

CHEM 660: Systematic Inorganic Chemistry
Spring 2019
M/W/F, 12:00-12:50pm
Central District Utility Plant (CDUP Room 1200)

Syllabus

Instructor: James Blakemore
Assistant Professor, Department of Chemistry

office: 3118 ISB lab: 3105 ISB
phone: (785) 864-3019 phone: (785) 864-4633
e-mail: blakemore@ku.edu web: blakemore.ku.edu

Office hours: Wednesday, 1:00-2:00 pm, and other times by appointment

Description from course catalogue: A systematic study of the elements and their compounds, emphasizing the relationship between properties of substances and their atomic and molecular structures, and the positions of the elements in the periodic systems. Prerequisite: CHEM 510, CHEM 520, or CHEM 530. LEC. N. (3 h)

Instructor's description: CHEM 660 explores the basis of the field of inorganic chemistry, including the relevant theoretical models and the interpretation of experimental data. Using principles developed in course content, we will endeavor to understand the role that electronic structure plays in the properties and reactivity of selected molecules and materials. Selected advanced topics (e.g., organometallic chemistry, chemistry of the f-elements, nuclear chemistry) will be discussed. In general, the course aims to build a foundation of organizing concepts that will be helpful in higher-level studies and original research in chemistry.

Required Texts

Gray, Harry B.; *Chemical Bonds: An Introduction to Atomic and Molecular Structure*, **1996**, 2nd edition, University Science Books, ISBN-13: 978-0935702354

Available at bookstore or as a used book on Alibris.com

Crabtree, Robert H.; *The Organometallic Chemistry of the Transition Metals*, **2014**, 6th edition, Wiley, ISBN-13: 978-1118138076

Available at bookstore or as a used book on Alibris.com; recent past additions are likely suitable for our purposes, but the 2014 edition is most recommended.

Recommended Texts

Cotton, F. Albert; *Chemical Applications of Group Theory*, **1990**, 3rd edition, Wiley-Interscience, ISBN-13: 978-0471510949

A classic chemistry text; we will use selected portions in our work, and will rely on the character tables for reference throughout the course.

Harris, Daniel C., and Bertolucci, Michael D.; *Symmetry and Spectroscopy: An Introduction to Vibrational and Electronic Spectroscopy*, **1989**, Dover, ISBN-13: 978-0486661445

Advanced treatment of spectroscopy and symmetry.

Reference Text

Shriver, Weller, Overton, Rourke, and Armstrong; *Inorganic Chemistry*, **2014**, 6th edition, W. H. Freeman and Co., ISBN-13: 978-1429299060

Do not purchase this one; will be available on course reserve at Anschutz Lib when needed.

Model Kit

A key learning goal for us this semester is to enable students to effectively visualize molecular symmetry and atomic connectivity in molecules. In work toward this goal, molecular model kits can be very useful. An especially nice kit for our purposes comes from the Maruzen company, their no. 1005 Alpha Standard Set

Link: http://www.maruzen.info/hgs/catalog/product_info.php?products_id=652

Grading

Periodic Table Quiz	1 x 10%; 50 pts
Midterm Exams	2 x 20%; 100 pts each
Final Exam	1 x 25%; 125 pts
In-Class Participation	1 x 5%; 25 pts
Problem Sets	4 x 5%; 25 pts each
Total	500 points

Exams

There will be three exams, two midterms and one final. Midterm exams will be administered during the usual class period, and will cover all material presented to-date. These midterms may have a take-home component. The final exam will be administered during the scheduled final-exam period, and will be comprehensive.

Midterm I: **Friday, 22 February 2019**

Midterm II: **Friday, 22 March 2019**

Final Exam: **Tuesday, 14 May 2019, 10:30 a.m. – 1:00 p.m.**

For more information: <https://registrar.ku.edu/exams>

Periodic Table Quiz

Understanding of the periodic table is among the great achievements in chemistry. Instant recall of the organization of the periodic system vastly accelerates scientific discussion in chemistry, and prepares students for use of chemistry in a variety of settings. Students will be quizzed on the location of all elements in the *s*, *p*, and *d* blocks in an in-class quiz, i.e., a blank chart will be handed out and students will fill in the location of the elements. The quiz will take place at the beginning of the class period on **Wednesday, January 30, 2019**.

