

INORGANIC & MATERIALS CHEMISTRY 265

Lecture TR 10:30 am Taylor G042 | Laboratory M 1:00 pm Taylor 1068

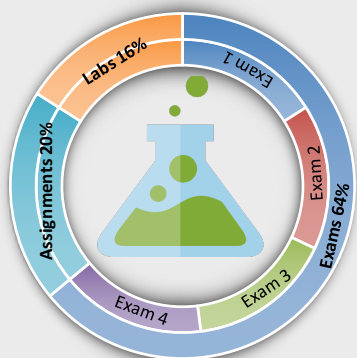
central topics

- properties of the nucleus
- organizing trends of the periodic table
- electrochemistry & batteries
- transition metal and Ln/Ac coordination chemistry
- structure and properties of metals and alloys
- structure and properties of ionic solids
- materials characterization methods
- inorganic materials: polymers, semiconductors, data storage, and nanomaterials

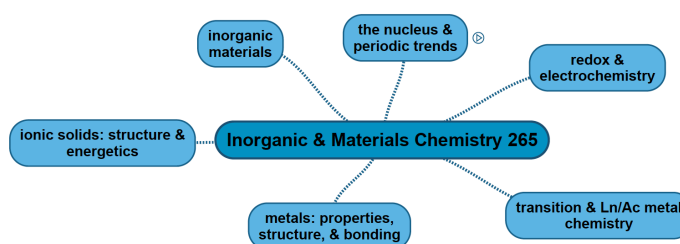
grading

You must earn a passing grade in the laboratory and in the exams in order to pass. Grades in this course are not curved.

- 90–100% A
- 80–89% B
- 70–79% C
- 60–69% D
- < 60% F



A one-semester course to explore the theory and scope of the chemistry of the elements with specific interest in inorganic chemistry's contributions to materials science. For chemistry concentrators, Inorganic & Materials Chemistry 265 completes the foundational sequence in general, organic, inorganic, and biological chemistry.



alignment with college goals

This course has been designed with all of Hamilton's educational goals in mind with an emphasis in the lecture and laboratory on five of them. The most obvious goal addressed in this course is **Disciplinary Practice** because you will examine in depth the foundational concepts of inorganic chemistry and begin to think like an inorganic chemist. To achieve this you must develop **Intellectual Curiosity and Flexibility** as there will often be more than one way to solve a problem or design an experiment. You will at the same time grow in your skills in **Analytic Discernment** to analyze graphical information and equations that illustrate chemical phenomena. In the laboratory, in particular, you will have the opportunity to show **Creativity** in designing experiments and in representing and interpreting your data and you will advance in **Communication and Expression** through writing concise technical summaries of your procedures, data, and conclusions.

Professor Karen Brewer

Taylor Science Center 1060
kbrewer@hamilton.edu

Individual appointments

(sign up via Google Calendar)

W 2:00–4:30 pm

F 10:00 am–12:00 pm

Evening Open Office Hours

T 7:30–9:00 pm

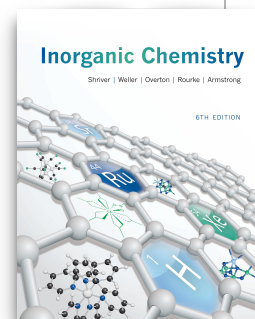
assignments

Throughout the semester there will be several graded take-home and in-class assignments designed to provide further exploration of the topics and to give you practice and feedback. You are encouraged to collaborate with each other on these assignments. Any in-class assignments that we do will count as part of your assignment grade. If you miss an in-class assignment, you will not have the opportunity to make it up by doing it on your own.



