

# 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 and finish incomplete in-class work.

## 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 (2-4PM), or by appointment  
Class location: Tomsich 101  
Class time: 9:10-10:00 AM; M-W-F  
Required materials: Chemistry, 11th 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 (strongly recommended).  
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 unexcused absences (>3) will lead to a lower grade and may lead to expulsion from the course. As stated in the Course of Study 2016-2017 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 2016-2017 for details).

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

Participation		5%
ALEKS	(Mastery)	10%
	(Timely completion)	10%
Case Studies	(Homework)	10%
	(Project)	5%
Semester exams	(Exam 1)	10%
	(Exam 2)	15%
	(Exam 3)	15%
Final exam		20%

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

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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, seven 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 (overall mastery). 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 the instructor 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 and lecture slides. 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 Wednesday (or Monday if an exam is scheduled for Wednesday). Later in the semester you will have the opportunity to develop your own Case Study (Due November 30<sup>th</sup>).

Participation – Your active participation in this class is critical to your success. The instructor will regularly call on students to answer questions or complete work at the board. You will also be expected to work with your peers for problem-solving exercises. Your preparedness and engagement will be assessed as part of your “participation” grade.

Semester exams – There will be three fifty-minute exams during the semester. Each exam is cumulative, with emphasis on material covered since the last exam. 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 21<sup>st</sup>, October 19<sup>th</sup>, and November 16<sup>th</sup>. There will be no makeup exams.

Final exam – The final exam will be Tuesday, December 13<sup>th</sup> at 1:30 PM. It will be cumulative for the semester and take you approximately 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 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.

## Student Comments

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Each year I ask 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 some of their responses (unfiltered, unedited) from the last two years.

*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.*

*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!*

*At first, I despised ALEKS, however overtime, especially the last half of the course, I thought that ALEKS was really helpful in getting me to understand the material. I thought the pace was reasonable as well as the amount of time I spent working on it.*

*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.*

*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*

*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.*

*Use ALEKS ahead of the deadlines. Finish your objectives so you can fill in pie slices before the open pie, and a lot of the pressure disappears. The number one thing that will lead to your success in this course is simply practicing. Go through practice problems from the chapter, write your own, and use ALEKS to the point of excess. Make sure you understand what you're doing, and you'll be able to apply it to any problem on the tests at least enough to get some partial credit. Another suggestion is to go into office hours and go through your tests each time; make sure you understand what you did wrong and why you did it.*

*Professor Rouhier is a very difficult teacher and in order to not get behind I suggest going to her office hours as much as possible and asking questions and getting extra practice problems from her. She is very helpful 1 on 1. It is definitely necessary to read the material she assigns before class and utilize the MSSC for case studies. Also, don't procrastinate with ALEKS, work on it a little bit each day.*

*PRACTICE PROBLEMS FROM THE BACK OF THE BOOK BEFORE EXAMS. Absolutely please tell future students! I can't believe how my exams grades improved after sitting down and practicing from the book to study before exams. It's obviously necessary to take notes, re-read notes, for some re-write notes, but for Chemistry it is absolutely important to get as many practice problems in before exams and physically write them out as well. I know there were study guides with example problems but those weren't enough to study appropriately. CHANG isn't as bad as everyone says - just go into the text with the expectation that it will be terrible and be pleasantly surprised! Thank you for office hours! Although I did not attend frequently, the times I did attend you were helpful, willing to take the time, and cheerful as always!*

