Metals in Biology

BMB 961 (section 3), MMG 803 (section 1), & CMB 800 (section 1) – 2 credits
Spring 2021

Instructors: Bob Hausinger
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Lectures: Tu and Th 9:10 A.M. 10:00 A.M. (tentative)

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_2 activation by heme and nonheme sites
O_2-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.