

CHEM 111

Introductory Chemistry I

Trinity College

Spring 2023

Class Meetings

MWF 10-10:50 am
Clement 308

Instructor

Prof. Michelle Kovarik
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Office Hours

Clement 129
Mondays 12:45-1:45 pm
Wednesdays 4-5 pm
and by appointment

Teaching Assistants

TAs are available to help with homework problems and answer general questions every Sun-Thurs evening (times TBA) in the chemistry library (Room 209).

Supplemental Instruction

Isolde Edson
isolde.edson@trincoll.edu

Our SI leader will lead weekly sessions with extra practice. These sessions have been shown to raise grades for all students who attend.

Inside this syllabus

Tips for Success	2
Resources.....	2
Important Dates	3
Required Materials.....	3
Grading	3
Course Policies.....	3-4
FAQs.....	5

Course Objectives

The study of the major concepts and theories required for an understanding of chemical phenomena. Principal topics include atomic and molecular structure, gas laws, stoichiometry, changes of state, chemical binding, and solutions in chemical reactions.

After completing this course, students should be able to

- Perform calculations and conversions of scientific measurements with appropriate significant figures (Ch. E)
- Describe the quantum mechanical model of the atom and support it with evidence from experiments (Ch. 1-3)
- Translate between various representations of molecules, including formulas, names, and structures (Ch. 4-6)
- Identify types of chemical reactions and perform stoichiometric calculations (Ch. 7-8)
- Use concepts, calculations, and experimental data in thermochemistry to explain the role of heat in chemical reactions (Ch. 9)
- Apply knowledge of intermolecular forces to predict the behavior of matter (Ch. 11)

Course Format

During class we will alternate between short lectures, small group work, and whole class discussion. Much of our discussion will draw on data that you generate in lab, so that the lecture and laboratory portions of the course are complementary.

You should do the pre-class reading in order to participate and make the most of your time in class. Sometimes I may call on you randomly to answer a question instead of asking for volunteers. I want to make sure everyone is contributing their ideas to the class, but I know that “cold calls” can be stressful. Our goal is to create a classroom environment where it’s OK to get something wrong or not know an answer. (If we all knew all the answers already, then we would just go home.) If you are anxious about this part of class, please let me know so we can discuss strategies for your participation.

We will have regular quizzes to help you test your conceptual understanding. These quizzes will be mostly multiple choice and short answer and will not require a calculator. However, you should plan to have and use a calculator on exams.

Tips for Success

Before class read the textbook pages that introduce the next topic and preview the homework problems.

During class participate often and ask questions. Discuss difficult concepts with your group members and make notes of sections you need to review in more detail.

After class review your notes and attempt the homework problems. Attend SI sessions regularly. As soon as you get stuck or feel uncertain, reach out to me or a TA. You will get the best results if you review the notes and start the homework as soon as possible after class. For any topics that you find challenging, work the extra practice problems in the textbook and check your answers using the appendix.

When you get stuck on homework problems...

- Identify the goal of the problem.
 - Break large problems into smaller parts.
 - Identify the units your answer will be in and compare to the units of the information you have been given. Form a strategy based on converting from the units of what you know to the units of what you want.
- Do not try to track large quantities of information in your head.
 - Write things down (nearly) as you go.
 - Show your work and keep track of units.
 - Use diagrams and equations to summarize information.
- Check your work. Ask yourself if you have...
 - Copied the problem correctly (no numbers transposed, no mistakes in units, etc.).
 - Entered calculations into your calculator correctly.
 - Obtained a reasonable result for intermediate steps of the calculation, based on your common sense, your chemical knowledge, and information from the problem.
 - Written all chemical formulas correctly and balanced all equations.
- Seek new ideas.
 - Consider whether you need to look up information in the textbook or your notes to solve the problem.
 - Brainstorm. Draw new diagrams to represent what is happening.
 - Ask a friend for input. Come to office hours, supplemental instruction, or a TA help session.

