Metals in Biology

BMB 961 (section 3), MMG 803 (section ??), & CMB (section ??) – 2 credits

**Spring 2017**

**Instructors:** Eric Hegg Bob Hausinger

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**Lectures:** Tu and Th 9:10 A.M. 10:00 A.M. 502 Biochemistry

**Office Hours:** By appointment

**Text:** A significant portion of the reading will come from journal articles. All primary and secondary articles will be available online via D2L.

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 D2L.

**Topics:** Electron transfer

O2 and activation by heme and nonheme sites

Mn cluster in photosystem II: O2-production

Metal regulation/homeostasis

Fe/Cu/Ni/Zn transport and storage

Biochemistry of Nickel: [NiFe] H2ase and CODH

Nitrogen cycle: Nitrogenase and NOx reductases

Hydrolysis reactions

Metals in medicine

Metal toxicity

Metal cofactor biogenesis

Metals in energy transduction

**Grading:** Two student presentations (50%)

Presentation evaluations/class participation (20%)

Midterm exam (15%)

Final exam (15%)

Metals in Biology (BMB 961) is intended for graduate students with backgrounds in biochemistry, molecular/cellular/plant biology, microbiology, and/or chemistry. In this course we will discuss the roles of metals in biological systems, including metalloenzymes, metallocenter biosynthesis, metal transport, metal toxicity, and metalloregulation. Discussions will focus on the catalytic mechanisms as well as the way in which the different protein environments “tune” their active site. Student presentations will be an important emphasis in this class.