Problem Sets

Four sets will be assigned throughout the semester, based on textbook reading, lecture content, and outside sources. Your solutions (show your work!) to these problems will be due in class on the specified "due dates." **Absolutely no late sets will be accepted.** Students are encouraged to work together on solving the problems, including discussion of the problems and their possible solutions. However, do not copy solutions from others.

Lecture Material

Some lectures may emphasize topics not covered in the primary or secondary texts, or could discuss topics in a context not provided in the texts. Additionally, the time sequence of the presentation of certain topics will evolve naturally based on in-class discussions and student questions. *Therefore, it is highly recommended that students attend all lectures and take notes.*

Course website

All students enrolled in CHEM 660 have been granted access to the Blackboard site for the course. Please ensure that you can access the site, as it will be the platform for distribution of electronic handouts, problem-set answer keys, course announcements, important links, etc. You will be prompted for your KU Online ID and password to access these materials. If you have any trouble accessing the course website, contact the instructor immediately.

Special Needs

The Academic Achievement and Access Center (AAAC) coordinates accommodations and services for all students that are eligible. If you have a special circumstance (e.g., medical issues, serious test-taking anxiety) for which you wish to request accommodations and have not yet contacted the AAAC, please do so as soon as possible. Their office is located in 22 Strong Hall, and the phone number is (785) 864-4064 (V/TTY). Information about their services is available at <http://access.ku.edu>. *All arrangements for special needs must be set well in advance of exam administration or problem set distribution to ensure fairness to all students.*

Course Evaluation

Both the University and the instructor value effective teaching. Student evaluations are an important component of teaching assessment, and the instructor places strong emphasis on feedback provided by students. The Department of Chemistry uses online student-evaluation surveys.

Surveys in this course will be administered via Blackboard, and are configured such that student anonymity is guaranteed. Students will receive an email from the KU Center for Online and Distance Learning with instructions for completing the survey in Blackboard. Students can only access the survey once, and reminders will be sent to those who have not completed the survey. The survey period is Sunday-Sunday of the last week of classes (ending just before finals week).

Students will be provided time during a class period to complete the electronic course evaluation.

A full description of procedures is found in the KU Policy Library at:
<http://policy.ku.edu/provost/student-eval-procedures-for-admin>.

Important Dates

- **Monday January 28:** Last day to add, change sections and increase credits online.
- **Monday February 11:** Last day to drop a full semester class and not have it appear on the transcript.
- **Monday February 18:** Last day to add or swap a class.
- **Monday April 22:** Last day to withdraw or drop a course with a "W". Most students can drop online, but some schools/careers require permission to drop after February 11th.

For more information: <http://registrar.ku.edu/schedule-change-approvals-and-deadlines>

Academic Integrity

We expect that all students will maintain the highest standards of personal, academic, and scientific integrity. The study of science is worth little unless findings are reported accurately and proper authorship is attributed.

From the KU Student Handbook:

“The following policy . . . defines a uniform approach to acts of academic misconduct involving students in courses offered by the KU College of Liberal Arts and Sciences (CLAS). Academic integrity requires the honest performance of academic responsibilities by students. Academic responsibilities include, but are not limited to: the preparation of assignments, reports, and term papers; the taking of examinations; and a sincere and conscientious effort by students to abide by the policies set forth by instructors. Any subversion or compromise of academic integrity thus constitutes academic misconduct. Examples of misconduct include (among others) falsification, unauthorized assistance or plagiarism or reports, term papers, research papers, or other written documents; giving or receiving unauthorized aid on examinations; disruption of classes; and the offering of gratuities or favors in return for grades.”

For more info on this issue, including charges and sanctions, see:

<https://college.ku.edu/undergrad/students/policies>

Any incidents of academic misconduct will be prosecuted to the fullest extent possible within the scope of University policies, as described in the Student Handbook that is available at the website quoted above. At a minimum, this will include receiving zero credit for the work in question for any party involved. Additional penalties may include a grade of “F” for the entire course as well as suspension or expulsion from the University. If you have any questions about what constitutes academic misconduct, please consult with the instructor or the Student Handbook.

