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Chem 177 Chemistry Department Homepage: <https://www.courses.chem.iastate.edu/courses/2024/fall/chem-1770>

Canvas: <https://www.celt.iastate.edu/learning-technologies/canvas-isu/>

Top Hat: <https://success.tophat.com/s/>

*Chem 1770 and 1770L/1770N are co-requisite courses, i.e., students in Chem 1770 are required to take Chem 1770L/1770N at the same time or to have already received credit in 1770L/1770N. If you do not fulfill these requirements, you will not get credit for Chem 1770. Students who drop or audit Chem 1770 will be required to drop 1770L/1770N and vice versa. Students may not register to audit Chem 1770 after 5:00 PM on Friday, September 6, 2024. The audit does not count towards full-time student status. **To add or drop recitation or lab sections during the first week of class, use WorkDay. After the first week, please go to the Undergraduate Chemistry Office in 1608 Gilman (M-F 8 – 11:50 am and 1 – 5 pm).** The last day **to change the course to pass/not pass or to drop CHEM 1770** is Friday Nov. 1st, 2024.*

Required Textbooks & Supplies: *Chemistry* (11th Edition), Zumdahl, Zumdahl, DeCoste (2024), Cengage: Boston. This book is part of the **Inclusive Access** program at Iowa State, which means that by enrolling in this course you will have the e-book version and the electronic homework included as part of your U-Bill. By using this option, the book and homework comes at a much lower price than other textbook/homework options.

Top Hat Response Technology:

We will begin using a response system based on your phone or tablet on day two and assessing points starting on **Friday, August 30, 2024**. We will be using the Top Hat (www.tophat.com) classroom response system in class. You will be able to submit answers to in-class questions using smartphones, tablets, laptops, or through text messaging. You can visit the Top Hat Overview (support.tophat.com/hc/en-us/articles/200019034-Top-Hat-Overview-Getting-Started) within the Top Hat Success Center which outlines how you can register for a Top Hat account, as well as provides a brief overview to get you up and running with the system. An email invitation to join your Top Hat space will be sent to you by Prof. Holme, but if you don't receive it, you can still create your student account at tophat.com. The Top Hat license is campus wide so you don't need to purchase an individual license to access any quizzes or questions created in the Top Hat system. Should you require assistance with Top Hat at any time please contact the IT Solution Center at 515-294-4000 or solution@iastate.edu.

Nonprogrammable scientific calculator (with $\ln x$, e^x , $\log x$, 10^x , y^x functions). Calculators with graphing and text capabilities may not be used during exams and quizzes. All calculators are subject to inspection during exams and quizzes; improper calculators may be temporarily confiscated. Bring your own calculator to class and recitation. Your mobile phone **cannot** be used as a calculator on a test.

OWL V2: OWL V2 is an online homework and tutorial system that is associated with our textbook. Because we have Inclusive Access you **SHOULD NOT** buy an "access code" for OWL V2. You already have access by signing up for this course (as long as you haven't taken actions to override the Inclusive Access billing on your UBill.) You will be able to access the Homework, the ebook and a set of "animations" associated with the book directly from the Canvas page for the course. The homework assignments you see are specifically for students in the MWF 11:00 AM class in Troxell Hall. The first assignment to get familiar with OWL does not count for points, and is due **Friday, August 30 at 8:00 PM** and the first book homework for Chapter 1, which does count for points, is also due on **Friday, August 30 at 8:00 PM**. Step by step instructions for registering in the OWL and joining the course are posted on *Canvas (Course Content)*.

The textbook company who markets OWL (Cengage) usually has representatives on campus the first week of classes to help students get it working correctly. We will keep you informed on Canvas about when and where they are available. It is your responsibility to get the help you need to get your access to the homework correctly working.

Overall Theme: A key premise of this course is the importance of connecting chemistry to Earth and societal systems. For this semester in this section of the course the connections will be between chemistry, wildfires and climate. Examples of these connections will appear regularly in the course and activities including tests may assess learning about them.

Lectures:

This section for Prof. Holme's Chem 1770 course meets at 11:00 am in Troxell Hall 1001. Students are expected to attend lecture and are responsible for knowing information that is provided in announcements that are given at the beginning of each lecture. Participation in lecture is often monitored via the Top Hat response system with questions that may occur at any time in the class. You need a Top Hat account and to bring your device (probably your smart phone) with you to every lecture. You are required to accumulate 30 points from clicker questions. Probably around ~40 points worth of chances will be given to accumulate needed clicker points. Missing 2-3 classes does not greatly affect your clicker score. Clicker scores are based on participation so we are mostly rewarding the idea of engaging in the material. When something is new, it's OK to make some mistakes – the key is to learn from them. That's why the "correctness" is deemphasized. For TopHat questions where a number of students choose the incorrect answer, I may review concepts immediately in class. For those questions where most students have a correct answer, the discussion of the question will be available as a recording on Canvas sometime after class.

