

# Chemistry 121: Introductory Chemistry

## Course Description

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This course provides a thorough introduction to the fundamental concepts, theories, and methodologies of chemistry. Topics may include stoichiometry, theories of molecular structure and bonding, the periodic table, acid-base chemistry, chemical equilibria, and thermodynamics. This course provides a basis for further study of chemistry.

## What To Expect

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From the course – to be amazed, challenged, and learn a lot about chemistry. Students can expect to improve their problem-solving skills, apply and extend their chemical knowledge to other areas of science, and enhance their written and oral communication skills. We will be spending 3-5 class periods on each topic and it is expected that you will have read the associated material before class. In class we will work more challenging problems, analyze demonstrations, and discuss various applications of chemistry.

From the instructor – to treat each person with respect, be enthusiastic and knowledgeable about the subject, arrive to class on time and prepared, return graded and assessed items in a timely manner, reply to emails in a timely manner (within 24-48 hours), and be available outside of class for questions or further discussion.

Of the students – to respect others, be on time (when arriving to class, turning in assignments, etc.), be prepared for class (have read related course material before class, be alert, etc.), and participate during class (participate in small group activities, answer/ask questions, etc.). Outside of class, you are expected to make consistent progress towards completing course objectives on ALEKS.

## Instructor and Course Resources

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Instructor: Prof. Kerry Rouhier (“Roo-yer”)  
Email: rouhierk@kenyon.edu  
Office: 212 Tomisch Hall  
Office Hours: M (10– 12PM), T (3:30-4:30PM), W (3:30-4:30PM), F (3:30-4:30PM) or by appointment  
Class location: Tomsich 101  
Class time: 9:10-10:00 PM; M-W-F  
Required materials: Chemistry, 9th Ed. by Raymond Chang (although any general chemistry textbook is acceptable); ALEKS (Assessment and LEarning in Knowledge Spaces) Online course-companion; basic scientific calculator (bring to every class); Molecular structure model kit.  
Course websites: moodle.kenyon.edu (CHEM 121.01) and <https://www.aleks.com>  
Lead tutor: Madelyn Cook (will be available at MSSC)

## Course Policies

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Accommodations – Students who anticipate they may need accommodations in this course because of the impact of a learning, physical, or psychological disability are encouraged to meet with me privately early in the semester to discuss your concerns. In addition, students must contact Erin Salva, Director of Student Accessibility and Support Services (740-427-5453 or [salvae@kenyon.edu](mailto:salvae@kenyon.edu)), as soon as possible, to verify their eligibility for reasonable academic accommodations. Early contact will help to avoid unnecessary inconvenience and delays.

Academic Honesty – Kenyon College is, at the core, an intellectual community of scholars – students and faculty – engaged in the free and open exchange of ideas. Critical to this lively exchange and deep engagement with ideas is the academic integrity of our work, both inside and outside the classroom.

At Kenyon we expect all students, at all times, to submit work that represents these standards of academic integrity. It is the responsibility of each student to learn and practice the proper ways of documenting and acknowledging those whose ideas and words you have drawn upon (see Academic Honesty and Questions of Plagiarism in the Course Catalog). Ignorance and carelessness are not excuses for academic dishonesty. If you are uncertain about the expectations for academic honesty in this class, please ask for clarification. Note: this class encourages collaborative work; however your work must still be your own.

Attendance – Your attendance at every lecture is expected. Excessive absences will lead to a lower grade and may lead to expulsion from the course. As stated in the Course of Study 2015-2016 regarding absence due to illnesses:

*“Absences for reasons of illness are not ordinarily excused: only when a student is declared by the College physician to be infirm (in a hospital or at home) will a health report be sent from the Health and Counseling Center to the dean of students, giving the days when each patient is judged infirm and recommending that the student's class absences be excused. When released from confinement, the student is expected to resume regular required attendances unless otherwise advised.”*

Athletics and Extracurricular Activities – If your participation in athletics or extracurricular activities conflicts with a class, scheduled exam time or project due date, please let me know as soon as possible, at least two weeks in advance. Typically you will be expected to complete your work before (not after) the deadline for the rest of the class. Note: only the Dean of Students offers an Excused Absence (see Course of Study 2015-2016 for details).

Course grade – your overall course grade will be based on your performance in the following areas:

ALEKS		20.0%
Case Studies	(Homework - Graded)	5.0%
	(Homework - Completion)	5.0%
	(Project)	5.0%
Semester exams	(3)	45.0%
Final exam		20.0%

Letter grades will be assigned no more strictly than the following scale:

A/A-: 90-100%; B(+/-): 80-89%; C(+/-): 70-79%; D(+/-): 60-69%; F: <59%

Technology use – Please refrain from using laptops, tablet devices, cell phones, and recording devices in class without the prior approval of the instructor. All phones should be set to silent. Please bring a calculator to every class.