Honors Credit

Students often express interest in obtaining credit through the KU Honors Program for this course via the “Honors Course Contract” option. The instructor enthusiastically recommends that all eligible students pursue this option. For CHEM 660, Honors Credit can be obtained via a “Collective Contract” model. Under this model, the requirements for all Honors students in this course will be similar, but tailored to individual student interests. Please arrange to meet with the instructor within the first month of the course to set up your specific program within CHEM 660.

In general, each student will select an advanced topic relevant to one of our syllabus subjects, and complete a tailored additional problem set that exposes them to an advanced topic in an approachable way. The goal here is to maintain a solid relationship with the course context and background. Students will be free to pick from among several topics. Honors students will also write a final paper on a frontier area where the advanced topic covered in their custom problem set has some relevance. For CHEM 660, this could be (for example) sustainable polymer production, renewable energy utilization, or pharmaceutical design/synthesis.

More information is available at:

<https://honors.ku.edu/course-contract>

Statement on Diversity and Inclusion

As a premier international research university, the University of Kansas is committed to an open, diverse and inclusive learning and working environment that nurtures the growth and development of all. KU holds steadfast in the belief that an array of values, interests, experiences, and intellectual and cultural viewpoints enrich learning and our workplace. The promotion of and support for a diverse and inclusive community of mutual respect require the engagement of the entire university.

Recommendation Letters

As this is an upper-division course, students may be pursuing admission to graduate or professional schools, or be actively engaged in a search for employment. The instructor is happy to provide letters of recommendation for any relevant opportunities. It is recommended that students interested in obtaining letters of recommendation contact the instructor well in advance of submission deadlines, so that adequate preparations can be made. Requests for letters should include an up-to-date résumé or curriculum vitae, as well as a description of specific information to be included in the letter of recommendation.

Information for Auditors

Students who are attending this course but not enrolled for credit (“Auditors”) should check-in with the instructor early in the course. Auditing will be authorized on a case-by-case basis. Access can be granted to the course website on Blackboard. Auditors are encouraged to complete all problem sets and exams, as working with the course content is important for knowledge acquisition.

Concealed Carry on the KU Campus (i.e., K.S.A. 75-7c20 Compliance)

Individuals who choose to carry concealed handguns are solely responsible to do so in a safe and secure manner in strict conformity with state and federal laws and the KU weapons policy. Safety measures outlined in the KU weapons policy specify that a concealed handgun:

- Must be under the constant control of the carrier.
- Must be out of view, concealed either on the body of the carrier, or backpack, purse, or bag that remains under the constant control of the carrier.
- Must be in a holster that covers the trigger area and secures any external hammer in an un-cocked position
- Must have the safety on, and have no round in the chamber.

For more information:

<http://concealedcarry.ku.edu/information>

<http://policy.ku.edu/university-kansas-policy-weapons-including-firearms-effective-july-1-2017>

Materials

Prepared course materials and delivered lectures are the property of the instructor. Video and audio recording of any lecture without instructor’s consent is prohibited. On request, the instructor may grant permission for students to record lecture audio; this will be on the condition that the specific individual use the recordings only as a study aid. Unless explicit permission is obtained from the instructor, electronic copies of any course-related materials may not be transmitted or transferred to any other person, regardless of whether or not that individual is enrolled in the course.

Commercial Note-Taking Ventures

Pursuant to the University of Kansas’ Policy on Commercial Note-Taking Ventures, commercial note-taking is not permitted in this course. Lecture notes and course materials are provided for personal use in mastering the course material; these materials may not be sold to any person or entity in any form. Any student engaged in or contributing to the commercial exchange of notes or course materials will be subject to discipline, including academic misconduct charges, in accordance with University policy. Please note: note-taking provided by a student volunteer for a student with a disability, as a reasonable accommodation under the ADA, is not the same as commercial note-taking and is not covered under this policy.

For more information:

<http://policy.ku.edu/provost/commercial-note-taking>