NOTE: Because Top Hat sends questions to your phone, we will occasionally have "check" questions that will be improbable to answer correctly if you are not in class. I will also occasionally have students in class write out answers for questions on paper and turn them in. Answering Top Hat questions when you are not in class is a form of academic misconduct, see below for information about how Dr. Holme handles such cases.

Lecture capture is part of the facilities in Troxell Hall, so you will be able to review class afterwards. The capture does NOT show what gets written on the chalkboards very well, however, so it provides a good way to review things that you may have missed, but is not 100% of the in-class experience. Prof. Holme also posts PDF versions (with some missing information) of his lectures BEFORE class, so you can have the option of printing these out so you do not need to try to copy all of the notes from the powerpoint portion of the lecture and can focus on the ways those notes are augmented in the class.

There is significant research that shows students who have computers open in class, even those who are trying hard to take notes on those computers, generally have lower performance in the class. Importantly, there is also evidence that students who sit near students with open computers are also adversely affected by the possibility of distraction. This aspect of device note-taking is not a problem for tablets that lay flat on the desktop. Given these research observations, Prof. Holme does not forbid computer-based note taking in class. He will, however, be open to limit where people who are using screen-up computers in lecture may sit if there are classmates who wish to avoid distraction so they can find seats where computers are not open. The specific geography of this system will be explained if it is invoked.

Recitation: On Thursdays you will meet in smaller groups with a teaching assistant (TA); **attendance is expected** at all recitation sessions. Recitation sessions will be used to discuss questions, work some end-of-chapter problems, and discuss ways in which the chemistry content connects to other science courses and to real-world issues. Discussion sections will have quizzes roughly 40% of the time, and when the quizzes will occur is noted during the pre-lecture announcements in class, so they are known in advance. Another 30-40 percent of the time there will be group work on concept maps that will serve as a way to do quizzes for concepts covered in the course. Athletes and students who are away from campus for ISU games, matches, or club trips and cannot attend a recitation where a quiz or concept map exercise occurs must discuss their options with Prof. Holme as soon as possible. At the end of the semester, the sum of the quizzes and concept maps will be worth a maximum of 80 points towards of your grade. It is anticipated that there will be more opportunities to gain points than the maximum points available, so that missing a small number of the quizzes or concept map assignments will not prevent you from getting a full score on the recitation assignments.

Homework and Electronic Access Assignments: There are several types of electronic assignments associated with this course. In terms of formal homework, (1) we will use an online homework system noted earlier (OWL V2). In terms of

additional electronic access assignments, there are (2) a handful of other electronic surveys and/or assignments that will show up in Canvas – and be announced in class, including one designed to get you familiar with things in this syllabus. (3) There will be extra questions/calculations available in a gamified system (called Island-C) we are working on to enhance the homework experience. (4) There will be opportunities to practice with software tools that help with building concept maps. **All of these assignments will have connections in Canvas system, but in some cases the links do not include the gradebook – so the calendar function does not always catch the due dates. The announcements (and “Keeping Track” paper) before and at the start of class is the best source for due dates.**

The way that I manage this type of work is that there will be more points available in assignments than the maximum for that assignment. Thus, if you miss a small percentage of this type of work in the course you can still obtain maximum points. You cannot, however, get more than the maximum points. This scoring system will be addressed occasionally in class announcements and specifically near the end of the course, when I will do the aggregated scoring.

- OWL V2 homework will be worth a maximum of 50 points
- The set of additional electronic assignments will also be worth a maximum of 50 points

Don't wait until the due date to work on these assignments; try to spend some time **every day** on them and read ahead in your book.

Late assignments usually do not receive any points. Exceptions to this policy are rarely made – athletes and others who know they will be traveling at the deadline should be sure they finish the assignment early.

