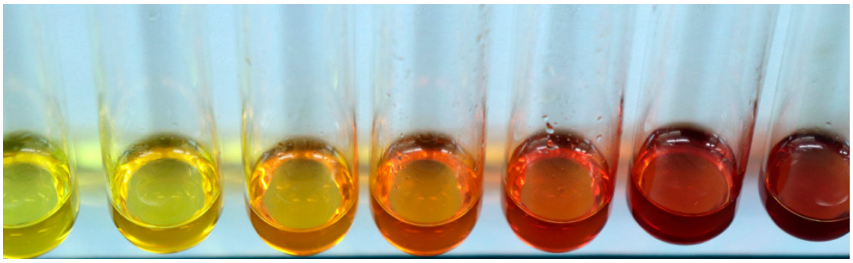
CHEM 430 – Inorganic Chemistry w/Lab

Fall 2020

MWF 1.20 - 2.35 PM

Th 12.30 - 4 PM (lab)



$Zn_{2x}Cu_{1-x}In_{1-x}S_2$ quantum dot (QD) samples suspended in octadecene.
QD diameter increases from left to right.
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Instructor

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office hours

Mondays 5P-7P
Thursdays 9A-11A
on Microsoft Teams

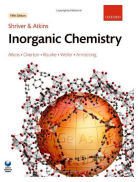
Course Description

The field of inorganic chemistry is vast, as it essentially encompasses the chemistry of all elements other than carbon. Our discussions will build upon many concepts from previous classes, such as atomic structure and bonding. We will study the electronic and atomic configuration of molecules and materials, and use that knowledge to explain their properties and understand some of their applications (nuclear power, solar energy conversion, catalysis, etc.)

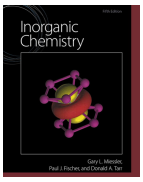
Learning Goals

- Describe the electronic structure of compounds and materials
- Rationalize chemical properties based on electronic structure and bonding
- Search the scientific literature and evaluate synthetic procedures
- Design and perform an inorganic synthesis
- Strengthen scientific communication skills

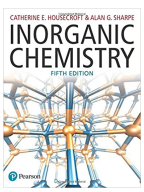
Suggested Textbooks



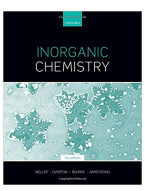
Atkins & Shriver's Inorganic Chemistry
Atkins et. al. (5th edition)



Inorganic Chemistry
Miessler et. al. (5th edition)



Inorganic Chemistry
Housecroft & Sharpe (5th edition)



Inorganic Chemistry
Weller et. al. (7th edition)

Tentative Schedule

This schedule represents our "best case scenario". Only topics covered in class will appear in the exams.

Week	Monday	Wednesday	Friday
1 *9/14 – 9/18*	Course Overview Atomic Structure	Nuclear Chemistry	Nuclear Chemistry
2 *9/21 – 9/25*	Molecular Structure and Bonding Lewis Dot Structures	Molecular Structure and Bonding Valence Bond Theory	Molecular Structure and Bonding Molecular Orbital Theory
3 *9/28 – 10/2*	Molecular Symmetry	Molecular Symmetry Molecular Orbital Theory	Solid State Chemistry
4 *10/5 – 10/9*	Solid State Chemistry	Solid State Chemistry Band Theory	Nanoparticles and Quantum Dots
5 *10/12 – 10/16*	*Spill-Over Day* *Review*	*Spill-Over Day* *Review*	**First Exam**
6 *10/19 – 10/23*	Acids and Bases Brönsted-Lowry Definition	Acids and Bases Lewis Definition Non-Aqueous Media	Coordination Compounds Crystal Field Theory
7 *10/26 – 10/30*	Coordination Compounds Ligand Field Theory	Redox Reactions	Redox Reactions Latimer and Pourbaix Diagrams
8 *11/2 – 11/6*	Coordination Compounds Reactions	Photoactive Complexes Basics of Solar Energy Conversion	Organometallic Compounds
9 *11/9 – 11/13*	Organometallic Compounds Reactions	Cross-Coupling Reactions	Photoredox Catalysis
10 *11/16 – 11/20*	*Spill-Over Day* *Review*	*Spill-Over Day* *Review*	**Second Exam**

