

Lewis & Clark College
General Chemistry I, Chemistry 110, Section 01

Basic Information

Professor: Barb Balko; Olin 225; x 7534; balko@lclark.edu

Department Secretary: Amy Timmins; Olin 226A; x 7530; timmins@lclark.edu

Office Hours: Monday 1 – 2 pm; Tuesday 10 – 11 am; Wednesday 1 – 2 pm; Thursday 1 – 2 pm; Friday 3 – 4 pm. I may need to change these as I schedule other meetings. If there are any changes, I will announce any changes in class as well as on Moodle. Please keep in mind that I am happy to schedule appointments outside of my posted hours if you can't make the scheduled hours.

Lectures: MWF 10:20 – 11:20, Olin 301

Moodle: You should find a moodle site for our lecture section as well as your laboratory (all sections share the same site). The enrollment key for lecture materials is CHEM110_01; the enrollment key for lab materials is CHEM110L

Help Center: Starts the second week of classes; hours will be announced. The center will be located in Howard (former lounge in the first floor) along with the Math and Physics help centers.

Materials on Reserve: we will have 2 copies of the required text on reserve as well as 2 copies of the student guide to the text on reserve in Watzek

Labs and Discussions: You must register for a laboratory and discussion section as well as the lecture. **Discussion sections and labs will meet starting the week of Sept. 9.** For discussion sections, please bring a calculator. For lab, please bring safety goggles and a lab notebook and dress appropriately (closed-toe shoes, long pants or skirt, and a shirt that covers your midriff).

Required Materials

Text: Brown, LeMay, Bursten, Murphy, Woodward, *Chemistry: The Central Science*, 12th edition. This text is available in the college bookstore. You may also purchase an electronic version of the text at www.mypearsonstore.com. If you buy a new copy of the text in the college bookstore, it comes with access to the “Mastering Chemistry” website, which provides additional problems and learning materials to accompany the text, and a student solution manual, which has solutions to problems with answers in the text as well as an explanation of the solution. You can buy a used text and purchase access to “Mastering Chemistry” and/or the student solution manual separately if you desire. **Neither access to the “Mastering Chemistry” website or the student solution manual is required.**

Safety Goggles: These must be worn **at all times** in the laboratory. Goggles will be available for you to use but you are encouraged to purchase your own (they should be available in the college bookstore).

Laboratory Notebook: This is a bound duplicate notebook with numbered pages; it can be purchased in the college bookstore.

Calculator: This must have log and exponential capabilities.

General Information

Student Learning Outcomes

By the end of this course, students will be able to:

1. Apply the concepts of uncertainty and dimensional analysis to solve chemical problems.
2. Understand the relationship between atoms, molecules, and moles and be able to apply this idea to chemical equations
3. Understand the atomic basis for the periodic table and the trends in atomic properties that exist in the table.
4. Identify and describe the subatomic particles (electron, proton, neutron) and understand how they fit into the picture of the atom. Students will be able to describe how chemist's understanding of these particles has changed with the development of quantum mechanics and be able to apply this knowledge to solving problems involving small particles.
5. Identify the type of aqueous reaction that is likely to occur between two reactants (precipitation, oxidation-reduction, or acid-base) and predict the products that will form.
6. Use thermodynamics to predict the energy and/or temperature change in a given chemical reaction or phase change.
7. Apply the gas laws to solve a variety of chemical problems.
8. Predict the three dimensional and bonding structures of molecules. Moreover, students will understand how these structures affect various properties and the reactivity of the molecules.
9. Apply the scientific method to their own experiments, be proficient in fundamental laboratory techniques, be able to record relevant laboratory data and observations, be able to analyze their experimental results, and be able to accurately summarize and convey these results to others.

Course Strategy

Reading the text (skim it before the lecture and then read it thoroughly after the lecture), doing all the assigned homework, and coming to class are essential for succeeding in this course. Doing extra problems is especially helpful. The text has a website (Mastering Chemistry) with some self-study resources. If you purchase a new text, you should receive an access code for this site. If you purchase a used text, you can purchase access to this site (~ \$40) at www.mypearsrsonstore.com. I encourage you to form study groups and I can help get these groups together and/or can suggest problems to work on. Don't be afraid to ask questions—there are no stupid questions and I guarantee that someone else has the same questions. In addition to helping you, your questions will help me by making me aware of difficulties that the class is having with the material. Don't hesitate to see me if you're having difficulties!