Concept Mapping (and SOCME) Assignments and Testing:

It is important for this course that we endeavor to identify the ways that chemistry connects with other science and engineering fields of study. A large majority of students in this course are interested in studying these areas where chemistry helps build the understanding of the content in those “allied” fields. To provide skill in making such connections we will use tools called Concept Maps and the related Systems Oriented Concept Map Extension (SOCME). These visualization tools will be incorporated in lectures, practiced in discussion sections, constitute a form of homework from discussion section and be part of testing of conceptual understanding. Points will be available (in the electronic access assignments to assist learning to use software tools that will help with building concept maps and SOCMEs.)

Exams: In addition to the Final Exam (given during the week of Dec. 16-20), there will be **Four** 25 minute exams and **One** 50-minute exam scheduled as shown in the calendar on the last page of this syllabus. Exams will have different emphases – with quantitative (math) style items emphasized in some cases and conceptual understanding emphasized in others. Exams will have multiple-choice questions. It is anticipated that there will be no make-up exams scheduled after an in-class exam has been completed. However, if health concerns arise (an outbreak of covid or the flu, for example) we will work with students who need to take a make-up exam. Make up exams are more often open-response rather than multiple choice exams and there is normally a relatively short time-slot in which a make-up exam must be taken. Students are urged to be proactive and communicate to the instructors, in a timely manner, if anything prevents them from taking an exam. Athletes and students who are away from campus for ISU games, matches, or club trips and cannot take the exam as scheduled, must discuss their options with the instructors as soon as possible

If at all possible, exams will be returned to students during the recitation session on the Thursday following each exam. **The General Chemistry Office will not give out individual exams or scores.** Any requests for regrades must be submitted at the recitation where the exam is returned to students. A test paper handed in for regrade may have any question regraded, and students may gain or lose points in the regrading process. **Language translators and dictionaries are not allowed during quizzes and exams.**

Accessibility: Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are

required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

Academic Misconduct: The class will follow Iowa State University's policy on academic dishonesty. Prof. Holme will follow the standard misconduct reporting protocol for anyone suspected of academic dishonesty working with the [Dean of Students Office](#). See the Conduct Code at <https://www.policy.iastate.edu/policy/SDR#4.0> for more details and a full explanation of the ISU Academic Misconduct policies.

Grades: Your course final grade is based on

- 5 in class tests (4 25-minute tests and one 50-minute tests) (270 pts total),
- OWL homework (50 pts max),
- Chemistry problem recitation quizzes (40 pts max),
- Concept maps from recitation (40 pts max),
- Electronic Assignments – noted earlier (50 pts max),
- in-class (Top Hat) response system (30 pts max), and
- the Final exam (120 pts) for a total possible 600 points.

Based on this amount of available points, following tentative letter grade scale will be used to give your final letter grade:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Above 560	540-559	520-539	495-519	470-494	445-469	420-444	390-419	360-389	330-359	300-320	Below 300

Important: These cutoff scores are expected to lead to a grade distribution that will be consistent with prior semesters and other sections of Chem 1770 in this semester. Students near grade borderlines (typically within 2 points) are explicitly checked to determine if a higher grade is warranted – but even in these cases students often do not receive the higher grade. Students who have missed a few classes are less likely to get bumped up to a higher grade. If you are 3 points or more from a cutoff, in a class this large there are many people closer to the higher grade than you, and you are not competitive to obtain the higher grade. Once established your final letter grade is NOT negotiable; once the final exam has been taken, there is no other way to obtain more points. Extra credit points are very unlikely in this course, but if they are offered, the activities will occur during the semester and will be made available to ALL students – individual requests to do extra credit cannot be granted.

Important Course Policy: It is the student's responsibility to check grades on Canvas. Any student who discovers an error in a grade on Canvas must contact the teaching assistant and bring the graded work to their TA **within 1 week** of receiving the returned graded work to have the grade corrected.

Resources: Important announcements, previous semesters' hour exams, this syllabus, lecture notes, and exam review sheets, as well as other useful information are posted on Canvas. Throughout the semester items will be added to Canvas. Deadlines are always noted in the pre-class "Keeping Track" sheet that is up before lecture starts, and is captured in lecture capture, so that is the authoritative source of deadlines. Canvas is NOT always a reliable source for deadlines, so do not rely on Canvas to remind you that something is due.

Chemistry Help Center: Teaching assistants are available in the **Martha E. Russell Chemistry Help Center and Resource Room, room 1761 Gilman**. This Center is staffed by general chemistry teaching assistants and is open M – R, 9 – 5, and F, 9 – 1. Answers to all previous quizzes and previous exams are on file in the Center. Resources in the Help Center are not to be removed from the room. For more help, visit Prof. Holme during his office hours.

