

## Chemistry 202: Principles of Reactivity, Spring 2019

This course answers the questions *How Fast?* and *How Far?*

<b>Sections</b>	<b>Chem 202-4 and 202-5</b>
<b>Meeting Time</b>	<b>202-4: MWF 9:00–9:50 am</b> <b>202-5: MWF 10:00–10:50 am</b>
<b>Location</b>	OSB 423
<b>Instructor</b>	Dr. Annette Neuman
<b>E-mail</b>	<a href="mailto:annette.neuman@emory.edu">annette.neuman@emory.edu</a>
<b>Office</b>	OSB 404
<b>Office Hours</b>	Mondays 1–3 pm, Tuesdays and Thursdays 2–4 pm (drop-in) Or by appointment (e-mail me to set up a time)

**Description** Chemistry 202 is the second course in the chemistry curriculum at Oxford. It aims to build on the concepts of molecular structure from Chemistry 150 and to connect molecular structure with reactivity. The goal of this course is to provide a basic understanding of kinetics and thermodynamics of chemical reactions and how these are related to the structure of the reactants and products and the pathways between them. You will use reaction coordinate diagrams and the curved arrow formalism to illustrate reaction mechanisms, and you will be introduced to nucleophilic acyl substitution and nucleophilic substitution reactions and their mechanisms. When you finish the course, you will be ready to learn more reactions and their mechanisms and the importance of molecular orbitals in chemical reactivity.

Oxford College is dedicated to a liberal arts education. The ultimate goal of a liberal arts education is not to merely provide a collection of knowledge, but rather to teach you how to think and how to learn. The study of science is an integral part of a liberal arts education, and mastery of chemistry will serve you well whether you pursue a career in science, healthcare, or another field. Success in Chemistry 202 requires a thorough understanding of fundamental principles and the ability to use these principles to analyze, classify, and predict. Medicine and other fields make similar demands. Your mastery of the principles of reactivity will not only provide you with valuable knowledge about chemical reactivity; it will also hone the critical thinking skills that will be invaluable in your future career.

Please note that Chemistry 202 and 202L are co-requisites; *you must be enrolled in both a lecture section and a lab section*. They do not need to be with the same professor.

- Learning outcomes** By the end of Chemistry 202, students will
1. Use their understanding of chemical bonding and energetics to predict and explain changes in enthalpy, entropy, and free energy for a variety of processes and reactions;
  2. Use their understanding of collision theory, temperature, and average kinetic energy of the system to make predictions about reaction rate and explain in the context of a reaction coordinate diagram;
  3. Demonstrate their understanding of chemical equilibrium and acid base chemistry through qualitative and quantitative approaches;
  4. Apply their understanding of acids and bases, thermodynamics, and kinetics to predict and explain simple organic reactions: substitution, elimination, and nucleophilic acyl substitution;
  5. Illustrate their understanding of reaction mechanisms by using curved arrow formalisms and proposing reaction coordinate diagrams; and
  6. Interpret experimental kinetic data to propose and evaluate reaction mechanisms.

## Course materials

### Required:

*Chemistry: Atoms First*, 3<sup>rd</sup> Edition, by Julia Burdge and Jason Overby\*  
*Organic Chemistry*, 10<sup>th</sup> Edition, by Francis A. Carey and Robert M. Giuliano\*  
ALEKS registration code for Neuman sections  
Nonprogrammable scientific calculator\*\*

\*Electronic books are strongly recommended. The e-books are available from McGraw-Hill Connect; you can purchase the access code from the bookstore or on the McGraw-Hill website.

\*\*Calculators that can download and/or store information, can automatically solve equations, or can be programmed may not under any circumstances be used on an exam. **If you bring such a calculator, you will not be allowed to use it.**

### Optional:

*Molecular Visions* model kit  
Solutions manuals for the textbooks

Bring a notebook, pen or pencil, and calculator to every class.

## Course Content

The content of this course **cannot** be found in any single textbook resource. For this reason, the structure is best followed on the course Canvas site in a series of modules. You are responsible for all announcements and content that is outlined in the Canvas modules.