Responsibility – As a member of the Kenyon College Faculty, I am concerned about the well-being and development of our students and am available to discuss any concerns. However, I want you to know that faculty members are legally obligated to share certain information with the College's Title IX coordinator. This is to ensure the student's safety and welfare is being addressed, consistent with the requirements of the law. These disclosures include, but are not limited to, reports of sexual assault, relational/domestic violence, and stalking.

### Course Details

ALEKS online companion – As a supplement to the text, the instructor has asked that students purchase access to ALEKS (<https://www.aleks.com>). ALEKS (Assessment and LEarning in Knowledge Spaces) is a Web-based, adaptive questioning, CHEM121-course specific, program that supports the material taught in the lecture.

For ALEKS, there are two modes in which you will work: *Assessment Mode* and *Learning Mode*. In assessment mode, ALEKS determines what you have and have not yet mastered. Each ALEKS assessment takes about 45 minutes, so please plan accordingly. ALEKS uses the assessment data to determine what topics you have not yet mastered. Then ALEKS has you work in Learning Mode where you work on objectives with tutorials and problems to build your understanding. Working in learning mode is best done in frequent, small blocks of time. For example, 7 30-minute periods with ALEKS in a week is much better than one 3.5-hour block. Your ALEKS grade in the course is determined by the percent mastery of objectives at each of the ALEKS due dates and at the end of the course. Due dates are posted on ALEKS and are synchronized with the content addressed in lecture. The purpose of this is to keep you working regularly on learning chemistry. It is human nature to procrastinate, and this part of the course structure rewards those who work regularly toward mastery!

The percent mastery you earn on each objective or set of objectives associated with each due date will be weighted equally and averaged. The “gradebook” section of ALEKS enables you and me to track these scores. In addition, you will earn an ALEKS score based on your overall level of mastery at the end of the class. The purpose is for you to earn credit for mastery achieved before the course ends, whether or not it is achieved by the deadline. It is also in place to motivate you to work on topics that you forgot, so that by the end of the course you can succeed on the final examination and leave the course with a strong command of general chemistry knowledge. The numerator on the fraction above your ALEKS pie tells you your overall mastery score.

Also note, ALEKS instructs you on the topics you are most ready to learn. As you work through the course, ALEKS periodically reassesses you to ensure that topics learned are also retained. The ALEKS course is very complete in its chemistry coverage and ALEKS avoids multiple-choice questions. Historically students who show a high level of mastery of an ALEKS course are successful in the accompanying lecture. Please remember that ALEKS is tailored to assist you therefore it is to be completed **individually**.

Moodle – All course-related information will be posted and available through the course Moodle site. This includes the current schedule, lecture slides, and a gradebook. The Moodle calendar includes due dates for ALEKS and exam dates. This calendar can be exported to your own personal calendar (see course Moodle site for details). Please check this site frequently for important class-related information.

Case Studies – Everyday interesting things are happening in our chemical world. Each week, we will dive into these events by discussing the context, impact, and outcomes of these chemical happenings. These Case Studies are designed to build conceptual understanding of the material covered in your reading, develop your problem-solving skills, and provide a forum to practice scientific communication. You will be asked to complete short assignments based on the problems or discussions generated in class. Case Studies are typically undertaken on Fridays with the associated questions collected the following Monday. The questions will be graded for completion and a select subset will be graded for correctness and thought-process. Later in the semester you will have the opportunity to develop your own Case Study.

Semester exams – There will be three fifty-minute exams during the semester. If you have a scheduling conflict, please notify the instructor in writing at least two weeks prior to the scheduled exam to set up an alternate exam time. The exams are scheduled for September 16<sup>th</sup>, October 21<sup>st</sup>, and November 18<sup>th</sup>. There will be no makeup exams.

Final exam – The final exam will be Thursday, December 17<sup>th</sup> at 6:30 PM. It will be cumulative for the semester and you will have two hours to complete the exam. Because of limited time, it is impossible to include every concept or skill covered in this class, therefore the exam will sample topics. You should expect that any topic covered during the semester may appear.

Best practices for success in CHEM 121 – Found on the Moodle page is a section that includes several strategies for how to be successful in this course. There is also a link to an article on “Study smarter, learn better: 8 tips from memory researchers” that can be applied to all of your courses. It is encouraged that you look at these documents and put into practice these strategies early in the semester to maximize your success.

### **Student Comments**

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Last year I asked my students to write a short letter to future students in the class, letting them know whatever they thought was most important about the instructor, the course, the assignments, and the readings (textbook and/or in-class papers). Below are their responses (unfiltered, unedited).

