

Chemistry 614
Bioinorganic Chemistry
Course Syllabus Spring 2012

1. General Information

Instructor: Andy Pacheco

Lecture: M, W, F 10:00 - 10:50 am, Chem 170

Office Hours: By e-mail appointment (Chem 629)

E-mail: apacheco@uwm.edu

Text: Bertini et al. "Biological Inorganic Chemistry, Structure and Reactivity"

2. Course Objectives and Methods: This course is designed primarily for senior undergraduate and graduate students in biochemistry who want a solid background in inorganic chemistry, but with an emphasis on biological aspects. As a prerequisite for the course, you should have taken at least one semester of inorganic chemistry as an undergraduate, and preferably two semesters. You should also have taken at least a survey course in biochemistry.

3. Grading Summary: You will be given 5 assignments throughout the semester, each worth 100 points, for a total of 500 points. There will be no in-class or final exam. For the first four assignments you will be required to read through articles in the original literature, and then answer questions on these articles. For the last assignment you will choose a topic that you are interested in, and prepare a 20 minute Powerpoint presentation on that topic. The presentations will be given to the class during the final lecture slots.

For the first four assignments, you may use any resources that you see fit, such as your text book or library reference books. You may also consult me with questions, and you may even discuss the questions with other students in the class, prior to writing down your answers to the questions. *However*, you may not consult with other students *while you are writing up your answers*. Please be advised that it is very easy for me to tell if two or more students have collaborated in writing an answer. Each of you has a unique way of putting your thoughts on paper, and you cannot disguise it if you have copied the ideas from someone else! If two or more students collaborate in writing the answers to a problem set, all of the collaborators will receive a zero for that problem set.

4. Topics to be Covered (approximate):

I. Review of general principles of coordination chemistry as applied to biological systems

- A. Nature of the dative bond
- B. Crystal field theory summary

II. Metal uptake, storage and regulation in biological systems

III. Structural roles of metals in biological systems

IV. Metalloenzymes that function through Lewis acidity

V. Electron Transfer (ET) Proteins

- A. Basic ET theory
- B. Classes of ET Proteins
- C. Long range ET
- D. Photosynthesis

VI. Oxygen Chemistry

- A. Redox chemistry of O₂
- B. Biological O₂ carriers and their models
- C. Aerobic respiration
- D. Mono-oxygenases, catalases and peroxidases

Ongoing topic: spectroscopic characterization of bioinorganic systems

5. University and Departmental Policies

For information regarding university policies on such subjects as students with disabilities, accommodations of religious observances, students called to military active duty, and other important topics, please visit the following web site maintained by the Secretary of the University: <http://www.uwm.edu/Dept/SecU/SyllabusLinks.pdf>.

Chemistry Department policies are posted on bulletin boards across from Chemistry 195 and Chemistry 164.

5. Recommended Bioinorganic References

1. Bertini, I.; Gray, H. B.; Stiefel, E. I.; Valentine, J. S. "Biological Inorganic Chemistry, Structure and Reactivity", University Science Books, 2007. ISBN 1-891389-43-2; QP531.B547 2006 (Recommended text book).
2. S. J. Lippard, J. M. Berg "Principles of Bioinorganic Chemistry"; University Science Books, 1994. ISBN 0935702725.
3. I. Bertini, H. B. Gray, S. J. Lippard, J. S. Valentine "Bioinorganic Chemistry"; University Science Books, 1994. ISBN 0-935702-57-1; QP531.B543 1994

6. Recommended General Inorganic Text Books

1. Duward Shriver, Peter Atkins "Inorganic Chemistry, 3rd edition"; W. H. Freeman and Co., 1999. ISBN 716728737; QD154.5.S57 1999b (5th edition now available, but not in library).
2. D. M. P. Mingos "Essential Trends in Inorganic Chemistry"; Oxford University Press, 1998. ISBN 0198501099; QD467.M64 1997.
3. M. Gerloch, E. C. Constable "Transition Metal Chemistry, The Valence Shell in d-Block Chemistry"; VCH, 1994. ISBN 1560818840; QD172.T6 G47x 1994.
4. F. A. Cotton, G. Wilkinson "Advanced inorganic chemistry : a comprehensive text, 5th edition"; J. Wiley and Sons, 1988. ISBN 0471849979; QD151.2 C68 1988 (6th edition now available, possibly in library).
5. Wulfsberg, G. "Inorganic Chemistry"; University Science Books, 2000. ISBN 1-891389-01-7; QD151.5.W84 2000.