Syllabus
Chemistry 405WI
Inorganic Chemistry
Spring 2019

Days/Time of meeting: TuTh at 9:30 a.m. for Class, MAC 328
Thursday at 2 - 5 for Laboratory, MAC 240

Professor: Kevin Hoke, Ph.D.
E-mail: khoke@berry.edu
Telephone: 706-290-2674

Office Location: MAC 303B
Office Hours: MWF 10 am – noon,
MTuF 1 – 2 pm (MAC 303B)
Other times available by appointment

Course Description

Theoretical and descriptive inorganic/bioinorganic chemistry. Examines molecular structure and other properties of crystals, coordination compounds, and organometallic compounds. Topics include the roles of metal complexes as acids and bases, in oxidation-reduction reactions, and in biochemical systems. Laboratory in which main group and transition metal compounds are synthesized and studied.

Texts

INORGANIC CHEMISTRY, 6th edition, by D. F. Shriver, and others,
W. H. Freeman and Co., New York, 2014
Carbon copy laboratory Notebook (may use carbon-copy notebook from a previous course)

Purpose of the Course

The Berry College chemistry program is designed to provide a high quality undergraduate preparation for entrance into graduate school, professional school, or the work force. By addressing current theories and practices of inorganic chemistry, CHM 405WI serves as an introduction to graduate studies in inorganic chemistry and a summary of inorganic chemistry for those who will apply the topic in their professions.

Method(s) of Instruction

The two 75-minute class sessions per week will be devoted to discussion of the topics, keyed to INORGANIC CHEMISTRY by D. F. Shriver, 6th edition, outlined in the schedule of class sessions. The weekly laboratory sessions will be devoted to performance of exercises provided by the instructor and will consist of laboratories involving synthesis and characterization of interesting and significant inorganic chemicals.

Student Learning Outcomes

Students will know key topics of inorganic chemistry, including the foundations of coordination chemistry, solid state chemistry, and organometallic chemistry. Students will also learn more sophisticated applications of general chemistry topics in acid-base and oxidation-reduction chemistry.

Assessment Measures

Upon completion of chemistry 405WI, students will have demonstrated knowledge of the surveyed topics of inorganic chemistry at the 60% level as measured by scores on tests, homework assignments, laboratory reports, and a cumulative final examination. In the laboratory, the student will carry out inorganic syntheses and report results in a written format.

Evaluation and Grading

Chemistry 405WI carries 4 semester hours of credit and consists of 3 hours of lecture and three hours of laboratory per week. This is a writing course and certain student work is graded for writing content. The student's writing style is evaluated from papers, essays, lab reports, and pertinent exam questions. A cumulative average, using the following weighted scale, will determine the student's grade in the course:

3 Midterm Tests = 35%
Homework Problems = 10%
Article Analysis Assignments (in and out of class) = 5%
Article Summaries = 10%
Laboratory Average = 25%
Final Exam = 15%

The final exam will be a comprehensive ACS standardized exam for Inorganic Chemistry. The examination time for the final exam scheduled by the Registrar is Monday, April 29th at 8 am.

If any examination date poses a conflict, you must let me know as soon as the conflict presents itself and before the exam is given. I reserve the right to refuse any makeup request, even with documented excuses. For excused absences, I may at my sole discretion instead substitute the outcome for comparable questions from the final exam in lieu of the missed exam.

Homework and Writing Assignments

Approximately 9-10 homeworks based on the textbook reading will be assigned, with the points corresponding to the number of questions on each. At least four of these homework assignments will involve additional writing, which contribute an additional 2-4 points each towards the total points earned.

I do not want you to do your homework from a solutions guide (see Academic Integrity).

An article from the literature will be assigned reading. Two assignments will be given for this paper, culminating in a short in-class presentation/discussion. Students will also write summaries of two other articles in inorganic chemistry. The laboratory will also include writing assignments.

Attendance Policy

It is expected that class attendance will be 100% and that full attention will be given to the subject while present. More than two unexcused absences from lecture will be considered grounds for grade reduction. More than two unexcused absences from lab will be considered grounds for loss of credit for the entire course. Since the study of chemistry requires in class discussion, any absences that are excused for college sanctioned activities will still require the student to meet with the professor in office hours to make up the work. As much as two points on the final average may be subtracted for each excess absence.

Academic Integrity:

Academic dishonesty will be dealt with severely. In addition to betraying the trust placed in the students at Berry, dishonesty cheapens the value of the hard work of all other students and alumni. No credit will ever be given for dishonest efforts. Dishonesty on exams is grounds for dismissal with a failing grade from this course (WF).

You should read again the policy on Academic Integrity found in the *College Catalog* under "Academic Standards". It will be the student's responsibility to understand what is expected in this course and to seek clarification if necessary. For example, the student should fully understand what constitutes plagiarism on writing assignments and problems sets.

Note: Use of the solution guide for the textbook on assigned homework problems will be considered a break in Academic Integrity. You will learn nothing by just copying the answers.

Accommodation Statement:

Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the Academic Success Center in Evans Hall (Ext. 4080) as soon as possible to ensure that such accommodations are implemented in a timely fashion. I am very proud that Berry College provides an opportunity for all of its students to excel and will work with the staff of the ASC to help achieve that.

The syllabus

In a syllabus, a professor attempts to explain what is expected of the students in the course. If necessary, I will amend the syllabus, but the student may not. Changes to items in the syllabus will be announced in class, posted on VikingWeb, disseminated by email, or any combination of these.

Email

You are reminded that your Berry college email is our official means of communication. I will not send email to any other account, nor will I be responsible if your email from another account does not reach me.

