealing with certain aspects of organophosphorus, organoselenium, and organosulfur chemistry also will be considered. In considering submissions that deal with subject matter that is peripheral to mainstream organometallic chemistry, our primary concern will be that the manuscript be of interest to our readers.

Thus, organometallic chemistry is a big tent,[1] meaning all are welcome. Our principal interest will be in organometallic complexes of the transition-series elements (groups 3–10). The elements of the *s*, *p*, and *f*-block certainly have interesting organometallic chemistry. The limits of time force us to largely ignore these elements. However, application of transition-metal complexes in catalysis and organic synthesis makes this course more topical. Of course, this class is conceptual

[1] The same is true of inorganic chemistry if not more so. Makers, measurers, modelers, and any combination are all welcome in inorganic chemistry. Anyone who tells you otherwise is a liar…or worse.

in nature, and the fundamental principles we investigate are widely applicable throughout organometallic chemistry.

Text: (Optional) *Organometallic Chemistry* by Spessard & Messler, ISBN = 9780199342679.

Web content: Course materials are available at Blackboard (bb.uvm.edu)

Grading: There will be two mid-term exams (20% each), a final exam (20%), problem-based homework (20%) and essays (ca. 2 pages/each; 20%).

Homework: Homework will be assigned approximately weekly and is due at the *beginning* of class on the date noted. Homework turned in within 24 hours of the due date will be given 50% credit and after 48 hours no credit. I will accept and correct homework after 48 hours: Practicing the concepts presented in class is more important than the grade on an individual assignment.

In-class work: I want to try something a little different this year with some in-class activities. These will be programmed and if they are successful, then some additional credit as homework or exams will be applied.

Essays: There will be 4–5 short written assignments (ca. 2–4 pages) dealing with fundamental topics in organometallic chemistry. Further details supplied in class. No homework or a limited problem set will be due on the weeks of an essay assignment.

Important dates:	Monday February 28, exam 1
	Monday April 17, exam 2
	Friday, May 1, last class
	Tuesday, May 7 at 10:30 am, final exam
No lectures:	Monday 1/20, Martin Luther King, Jr. Day
	Monday 2/17, Presidents' Day
	Monday – Friday 3/9–3/13, spring break

The instructor reserves the right to make changes, with notice

Supplemental texts

Principles and Applications of Organotransition Metal Chemistry by J. P. Collman, L. S. Hegedus, J. R. Norton, R. G. Finke; University Science Books, Mill Valley, California, 1987. ISBN: 0935702512.

Organometallic Chemistry by G. O. Spessard, G. L. Miessler; Prentice Hall, 1997. ISBN: 0136401783. Second edition: 978-0-19-533099

Organometallics (Third edition) by Christoph Elschenbroich; Wiley-VCH, Weinheim, 2006. ISBN: 3527293906

The Organometallic Chemistry of the Transition Metals, *4th Ed.* by R. H. Crabtree; Wiley-Interscience, 2005. ISBN: 0471662569.

Oxford Primer No. 12: Organometallics 1 – Complexes with Transition Metal-Carbon σ-Bonds by M. Bochmann, Oxford University Press, Toronto, 2002. ISBN: 0198557507.

Oxford Primer No. 13: Organometallics 2 – Complexes with Transition Metal-Carbon π-Bonds by M. Bochmann; Oxford University Press, Toronto, 2001. ISBN: 0198558139.

Selected standard inorganic chemistry texts:

Inorganic Chemistry by Huheey, Keiter, and Keiter
Inorganic Chemistry by Shriver, Atkins, and Langford
Inorganic Chemistry by Meissler and Tarr
Inorganic Chemistry by Housecroft and Sharpe