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

Date	Topics	Case Study	ALEKS Objectives Due date
8/26 – Friday	Introduction	CS1: Neurogenesis	
8/29 – Monday	2.5-2.7 Molecules, Ions, Chemical formulas, naming		<b>SUN 8/28 Initial Assessment</b>
8/31 – Wednesday	3.1-3.3, 3.5-3.7 Moles, Molar Mass, & Percent Composition		
9/2 – Friday	3.8-3.10 Stoichiometry, Limiting Reagent, & Percent Yield	CS2: Onions	<b>FRI 9/2 PreReq Due</b>
9/5 – Monday	4.1 Reactions in Aqueous Solutions		<b>TUE 9/6 Obj. 1 (Ch2)</b>
9/7 – Wednesday	4.2 Precipitation reactions	CS2 due	
9/9 – Friday	4.4 Redox Reactions	CS3: Biofuel cells	<b>FRI 9/9 Obj. 2 (Ch2)</b>
9/12 – Monday	4.3 Acid/Base Reactions		<b>TUE 9/13 Obj. 3 (Ch3)</b>
9/14 – Wednesday	4.5 Solute Solvent Relationships	CS3 due	
9/16 – Friday	5.1-5.4 Gas Laws And Ideal Gas Law	CS4: Limnic Eruption	<b>FRI 9/16 Obj. 4 (Ch3)</b>
9/19 – Monday	5.5, 5.7 Ideal Gas Law and KMT of gases	CS4 due	<b>MON 9/19 Obj. 5 (Ch4)</b>
<b>9/21 – Wednesday</b>	<b>Exam1</b>		
9/23 – Friday	6.1-6.3 Energy As Heat & 1 <sup>st</sup> Law Of Thermodynamics	CS5: Thermosiphon	<b>FRI 9/23 Obj. 6 (Ch4)</b>
9/26 – Monday	6.4 State Functions And Enthalpy		<b>TUE 9/27 Obj. 7 (Ch6)</b>
9/28 – Wednesday	6.6 Hess' Law & Energy Required-For/Evolved-By Reactions	CS5 due	
9/30 - Friday	7.1-7.2 Properties Of Electromagnetic Radiation	CS6: Atomic Models	<b>FRI 9/30 Obj. 8 (Ch6)</b>
10/3 – Monday	7.3-7.4 Bohr's Atom and the electron		<b>TUE 10/4 Obj. 9 (Ch7)</b>
10/5 – Wednesday	7.5-7.7 Quantum Numbers	CS6 due	
10/7 - Friday	<b>October Break</b>		
10/10 – Monday	7.8-7.9 Electron Configurations		<b>TUE 10/11 Obj. 10 (Ch7)</b>
10/12 – Wednesday	8.1-8.2, 8.4-8.5 Atomic Trends – Size, Ionization Energy, & Electron Affinity		
10/14 – Friday	9.1, 9.4 Valence Electrons & Lewis Dot Structures	CS7: Brass Pots	<b>FRI 10/14 Obj. 11 (Ch8)</b>
10/17 – Monday	9.5-9.7 Covalent Bonds	CS7 due	<b>MON 10/17 Obj. 12 (Ch9)</b>
<b>10/19 – Wednesday</b>	<b>Exam 2</b>		
10/21 - Friday	9.8-9.9 Where Lewis Structures Break Down	CS8: Ibuprofen	<b>FRI 10/21 Obj. 13 (Ch9)</b>
10/24 – Monday	9.10 Bond Enthalpy		<b>TUE 10/25 Obj. 14 (Ch9)</b>
10/26 – Wednesday	10.1-10.2 Molecular Geometry and VSEPR	CS8 due	
10/28 – Friday	10.3-10.4 Valence Bond Theory - Hybrid Orbitals	CS9: Ozone	<b>FRI 10/28 Obj. 15 (Ch10)</b>
10/31 – Monday	10.5 Sigma and Pi Bonding		<b>TUE 11/1 Obj. 16 (Ch10)</b>
11/2 – Wednesday	10.5 Atomic and Molecular Orbitals	CS9 due	
11/4 – Friday	10.6-10.7 Molecular Orbital Theory	CS10: Retinol	<b>FRI 11/4 Obj. 17 (Ch10)</b>
11/7 – Monday	10.8 Delocalized Orbitals		<b>TUE 11/8 Obj. 18 (Ch14)</b>
11/9 – Wednesday	14.1 What Is Chemical Equilibria	CS10 due	
11/11 – Friday	14.2 Equilibrium Constant expressions	CS11: Dimethylfumarate	<b>FRI 11/11 Obj. 19 (Ch14)</b>
11/14 – Monday	14.4 Equilibrium Constants And Reaction Quotient	CS11 due	<b>MON 11/14 Obj. 20 (Ch14)</b>
<b>11/16 – Wednesday</b>	<b>Exam 3</b>		
11/18 - Friday	14.5 Factors that affect chemical equilibrium		
11/21 to 11/25	<b>SUN 11/27 Open Pie Closes</b>		
11/28 - Monday	15.1 Brønsted-Lowry Acids & Bases		<b>TUE 11/29 Obj. 21 (Ch15)</b>
11/30 – Wednesday	15.2-15.3 Water And pH	<b>Case Study Project due</b>	
12/2 - Friday	15.4 Strength Of Acids & Bases	CS12: Atropin	<b>FRI 12/2 Obj. 22 (Ch15)</b>
12/5 – Monday	15.5-15.6 Weak Acid/Bases And Ionization Constants		<b>TUE 12/6 Obj. 23 (Ch15)</b>
12/7 – Wednesday	15.7-15.8 Diprotic Acids, Structure And Strength Of Acids/Bases	CS12 due	
12/9 - Friday	Flex day/Review	CS13: e-Cigarettes	<b>SAT 12/10 Open Pie Closes</b>
<b>12/13 - Tuesday</b>	<b>Final Exam @ 1:30 PM</b>		