Lectures

It is important to read your textbook before coming to class or at least skim it over to get a sense what we will be covering. Use the syllabus to find out what will be covered in lecture

and read ahead. After class read the chapter and try some of the problems to practice what you learned that day. If you don't understand something, ask questions during lecture or come see me after class or during my office hours.

Office Hours

If you have questions that cannot be answered in class, would like additional practice problems, would like to talk about the class, or would like to talk about chemistry in general, please see me during my office hours. If the posted times don't work for you, feel free to make an appointment with me for another time or talk to the other General Chemistry professor (Louis Kuo) as appropriate.

Discussion Sections

These sections give you the opportunity to practice what you've been learning in lecture and to challenge your comprehension of the material. **You must register for a discussion and show up.** Students will work in assigned groups to complete a set of problems with help from your group members as well as your instructor. For discussion section, please bring your textbook and calculator.

Laboratory

The lab is an integral part of the course. This is when you get to put into practice what you've been learning. **Plan on attending all your labs as there are no make-ups.** Scheduling conflicts due to athletics or illness must be worked out with your lab instructor as soon as possible, preferably before the lab that will be missed. Read the lab before you arrive! Doing so will likely give you greater experimental success and help you to finish faster. **In order to pass the course, you must pass the laboratory section of the class!**

Moodle

The class moodle page will feature copies of assignments and solutions to homework and discussion problems and practice tests. There will also be links to other sites that you may find interesting as well as class announcements. To access our course Moodle page directly, go to <http://moodle.lclark.edu>. You'll be prompted to login to Moodle - use your L&C login and password (same as for email). Scroll down in the list until you find the chemistry department, click this link and then click on our course/section. Remember, we're section 1. You'll be asked to type in the enrollment key for this Moodle page, which is CHEM110_01. Remember, enrollment keys are case sensitive. Please let me know if you have any difficulty accessing the page.

Academic Honesty

I expect academic honesty. This means homework, labs, and exams should be your own efforts. Discussion about homework assignments and labs is encouraged but the work you turn in should be your own (i.e., it should be in your own words and you should be able to explain it fully if asked). You will be assigned a clicker to use during lecture; do not use another student's clicker and/or take the clicker for a student who is not in class. Cheating will result in failure on the assignment, possible failure of the course, and disciplinary action by the College Honor Board. Please consult the *Pathfinder* for more information on the College's academic integrity policy. If you are having problems come see me!

Classroom Disruption

I expect the classroom to be a comfortable environment for learning and that we support each other as we cover the basics of chemistry. Thus, disruptive class behavior, which is

behavior that in my judgment impedes another student's opportunity to learn or interferes with the class goals, is unacceptable. Should such behavior occur, the student will be asked to leave class and I will refer the matter to the director of Academic Advising. Permission to return to class will be granted only after the student meets with the director of Academic Advising and agrees to stop the disruptive behavior. If the disruptive behavior continues, the student will be dropped from the course.

Academic Accommodations

If you have a disability that may impact your academic performance, you may request accommodations by submitting documentation to the Student Support Services Office in Albany Quadrangle (x7191). That office will notify me of the accommodations for which you are eligible.

Grading

3 "Midterm" Exams	45%
Final	20%
Homework	10%
Discussions	2.5%
In-class activities	2.5%
Laboratory	20%

Midterm Exams

Three one hour midterms will be given in class. The dates for these tests are in the syllabus.

Final Exam

Your final exam is scheduled for Monday, Dec. 16, 1 – 4 pm.

Homework

Homework will be assigned weekly and will be due at the **start** of class each Friday. To be fair to students who hand their homework in at the start of class, papers handed in right after class or later in the day will be accepted with a 5% penalty. Students get one "free pass" (i.e., no penalty) for homework that is less than one day late. Late homework will be accepted up to one week past the due date; homework that is more than one day late will be penalized by 10%. The lowest homework score will be dropped.

Discussions

Students will work in assigned groups during their discussion section. We will change groups mid-way through the semester. Each group should work their way through the problems provided. Solutions will be available during the discussion so that you can check your answers and make sure that you understand the material. Your discussion grade will be based on attendance and participation. If you are late to discussion or leave early (unless you show the instructor that your group has completed all the problems), your grade will be the percentage of the class hour; thus, if you are 10 minutes late, your grade for that discussion will be 83%. We also expect you to participate in discussion; this means that you shouldn't use the time to do homework or study for other classes, text, etc. Your two lowest discussion grades will be

dropped. Since we are dropping the lowest two grades, unless there are extenuating circumstances, absences will count as a 0 (and the grade will presumably be dropped)

In-class activities

Throughout the semester we will have in-class activities of primarily two types: clicker responses and problem-solving based on lecture/reading/viewing material. These activities are intended to encourage you to think about the lecture material during the lecture, to give me a sense for how well the class is learning the material, and to keep track of attendance. Students will receive a score of 100 (for trying) or 0 (for being absent or failing to respond the assignment).

