

# Metals in Biology

BMB 961 (section 3), MMG 803 (section 1), & CMB 800 (section 1) – 2 credits  
Spring 2019

**Instructors:** Eric Hegg  
510 Biochemistry  
[EricHegg@msu.edu](mailto:EricHegg@msu.edu)

Bob Hausinger  
6193 BPS  
[Hausinge@msu.edu](mailto:Hausinge@msu.edu)

**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), and *Physical Methods in Bioinorganic Chemistry* (Que, Ed.). These short text sections will be available via D2L.

**Topics:** Electron transfer  
O<sub>2</sub> activation by heme and nonheme sites  
O<sub>2</sub>-production by the Mn cluster in photosystem II  
Metal regulation/homeostasis  
Fe/Cu/Ni/Zn transport and storage  
Biochemistry of Nickel  
Biochemistry of Lanthanides  
Nitrogen cycle  
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 (take-home problem set) — (15%)  
Final exam (take-home problem set) — (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.