

## Chemistry 103 Inorganic Chemistry in Living Systems Fall 2019

This course will present the basic principles of metal ions and coordination chemistry and apply these fundamentals toward the study of biological systems.

**Instructor:** Professor Chris Chang (chrischang@berkeley.edu)  
Office Hours: Thurs 4-5 pm, 532 Latimer Hall

**GSI:** Paty De La Torre (patitodlt@berkeley.edu)  
Office Hours: Mon noon-1 pm, Fri noon-1 pm, 1 Lewis  
Hyo Jin Jang (hyojin.jang@berkeley.edu)  
Office Hours: Tues 1-2 pm, Wed 1-2 pm, 1 Lewis

**Lecture:** Tues and Thurs, 8:10-9:30 am, 120 Latimer Hall

**No Textbook:** There is no required textbook for this course. Course material will consist of lecture notes as well as handouts and supporting material posted on the course website.

**Additional Resources:** Miessler and Tarr, Inorganic Chemistry (any edition)  
Bertini/Gray/Stiefel/Valentine, Biological Inorganic Chemistry  
Lippard and Berg, Principles of Bioinorganic Chemistry

**Course Website:** Go to <https://bcourses.berkeley.edu/> and find the "CHEM 103 F2019" page under "Sites". Handouts, lecture notes, problem sets, practice exams, and other supporting materials will be posted here.

### Grading:

Problem Sets	<i>throughout semester, due before class</i>	10%
Exam 1	<i>in class, Thurs Sept 26, 8:10-9:30 am</i>	20%
Exam 2	<i>in class, Thurs Oct 24, 8:10-9:30 am</i>	20%
Quiz 1	<i>in class, Thurs Nov 21, 8:10-9:30 am</i>	10%
Final Exam	<i>in class, Wed Dec 18, 3-6 pm</i>	40%

**Exams and Quizzes:** Exams and quizzes will cover material emphasized in the lectures and the problem sets. No makeup exams/quizzes will be given. If you have a legitimate reason (with documentation) to miss an exam/quiz, you may be excused from the exam/quiz and in this case your final grade will be based on your *prorated* scores from the rest of the course. This situation does not apply to the final exam, which is required in all cases to complete the course. Please mark exam/quiz dates on your calendar immediately. If you know in advance of any reason that may cause you to miss any exam/quiz, please contact Prof. Chang immediately. The GSIs will hand back exams/quizzes after lecture periods and also in their office hours. Requests for regrades will only be considered if they are in the form of a written statement on a sheet of paper attached to the original, unaltered exam/quiz. No requests will be considered more than one week after the exam/quiz. **Note:** Dishonesty and cheating will not be tolerated. Evidence of cheating on an exam/quiz will result in a grade of zero for that exam and further disciplinary action by the University.

**Problem Sets:** You are strongly encouraged to work through the problem sets, as this work will test your understanding of the course material. Exam/quiz questions may be

similar to the material covered in the problem sets. Problem sets will be assigned during lecture and posted on the course webpage, and the GSIs will collect your answers at the beginning of the lecture one week later. 10% of your final grade will be based on turning in completed homework assignments. If you are on a border between two grades, regularly completed problem sets will be taken into account in determining whether or not your grade should be higher. Answers will be available on the course webpage. Each problem set will have 2 levels of questions: Level 1, which are training questions, and Level 2, which are more challenging exam-style questions, many of them which are taken directly from exams from previous years, to help you prepare for exams/quizzes.

**Review Sessions:** Reviews before Exams 1 and 2 will be held the lecture before the exam. The review session for the final will be at the regular class time Thurs Dec 12 during RRR week (8:10-9:40 am). Extended office hours the weeks before the midterm exams and final exam will also be added and practice exams will be provided to all.

### Chemistry 103 Lecture Schedule

Week	Topic
1,2	Intro to Metals in Biology, Inorganic Chemistry Basics (Electronic Configuration, Nomenclature, Lewis Structures, VSEPR, etc) - <i>Problem Set 1 Thurs Sept 5, Due Thurs Sept 12</i>
3	Bonding and Molecular Orbital Theory for Small Molecules – <i>Problem Set 2, Thurs Sept 12, Due Thurs Sept 19</i>
4	Coordination Chemistry Fundamentals (Ligands, Geometries, Hard-Soft Concept, Chelate and Macrocyclic Effects, Electron Counting, etc), Crystal Field Theory
5	<b>In-Class Midterm Exam 1, Thurs Sept 26, 8:10-9:30 am, 120 Latimer</b>
6	Applications of Crystal Field Theory (Magnetism, Absorption Spectroscopy, Reactivity) - <i>Problem Set 3 Thurs Oct 3, Due Thurs Oct 10</i>
7	Aqueous Coordination Chemistry: Principles and Applications to Biological Systems – <i>Problem Set 4 Thurs Oct 10, Due Thurs Oct 17</i>
8	Structural Roles for Metals in Biology (Gene Expression, Signaling)
9	<b>In-Class Midterm Exam 2, Thurs Oct 24, 8:10-9:30 am, 120 Latimer</b>
10	Metallohydrolases
11	Oxygen Binding and Transport – <i>Problem Set 5 Thurs Nov 7, Due Thurs Nov 14</i>
12	Electron Transfer
13	<b>In-Class Quiz 1, Thurs Nov 21, 8:10-9:30 am, 120 Latimer (40 min during class),</b> Water and Oxygen Catalysis in Photosynthesis and Respiration
14	Oxygen Catalysis, Metals in Medicine
	<b>Final Exam Group #11, Wed Dec 18, 3-6 pm</b>