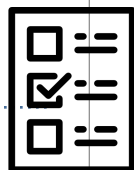
textbook and class materials

- Inorganic Chemistry 6th Edition, Shriver, Weller, Overton, Rourke, Armstrong, 2014, WH Freeman, ISBN 978-1-4292-9906-0
- Supplemental chapters, videos, and articles on topics (Blackboard)
- Lab handouts and information (Blackboard)
- Laboratory Notebook and Lab Coat (bookstore)
- Laboratory Safety Glasses (lab instructor)



exams

There will be four exams covering the material this semester. The exams will emphasize the material covered in assignments and class notes, as well as in the textbook and other assigned readings. Please note that often class time will expand textbook topics, so your notes are your best outline of the course, but are not the only resource when studying for an exam.



tentative lecture topic schedule

Week	Topic
Jan 15	Properties of the Nucleus and Synthesis of the Elements
Jan 22	Periodic Properties of the Elements
Jan 29	Electrochemistry
Feb 5	Electrochemistry & Batteries
Feb 12	Transition Metal Structure
Feb 19	Transition Metal Bonding
Feb 26	Transition Metal Reactivity
Mar 6	Lanthanoids & Actinoids / Metal Bonding
Mar 26	Metal and Ionic Solid-State Structure
Apr 2	Structure & Energetics of Ionic Bonding
Apr 9	Diffraction and Materials Characterization Methods
Apr 16	Inorganic Materials: Polymers & Carbon
Apr 23	Inorganic Materials: Semiconductors & Data Storage
Apr 30	Inorganic Materials: Nanomaterials & Quantum Dots
May 7	Last Day of Class

Exam Schedule

Exam I Tues Feb 13 6:30 pm
 Exam II Tues March 6 6:30 pm
 Exam III Tues April 17 6:30 pm
 Exam IV Thurs May 10 7:00 pm

Exam IV is scheduled for finals week and it will not be comprehensive but will cover only the last portion of the course. During exams, no electronic devices other than a standard scientific/graphing calculator will be permitted. Do not use your phone or other text-saving or messaging device during an exam.



Blackboard is your central information center for this course please check it frequently throughout the semester

- course announcements
- syllabus and course concept maps
- lecture notes, assigned readings, and suggested practice problems
- screencasts on background material, video links
- assignments and answers
- previous year's exams and this year's exam answers
- web resources and news items
- assignment/lab submission links
- lab handouts including prelab information and report guides



Academic Honesty

The rules concerning the Academic Honor Code are described in Article 3, section 2 and 3, of the Honor Court Constitution. These rules apply to all examinations and assignments including and laboratory pre-lab assignments, notebooks, and reports; in other words, all work submitted for a grade. If you find yourself questioning whether an action could violate the Honor Code, chances are that it does. During exams, only a standard scientific/graphing calculator will be allowed. No other electronic devices will be permitted including notebook computers, tablets, mobile phones, smartwatches, or other data-saving/text-messaging electronic devices.

getting help

I am usually available by email for your questions; please allow up to 24 hours for a reply. I have set aside the following regular times for appointments and drop-in office hours specifically for this course.

Individual appointments

W 2:00–4:30 pm, F 10:00 am–12:00 noon, Taylor 1060

signup via Goggle Calendar link on Blackboard

Evening drop-in office hours

T 7:30–9:00 pm, Taylor 1060

course policies

Class attendance

Your attendance at every class meeting is expected. If, however, you must be absent from a class meeting because of illness or other pressing reason, please follow up to find out what you missed with classmates or through office hours.

Students with Disabilities

Hamilton College will make reasonable accommodations for students with properly documented disabilities. If you are eligible to receive an accommodation and would like to make a formal request for this course, please discuss it with me during the first two weeks of class. You will need to provide Allen Harrison, Associate Dean of Students (Elihu Root House; ext. 4021) with appropriate documentation of your disability.

Exam rescheduling

Knowing that there will be conflicts for orchestra, choir, sports, and work-study with the scheduled evening exams, accommodations will be made if you have one of these direct conflicts to take the exam earlier or the following day. The final exam cannot be rescheduled unless there is a direct conflict with another exam.

infographics project

During the semester you will research, develop, and print an infographic describing the structure and applications of an inorganic material. During the first lab meeting, you will have time to explore infographic software that you will use and choose from topics on materials from aerogels to quantum dots.

special seminar

Prof. Harry Gray (CalTech) winner of the Wolf Prize in 2004 for his work in bioinorganic chemistry is this year's Plant Lecturer. He will be on campus April 3–4 to meet with faculty and students and present two lectures, one for the general public and a more technical one in the Chemistry Department. Details will be forthcoming. It is expected that you will reserve time to attend one or both of his lectures.



