

Inorganic Chemistry CHEM 301 Spring 2023

Monday & Wednesday 12:05 - 12:55 GILMAN 1652

Instructor: Dr. Julia Zaikina, Assistant Professor (Email: yzaikina@iastate.edu)

Office Hours: Monday & Wednesday 1:10pm – 2:10 pm (Hach 2140)

T.A.: Seongyoung Kong (Email: sykong@iastate.edu)

TA Office Hours: TBA.

Course Learning Goals

This course will examine atomic and molecular structure, molecular chemical bonding principles, molecular shapes and symmetry, main group chemistry, and crystal and electronic structures of solids.

Grading Policy

In-class Exams (3 total, 15% each)	45%
Homework (8 total, 20 points each)	25%
TopHat Questions (based on a cumulative Top Hat score of 75%)	5%
Final exam (cumulative)	25%

Tentative letter grade assignments (based on percentages) will be as follows: "A/A-," 90-100%; "B+/B/B-," 80-90%; "C+/C/C-," 70-80%; "D+/D/D-," 60-70%; "F", 0-60%, but these specific ranges (including those for +/- cutoffs) will be determined once all scores for the academic semester are entered.

Students will retain all points earned for TopHat, which may result in bonus points toward the final grade. The bonus point will be applied at the end of the semester.

Important: final grades are based solely on graded work and are NOT negotiable; no single student will be offered make-up or extra credit points. Within these limits, I reserve the right to exercise discretion in deciding the exact cutoff.

Textbook

- **LibreTexts.** The Living Chemistry Library is a principal hub of the LibreTexts project, which is a multi-institutional collaborative venture to develop the next generation of open-access texts to improve postsecondary education at all levels of higher learning. The LibreTexts approach is highly collaborative where an Open Access textbook environment is under constant revision by students, faculty, and outside experts to supplant conventional paper-based books.

The selected chapters of *Map: Inorganic Chemistry (LibreTexts)* are available from Canvas course page. The text follows the organization around Miessler, Fischer and Tarr's textbook, but with content built as an Open Education Resource and some parts are still under construction. *Disclaimer:* Instructor assumes no responsibility or liability for any errors or omissions in the content of **LibreTexts**. The information contained in **LibreTexts** is provided on an "as is" basis with no guarantees of completeness, accuracy, usefulness or timeliness.

- "Introduction to Molecular Symmetry" J. S. Ogden, 1st Ed., Oxford, 2001 (ISBN 978-0198559108)

Recommended:

- "Inorganic Chemistry" Solution Manual Alen Hadzovic, 6th Edition (ISBN: 0198701713)
- Molecular model kit (Play-Doh + toothpicks)
- Miessler & Tarr, Inorganic Chemistry, 5th Ed., Pearson, 2014 (ISBN 01321811054)
- "Essential Trends in Inorganic Chemistry" D. M. P. Mingos, 1st Edition (ISBN-13: 978-0198501084; ISBN-10: 0198501080)
- N.N. Greenwood, A. Earnshaw: Chemistry of the Elements, 2nd Edition, Butterworth-Heinemann, Oxford, 1997 (ISBN: 0750633654).
- C. E. Housecroft, A. G. Sharpe, Inorganic Chemistry, Prentice Hall, 3rd edition, December 2007, (ISBN 0131755536).

Weblinks:

- Symmetry: <https://symotter.org/>
Packing and Solids: <https://crystalviz.symotter.org/>
Periodic Table: <http://www.webelements.com/>
Orbitals: <http://winter.group.shef.ac.uk/orbitron/AOs/6s/e-density.html>
Good Resource: <https://www.chemtube3d.com/category/structure-and-bonding/>

Course Format and Assessments

Lectures. In-person lectures over 15 weeks. Lectures will follow the tentative course schedule (see below), however, deviations from this schedule are anticipated. Students are expected to read the assigned materials **before** coming to the lecture, participate actively during the lecture, complete homework assignments before the deadline, and come to the scheduled exams. Lectures will use PowerPoint and some board work along with occasional demonstrations and in-class problem-solving. **Not everything covered in lectures is included in the textbooks and/or lecture notes.** Previews of lecture slides (PDF format) are available on Canvas. It may be helpful to print or save them to your personal computer for use during the lecture periods.

