

**BIOLOGICAL INORGANIC CHEMISTRY**  
**Chemistry 395/425/465**  
Spring 2012

**Instructor:** Dr. Richard Holz  
E-mail: Rholz1@luc.edu

**Office:** 420 Fanner Hall

**Lectures:** MWF 12:35-1:25 PM in Mundelein Center 520.

**Office Hours:** By prior arrangement.

**Text book:** The required text is: "Biological Inorganic Chemistry: Structure and Reactivity" Bertini, Gray, Stiefel, and Valentine, University Science Books, 2007.

\*Other resources will be the primary literature.

**Course content:** The goal of this course is to provide a broad survey of bioinorganic chemistry focusing on structure, function, and spectroscopic methods of metalloenzymes. We will examine current areas of research and future directions of the field. The material covered in this course and approximate dates are given in the course outline. Some sections in certain chapters will be skipped or may be covered out of order. The prerequisites for this course are Chem. 340.

**Exams:** Two 50 minute exams will be held at the normal class times during the semester. Exams will be composed of problems that are similar to those worked in class, problem sets, assigned literature readings, and the book example problems. There will be *no* make-up exams. If you have a major problem (a written medical excuse, etc.) and you absolutely *must* miss an exam please see me *in advance*, if possible, to discuss your situation. The final examination, which is comprehensive, is scheduled for **Friday, May 4, at 9:00 AM**. It is official university policy that unless you have three examinations on this day, you must take the final exam at this time. Permission to take the final exam at another time for any other reason must be obtained from the Dean of the College of Arts and Science.

**Grading:** Grades will be assigned according to the results of three one hour exams, in class 20 min. presentations, and a two hour final examination.

Exam I	100 pts.
Exam II	100 pts.
In Class Presentation	100 pts.
Comprehensive Final Exam	200 pts.
<b>Total</b>	<b>500 pts.</b>

Grading will be assigned as follows: A = 90%, B = 80%, C = 70%, D = 60%.

**Course Withdrawal:** Anyone may withdraw from Chem. 395/425/465 with a "W" grade through Monday, March 26<sup>th</sup>.

### Chemistry 340-441 Course Outline

Monday	Tuesday	Wednesday	Thursday	Friday
<b>Jan. 16</b> Martin Luther King Day  No Classes	<b>Jan. 17</b> Classes Begin	<b>Jan. 18</b> Chap. 1: Introduction	<b>Jan. 19</b>	<b>Jan. 20</b> Tutorial I: Biochemistry
<b>Jan. 23</b> Symmetry and Group Theory Review	<b>Jan. 24</b>	<b>Jan. 25</b> MO Theory Review	<b>Jan. 26</b>	<b>Jan. 27</b> Tutorial II: Fund. of Coord. Chem.
<b>Jan. 30</b> Tutorial II: Fund. of Coord. Chem.	<b>Jan. 31</b>	<b>Feb. 1</b> Tutorial II: Fund. of Coord. Chem.	<b>Feb. 2</b>	<b>Feb. 3</b> Spectroscopic and Physical Methods
<b>Feb. 6</b> <b>EXAM I-Review</b>	<b>Feb. 7</b>	<b>Feb. 8</b> <b>EXAM I</b>	<b>Feb. 9</b>	<b>Feb. 10</b> CH 3: Protein Residues as Ligands for Metal ions
<b>Feb. 13</b> CH. 7: Metals in Medicine	<b>Feb. 14</b>	<b>Feb. 15</b> CH. 7: Metals in Medicine	<b>Feb. 16</b>	<b>Feb. 17</b> CH 5: Metal Selection, Transport and Storage
<b>Feb. 20</b> CH 8.1&2: Metal ion Transport and Storage: Transferrin and Ferritin	<b>Feb. 21</b>	<b>Feb. 22</b> CH 8.3&4: Metal ion Transport and Storage: Siderophores	<b>Feb. 23</b>	<b>Feb. 24</b> CH. 8.5: Metal ion Transport and Storage: Copper Transporting ATPases
<b>Feb. 27</b> CH. 8.6: Metal ion Transport and Storage: Metallochaperones	<b>Feb. 28</b>	<b>Feb. 29</b> <b>EXAM II-Review</b>	<b>March 1</b>	<b>March 2</b> <b>EXAM II</b>
<b>March 5</b> Spring Break	<b>March 6</b> Spring Break	<b>March 7</b> Spring Break	<b>March 8</b> Spring Break	<b>March 9</b> Spring Break
<b>March 12</b> CH. 9.1: Hydrolytic Chemistry: Metal Dependent Lyases and Hydrolases Enzymes	<b>March 13</b>	<b>March 14</b> Chap. 9.1: Hydrolytic Chemistry: Metal Dependent Lyases and Hydrolases Enzymes	<b>March 15</b>	<b>March 16</b> CH. 9.2: Hydrolytic Chemistry: Nucleic Acids
<b>March 19</b> CH. 9.3: Hydrolytic Chemistry: Urease	<b>March 20</b>	<b>March 21</b> CH. 4: Special Metal Cofactors and Metal Clusters	<b>March 22</b>	<b>March 23</b> CH. 10: Electron Transfer, Respiration, and Photosynthesis: Electron Transfer Proteins
<b>March 26</b> CH 11.1&2: Oxygen Metabolism: Dioxygen Reactivity and Toxicity	<b>March 27</b>	<b>March 28</b> CH 11.3: Oxygen Metabolism: Peroxidases and Catalases	<b>March 29</b>	<b>March 30</b> CH 11.4: Oxygen Metabolism: Non-Heme Iron.