In Class: Small Groups

Most of our “lecture” time will be spent working in small groups (more information can be found on moodle). On most days, there will be a new worksheet. While you are expected to work with your group members and learn from each other, you will be responsible for turning in your own work at the end of the class. To do this, you must upload a picture of your worksheet to moodle. This work will not be graded, but it’ll serve as proof of your attendance, and help me assess how you’re doing in this course.

Laboratory

The virtual lab for CHEM 430 will give you an idea of what it’s like to work in a synthetic inorganic lab.

You will have to design the synthesis of a coordination complex using the literature to guide you. Then, you will analyze data for a handful of characterization techniques.
The whole class will share results to compare the compounds, interpreting differences and similarities. At the end of the term,you will give a 10-minute presentation on your work.

In addition to the final presentation, there will be graded assignments every week. The lab will count for 30% of your final grade in the class.

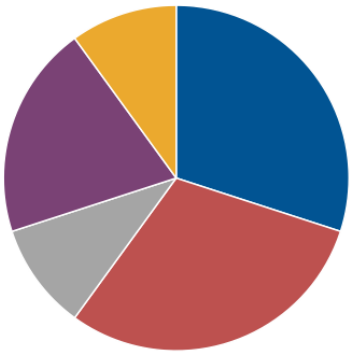
Graded Activities and Assessment

In CHEM 430, you will apply the topics covered in class to rationalize the properties of molecules and materials. It is important that you master the concepts and apply them:
This will be mainly evaluated through homework sets. There will be 8-12 HW sets, accounting for 30% of your final grade.

Being able to communicate your ideas is key in chemistry (and most scientific endeavors).
This will be assessed in two oral exams, each of which represents 15% of your final grade.

The remaining 10% of your grade will come from your participation in class. I expect to see you at least once a week (preferably in lecture, but office hours count, too).

Your Grade – Summary



- Homework Sets – 30%
- Two Exams – 30%
- Class Participation – 10%
- Lab Assignments – 20%
- Lab Presentation – 10%

Grading Scale

A ≥ 90%
B: 80–89%
C: 70–79%
D: 60–69%
F < 60%

Synchronous Meetings (MWF)

You will solve worksheets in small groups
We will all discuss your answers
A great time to ask questions, too!

Office Hours

Stop by our Teams site if you have questions.
You might get to "meet" my cats.

Asynchronous Activities

Readings, video lectures, homework

The "Lab"

I will be online if you want to work on the current assignment and ask questions.

All readings, resources, assignments, and important dates will be posted on moodle

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When we meet, I will keep my camera on, and I ask that you do then same whenver possible (fun backgrounds are encouraged!). There are many reasons why you might need to turn off your camera – that's totally fine.

If you have a question, you can speak up or you can use the chat (our class channel or an individual message to me)

Academic Dishonesty in the Time of Chegg

Under the Kalamazoo College Honor Code, Nurturing Independent Thought:
"To safeguard the integrity of academic work and research, we accept responsibility for our own scholarly performance. We regard false representation of our scholarly work as unacceptable because it undermines our integrity and that of the community. We commit ourselves to knowing under what conditions scholarly research is to be conducted, the degree of collaboration allowed, and the resources to be consulted."

All the work you turn in must be your own original work. We live in the era of readily available information; I cannot control where you get such information, but I trust you all to be honest. Any sources you consult during your work must be properly cited (in ACS format), and you must list the names of any students you collaborate with.

If you use Chegg, be aware that it isn't error-free. I expect you to make an effort to understand the answers you find there before copying them.

If I have evidence that the work is not your own, the evidence will be construed as a violation of the Kalamazoo Honor Code and will result in a permanent zero for that assignment. Violators will also be referred to the Dean of Students for appropriate action.