Before exams focus on the learning objectives in the course schedule. When reviewing worksheets and homework, re-work questions from scratch instead of reviewing worked solutions. For more practice, do the dynamic study modules from Mastering Chemistry. These are adaptive assignments that let you self-quiz to assess your learning. For difficult concepts, practice explaining them out loud, as though you are the teacher. Keep in mind that the exam will not include questions you have seen previously, so you will need to apply your knowledge to new problems. It will not be sufficient to know the "right answer" – you need to understand why the correct answer is correct.

You should plan to spend 6-12 h per week outside of class time in order to be successful.

Resources

Accessibility Requests

Please let me know if there are circumstances that might affect your full participation in class or your health and safety in the lab. If you are requesting academic accommodations, you should notify me at least 10 days in advance and contact Pamela McKeever in the Student Accessibility Resource Center at 860-297-4025 or sarc@trincoll.edu.

Emergency and Equity Fund

This initiative provides students with financial assistance for significant, unforeseen, unavoidable emergencies and unexpected expenses.

<https://rb.gy/2vge5>

Excel for Chemists

A copy of this book is available electronically through the library, and a hard copy is available for use in my office during office hours.

<http://site.ebrary.com/lib/trinity/Doc?id=10510405>

Peer Tutoring

Your first resources if you want help with class should be office hours, SI sessions, and TA visits, but peer tutoring is also available. You may also find you'd like to serve as a peer tutor. Learn more at <https://www.trincoll.edu/trinityplus/peer-tutoring-network/>

The Writing Center

For hours or to schedule an appointment, call 297-2468 or visit <http://trincoll.mywconline.com/>

How do you earn your grade?

Exams	45%
Quizzes	15%
Homework	15%
Laboratory	25%

We will have 4 equally-weighted exams, including 3 in-class exams and a final. The final exam will be cumulative.

Quizzes will focus on conceptual understanding and will be multiple choice and short answer.

Homework on Mastering Chemistry can be resubmitted once, and your grade will be the best score of the two attempts. Case studies will be given full credit for completion.

Your lab grade will be kept by your lab instructor until the end of the semester, so you should contact your lab instructor with any questions about lab grades.

Course Materials

Required

- **Textbook and online homework**
Chemistry: Structure and Properties, 2nd ed. by Nivaldo J. Tro, Pearson, 2015. with Mastering Chemistry access (course ID kovarik84498). Join through Moodle, and use a free trial to stay on track with homework until you've purchased access.
- **Scientific calculator** (bring to class!)
- **Model kit, laboratory safety glasses, and lab coat**
Available from the chemistry department, see link on Moodle
- **Laboratory manual**
Available on Moodle
- **Laboratory notebook**
Spiral bound, carbonless copy, available in bookstore, ~\$20.

Suggested

- *ACS Style Guide*
- *Excel for Chemists*
- Binder and 3-hole punch for organizing handouts

Course Policies

Due Dates, Late Work, and Make-up Assignments

We will use Mastering Chemistry for most homework. A weekly assignment will be due by 8 am, usually on Monday mornings. Before each exam we will do a case study assignment that will be due at the start of class. Late assignments will be penalized at a rate of -10% per day or 0.4% per hour on Mastering Chemistry.

Sometimes unexpected (and often unwelcome) events intrude on our plans – mental and physical illness, family needs, etc. may affect your class performance this semester. To the extent that you are comfortable sharing this information with me, I would like to know as soon as possible. If you miss an exam or quiz due to illness, injury, or a family emergency, you should provide some confirmation of the event directly to me or to the Dean of Students office. If you will miss an exam or quiz for a scheduled, College-sanctioned event (e.g., religious observance, athletics), you should discuss your absence with me in advance (preferably at least 3 days prior). In most cases, your other exams or quizzes will be weighted to replace the one missed. Make-ups will be given only in special circumstances at the instructor's discretion.

