

# Bioinorganic Chemistry (Inorganic Biochemistry)      Fall, 2019

## CHM 4671 (Sect. 1762) and CHM 6670 (Sect. 4628)

**Instructor:** Prof. G. Christou   **Email:** [christou@chem.ufl.edu](mailto:christou@chem.ufl.edu)   **Office:** CLB 408   **Phone:** 392-8314  
**Class Times:** M, W, F   Period 8 (3.00–3.50 p.m.)   **Room:** Flint 109  
**Office Hours:** 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. 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.

### 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. 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. **The final exam is 5:30-7:30 pm, Thursday, Dec 12, 2019.**

### 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 approval from the instructor. It must be submitted to the instructor by 3.00 pm Friday, December 8, 2019.

### 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  | e) Metal substitution    |
| b) Metal structural types        | f) Synthetic analogues   |
| c) Elements of protein structure | g) Some physical methods |
| d) The entatic state hypothesis  |                          |

### **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

## 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; 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 <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>

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