Dear future chem student, From my experience, it is really important to keep up on the textbook reading, especially when you don't understand a section. Toward the end of the semester it got harder to keep up with the reading, but I know I would've understood the confusing topics better if I actually took the extra time to read the book. Also, office hours are super helpful even just for a quick clarification.

Do the readings before class. Class time is used to delve deeper into what is taught in the readings in order to get a better grasp on the material. Make use of office hours and the MSSC when needed- different explanations usually help in understanding the material completely.

It is critical to do the reading for before class. I advise to do the guided readings before doing going over the topics in class. It will help you to truly understand the topics because you're not seeing it for the first time. Chem students, Take good notes, read your textbook, and most importantly, go to office hours if you are ever unsure on the topics.

Pay attention in class and read

Dear Future Students, Go to office hours. Seriously, they are so helpful. Before exams, make sure that you review the textbook readings and study your notes heavily. The MSSC is great because it allows you to study with your peers, and they may ask questions that you didn't even think of. The first few weeks of this class will be a bit overwhelming, but it gets much easier. Good luck!

Work in small groups!! I truly got by with a little help from my friends. In order to make it through this course, you need to make it a part of your life and practice everyday. It's a lot easier when you're doing it with others. Take advantage of office hours! They are there for a reason and are helpful when you need clarification on a topic. Also, just do the reading and re-write your notes. You won't be sorry!

Dear student, Go to office hours and use the MSSC all the time. The tutors there are so helpful and there is free candy. Prof. Rouier is very quirky and funny, you'll get use to it.

To succeed in the classroom, read over the in class notes every week to keep up with the material and to make sure that you understand everything that was taught.

I think it is very important to do the readings, take notes, and look over those notes as often as possible. I found that when I read the textbook chapters I could keep up in class but if I didn't, everything introduced was very confusing. I also suggest going to office hours whenever you can especially if you don't understand something. It is very helpful and better to do when confusion arises instead of waiting to get help. The exams are hard so I would definitely start studying at least three days in advanced so that the material doesn't seem so intimidating and you have time to ask for help. Also, pay attention and ask questions in class, even if it is just to the people around you.

Take readings very seriously, it will help with understanding course material and following what is happening in class. The class is not too difficult but will be a challenge if you do not ask for assistance, go to MSSCs, office hours, talk to your TA, find the best and most effective way to learn for you. The instructor can only help you if you make them aware of your ignorance. Its a fun class, enjoy it.

Please do the reading and study hard.

The most important things are showing up to class, reading your text, and going to office hours in that order. Besides that also do as many practice problems as you can, they help on quizzes and tests a lot.

To be successful in this course it's best to stay on top of the textbook reading, and study the course material outside of class. Also it helps to do the practice problems in the textbook!

I think that it is important to do all the work your professor tells you to do. For example, if we are working in class and we didn't get to a question and the professor asks you to get it done before the next class so we can discuss it, then you should actually attempt the question. It is also important to start studying or start projects early, so that if a question pops up in your head, you have enough time to go to office hours/MSSC before a test or a due date.

Read the textbook before class

Always do your work and make sure you are over prepared for tests

The first exam threw most of us for a loop. You need to do more to prepare than just reading your notes. You must thoroughly understand the concepts and to do so I went to office hours and did extra practice problems. The exams are incredibly challenging, and grasping the material at a medium level is not enough. Professor Rouhier is very nice and kind and I wish I went to her office hours more, because she's great one on one.

Post-Exam office hours are essential.

Honestly, the most I can say is if you don't understand a concept, ask for help right away. Chemistry is one of those courses that builds on itself, so having a strong base of understanding will be way more important than it might seem-- most topics aren't over after the exam. If talking in class makes you want to puke, go to MSSC. I promise it will be worth it. P.S There are so many people in your place, and so many people willing to help. Don't stress.

I never really got a full grasp of some of the material for the class, but some of the material after made sense anyways so don't worry too much.

Dear future Introduction to Chemistry student, Do the homework. Review the night before a quiz, review the quizzes before the exams.

## **Student Research**

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The Chemistry department encourages students with interests in the sciences to consider an independent research experience at some point during your undergraduate education. If you are interested in doing research within the Chemistry department, first check the faculty websites ([www.kenyon.edu/academics/departments-programs/chemistry/chemistry/](http://www.kenyon.edu/academics/departments-programs/chemistry/chemistry/)) for an introduction to each person's individual research. If you find one (or more) faculty with interests that pique your curiosity, contact those people to set up an appointment to talk further. Some research groups may be full when you initiate contact, but this status may change semester to semester.

