

# Chem 177(A) Spring 2023 – MWF 9:55 am – 1002 Gilman Hall

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## William Jenks

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Please note: Chem 177 is *corequisite* with Chem 177L. You **MUST** be enrolled in Chem 177L or already have credit for Chem 177L. Passing grades will not be awarded to anyone who completes Chem 177 without taking the lab. Jenks's lectures are Section A.

Office hours: Monday 11-12 am, Tuesday 2-3 pm in 1605 Gilman

## Marquis Adamson, Head TA for Chem 177

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[Click here for information and schedule for the SI leader.](#)

## Communications

For routine administrative matters like clicker and homework issues, please contact our head TA, Marquis Adamson. For more substantive or content-related matters, please contact Dr. Jenks. **For all email communications, you are expected to use an iastate.edu email address and put 177 in the subject line.**

Please also note that I make extensive use of the “Announcement” section of Canvas and I do expect that you are responsible for information given there...so please check that regularly and/or configure Canvas to forward your announcements to your emails.

## Required Materials

- Zumdahl's *Chemistry*, 10<sup>th</sup> edition and the associated OWL 2 online homework.

*Most of you will have obtained this through the Immediate Access program. The OWL 2 homework system will have points associated with it. More info on Immediate Access is available on Canvas.*

- A TopHat account associated with our course. The “join code”, in case you need it, is 729974.
- Some kind of smartphone, tablet, or laptop from which you can answer TopHat questions in class.
- You may use a non-programmable, non-alphanumeric scientific calculator (not your cell phone) on exams.

## Course Format

This will be a “mostly inverted” course. Because of the lecture room and size of the class, I can't go all the way into you being seated at group tables and working in formalized learning groups, but I encourage you to find a group of friends and sit with them consistently because we will spend quite a bit of our time doing problems.

- You are expected to watch the lecture videos on Canvas **in advance of class** according to the published schedule
- I will frequently “lecture” for 5-10 minutes, but this is no substitute for you preparing!
- The remainder of class time will be spent going through worksheets and TopHat questions.

## Recitation Sections

In addition to the 3 MWF “lectures” you will have an assigned recitation section meeting on Thursdays. Recitations are your chance to review, get some help with homework and problems, and ask questions in a small group setting. During each recitation section, more difficult problems – comparable to questions that will appear on the exams – will be done. Keys and grades will be posted by Monday at noon.

## Grading

- Tophat: 100 points
- Online homework: 100 points
- Recitation problems: 100 points
- Best three midterms scores (Four exams offered): 100 points each, 300 total.
- Final exam: 200 points

Midterm dates (all 6:45 pm Wednesdays)

- Feb 8 (Chapters 1-3) From Ch 3: mole, molar mass, formulas, etc
- March 8 (Chapters 3-5) From Ch 3: balanced equations and stoichiometric calculations
- April 5 (Chapters 6-7)
- April 26 (Chapters 8-9)

**TopHat:** Tophat questions will be scored as 0.5 point for participation and 0.5 point for the correct answer. Canvas will report your percent of available points throughout the semester which is what your score will be. This will be scaled so that the best score obtained in the class is 100, e.g., if the highest score in the class was 90%, all the clicker percentages would be multiplied by a factor of  $10/9 = 1.11$ . This policy means that missing a single lecture and its clicker points will not have a significant effect on your grade, but a pattern of non-attendance will add up. Please note that you are welcome to attend the other lecture section if you need to miss mine (and they will be closely coordinated), but TopHat points do not transfer from one section to another. You need to be there in person to get the TopHat points. **Homework.** Your homework score will simply be the percent of homework points you got from OWL 2. The settings on the homework are the most forgiving ones possible, so that if you apply yourself you will get very close to 100%. All homework assignments are due Sunday night at 11:55 pm the weekend after we finish a chapter. Late submissions will not be accepted. **Recitation Problems.** 10 points will be available most weeks in recitation. Each student may earn up to 100 points through the semester (obviously, the theoretical maximum possible will exceed 100, but we cap it at 100.) **Midterm exams.** Midterm exams will be multiple choice in part, and potentially free answer in part. Attendance of the recitations is highly encouraged to experience exam-level questions. Your best three midterm scores will be counted; no after-the-fact make up exams will be given. **Final exam.** The final exam will be formatted like the midterms.

