

Che 523 Bioinorganic Chemistry

Fall 2017

Place: **Norton 214**, MW 11:00-12:20

Office hours: M, W 10-11 or by appointment

Instructor: Dr. Janet Morrow

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Suggested textbooks: Biological Inorganic Chemistry: Structure and Reactivity (Bertini, Gray, Stiefel, Valentine), University Science Books 2007. Biological Inorganic Chemistry: a new introduction to molecular structure and function. Second edition. Robert Crichton, Elsevier 2012.

Online References: UB libraries electronic journals

A. Ben Wagner, Chemistry Librarian, 226 Capen Hall inside the Silverman Library.

Phone: 645-1333. Email: abwagner@buffalo.edu. Info: <http://library.buffalo.edu/bwagner>.

Learning outcomes:

Upon completion of this course:

- 1) Students will have an understanding of how metal ions function as catalytic and structural centers in metalloproteins and metalloenzymes.
- 2) Students will have an understanding of metal ion transport and storage within cells and how errors in storage and transport may result in disease states.
- 3) Students will have an understanding of important pathways of metal ion signaling and action of metal ion receptors. By applying critical thinking about spectroscopic properties of molecules, students will design ways to monitor metal ion concentrations within cells.
- 4) Students will gain an understanding of metallodrug binding to nucleic acids. The inorganic principals that are important in the efficacy of these agents will be identified by the students and used to design improved metallodrugs.
- 5) Students will have an understanding of metal ion based imaging agents and will use critical thinking skills to design imaging agents that respond to biological environment.

Assessment tools

Students will be expected to progress from knowledge of basic concepts in inorganic chemistry to an appreciation of how metal ions function in biology and medicine. A combination of lectures, group discussions of the literature and presentations will be used.

- 1) Students will have graded homework sets to ensure a solid foundation in inorganic chemistry, metal ion coordination chemistry and bioinorganic chemistry.
- 2) Students will read current literature articles nearly every week. They will answer questions about the literature, and participate in discussions held in class.
- 3) Students will write a paper and present a discussion of a research problem in the field of bioinorganic chemistry.

- 4) A take home final will be given to assess the application of students' critical thinking skills to problems in bioinorganic chemistry.

<u>Tentative Schedule</u>	<u>chapter</u>	<u>Date</u>
Essential elements/coordination chemistry	tutorial I & II	8/28, 8/30
Introduction to metalloproteins	3	9/6
Metalloenzymes: metallohydrolases (Zn, Mg)	9	9/11-9/18
Metalloenzymes: oxygen metabolism (Fe, Cu)	11	9/18-9/27
Metal ion transport and storage	8	10/2-10/9
Metal ion receptors and signaling (Ca & Zn)	14	10/11-10/18
Metallodrugs/nucleic acids	7 & 9	10/23-11/1
Radiopharmaceuticals and therapeutics	7	11/6-11/8
MRI contrast agents	7	11/13-11/20
Presentations	-	11/27-12/8

Grading (total 400 pts)

Final Exam	100
Homework/literature discussion	200 (includes 50 pts for attendance/participation)
Presentations	100

The final course grade will be determined on the basis of total points and will be based on a curve. Students who have an excused medical reason for absence from class will be allowed to turn in late homework and be excused from the discussion without loss of points for participation.