Your lowest two in-class activity grades will be dropped. Since we are dropping the lowest two grades, unless there are extenuating circumstances, absences will count as a 0 (and the grade will presumably be dropped).

Laboratory

Your lab instructor will discuss how to prepare your lab reports and how these will be graded.

In order to pass the course, you must pass the laboratory section of the class!

Tentative Class Schedule

Date	Material Covered	Reading
Wed., Sept. 4	Matter: introduction, basic vocabulary, states of matter, density	1.1 – 1.3, density in 1.4
Fri., Sept. 6	Calculations: units, uncertainty, significant figures, dimensional analysis	1.4 – 1.6
Mon., Sept. 9	Atomic structure	2.1 – 2.4
Wed., Sept. 11	Periodic table, binary compounds,	2.5 – 2.7
Fri., Sept. 13	Formulas and nomenclature	2.8 – 2.9
Mon., Sept. 16	Chemical reactions, moles	3.1 – 3.4
Wed., Sept. 19	Empirical and molecular formulas	3.3, 3.5
Fri., Sept. 20	Stoichiometry	3.6
Mon., Sept. 23	Limiting reactants, percent yields	3.7
Wed., Sept. 25	Solutions, precipitation reactions, ionic equations	4.1 – 4.2
Fri., Sept. 27	Acid-base reactions	4.3
Mon., Sept. 30	Exam 1 (Chapters 1, 2 & 3)	

Wed., Oct. 2	Oxidation-reduction reactions	4.4
Fri., Oct. 4	Concentration, titrations	4.5 – 4.6
Mon., Oct 7	Energy: work and heat, the 1 st law of thermodynamics	5.1 – 5.2
Wed., Oct. 9	Enthalpy	5.3 – 5.4
Fri., Oct. 11	Fall Break – no classes!	
Mon., Oct. 14	Calorimetry	5.5
Wed., Oct. 16	Hess's Law and enthalpies of formation	5.6
Fri., Oct. 18	Light: waves and photons	6.1 – 6.3
Mon., Oct. 21	Wave-particle duality	6.4
Wed., Oct. 23	Quantum numbers and atomic orbitals	6.5 – 6.6
Fri., Oct. 25	Electronic configurations	6.7 – 6.9
Mon., Oct. 28	Exam 2 (Chapters 4, 5, & 6.1-6.4)	
Wed., Oct. 30	The periodic table, revisited, trends in atomic size	7.1 – 7.3
Fri., Nov. 1	Trends in ionization energy and electron affinity; other trends as time allows	7.4 – 7.8
Mon., Nov. 4	Chemical bonds and Lewis structures	8.1 – 8.3
Wed., Nov. 6	Electronegativity and bond polarity	8.4
Fri., Nov. 8	Lewis structures and formal charges, resonance structures	8.5 – 8.6
Mon., Nov. 11	Exceptions to the octet rule, bond strength/length	8.7 – 8.8
Wed., Nov. 13	Molecular shape, VSEPR theory	9.1 – 9.2
Fri., Nov. 15	Polar molecules Valence bond theory	9.3 – 9.4
Mon., Nov. 18	Hybridization	9.5 – 9.6
Wed., Nov. 20	Molecular orbital theory	9.7 – 9.8
Fri., Nov. 22	Exam 3 (Chapters 6.5 – 6.9, 7, 8, 9.1-9.4)	
Mon., Nov. 25	Pressure, $PV = nRT$	10.4 – 10.4
Wed., Nov. 27	Applications of $PV = nRT$, mixtures of gases	10.5 – 10.6
Fri., Nov. 29	Thanksgiving Break	
Mon., Dec. 2	Kinetic Molecular Theory of Gases	10.7 – 10.8
Wed., Dec. 4	Real Gases	10.9

Fri., Dec. 6	Intermolecular Forces	11.1 – 11.2
Mon., Dec. 9	Phase Changes	11.4 – 11.5
Wed., Dec. 11	Phase Diagrams	11.6

Mon., Dec. 16 **Final (1:00 – 4:00 pm)**