To show proper respect to your colleagues and the instructors, put aside the ISU Daily, do not use iPads, iPods, laptops, or other PDA devices for messaging, Facebook, Twitter, etc., internet browsing, streaming videos, etc. during lectures and recitations. Please refrain from any disruptive activities in the classroom, which might affect other students or distract the instructor. Research studies have shown a clear correlation between the use of laptops for entertainment in large lecture settings and LOWER student learning in the lecture environment; students around a laptop user also pay less attention to the content of the lecture. Your instructors and classmates are permitted and encouraged to ask you to discontinue distracting behavior. To help promote a good learning environment for all, please be respectful in your behavior toward your fellow students and your instructors.

Homework: Homework assignments will be due on the specific day (Wednesday, see Table below) and should be uploaded on Canvas or turned in in person before the start of the lecture.

If homework has been turned in by both methods, only the work turned in in-person will be graded. No late assignments will be accepted without an approved advanced notice. **In your answers, write legibly.** Feel free to work with other students on the homework, but you must turn in your own individual set of solutions. All work must be shown to receive full credit.

There will be 8 homework assignments, and 1 lowest score assignment will be dropped. Each homework assignment will be worth a total of 20 points. **A randomly selected subset of problems from each homework assignment will be graded.** Solutions to the homework will be posted on Canvas after the due date.

Top Hat: We will be using the Top Hat (www.tophat.com) classroom response system in class starting on the first day of class. You will be able to submit answers to in-class questions using smartphones, tablets, laptops, or via text messaging.

TopHat questions are worth 5% toward your course grade. Each question counts as 1 point (0.5 for correctness + 0.5 for participation). To receive full credit at the end of the semester, you must have a cumulative score of 75% or higher. For example, if you obtain 75% on the TopHat app, you will receive 5% toward your course grade, if you obtain 60% you will receive 4% toward your course grade, etc. The cumulative TopHat score exceeding 75% will result in bonus points that will be added at the end of the semester. TopHat scores will be uploaded on the Canvas gradebook only at the end of the semester, after the last lecture. You may monitor your performance directly on the TopHat app.

You can visit the Top Hat Overview page (<https://success.tophat.com/s/article/Student-Top-Hat-Overview-and-Getting-Started-Guide>) within the Top Hat Success Center which outlines how you can register for a Top Hat account; this page also provides a brief overview about getting you up and running with the system. You will be required to purchase a Top Hat license from the ISU Book Store or online in order to access any quizzes or questions your instructor creates in the Top Hat system. To register, you must use your ISU email address.

An email invitation has been sent to you by email, but if don't receive this email, you can register by simply visiting our course website: <https://app.tophat.com/e/767146/>

Our Course Join Code is **767146**

Should you require assistance with Top Hat at any time, due to the fact that they require specific user information to troubleshoot these issues, please contact their Support Team directly by way of email (support@tophat.com), the in app support button, or by calling 1-888-663-5491.

The device used for TopHat can be a smartphone, a tablet, or a personal computer. A regular phone can be used to submit answers to multiple-choice, word, or numeric questions; however, it cannot be used to answer "click on target", "sorting", or "matching" questions. CELT can lend you a TopHat-ready device at no additional cost – please contact Lesya Hassall, lesya@iastate.edu

Bring your device to all lectures. Sharing the attendance code with classmates who are absent from class, having a classmate give you the attendance code while you are absent from class, submitting answers while absent from class, sharing answers with students who are not in class, etc. constitute *academic misconduct*.

In-class Exams (3 in total): Three 50-min exams (100 points each) will be given during the assigned class times. Make sure you understand and can work out all the assigned problems from homeworks, relevant examples in the text, and any problems that are presented in class.

- Exams will be given in-class on February 15, March 29, and April 26 (Wednesdays)
- List of concepts for each exam will be announced in class and uploaded on Canvas
- Each exam includes a mix of short answer questions and problem-solving, including writing brief explanations.
- Each exam should be written *neatly*, with the answers to the questions in order.

Final Exam (Wednesday, May 8th, 12 – 2 pm, Location: Gilman 1652)

A 2-hour comprehensive final exam (100 points).