<b>April 2</b> CH 11.4: Oxygen Metabolism: Non-Heme Iron.	<b>April 3</b>	<b>April 4</b> CH 11.4: Oxygen Metabolism: Non-Heme Iron.	<b>April 5</b>	<b>April 6</b> Easter Break No Class
<b>April 9</b> Easter Break No Class	<b>April 10</b>	<b>April 11</b> CH 11.7 Oxygen Metabolism: Multicopper Oxidases	<b>April 12</b>	<b>April 13</b> CH 12.1: Hydrogen, Carbon, and Sulfur Metabolism: Hydrogenase
<b>April 16</b> CH 12.3: Hydrogen, Carbon, and Sulfur Metabolism: Nitrogenase	<b>April 17</b>	<b>April 18</b> Catch-up	<b>April 19</b>	<b>April 20</b> Presentations
<b>April 23</b> Presentations	<b>April 24</b>	<b>April 25</b> Presentations	<b>April 26</b>	<b>April 27</b> Review Last Day of Classes
				<b>Friday</b> <b>May 4</b> <b>Final Exam</b> 9:00 to 11:00 AM

**General course learning objectives include:**

1. Integrate skills involving scientific methodology.
2. Use evidence to support a claim.
3. Analyze key facts pertaining to metalloenzymes as outlined during the course.
4. Compare and contrast the vocabulary of Biological and Inorganic chemistry.
5. Ability to analyze chemical and physical properties of biological inorganic molecules.
6. Be able to distinguish chemical and physical properties of bioinorganic structures based on structure and bonding.
7. Relate structure and bonding to function.
8. Provide macroscopic and microscopic descriptions of metalloenzyme reaction mechanisms.

**General Information:** In accordance with the Americans with Disabilities Act, reasonable accommodations will be provided for all persons with disabilities in order to ensure equal participation in Chem. 395/425/465. In cooperation with the Services for Students with Disabilities, reasonable accommodation will be provided for students with disabilities. Please meet with the instructor during the first week of class to make arrangements.

**Academic Integrity:** Please refer to the policies on dishonest academic behavior in the Graduate or Undergraduate Studies Catalogs (for details see [www.luc.edu/academics/catalog/undergrad/reg\\_academicgrievance.shtml](http://www.luc.edu/academics/catalog/undergrad/reg_academicgrievance.shtml)).