Important Dates

Drop/Add Deadline.....	9/12
Exam 1	9/29
Withdraw Deadline	10/23
Exam 2.....	11/1
Exam 3.....	12/4
Final Exam	12/19

Weekly syllabi will be handed out regularly in class.

A complete schedule is available on Moodle.

By department policy, to pass this course, you must complete all laboratory experiments. If you miss a lab period, it is critical that you contact your lab instructor as soon as possible to arrange a make-up lab.

Moodle & Email

Moodle and e-mail will be used extensively. All students are required to have an active e-mail account. Please inform me during the first week of class if you prefer to use a non-trincoll address. Students are expected to consult the course Moodle site frequently for assignments, announcements, schedule changes, lecture materials, supplementary course materials and external links.

Classroom Citizenship

This course is intended for advanced students, and I expect you to conduct yourselves as such and to be familiar with the College's policies on attendance, absences, academic honesty, and classroom behavior as outlined in the Student Handbook.

I also expect you to conduct yourselves with integrity as persons. There are persistent, pervasive, and pernicious issues in academic science concerning discrimination based on race, sex/gender, sexual orientation, disabilities, religion, body type, etc. Such violations take many forms from overt harassment to seemingly smaller transgressions (unwanted comments, bullying, patronizing). While some issues may seem less serious, their cumulative effect on the recipient's career and well-being can be just as detrimental as more obvious offenses. Treating others with dignity is as integral to the proper conduct of science as keeping a good lab notebook. Discrimination and harassment persist because our scientific culture has not historically valued diverse perspectives, backgrounds, and contributions. I invite you to help me foster a community of mutual respect by reflecting on your own biases and supporting your peers to do the same. This means speaking out when you observe abuse and apologizing when your peers point out negative impacts of your behavior. I will model this openness to feedback if you notice behavior of mine that has a negative impact and bring it to my attention. Together, we can foster a climate free from bullying, harassment, and discrimination where we all can thrive and learn.

Academic Integrity

Each student should be familiar with the Trinity College Student Integrity Contract and the section on Intellectual Honesty in the Student Handbook.

References: Any ideas in your written assignments that (i) did not spring from your own mind and (ii) are not common knowledge to high school science students should be cited at the end of each assignment. Direct quotes are usually unacceptable: rewrite all ideas in your own words *and* cite them. If you have a question about whether your rewording is acceptable, ask before turning in the assignment. Use the *ACS Style Guide* to format your references. Plagiarism and academic dishonesty – copying from another student, copying from another source including the internet, failing to cite a reference, etc. – will be addressed through the College's jury system.

Homework: I encourage you to discuss homework with your classmates. Your peers should be a primary resource if you are uncertain about how to proceed with a problem (although the TAs and I are happy to help, too). **On written homework assignments, you should acknowledge which classmates worked with you on an assignment by listing their names on the first page.** Additionally, I expect each of you to do your own work. Discussing homework problems with your classmates is acceptable; copying your classmate's answers or work is not. If I find

evidence of copying or allowing work to be copied, we will go through the College's academic honesty proceedings. If you have any questions about whether your collaboration with a classmate complies with my expectations, please talk to me about it *before* turning in an assignment.

Use of Artificial Intelligence: If you choose to use AI tools like ChatGPT in this class, I recommend that you do so with care. Like Wikipedia, AI chat systems can provide a useful introduction to a topic or clarify a point of confusion. For most questions, I suggest you reach out to me, the TA, or a classmate. If you need a more immediate reply, you may find it useful to use AI to check your work for errors or suggest a starting point to approach a problem. You should not copy and paste homework questions into a chat platform to ask for solutions as this will not be effective for your learning. Your textbook already has many worked examples, and reviewing worked solutions is not nearly as effective in building your understanding as generating your own solutions. Additionally, current versions of AI chatbots are not particularly accurate with the nuances of some chemical reasoning, and they sometimes fail to complete calculations correctly. They will not be available during exams, which require you to demonstrate your own reasoning about class topics, and therefore it is best not to rely on them too heavily. Finally, I would like to be clear that in addition to cheating yourself out of learning opportunities, I consider copy-paste approaches to AI use on graded assignments to be cheating as defined by the College's student integrity policies and will address them as such.