Review module (will not be covered in class):

- Resonance, functional groups, nomenclature, line-angle representations
- Newman projections, conformational isomers, and constitutional isomers
- Configurational isomers and chirality
- Polarity and intermolecular forces

Chemistry 202 Modules:

- Thermodynamics and Collision Theory (Classes 1–5)
- Introduction to Equilibrium and LeChatelier's Principle (Classes 6–10)
- Acid-Base Chemistry (Classes 11–22)
- Carbonyl Compounds (Classes 23–29)
- Kinetics (Classes 30–39)

## Grading

In-class exams	4 @ 16%	64%
Final exam		22%
ALEKS		5%
Connect		5%
Participation/worksheet completion		4%
LearnSmart (bonus)		1%

Your final letter grade will be determined by the usual scale. *There is no automatic rounding or curve to course grades.*

	93		90		87		83		80		77		73		70		67		60	
A		A-		B+		B		B-		C+		C		C-		D+		D		F

In fairness to all students, grades must be based solely on your performance in the course. If you believe I have misgraded an assignment, please bring this to my attention immediately. Otherwise, **under no circumstances will grades be open for negotiation.**

Partial credit on exam questions will be awarded at my discretion and is not open for negotiation.

## Exams

We will have four 50-minute in-class exams. The exams will be given during the regularly scheduled class period.

Exam 1	Wednesday, February 13
Exam 2	Monday, March 4
Exam 3	Monday, April 1
Exam 4	Friday, April 26

Exams will consist of multiple-choice questions, quantitative problems, and explanations. Wondering what you're responsible for knowing? **Check the daily learning objectives!** (on Canvas and worksheets)

Make sure that you have a pen or pencil and an **acceptable** calculator with you for each exam. You will not be allowed to use a graphing calculator or the calculator on your phone for exams.

Please use the restroom and get a drink of water before beginning an exam. Once the exam period begins, you will not be able to leave the room until you have turned in your exam.

Your final exam score may be used to replace your lowest in-class exam score with the following exceptions:

1. You have a zero on an exam due to missing the exam without a valid excuse.
2. You violated the Honor Code.

## Final Exam

The final exam will be comprehensive. It will be given during the scheduled exam period:  
9:00 section: Wednesday, May 8, 9 am – 12 pm  
10:00 section: Monday, May 6, 9 am – 12 pm

## Makeups

Makeup exams are not given after missed exams. In extenuating circumstances, it may be possible for a student to take an exam ahead of time, if I am given at least seven days' notice. Under no circumstances will a makeup exam be given *after* the scheduled time and date of the exam.

## Review sessions

Review sessions will be held one or two days before each exam at a mutually agreed upon time. These sessions are completely optional and will give you the opportunity to ask me any questions you may have about the current material.

## ALEKS and Connect

Diligently working problems is one of the major keys to success in chemistry. To this end, you have several types of practice problems available to you. Two of these will contribute to your course grade: ALEKS and Connect. Assessment and Learning in Knowledge Spaces (ALEKS) is a web-based, artificially intelligent assessment and learning system. ALEKS problems will be assigned for Modules 1–3 in the first half of the semester.

You will access your e-books through Connect; you will also be assigned online homework through Connect for some modules throughout the semester. These will be more challenging than ALEKS, and they will require you to use higher-order thinking, apply what you have learned in ALEKS and in class, and prepare you for the types of problems you will see on exams. Your completion of these ALEKS and Connect assignments will contribute 10% toward your course grade, so it is important that you complete all of these assignments!

In addition to these graded assignments, practice problems from the textbooks will be posted on Canvas. While these problems will not be graded, your success on exams is dependent on your deep understanding of problem-solving methods, conceptual understanding, and linking mathematics with concepts. The textbook problems are a very useful tool (in addition to the other tools listed here) to help you strengthen these skills.

### Participation

Engagement in the class meetings is helpful to your success in organic chemistry. For this reason, you will work in-class problems in groups on most days. Worksheets may also be assigned for out-of-class completion. Your participation with your group during the class period and completion of worksheets outside of class will constitute your participation score. **You cannot earn participation points if you are not in class.**

### LearnSmart

LearnSmart will give you practice on each section of topics and will help you in understanding the material as you study. LearnSmart problems are for your benefit. Completion of these exercises by each of the chapter due dates will earn you up to 1% bonus on your final grade.

### SI

We are fortunate to have Alex Welsh as the SI leader for our sections of Chemistry 202. Alex has excelled in his previous chemistry classes, and his advice will be valuable for learning and understanding chemistry.

