

CHM 4671 and CHM 6670

Spring 2024

Bioinorganic Chemistry (Inorganic Biochemistry)

Sections: 30698 (4671) and 28963 (6670)

Credits: 3

Instructor: Prof. G. Christou

Office: CLB 408

Email: christou@chem.ufl.edu

Class Times: MWF Period 7 (1.55 – 2.45 p.m.)

Classroom: LEI 242

Office Hours: M 3:00-4:00 pm, W 4.00-5.00 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 and where the mechanism of action has been well determined. 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.

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) Some physical methods (time permitting)

II. Metallobiomolecules: Specific

Detailed look at representative examples, as many as time will permit, and a few examples of synthetic analogue (model) compounds.

1. Proteins:

Oxygen carriers: hemoglobin/myoglobin, hemerythrin, hemocyanin

Electron transfer: cytochromes, 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

Oxygen production: water-oxidizing complex of photosynthesis

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 emphasize material after the mid-term exam. Exams will be administered in class unless otherwise arranged with class approval. Make-up exams will only be given by pre-arrangement (before the exam) or under special circumstances (e.g., medical emergencies) that must be documented (see below). **Final Exam: 10.00 am - 12.00 pm, Wednesday, May 1, 2024.**

Grades

Graduate Students: The course grades will be based on a mid-term exam during the semester (35%), research paper (30%), and a final exam (35%).

Undergraduate Students: The course grades will be based on a mid-term (35%), a second exam (30%), and **either** a final exam **or** a research paper (35%).

Research Paper

The research paper (required from all graduate students, and optional for undergraduates) will be on a topic not covered in the course. A list of suitable topics, including medical applications of inorganic compounds, will be made available after about six weeks of the course. Topics not on the list may also be chosen, with prior approval from the instructor. **It must be submitted to the instructor in CLB 408 by 12.00 noon on Monday, April 29, 2024.**

Required Text

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

Recommended Texts

1. Special issue of the journal *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.
4. "*Biological Inorganic Chemistry*", I. Bertini, H. B. Gray, E. I. Stiefel, J. S. Valentine; University Science Books: Mill Valley CA.
5. "*Biochemistry*", L. Stryker; Freeman: New York.

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, and remember that you are responsible for being aware of all announcements made and material distributed in class. If an unexpected emergency or illness will prevent you taking an exam, you should notify the instructor as soon as possible.

Exam Grade Disputes: All exam grade disputes must be completed within one week of the exam date.

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 may result in failure of the assignment and/or the course. The link to the UF honor code is given at the end of the syllabus.

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); <https://counseling.ufl.edu/>

Students with Disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <http://www.dso.ufl.edu/drc/>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. The student is responsible for scheduling the exam dates with the DRC. Students with disabilities should follow this procedure as early as possible.

Additional Information:

1. UF Student Honor and Conduct Codes: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>
2. Students with Disabilities: see <https://disability.ufl.edu/>
3. Counseling and Health Care: see <https://counseling.ufl.edu/>