On the first day of class, I will be asking you to sign the Student Integrity Statement as a way of affirming your commitment to academic integrity. You may choose not to sign, however, whether you sign or not, you are expected to behave in accordance with the statement. For your records, the statement is as follows:

“In accordance with Article II of the Trinity College Student Integrity Contract, I hereby pledge that the papers, exams, and other academic exercises I submit for this course will represent my own work; that I will properly acknowledge and attribute any and all information and ideas that I have used from other sources; and that no collaboration unauthorized by the instructor of the course will occur in the course of its completion.”

Frequently Asked Questions (FAQs)

What should I do if I have to miss class?

Class attendance is critical to your success in the course, so please be on time and do not miss class if at all possible. If you will be absent, please do the following:

- (1) Notify me as soon as possible, preferably before class and by email.
- (2) Email me any assignments that are due, drop them in CT208, or send them to class with a friend.
- (3) Contact a classmate to get the notes and schedule an appointment with me to address any questions you have about missed material.

What if I miss a quiz or an exam?

You should contact me as soon as possible and plan to submit some documentation of extenuating circumstances, such as illness, injury, or family emergency. In most cases, your other exams or quizzes will be weighted to replace the one missed. See the section on course policies for more information.

Can I have an extension? What is the penalty for late work?

Late assignments will be penalized at a rate of -10% per day or 0.4% per hour on Mastering Chemistry. Because each lesson in this course builds on the previous one, extensions are not recommended and will be granted only in exceptional circumstances. In case of prolonged illness, injury, or family emergency, I will work with you in collaboration with the Dean of Students' office to determine the best course of action.

How can I tell what my current grade is?

Your current overall grade and your grades for individual assignments will always be available in the grade book on Moodle. If you have questions or would like to discuss the class at any time, please come by office hours or make an appointment. Keep in mind that your final grade for the course will be calculated using your grade for the lecture (75%) and for the lab (25%). You should contact your lab instructor if you have questions about lab grades.

Can I do extra credit?

There will be no extra credit in this class. Please don't ask! My philosophy is that you should spend your valuable time succeeding at the primary objectives for the course. If you have not completed them, you should not be spending time on additional work. If you have completed them, your grade should not need a boost.

Whom should I contact for technical help with Moodle?

If you are having general technical problems logging on or using Moodle, you should contact the Help Desk at 860-297-2007 or helpdesk@trincoll.edu. If you are having specific problems with content on our class site, you may want to contact me first so I can make sure it's not a mistake I've made in preparing the content.

Whom should I contact for technical support for the Mastering Chemistry online homework?

Be sure that you have done the Introduction to Mastering Chemistry demo assignment. If you are having general technical problems logging on or using Mastering Chemistry, you should visit their help website: <https://www.pearsonmylabandmastering.com/northamerica/masteringchemistry/students/support/index.html>. If you are having specific problems with content specific to our class, you may want to contact me first, so I can make sure it's not a mistake I've made in preparing the content.

Why are we doing so much group work?

A large body of educational research shows that students learn more and perform better on exams when they are actively engaged, rather than passively listening, in class. This is especially true when students work in groups because of the opportunity to learn from each other, rather than just from the instructor. Working with other people is also a key skill for almost every professional occupation, so a complete education should include practice with this skill. (For recommendations to graduate programs and references for job openings, I am almost always asked to comment on a student's ability to work on a team.) Finally, when you work in groups, it makes your thinking clear to me. If I talk and you listen, there aren't many opportunities for me to learn how things are going before the exam. When I hear you discussing ideas in class each day, it gives me important feedback about which topics we have grasped and which need to be revisited.