(TENTATIVE) Examination Schedule and Reading Assignments

Date(s)	Topic/Module	Reading	Homework Due
Jan. 18, 23, 25	Introduction, Atomic Structure	Part 1&2	
Jan. 30, Feb. 1	Atomic Structure, Periodic Trends	Part 2	HW1 – Feb. 1
Feb. 6, 8, Feb. 13	Simple Bonding Theories & Diatomic Molecules	Part 3	HW2 - Feb. 8
Feb. 15	<i>EXAM 1 (Atomic Structure, Simple Bonding Theories)</i>		
Feb. 20, 22, 27, Mar. 1, 6	Symmetry	Part 4	HW 3 – Mar. 1
Mar. 8	Molecular Orbitals	Part 4&5	HW 4 – Mar. 8
Mar. 13-17	Spring Break		
Mar. 20, 22, 27	Molecular Orbitals	Part 5	HW5 – Mar. 22
Mar. 29	<i>EXAM 2 (Symmetry, Molecular Orbitals)</i>		
Apr. 3, 5, 10, 12, 17, 19, 24	Molecular Orbitals	Part 5	HW 6 – Apr. 12
	Trends in the Main Group Elements, Acids-Bases	Part 6	HW 7 – Apr. 19
Apr. 26	<i>EXAM 3 (Molecular Orbitals, Main Group Elements)</i>		
Apr. 24, May 1, 3	Solid-State Chemistry	Part 7	HW8 – May 3
May 8	<i>FINAL EXAM</i>		

January

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

Lectures: Mon & Wed, 12:05 - 12:55 Gilman 1652
 In-class exam (Wed, 12:05 - 12:55)
 Homework due (in-class, 12:05)
 Last day to drop *without extenuating circumstances*:
 First half: Feb 17
 Full semester: March 31
 Second half: April 21

March

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

April

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

May

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Syllabus Statements

Free Expression: Iowa State University supports and upholds the First Amendment protection of [freedom of speech](#) and the principle of [academic freedom](#) in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

Public Health: If you are not feeling well, you should stay home and focus on your health. Should you miss class due to illness, it is your responsibility to work with your instructor to arrange for accommodations and to make up coursework, as consistent with the instructor's attendance policy.

You may choose to wear a face mask and/or receive the COVID-19 vaccine and boosters, as well as other vaccines such as influenza, but those options are not required. Thielen Student Health Center will continue to provide COVID-19 vaccinations free-of-charge to students. The university will continue to offer free masks and COVID-19 test kits during the fall 2022 semester. Other wellbeing resources for students are available at: <https://www.cyclonehealth.iastate.edu/wellbeing-resources/>

Public health information for the campus community continues to be available on Iowa State's [public health website](#). All public health questions should be directed to publichealthteam@iastate.edu.

Academic Dishonesty: The class will follow Iowa State University's policy on academic misconduct ([5.1 in the Student Code of Conduct](#)). Students are responsible for adhering to university policy and the expectations in the course syllabus and on coursework and exams, and for following directions given by faculty, instructors, and Testing Center regulations related to coursework, assessments, and exams. Anyone suspected of academic misconduct will be reported to the [Office of Student Conduct in the Dean of Students Office](#). Information about academic integrity and the value of completing academic work honestly can be found in the [Iowa State University Academic Integrity Tutorial](#).

Accessibility Statement: Iowa State University is committed to advancing equity, access, and inclusion for students with disabilities. Promoting these values entails providing reasonable accommodations where barriers exist to students' full participation in higher education. Students in need of accommodations or who experience accessibility-related barriers to learning should work with Student Accessibility Services (SAS) to identify resources and support available to them. Staff at SAS collaborate with students and campus partners to coordinate accommodations and to further the academic excellence of students with disabilities. Information about SAS is available online at www.sas.dso.iastate.edu, by email at accessibility@iastate.edu, or by phone at 515-294-7220.

Discrimination and Harassment: Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515-294-7612, Hotline 515-294-1222, email eooffice@iastate.edu

Prep Week

This class follows the Iowa State University Prep Week policy as noted in section 10.6.4 of the [Faculty Handbook](#).

Religious Accommodation: Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request the reasonable accommodation for religious practices. In all cases, you must put your request in writing. The instructor will review the situation in an effort to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the [Dean of Students Office](#) at 515-294-1020 or the [Office of Equal Opportunity](#) at 515-294-7612.

Contact Information for Academic Issues: If you are experiencing, or have experienced, a problem with any of the above statements, email academicissues@iastate.edu