

Metals in Biology

BMB 961 (section 3) – 2 credits
Spring 2009, January 12th to May 8th

Instructor: Eric Hegg, 510 Biochemistry
EricHegg@msu.edu

Lectures: Tu and TH 9:10 A.M. 10:00 A.M. Plant and Soil Sciences (PSS) A148

Office Hours: Monday 9:00 – 10:00 A.M. (or by appointment)

Text: A significant portion of the reading will come from journal articles. All primary and secondary articles will be available online via Angel.

Short readings may also be assigned from a variety of texts including: *Biological Inorganic Chemistry: Structure and Reactivity* (Bertini, Gray, Stiefel, and Valentine), *Principles of Bioinorganic Chemistry* (Lippard and Berg), *Inorganic Biochemistry: An Introduction* (Cowan), *Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life* (Kaim and Schwederski), and *Physical Methods in Bioinorganic Chemistry* (Que, Ed.). These short text sections will be available via Angel.

Topics: Electron transfer
O₂-transport
O₂-activation by heme and nonheme sites
Mn cluster in photosystem II: O₂-production
Fe/Cu transport and storage
Biochemistry of Nickel: [NiFe] H₂ase and CODH
Nitrogen cycle: Nitrogenase and NO_x reductases
Hydrolysis reactions
Metals in medicine
Metal toxicity
Metal cofactor biogenesis
Vitamin B₁₂

Grading: Two student presentation (40%)
2 Problem sets (10%)
Midterm exam (20%)
Cumulative final exam (30%)

Metals in Biology (BMB 961) is intended for graduate students with backgrounds in chemistry, biochemistry, and/or molecular biology. In this course we will discuss the role of metal ions in various biological processes. Discussions will focus on the catalytic mechanisms as well as the way in which the different protein environments “tune” their respective active site to perform a particular reaction. For instance, how do cytochrome P-450 enzymes activate O₂ for oxidation reactions, and how does the active site differ from the active site found in O₂-transport proteins? Student presentations will be an important emphasis in this class.