



College of Arts & Sciences

Inorganic Chemistry - CHEM 4390 Syllabus

Instructor: Mohamed Hassan**Email:** mhassan@tamus.edu**Office Hours:** Thursday: 9 pm- 11 pm, Friday: 10 am-12 am, SciTech 311H**Class Hours:** MWF 9am-9:50am**Class Location:** SciTech 179**Course Description:**

Inorganic chemistry is one of the four fundamental areas of chemistry. Students will delve into atomic and molecular structures, bonding theories, and symmetry principles. Topics include coordination chemistry, symmetry and group theory, molecular orbital theory, ligand field theory, and reticular chemistry principles. Throughout the course, students will develop a deep understanding of how atomic-level interactions influence the properties and behaviors of inorganic compounds.

Prerequisite: MATH 1314 or equivalent. **Corequisite:** CHEM 4190 (Laboratory).

Course Materials

Textbook: Inorganic Chemistry, Eighth Edition

Authors: Mark Weller, Jonathan Rourke, Fraser Armstrong, Simon Lancaster, and Tina Overton

ISBN: 9780198866916

Publisher: Oxford University Press, USA

Publication Date: 21 February 2025

Learning Objectives

By the end of this course students will be able to:

- A. generate MO diagrams for simple polyatomic molecules and ions,
- B. use ligand field theory to interpret the electronic structures of coordination complexes,
- C. describe the mechanisms of simple inorganic reactions,
- D. demonstrate a foundational understanding of electronic structure and reactivity of inorganic complexes, focusing particularly on the transition metals.
- E. Obtain a comprehensive understanding of reticular chemistry.

Communication: The best way to contact instructors is via email. All correspondence between professors and students must occur via Texas A&M University San Antonio email accounts. Students are expected to access Blackboard regularly for updates on the course, announcements, and other course materials. All students are strongly encouraged to come to office hours or make appointments at other times to discuss course material and ask questions. Discussions concerning grading/grades will not be addressed through email and will only be discussed during office hours or scheduled appointments.

Attendance Policy: All students are expected to attend lectures and actively engage in class discussion, activities, and online assignments. Absences will be excused if due to illness (medical excuse), death of a close family member, religious holiday (please inform instructor), official university activity, cancellation of classes/closure of the University, military duties, pregnancy & related conditions, or participation in legal proceedings. If you are absent, you are responsible for the material covered and are expected to get notes, announcements, and any other material from another student in the class.

Conduct and Behavior: My goal is to create a safe and engaging learning environment. Class disruptions are unacceptable, asking questions to clarify material during class is highly encouraged. Technology in the classroom may be a great resource, but it can also hinder the learning process. Therefore, students are not allowed to wear ear buds and headphones and/or use cellphones during class. All cellphones must be on vibration mode or turned off for the entirety of the class/lab period. In case of an emergency call, leave the room before answering the call. Texting during class is absolutely prohibited. The use of laptops, tablets or other devices for non-class related activities is not allowed.

| Day | Topic |
|---|--|
| Jan 21 | Introduction, Molecular Structure and Bonding |
| Jan 23 | Molecular Structure and Bonding |
| Jan 26 | Molecular Structure and Bonding |
| Jan 28 | Molecular Symmetry |
| Jan 30 th | Molecular Symmetry |
| Feb 2 nd | Molecular Symmetry |
| Feb 4 th | Molecular Symmetry |
| Feb 6 th | Molecular Symmetry |
| Feb 9 th | Molecular Symmetry |
| Feb 11 th | Molecular Symmetry |
| Feb 13 th | Molecular Symmetry |
| Feb 16 th | Test 1 |
| Feb 18 th | The structure and Energetics of simple solids |
| Feb 20 th | The structure and Energetics of simple solids |
| Feb 23 rd | The structure and Energetics of simple solids |
| Feb 25 th | The structure and Energetics of simple solids |
| Feb 27 th | The structure and Energetics of simple solids |
| March 2 nd | An Introduction to coordination compounds |
| March 4 th | An Introduction to coordination compounds |
| March 6 th | An Introduction to coordination compounds |
| March 9 th -14 th | Spring break |
| March 16 th | An Introduction to coordination compounds |
| March 18 th | An Introduction to coordination compounds |
| March 20 th | Test 2 |
| March 23 rd | Coordination chemistry: reactions of complexes |
| March 25 th | Coordination chemistry: reactions of complexes |
| March 27 th | Coordination chemistry: reactions of complexes |

| Day | Topic |
|------------------------|--|
| March 30 th | Coordination chemistry: reactions of complexes |
| April 1 st | Advanced solid-state chemistry “electronic properties” |
| April 3 rd | Study day |
| April 6 th | Advanced solid-state chemistry “electronic properties” |
| April 8 th | Advanced solid-state chemistry “electronic properties” |
| April 10 th | Advanced solid-state chemistry “electronic properties” |
| April 13 th | Advanced solid-state chemistry “electronic properties” |
| April 15 th | Advanced solid-state chemistry “electronic properties” |
| April 17 th | Frameworks and porous materials |
| April 20 th | Frameworks and porous materials |
| April 22 nd | Frameworks and porous materials |
| April 24 th | Test 3 |
| April 27 th | Student Presentations |
| April 29 th | Student Presentations |
| May 1 st | Student Presentations |
| May 4 th | Student Presentations |
| May 6-8 | Final week- No labs |

Instructor reserves the right to make changes as deemed necessary.

Grading:

- Three tests x 70 points each = 210 points
- Final Exam = 140 points
- Homework/quizzes = 150 points
- Presentation & participation = 100 points

$$\text{Your grade: } \left(\frac{\text{Total points earned}}{600} \right) * 100\%$$

All homework and grades will be posted to Blackboard. However, course percentages, letter grades, etc. are not to be considered as official and students should use caution when using those to evaluate overall course grades. To calculate your grade, use the equation above. Using that equation, letter grades will be determined as:

| Letter Grade: | A | B | C | D | F |
|--------------------|-------------|---------------|---------------|---------------|------------|
| % of Total Points: | 90.0 - 100% | 80.0 - 89.99% | 70.0 - 79.99% | 60.0 - 69.99% | 0 - 59.99% |

Should you have a question concerning the way that your homework/exam was graded, or if you think that there was an error in calculating the score, then it is your responsibility to bring the matter to the attention of the instructor.

Homework: Homework sets will be distributed approximately every week and will typically be due one week from when it is assigned. While each student must complete their homework individually, group discussions are encouraged.

Presentation: You will be REQUIRED to give a 20–30 minute presentation on a topic closely related to the lecture materials OR on a research article of any subject published in Inorganic Chemistry Journal by ACS Publications. If you choose a research article, it must have been published within the last ten years. For those presenting a research article, the presentation should include the following:

- Introduction to the paper, including the topic, journal, and authors.
- Explanation of why the paper was chosen.
- Presentation of the key findings and methods used in the research.
- Conclusion with a summary of the significant findings.

Extra Credit will be given for Research Article Presentations.