CHM 6670 Bioinorganic Chemistry Section 03EA

Spring, 2012 (Inorganic Biochemistry)

Instructor: Prof. George Christou **Class Times**: T-R, 10.30—11:45 am **Room**: CLB 414
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Office Hours: W, 2:00-4:00 pm, and by appointment

Course Description

The course will be an introduction to the structure and function of a variety of metalloproteins and metalloenzymes, concentrating on systems containing transition metals. Emphasis will be on the role of the metal ion(s), and the inorganic chemistry involved in the biomolecule's function. This is not a biochemistry course.

Required Text

There is no required text. Handouts will be provided, supplemented by recommended reference texts and references to literature reviews and other sources.

Research Paper

A research paper will be required from every student on a topic not covered in the course. A list of suitable topics, including medical applications of inorganic compounds, will be made available within the first six weeks of the course. Topics not on the list may also be chosen, with approval from the instructor.

Exams

Exams cover all lectures and reading assignments. It is the student's responsibility to ask questions (either during class or at office hours) if they do not understand lecture or reading materials. The final exam covers the entire semester, but will focus on material after the mid-term exam. Exams will be administered in class. Make-up exams will only be given by pre-arrangement (before the exam) or under extraordinary circumstances (e.g., medical emergencies) that must be documented.

Grades

Grades will be based on the research paper (25%), one or two short exams during the semester (total 35%), and a final exam (40%).

Attendance and Absence Policy

Attendance is not mandatory, and it is not used as part of the student grade assessment. However, you are advised to attend all classes, if possible. If an unexpected emergency or illness will prevent you taking an exam, you should notify the instructor as soon as possible.

Course Outline

I. Metallobiomolecules: General

a) Metal-binding organic groups
b) Metal structural types
c) Elements of protein structure
d) The entatic state hypothesis
e) Metal substitution
f) Synthetic analogues
g) Mossbauer spectroscopy

II. Metallobiomolecules: Specific

Detailed look at representative examples, as many as time will permit, and some examples of synthetic analogues.

1. Proteins:

Oxygen carriers: hemoglobin/myoglobin, hemerythrin, hemocyanin
Electron transfer: iron-sulfur proteins, blue copper proteins
Metal transport/storage: ferritin, transferrin, metallothioneins

2. Enzymes:

Hydrolases: carboxypeptidase, carbonic anhydrase
Carbon metabolism: methane monooxygenase, cytochrome P-450 enzymes
Oxygen metabolism: oxidases, oxygenases, superoxide dismutase, catalase
Nitrogen fixation: nitrogenase
Oxygen production: water-oxidizing complex of photosynthesis

Recommended Texts

1. Special issue of *Chemical Reviews*, November 1996.
2. Special issue of *Chemical Reviews*, February 2004.
3. "*Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life*", W. Kaim and B. Schwederski, Wiley: Chichester, England; 2001.
4. "*Biological Inorganic Chemistry*", I. Bertini, H. B. Gray, E. I. Stiefel, J. S. Valentine; University Science Books: Mill Valley CA, 2006.
5. "*Biochemistry*", L. Stryker; Freeman: New York.

Academic Honesty

Students must be honest in their coursework, not use notes during exams, and properly cite all sources they consulted for their projects. Any act of academic dishonesty will be reported to the Dean of Students, and may result in failure of the assignment and/or the course. For University of Florida's honor code, see http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php.

Accommodations for Students with Disabilities Students requesting classroom accommodation must first register with the Dean of Students Office, who will provide documentation to be given to ovide this documentation to the Instructor when requesting accommodation. Contact the Disability Resources Center (http://www.dso.ufl.edu/drc/) for information about available resources for students with disabilities.

Counseling and Mental Health Resources

Students facing difficulties completing the course or who are in need of counseling or urgent help should call the on-campus Counseling and Wellness Center (352-392-1575; http://www.counseling.ufl.edu/cwc/).