### Honor Code

Academic integrity is crucial to the Oxford community. Therefore, as in all courses, you will be expected to adhere to the Oxford College Honor Code. Academic misconduct, as defined in the honor code, will not be tolerated and will be immediately referred to the Honor Council. **Collaboration is not permitted on exams.**

### Accommodations

If you have a documented disability and have anticipated barriers related to the format or requirements of this course, or presume having a disability (e.g. mental health, attention, learning, vision, hearing, physical or systemic), and are in need of accommodations for this semester, you are encouraged to contact the Office of Accessibility Services (OAS) to learn more about the registration process and steps for requesting accommodations. If you are registered with OAS, please submit your documentation letter to me during the first week of the semester so that I can make appropriate accommodations.

### Attendance

All students are expected to attend all lecture sessions. However, I recognize that emergencies can arise that may result in absence from class. You should notify me if an absence is due to illness or other emergency. You are responsible for all material covered in lecture if you are absent.

Besides missing class, these also count as an absence:

1. Being late to class three times. If you come in late, it is your responsibility to see me after class to ensure that you are marked as being tardy and not absent. No adjustments will be made at a later time.
2. Coming to class more than 15 minutes late.
3. Leaving class early.
4. Going in and out of class.
5. Being inattentive or working on other assignments in class.

You are allowed 3 *absences* from lecture. If you exceed the 3-absence limit for *any* reason, by any combination of absences and tardies, you will:

1. Lose 1 point for the next absence (absence 4).
2. Lose 2 points for the next absence (absence 5).
3. Lose 3 points for each additional absence.

Note that each point deducted is a **percentage point** of your final grade. Therefore, excessive absences will have a significant negative impact on your course grade.

### Expectations

A growing body of evidence shows that college students learn less and tend to earn worse grades when they use computers or tablets during lectures. For this reason, it is in your best interest to focus on the matter at hand and not on your electronics for the 50 minutes we have together—whether this is lecture, group work, or something else. Please let me know if you have any concerns about this policy.

Inattentiveness noted in the attendance policy above includes being distracted by electronics (texting or other smartphone use), which detract from your ability to learn during the lecture period. For this reason, if I observe that you are frequently distracted by your electronic devices, **your course grade may be adversely affected.**

You should minimize your trips to the restroom or other reasons for leaving during class. You may excuse yourself from class if absolutely necessary, but this is very distracting and should be kept to a minimum.

### Canvas

The Chemistry 202 page on Canvas will be the primary means of communicating outside of class. It will also house supplementary course resources. **Please be sure to check the course page daily.** You may want to install the Canvas app on your smartphone for easy access.

### Student work

Occasionally I will photocopy assignments that you turn in for inclusion in my teaching portfolio. Furthermore, student work submitted as part of this course may be reviewed by Oxford College and Emory College faculty and staff for the purposes of improving instruction and enhancing Emory education.

**Tips for Success:** Chemistry 202 is an intensive course and requires time. To perform well in this course, you must manage your time appropriately. You must have a proper study plan, beginning from the first day of class.

1. **WORK PROBLEMS!** The assigned problem sets are a good place to start, but you should also work problems from the textbook. Don't try to work the largest volume of problems possible; rather, work each problem mindfully. Ask yourself, "What concepts does this problem relate to? If I changed one variable, how would that change the outcome?" Considering questions like this will help you connect topics in your brain, which will serve you well in this class and beyond.
2. Manage your time and your life. There are LOTS of extracurricular activities to get involved in at Oxford. None of them are an excuse for poor performance in the classroom. Remember why you are here.
3. The average student will need to set aside *at least* six hours a week to study for this class. However, students come into this class with all sorts of different backgrounds. You may be able to get away with studying less than this, or you may need to devote much more time in order to succeed. Do not compare yourself to your classmates. Do what YOU need to do in order to succeed.
4. Memorizing facts is important to establish a basis for your knowledge **but is not sufficient for success in Chemistry 202**. You must be able to **use** your knowledge to think logically and analytically. Many of the test questions will require you to apply your knowledge to unfamiliar situations.
5. Come to class every day, stay alert, and take good notes.
6. You may find it helpful to form a study group with two or three classmates and work problems together.
7. Use the resources available to you: SI sessions, office hours, review sessions, chemistry tutors, and your classmates are all excellent resources to help you achieve success in this class.
8. The pace of this course is rapid. Stay current with the material and don't get behind.