Supplemental Instruction (SI) sessions and materials are provided by the Academic Success Center and are prepared by the SI leaders. They are not provided by the course instructors, but I will work with the SI instructors to help them provide high quality help particularly for the problems solving aspects of this class.

How to e-mail your Chem 1770 Instructors: Email is often not a particularly rapid way to communicate, but Prof. Holme does make every effort to respond to emails. It is best to use chem1770-q2@iastate.edu as the email address because both Prof. Holme and the head-TA will check that email. In addition, your TA will fill you in about email availability when you meet them in Discussion. In many cases, you may have questions that other students can answer, and an email to instructors is not needed, so there will be alternative communication avenues associated with this course. Perhaps the best way to get quick answers are “Discussion Boards” within Canvas. Prof. Holme will help build some useful discussion threads, and he does monitor them as well and will step in to clear up confusion when he sees it.

Problems and Questions: Please check on *Canvas* to see if your question or issue can be answered under the [Frequently Asked Questions \(FAQ\) section](#). If you are having issues with **Canvas** or the electronic grade-book, contact your recitation TA directly. If you are having issues with **OWL V2**, visit: <https://www.cengage.com/student-training/owlv2/canvas/ia-yes/> (if the issue is not resolved with the OWL support, then please contact Prof. Holme with the detailed description of the issue). Note that we will not be able to solve technical issues such as registration, access to the internet, etc. You are however encouraged to let me know if you are unable to complete an assignment due to technical difficulties.

Free Speech: 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.

Harassment and Discrimination: 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

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.

Course Goal/Learning Outcome: Upon successful completion of this course, students will have mastered fundamental concepts in general chemistry and will be able to successfully approach Chem 178 (the second half of our general chemistry course). Chem 177 will allow the student to pursue upper level chemistry courses as well as specialized studies in other fields of science and engineering.

Learning Objectives: Learning objectives for this course are built with three aspects in mind (they are sometimes called tri-partite learning objectives as a result. The idea is that when we consider chemical skills and concepts we need to know (a) what they are; (b) how we know them; and (c) why they matter. The specific tri-partite learning outcomes are:

Knowledge: What We Know	Evidence: How We Know It	Relevance: Why It Matters
1K: Benefits and risks of chemicals Explains the concept of “the dose makes the hazard”	1E: How are toxicity and exposure measured?	1Ra: At what level is risk acceptable? 1Rb: We have to make decisions about chemicals and their use.
2K: Solve chemical problems with scientific data (graphical or tabulated data)	2Ea: Graphical and tabulated data come from measurements 2Eb: Measurements have precision and accuracy associated with instruments 2Ec: Error must always be kept in mind	2Ra: Need to be able to know which chemicals are more dangerous than others 2Rb: Need to know if ways to measure are adequate to use the chemical knowledge
3K: Describe fundamental components of chemical structure	3E: Mass spectrum shows molecular ion peaks, number of isotopes, and the relative abundances	3R: Differences in isotopes can cause changes in physical and chemical properties of a chemical, thus changing their uses and applications
4K: Explain fundamental features of chemical reactions (balanced equations, stoichiometric problems involving moles, mass, # of molecules, limiting reactant, theoretical yield, and % yield)	4E: The method of continuous variation is an example of a way of knowing stoichiometric ratios	4Ra: Knowing amounts of reactants can lead to methods to reduce waste – <i>green chemistry</i> . 4Rb: Societal instances of reactions, like wildfires, are often more complex than in the controlled environment of a lab.
5K: Explain chemical reactions in solution (precipitation, acid-base, redox)	5Ea: Observable to the eye changes (like color change) are not the only ways of identifying and quantifying reactions. 5Eb: Modern titrations include pH or conductivity measurement (or other electrochemical measurements)	5Ra: We need to know trace contaminant levels in air or water because of health and environmental consequences. 5Rb: Combustion is a key example of a redox reaction
6K: Describe the role of chemistry in water resources for human use and the importance of water for sustainability	6E: Instruments (from pH, conductivity, oxygen meters to chromatographic instruments) and analytical techniques allow purification and quality measurement of water	6Ra: Changing climate patterns play a role in where and when rain occurs and the resultant availability of water.
7K: Explain the central role of energy in chemistry and chemical reactions (measurement of energy using calorimetry)	7Ea: Calorimetry allows the measurement of heat involved in a chemical reaction (heat transferred to or from a substance) 7Eb: Measures of energy transformation efficiency (heat to	7Ra: Combustion and energy from wildfires to automotive engines 7Rb: Food sciences and dietary energy