**Tentative Schedule (also posted on Course Moodle Site)**

Class Meeting Date	Topics	Case Study	ALEKS
8/28 – Friday	2.1-2.3 Atomic Structure & Isotopes	How old are you?	
8/31 – Monday	2.5-2.7 Atomic Formulas & Atomic Representations		8/30 Initial Assessment
9/2 – Wednesday	3.1-3.3, 3.5-3.7 Moles, Molar Mass, & Percent Composition		
9/4 – Friday	3.8-3.10 Stoichiometry, Limiting Reagent, & Percent Yield	Onions	9/4 PreReq Due <b>FRI</b>
9/7 – Monday	4.1-4.2 Ionic Substances In Water		
9/9 – Wednesday	4.3 Common Aqueous Reactions & Acids and Bases		9/9 Obj. 1 Due <b>WED</b>
9/11 – Friday	4.4 Redox Reactions	Biofuel Cells	
9/14 – Monday	4.5 Solute Solvent Relationships		9/15 Obj. 2 Due <b>TUE</b>
9/16 – Wednesday	<b>Exam 1</b>		
9/18 – Friday	5.1-5.5 Gas Laws And Ideal Gas Law	Limnic Eruption	
9/21 – Monday	5.8 Stoichiometry And Non-Ideal Gases		9/22 Obj. 3 Due <b>TUE</b>
9/23 – Wednesday	6.1-6.3 Energy As Heat & 1 <sup>st</sup> Law Of Thermodynamics		
9/25 – Friday	6.4 State Functions And Enthalpy	Thermosiphons	9/25 Obj. 4 Due <b>FRI</b>
9/28 – Monday	6.6 Hess' Law & Energy Required-For/Evolved-By Reactions		
9/30 – Wednesday	7.1-7.2 Properties Of Electromagnetic Radiation		9/30 Obj. 5 Due <b>WED</b>
10/2 - Friday	7.3-7.4 Bohr's Atom and the electron	Atomic Models	
10/5 – Monday	7.5-7.7 Quantum Numbers		10/6 Obj. 6 Due <b>TUE</b>
10/7 – Wednesday	7.8-7.9 Electron Configurations		
10/9 - Friday			
10/12 – Monday	8.1-8.2, 8.4-8.5 Atomic Trends – Size, Ionization Energy, & Electron Affinity		10/13 Obj. 7 Due <b>TUE</b>
10/14 – Wednesday	9.1 Valence Electrons & Lewis Dot Structures		
10/16 – Friday	9.4-9.5 Covalent Bonds	Brass Pots	
10/19 – Monday	9.6-9.7 Covalent Bonds - Octet guidelines		10/20 Obj. 8 Due <b>TUE</b>
10/21 – Wednesday	<b>Exam 2</b>		
10/23 - Friday	9.9-9.10 Where Lewis Structures Break Down	Lewis Structures	
10/26 – Monday	10.1-10.2 Molecular Geometry and VSEPR		10/27 Obj. 9 Due <b>TUE</b>
10/28 – Wednesday	10.3 Valence Bond Theory - Hybrid Orbitals		
10/30 – Friday	10.5 Sigma and Pi Bonding	Ozone	
11/2 – Monday	10.5 Atomic and Molecular Orbitals		
11/4 – Wednesday	10.6-10.7 Molecular Orbital Theory		
11/6 – Friday	10.8 Delocalized Orbitals	Retinol	
11/9 – Monday	14.1 What Is Chemical Equilibria		11/10 Obj. 10 Due <b>TUE</b>
11/11 – Wednesday	14.2-14.3 Equilibrium Constants And Reaction Quotient		
11/13 – Friday	14.4 Equilibrium Constants And Reaction Quotient	TBD	
11/16 – Monday	14.5 Using K In Chemical Equilibria		11/17 Obj. 11 Due <b>TUE</b>
11/18 – Wednesday	<b>Exam 3</b>		
11/20 - Friday	15.1 Brønsted-Lowry Acids & Bases	Your Case Study Due	
11/23 to 11/27			11/29 Open Pie Closes <b>SUN</b>
11/30 - Monday	15.2 Water And pH		
12/2 – Wednesday	15.3 Water And pH		
12/4 - Friday	15.4 Strength Of Acids & Bases	Atropin	
12/7 – Monday	15.5-15.6 Weak Acid/Bases And Ionization Constants		
12/9 – Wednesday	15.7-15.8 Diprotic Acids, Structure And Strength Of Acids/Bases		
12/11 - Friday	Flex Day	e-Cigarettes	12/11 Obj. 12 Due <b>FRI</b>
12/17	<b>Final Exam @ 6:30 PM</b>		