

Instructor: Prof. Rory Waterman
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Lecture: MWF 12:00 12:50, Waterman 413

Office hours: M 1:00 2:00 and T 1:00 2:00 or feel free to make an appointment.

Course description: A general overview of inorganic chemistry. Topics include bonding, molecular structure, periodic properties, symmetry, main-group and transition-metal (including organometallic) chemistry, and bioinorganic systems.

Course objective: My goal is that students who complete this course should be able to use some basic inorganic concepts, broadly defined, to enable problem solving in other fields. To address that goal, one should have a basic idea about the bonding across inorganic systems, the interplay of symmetry and physical properties, transition metals, and main group elements. To meet that goal, we should investigate the inorganic chemistry in biological systems and applied fields like catalysis and energy conversion.

Learning outcomes: The course is broken into several parts (up to five, if all goes well see outline below). Each section will have a set of specific objectives associated with it. Those documents form a roadmap for the course. If you *understand* what the content of the objectives and can *perform* the skills, then you are learning the course material. We will get to that point by using class time to review concepts and for you to do exercises and activities that reinforce those ideas and practice skills. That plan will work if you engage in course materials (the book, homework, or other provided materials) before or after a given class, as prescribed.

Basic outline

- I. The basics of inorganic chemistry
- II. Metals in biology
- III. Catalysis
- IV. Energy
- V. Grand challenges

Important dates: Friday, February 5, paper topic due
Wednesday, February 24, exam 1
Monday, March 14, paper draft 1 due
Wednesday, March 23, exam 2
Wednesday, April 6, peer review due
Wednesday, April 27
Friday, April 29, final papers due
Final exam date: May 13, 10:30 1:15 PM

No class

7 Friday 3/11 (spring break)

Late policy: Materials submitted in print are due at the *beginning* of class on the date specified, and electronic material is to be sent by 11:30 AM on the date specified with your last name as the file name. Items submitted within 24 hours of the due date will be given 50% credit and after 48 hours, no credit.

Miscellaneous: For those issues not explicitly noted in these documents, the instructor may set policies during the semester. Howtst crBT1 8 0

Outline

- I. The basics of inorganic chemistry
 - A. Recap of Lewis structure & VSEPR
 - B. Point symmetry
 - C. Molecular orbital theory
 - D. Periodic trends
 - E. Lewis acids, hard-soft concept, and frustration
- II. Metals in biology
 - A. Metals: More than a point charge
 - B. Moving oxygen