Metallobiochemistry
(Bioinorganic Chemistry)

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Class Hours: Fri 10:00 a.m. to 12:50 p.m.
Location: Room WR-134 (West Residence)

Course Description:
Metallobiochemistry (Bioinorganic Chemistry) is a highly multidisciplinary research field, which deals with the role of metals in biological systems. This graduate course will discuss the widely varied roles metal (and in particular transition metal) ions play in living systems. Special attention will be directed towards the relationship of the function of a particular metal in a biological system and its (inorganic) properties. The role of model compounds in the elucidation of structure and mechanism will also be addressed. Physical techniques frequently used in the field of Bioinorganic Chemistry will also be discussed.

Topics include: general principles of metallobiochemistry (at the interface of inorganic chemistry and biochemistry), transport and storage of dioxygen, heme proteins, iron-sulfur clusters, transport and storage of iron, cobalamins, metals involved in photosynthesis, copper proteins in electron transfer and redox processes, nitrogen fixation, zinc proteins in Lewis acid/base catalysis and gene regulation, calcium as a second messenger and ubiquitous regulator, functions of alkali metals, biomineralization, biochemistry of toxic elements, metals in medicine, etc.. Please note that the topics listed above are tentative and depend on student interest and background. (lec 3) cr 3.
Textbooks and other useful references:

A textbook is not required for this course. However, there are a few books which give an excellent overview of the field of Bioinorganic Chemistry. If you would like to obtain a textbook for this course, you may want to choose one of the following books:


Furthermore, there are 3 issues of *Chem. Rev.* which contain excellent review articles on some aspect of Bioinorganic Chemistry. These include:


**Evaluation:**

Assignments & Class Discussion: 10 %  
Midterm (in class): 30 %  
Oral presentation (scientific paper): 10 %  
Oral presentation (lecture): 15 %  
Final (Research Proposal [25%] and oral defense [10%]): 35 %

**Assignments and Class Discussion:**
There will be a small number of minor assignments distributed throughout the course. Furthermore, class discussions will be a vital part of this course in which you are encouraged to participate.

**Midterm:**
The midterm (90 min in length) will be your only written examination. Hence, it will count (a rather high) 30% towards your final grade.

**Oral Presentations:**
As part of this course you will prepare two oral presentations, one on a selected scientific publication (usually on a very specific topic; e.g. a specific metalloprotein), and one of more general nature (lecture). Both presentations should be prepared with MSPowerPoint. Handouts of your presentations should be provided to your fellow classmates in advance.

1. **Scientific paper:**
   You will present the content of a scientific publication related to the field of bioinorganic chemistry. This presentation should be 20 minutes in length. A list of topics to choose from will be provided in class.

2. **Lecture:**
   You will also give a "lecture" on a selected, more general bioinorganic topic (e.g., biomineralization, metal-containing anticancer agents). A list of topics to choose from will be provided in class. The lecture should be 40 minutes in length.  
   *Note: The lecture needs to be prepared "from scratch". You will need to find appropriate reference material (books, articles, etc.), i.e. references for a particular topic will not be provided. As in every lecture, questions from the audience are encouraged, so you will need to be prepared for some questions.*
Final:
The final examination will consist of two parts. For the first part, you are required to write an original research proposal on a selected topic (subject to approval by the instructor). Details on how to write the proposal will be given in class. The second part of the final examination involves the oral defense of your written proposal (20-25 minutes in length).

Last, but not least, some important dates:

General:
September 05 First class
October 13-17 No class (study week)
November 28 Last class

Midterm:
October 31 (in class)

Oral Presentations: in November (dates to be determined)
Research Proposal Due Date: December 05 (3 p.m.)
Oral Defense of the Proposal: December 12 (tentative)