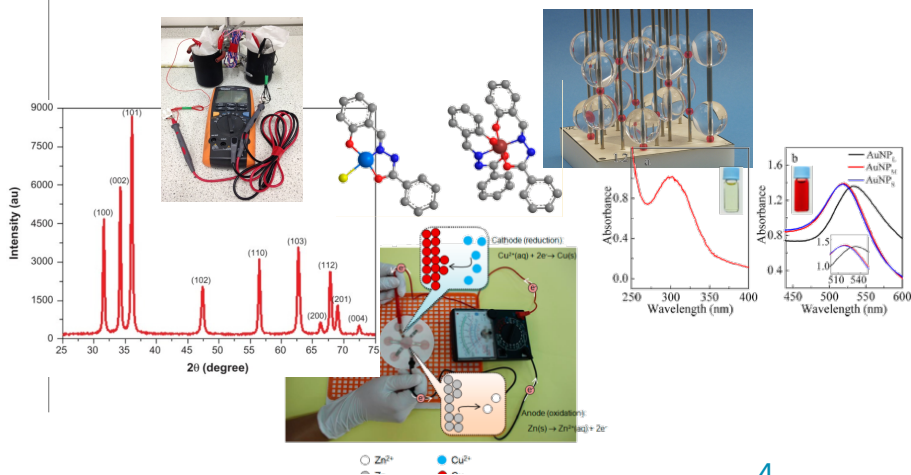
laboratory program

Attendance and completion of the laboratories for this course are required and you must earn a passing grade in the lab in order to pass the course. The experiments for this course have been chosen to allow you to explore a few topics in depth, rather than have an associated experiment for every topic covered in the class. In particular, this semester you will explore electrochemistry, transition-metal chemistry, and the synthesis and characterization of inorganic nanomaterials. Included in the schedule are three report writing workshops in which we will discuss in detail the experiment's data and how to present it for a report. You will then use the lab time to work on your report.



Week	Experiment
Jan 15	MLK Day—No Labs
Jan 22	Introduction to the lab / Canva infographics software
Jan 29	Electrochemistry: Investigating Galvanic Cells
Feb 5	Electrochemistry: Making an Aluminum Battery
Feb 12	Report Workshop: Electrochemistry
Feb 19	Schiff Base Complexes: Synthesis
Feb 26	Schiff Base Complexes: Characterization and Stoichiometry
Mar 5	Report Workshop: Schiff Base Complexes
Mar 26	Model Workshop: Solid State Structures
Apr 2	Zinc Oxide Nanoparticles: Synthesis
Apr 9	Zinc Oxide Nanoparticles: Diffraction
Apr 16	Report Workshop: Zinc Oxide Nanoparticles
Apr 23	Nanoparticles: Synthesis of Gold Nanoparticles
Apr 30	Nanoparticles: Characterization of Size and Thiol Binding
May 7	Last Day of Lab

Lab sessions are scheduled to run three hours and you should expect your work to fill that time. On occasion, a lab session may be shorter than usual, but you should not make appointments on or off campus during scheduled lab time. There may be times that you will have to return to complete data collection on an instrument for an experiment. These times will be arranged in advance with your instructor.



lab policies

If you must miss a lab session due to illness or a conflicting college event, you must notify the instructor in advance, if possible, so that you can be scheduled to complete the experiment at another time.

You are expected to know and abide by all the lab safety rules of the Chemistry Department. You are never permitted to work in the lab without consent and supervision; you must never work alone in the lab. Any dangerous spill or situation must be called to the attention of the instructor or teaching assistant immediately. Safety glasses must be worn at all times. A lack of appropriate behavior may be reflected in your grade. Seriously unsafe behavior could result in dismissal from the lab with no opportunity to make up the missed experiment.

lab reports

Each report will have a targeted section of a full report with the final experiment written up as a full, professional report. Please see the lab handouts and report guides for each experiment posted on Blackboard.

Each lab report will be due by submission through Blackboard one week after the workshop or completion of the experiment. One-third of a letter grade will be deducted for every day a report is late. Ten class days after the due date, your report will not be accepted for grading.