	work) are a key part of using chemistry for energy	
8K: Describe atomic structure and its importance in understanding chemistry	8Ea: Characteristic chemical and physical properties can be observed, measured, and then modeled using a combination of spectroscopy and quantum models 8Eb: Historic experiments such as photoelectric effect	8Ra: Atoms are building blocks of matter 8Rb: Atomic structure explains different chemical and physical properties of matter (e.g. periodicity)
9K: Explain the origin and implication of chemical bonding	9Ea: Concept of valence can be measured 9Eb: Strengths of interactions of atoms and molecules in materials can be measured	9Ra: How do different strengths of interaction lead to different properties that can be used? 9Rb: Epoxy vs. glue (bonding vs. intermolecular forces) 9Rc: Biochemicals of plants
10K: Describe fundamental characteristics of molecules and molecular bonding	10E: Spectroscopic measures that inform our understanding of molecular scale and bulk properties	10R: Oxygen is present in combustion and its importance can be understood in terms of its bonding.
11K: Explain characteristics of gases and how they are different than condensed forms of matter (liquids and solids)	11Ea: There are measures that are not dependent on the identity of the gas and others that are dependent on the identity. 11Eb: Measures of bulk vs. molecular properties (e.g. measuring pressure/temperature vs. spectroscopic properties)	11R: Understanding the behavior of the Earth's atmosphere depends on both common gas behaviors (ideal gases as a model) and unique gas behaviors (what makes something a greenhouse gas).
12K: Explain the concept of intermolecular forces	12E: Measurements of viscosity, surface tension, phase changes	12Ra: Chemical basis of life such as how cells are organized is closely tied to the nature of intermolecular forces. 12Rb: Understanding how coronaviruses infect cells and variants change the process.

Dates	Textbook Chapter Coverage	Deadlines and activities
Aug 26 - 30	Ch. 1: Chemical Foundations Ch. 2: Atoms, Molecules and Ions	Get Textbook and OWL access Get TopHat registered for Chem 177 TopHat in class counts for points (Aug 30)
Sep 2 – Sep 6	Sep 2: Labor Day – No Classes Ch. 2: Atoms, Molecules and Ions	
Sep 9 - 13	Ch. 3: Stoichiometry	Test 1: Sep 11 (Quantitative – 25 minutes)
Sep 16 – 20	Ch. 3: Stoichiometry	
Sep 23 – 27	Ch. 4: Solution Stoichiometry	
Sep 30 – Oct 4	Ch. 4: Solution Stoichiometry	Test 2: Oct 4 (Both – 50 minutes)
Oct 7 - 11	Ch. 5: Gases	
Oct 14 – 18	Ch. 5: Gases Ch. 6: Thermochemistry	Test 3: Oct 18 (Conceptual – 25 minutes)
Oct 21 - 25	Ch. 6: Thermochemistry	
Oct 24 – 28	Ch. 7: Atomic Structure and Periodicity	
Oct 28 – Nov 1	Ch. 7: Atomic Structure and Periodicity Ch. 8: Bonding General Concepts	Test 4: October 30 (Quantitative – 25 minutes)
Nov 4 – 8	Ch. 8: Bonding General Concepts	
Nov 11 - 15	Ch. 8: Bonding General Concepts Ch. 9: Covalent bonding orbitals	
Nov 18 – 22	Ch. 9: Covalent bonding orbitals Ch. 10: Liquids and Solids	Test 5: Nov 22 (Conceptual – 25 minutes)
Nov 25 - 29	Thanksgiving Break: No Lectures	
Dec 2 – 6	Ch. 10: Liquids and Solids	
Dec 9 – 13	Ch. 10: Liquids and Solids	
Dec 16–20	Final Exam: A 2-hour comprehensive final exam will be scheduled as a group final sometime during the week of December 16–20. The time will be announced by the Registrar in late September or early October. Do not make travel arrangements to leave for winter break or vacation prior to the end of finals week until the date / time of final exam for Chem 1770 is published by the ISU Registrar's Office. To check the update click http://www.registrar.iastate.edu/students/exams/fallexams	

* Students who have three or more finals on the same calendar day may request to reschedule a final. The instructor of the course having the smallest number of students is responsible for arranging an alternate examination time for the student unless make-up exam times are available in one of the other courses. To reschedule, the student must notify the instructor prior to the last day of class before the beginning of prep week so the instructor has time to make appropriate arrangements.