## Grading Scale

Grading scale: This is a non-competitive classroom. I will happily give As to the whole class if you earn them. The homework and recitation points are set up so you should get 100% or very close. Experience shows that – on the whole – most people get scores on Tophat that are comparable to their midterms so your TopHat score doesn't change your grade dramatically as long as you attend and participate. (This doesn't mean you should just assume you don't need to prepare for a midterm! It's just an observation for the class as a whole, not for any particular individual.)

The minimum total course scores (out of 800) required to achieve the corresponding grades are as follows: A  $\geq$  92% (736 points); A-  $\geq$  90% (720 points); B+  $\geq$  88% (you can do the math...); B  $\geq$  82%; B-  $\geq$  80%; C+  $\geq$  78%; C  $\geq$  70%; C-  $\geq$  67%; D  $\geq$  62% D-  $\geq$  58%. The D+ grade is not used. No extra credit will be given. No D+ grades will be given.

## “Excused” Absences

**Exams.** Truly excused absences are limited to official university activities and documented health-related absences. If you know you will miss an exam in advance, even if it is not an officially excused absence, we will try to work with you to let you take the exam a day early. It is the student's responsibility to ensure that such arrangements are made well in advance. (Non-official excuses are subject to my approval.) I understand that there are many reasonable excuses for missing an exam, which include things like illness, job interviews, non-university-function travel and the like. This is why you only have to count three midterm exams. Students who take all four midterms will have the “bonus” of being able to only count the top three scores. Subject to the discretion of the instructor, anyone who misses two exams will be asked to drop the class. **Tophat.** *I assume that everyone will probably miss a day or two of class, and that is built into how the Tophat questions are scored.* If you have excused absences or some reasonable TopHat malfunction, you will be credited with 2.5 TopHat points per excused day. Approval of non-official excused absences and malfunctions is at the discretion of the instructors. You must document this with the head TA, and keep the documentation through the end of the semester, so that we can fix the grade at the end.

## Resources

- Catch me right after class or office hours. (You can also make an appointment with me outside of office hours.)
- **Recitation section and TA.** Take advantage! Ask them stuff!!!
- **Help center 1761 Gilman** (Monday-Thursday 9-5 pm and Friday 9-1) <https://www.chem.iastate.edu/chemistry-help-room>
- **SI:** There will be a Supplementary Instructor for this course who will conduct group study sessions.
- **Lecture videos are mandatory** Watch them IN ADVANCE of the relevant class!
- **Jenks's Lecture Notes** are posted for each chapter.

## Academic Integrity

I have one rule, and it's pretty simple: Don't cheat. Let's behave like grown-ups and treat each other like grown-ups. ☺ All instances of cheating will be reported to the Dean of Students office.

Exams are closed book, closed note, individual activities, with the exception of a semester-long single "cheat-sheet" that you can use. It will be printed on colored cardstock and have a printed periodic table on one side. You may write anything (in your own handwriting, in ink) on this periodic table/cheat-sheet. You get one copy for the whole semester. Replacements may be obtained from Dr. Jenks, but it is expected that this is only for the genuine case of it being lost or unreasonably damaged. You may use a non-programmable, non-alphanumeric calculator.

You are welcome to work on recitation exercises and homework in groups and with open book.

You are welcome (in fact encouraged!) to work on TopHat questions with the people seated near you with open book.

## University Policies

This course will follow all university policies, as posted on the Canvas page. These include policies on Free Expression, Academic Dishonesty, Accessibility, Discrimination/Harrassment, Prep Week, Religious Accommodation, and COVID-related issues.

It is your responsibility to contact Dr. Jenks well in advance with respect to Exam Accommodations or other accommodation needs.

## Learning Objectives

Upon successful completion of the course, students will have refined their study skills for quantitative courses; will be able to describe chemical phenomena using macroscopic, particulate and symbolic representations; and will have learned to appreciate the importance of chemistry in their chosen major and of science in their everyday life.