Significant events

Date	Event
Jan 8:	First day of class
February 7:	Article Summary #1
February 14 (in lab):	Exam #1
February 21:	Paper Analysis #1
March 8th:	Lab Report #1
Mar 12-14:	Spring Break
Mar 26:	Article Summary #2
Mar 21 (in lab):	Exam #2
April 4:	Revised Lab Report due
April 18:	Paper Analysis #2
April 18 (in lab):	Exam #3
April 23:	last day of class
April 26:	(Friday) Report for Final Lab due.
Monday, April 29	Final Examination 8 am – 10 am (official date/time)

Schedule of Class Sessions

This is a very tentative order of topics (Textbook references from the 6th edition):

Week	Tuesday	Thursday	Lab (Thursday afternoon)
Jan 8-10	Nuclear Chemistry (Chapter 1.1) Note: you are also responsible for 1.3-1.6	Electronegativity and bonding (1.7, 2.13-2.15) Note: you are also responsible for 2.1-2.3	TBA; Check-in
Jan 15-17	Coordination chemistry: intro (7.1-7.10)	Coordination chemistry: structure and isomers (7.1-7.10)	Synthesis of NI_3
Jan 22-24	Symmetry (6.1) and Chirality (7.11)	Molecular orbitals and bonding (2.8)	Synthesis of $Co(acac)_3$
Jan 29-30	Metal-metal bonding (19.10-19.11)	Crystal Field Theory (20.1)	Characterization of $Co(acac)_3$
Feb 5-7	Ligand Field Theory (20.2)	Ligand Field Theory (20.2); Article Summary #1	Linkage isomers
Feb 12-14	Packing of Spheres and crystalline lattices (3.1-3.8)	Packing of Spheres and crystalline lattices (3.1-3.8)	Exam 1 and continuation of linkage isomers
Feb 19-21	Ionic Solids and Ionic Radii (3.9-3.10);	Ionic energetics (3.11-3.15);	Magnetic Properties of some Coordination Compounds
Feb 26-28	Ionic energetics and defects (3.16); Paper Analysis # 1	Metallic solids and Semiconductors (3.18-3.20)	Setup reaction for $MeCpMn(CO)_2PPh_3$; plan final projects
Mar 5-7	Brønsted Acidity and oxo acids (4.1-4.5); Lab report due	Lewis Acids (4.8-4.14)	Isolation and characterization of $MeCpMn(CO)_2PPh_3$
Mar 12-14	Spring Break	Spring Break	Spring Break
Mar 19-21	Exotic solvents and super Acids (4.12-4.15); Article Summary #2	Super Acids and Hard/Soft acids (4.9)	Exam 2 and continuation of above
Mar 26- 28	Oxidation-Reduction (2.16, 5.1-5.5)	Latimer Diagrams and redox equations (5.12-5.13)	Cytochrome *c* electrochemistry
Apr 2-4	Reading Assignments	Ellingham diagrams and isolation of elements (5.16-5.18);	Final lab project.; revised lab report due
Apr 9-11	Symposium Assignments	Organometallic Compounds: structure and nomenclature (22.1-22.5)	Final lab project.
Apr 16-18	Valence electron count and oxidation numbers (22.1-22.5)	Catalysis and polymers (22.21-22.26, 25.1-25.4); Paper analysis # 2	Exam 3 and Final lab project.
Apr 23	Catalysis and polymers (22.21-22.26, 25.1-25.4)		Final Exam on Monday: 8 am- 10 am

Textbook website:
http://bcs.whfreeman.com/ichem6e

WRITING REQUIREMENTS

Chemistry 405WI

CHM405 is a course intended to prepare students for graduate study in chemistry. Success in the chemical profession requires extensive use of effective writing in the form of laboratory notebooks, laboratory reports, and reviews of current chemical literature. Each of these aspects will be developed over the entire term of the course, in both laboratory and lecture. Notebook entries will be evaluated on how well they relate critical experimental details to a reader who may be referring to them several years after the writer has departed the research institution. Lab reports will assess the student's ability to draft a basis for a paper for a journal. It is expected that the quality of these "first drafts" will improve by incorporating instructor feedback. A few brief article summaries will expose the student to the literature.

Chemistry 405WI (3-3-4) requires writing in the following ways.

(1) Two brief (1-2 double-spaced pages) summaries of different articles relating to inorganic chemistry published in the primary literature within the last 8 years. The student is required to relate the paper in his or her own words; a rewording of the paper's abstract is inappropriate and a violation of the Academic Integrity Policy.

(2) Selected essay questions on each of the hourly tests throughout the semester.

(3) Typed laboratory reports that follow the format used in papers published in *Inorganic Chemistry*. Approximately three reports (4-6 pages each) are submitted throughout the semester, with the second being a revision of the first. It is expected that the quality of lab reports will improve as the course progresses, with students incorporating feedback on style and content on earlier reports as to improve later reports.

(4) Two to four of the homework assignments will include a critical evaluation of some topic.

The student should anticipate that over 30% of the course grade will be based on writing activities.

At a minimum:
Article Writing assignments will be 15% of course grade (2-4 pages in total).
At least 59% of the lab credit will be written reports = 15% of course grade (12-15 pages in total).
At least 10% of each midterm exam will be an essay response = 4% of course grade (3 pages in total).
At least 10% of homework questions will require essay response = 1 % of course grade
(2 to 4 pages in total)

However, as the class encounters interesting topics and material, I may choose to increase the WI aspects of homework in response.

Suggested journals to look for research articles to use for summaries:

Inorganic Chemistry
Journal of the American Chemical society
Angewandte Chemie
Science

<u>Instructor's Bibliography</u>

INORGANIC CHEMISTRY, all editions, by D. F. Shriver, Peter Atkins, and C. H. Langford, W. H. Freeman and Company, New York, NY 1994 through 2018