Students will be able to

- Solve chemical problems based on scientific data, using algebra and unit conversions as needed; and using graphical or tabulated data as needed, and with a reasonable understanding of accuracy and precision.
- Describe fundamental components of chemical structures: (a) use chemical nomenclature and terminology, use chemical symbols and formulas, understand atomic and small molecule structure
- Explain fundamental features of chemical reactions: (a) use balanced chemical equations; (b) calculate stoichiometric quantities (moles, mass, number of molecules, limiting reactant, theoretical and percent yield)
- Categorize solution phase reactions (acid/base, precipitation, redox)
- Describe the role of chemistry in water resources for human use and the importance of water in sustainable practices.
- Explain the central role of energy in chemical reactions: (a) define the enthalpy of a reaction and explain its measurement using calorimetry; (b) translate energy implications of reactions using Hess's Law; (c) calculate energy implications of/for reactions using any of the above.
- Describe atomic structure and its importance in understanding chemistry; (a) explain the use of spectroscopy to interrogate atomic structure; (b) use the periodic table to explain electronic structure, properties of elements, electronegativity, electron affinity, atomic sizes and other periodic properties of elements.
- Explain the origin and implication of chemical bonding: categorize ionic vs covalent bonds; polar vs non polar bonds.
- Describe the fundamental characteristics of molecules and molecular bonding: (a) produce Lewis structures and appropriate resonance forms; (b) describe models for molecular shapes, hybridization, molecular orbitals, and multiple covalent bonds.
- Explain characteristics of gases and how they are different than condensed forms of matter (liquids and solids).
- Summarize the postulates of the kinetic theory of gases; (c) Use the kinetic theory of gases to describe the relationship between pressure, volume, temperature and amount of gases; (c) Calculate quantitative features of chemical systems that include gases
- Explain the concept of intermolecular forces and describe the properties of the compounds in the solid, liquid, or gas phase using these concepts.

## Video and Chapter Schedule

You are required to have watched the videos listed for these dates BEFORE class. If you do not, you will not benefit from class nearly enough and your TopHat scores will suffer because the questions will ASSUME that you have been introduced to the material! Also, you will struggle more with the in-class worksheets and won't learn as much from them. This table gives the main topics for each day in line 1 and the required videos in line 2. These topics are the basic outline and we may bleed a little bit over or get a little ahead, but we will not deviate from this by more than about half a lecture period. The third line has an entry on days I expect to start a new chapter.

Week of	Monday	Wednesday	Friday
Jan 16	MLK holiday	Defining Stuff and Theory 1A, 1B Ch 1 starts	Units and measurements 1C
Jan 23	Accuracy, Precision, Sig Fig 1D, 1E	Conversions, Dalton Atom 2A Ch 2 starts	Isotopes and Ions 2B
Jan 30	Periodic Table, Salts 2C	Nomenclature 2D	The mole 3A Ch 3 starts
Feb 6	Molecular formulas & weight 3B	(Night Exam)	Balancing rxns. Mass conservation 3C, 3D
Feb 13	Yields 3E	Electrolyte solutions 4A Ch 4 starts	Concentrations 4B
Feb 20	Solubility and precipitation 4C	Oxidation states and numbers 4D	Balancing redox rxns 4E
Feb 27	Pressure and PV 5A Ch 5 starts	PV=nRT 5B, 5C	Partial Pressures, Kinetic Theory of gases 5D, 5E
March 6	Non-ideal gases 5F	(Night Exam)	Chemical potential & enthalpy 6A, 6B Ch 6 starts
March 13	Spring break	Spring break	Spring break
March 20	Calorimetry 6C	Hess's Law, Heat of Formation 6D	Spillover, more problems
March 27	Light & Photoelectric effect 7A, 7B Ch 7 starts	Abs & Emission, Bohr model	Modern H-atom model 7C, 7D
April 3	More H-atom, Periodic trends 7E	(Night Exam)	Electronegativity, Ionic bond 8A, 8B Ch 8 starts
April 10	Covalent bonds, Lewis struct 8C, 8D	More Lewis, Resonance 8E	VSEPR 8F
April 17	Hybridization 9A Ch 9 starts	Sigma, pi, & Lone pairs 9B	Spillover, MO intro 9C
April 24	MO applied to diatomics 9D	(Night Exam)	Intermolecular forces 10A Ch 10 starts
May 1	Solids 10B	Phase Changes 10C, 10D	Review
May 8	Finals week, TBA		