

Chemistry 121: Chemical Principles I Block 3, 2019-20

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Office hours for Prof. Strong: I'm usually in my office when we're not in class, and I'll announce office hours each day. Please stop by my office, talk to me after class, or email me to set up a time. I'll be in the classroom each morning at 8:45 to answer questions, and I can usually stay after class as well. Also, I check email at 9-10 pm each evening, and I'm happy to answer questions then. If you are stuck on a problem, asking a question can save you a lot of time and frustration!

Course Description, Objectives, and Meeting Times

Chem 121 begins with a review of some basic ideas about atoms, compounds, and the periodic table. Next, we consider stoichiometry and three major types of chemical reactions. We will deal with atomic structure and the bonds that form between atoms. A discussion of the shapes of molecules leads into the study of forces between molecules.

Learning Objectives (Educational Priorities and Outcomes):

1. Become familiar with introductory concepts of chemical substances and compounds, stoichiometry, chemical reactions, thermochemistry, gas behavior, atomic and molecular structure, chemical bonds, and intermolecular forces (Knowledge, Inquiry)
2. Apply knowledge of chemistry concepts to solve conceptual and practical problems (Inquiry, Reasoning)
3. Develop basic chemistry lab technique, draw conclusions from data, and connect classroom concepts to lab work (Inquiry, Reasoning, Ethical Behavior)
4. Work effectively with others in the classroom and lab and communicate results clearly, both in writing and verbally (Communication, Ethical Behavior)

This course supports the Educational Priorities and Outcomes of Cornell College with emphases on knowledge, inquiry, reasoning, and communication.

Class schedule: Class will meet from 9:00 to 11:00 am and from 12:30 or 1:00 to 3:00 pm every day; see the schedule on the last page. If you have questions about the problem set assignment, come early: we will work on those questions from 8:45 to 9:00. Afternoons will be a mix of lab, class, and problem sessions; please see the attached schedule for more details. Prof. Craig Teague will teach the lab portion of the course.

Course Materials, Assignments, and Grading

Text: Chemistry, by Gilbert, Kirss, Foster, and Davies, 4th edition.

Additional course materials: Lab goggles (UVEX stealth S3960C), a bound lab notebook (composition book), and a scientific calculator are also required.

Problem sets: A problem set will be assigned each day and posted on Moodle. **It is essential that you work the assigned problem set each night.** The details:

- Problem sets will be due two days after they are assigned, at 9:00 am. For example, work Monday's problem set on Monday, ask questions about it (if necessary) on Tuesday, finish it up on Tuesday, and turn it in on Wednesday at the beginning of class.
- I will collect your problem sets and check to see that they are complete, but I will not correct them.
- Answers for many of the questions are in the back of your textbook; I will post the answers to the remaining problems on Moodle. **You are responsible for checking to be sure that your answers are correct.** I will check to see that problems have been completed, but I will not correct them.
- For problems that require more than a very simple calculation, you must show your work.
- Late problem sets will be accepted at any time (until noon on the fourth Wednesday) and counted for half credit.

Grading: Your grade will be based on your scores on the three quizzes, two exams, and the comprehensive final exam, as well as the quality of your lab work, your problem sets, and your participation in in-class group work.

Three quizzes	120 points
Two exams	320
Lab work	200
Problem sets and participation	120
Final exam	<u>240</u>
	1000 points

Grading scale: 930-1000 points = A, 900-920 = A-, 870-890 = B+, 830-860 = B, 800-820 = B-, 770-790 = C+, 730-760 = C, 700-720 = C-, 670-690 = D+, 630-660 = D, 600-620 = D-, <600 = F

Note that the problem set and participation points will add up to more than 120, but I will scale them to 120 points when final grades are calculated. Similarly, lab points will be scaled to 200 points. Prof. Craig Teague will distribute more specific information regarding lab assignments and grading.

Math support: Jessica Johanningmeier, the Quantitative Reasoning Consultant, is available to help with math review, quantitative problem solving, data presentation, and other math-related issues. The Quantitative Reasoning Studio is located just to the left as you enter the library's main entrance (3rd floor).

Materials available on Moodle: This syllabus, problem sets, sample exams, and other course materials are available through the CHE 121 page at moodle.cornellcollege.edu. Please let me know if you have difficulty accessing any of the materials.

Class Policies

Academic Honesty expectations: Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is their work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

I encourage you to work together as you study the material and work the problems. Examples of inappropriate cooperation would be copying from another student's problem set or lab notebook, or sharing information during a test. Please be aware that these actions constitute academic dishonesty and will be handled in accordance with the policies in the student handbook.

Accommodations for learning disabilities: Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Coordinator of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see <http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml>.

Brooke Paulsen, the Coordinator of Academic Support and Advising, can be reached at bpaulsen@cornellcollege, 319-895-4382, or in room 309 of Cole Library.

Health issues: For your safety and the safety of those who will be working with you in the lab, please inform me and the lab instructor if you have a health issue that may be exacerbated by exposure to chemicals. Examples would be severe asthma, severe allergies, seizure disorder, or pregnancy. We will keep this information confidential and work with you to minimize your risk.

Other policies: You must pass the lab in order to pass the course.

I turn off my cell phone when I come to class, and I expect you to do the same. It is not appropriate to text, go online, etc. during class or lab.

A student who wishes to drop the course on the 15th day must have completed all the work for the course and must have attended class faithfully. Since the problem set grade and the lab

grade are based largely on effort, you must have passing grades in these two areas if you wish to drop the class.

Notes on the reading assignments

The following notes are provided to help you focus your reading time on the most important sections of the text. **It is essential that you work through the Sample Exercises and Concept Tests within each chapter** rather than simply reading them. If you have trouble working a Sample Exercise, take as many hints as you need from the solution to help you through it. Then, work the Practice Exercise that follows. For difficult problems, some students find it helpful to go back and re-work the Sample Exercise with the solution covered. Answers to the Practice Exercises and Concept Tests are in the back of the book.

Chapter 1: Matter and Energy. All sections; sample exercises 1-4 and 6-10. If any of the sample exercises are difficult for you, work the practice problems that follow.

Chapter 2: Atoms, Ions, and Molecules. We will be less concerned with sections 6 and 7. Read Sample Exercises 7-12 for practice; you will not be tested on nomenclature. Work Sample Exercises 1-4, 6, and 13.

Chapter 3: Stoichiometry. We will be less concerned with sections 4 and 5, and we will not cover section 8. Work all Sample Exercises except 18 and 19.

Chapter 4: Solution Chemistry. Sections 1-5 and 7-9; in section 9, we will stop after Considering Electron Transfer in Redox Reactions. Sample Exercises 1-5, 7, 8, 11, 12, 15-17, and 22.

Chapter 5: Thermochemistry. Sections 1-7; Sample Exercises 1-10, 12-16, 19.

Chapter 6: Properties of Gases. All sections, but no calculations in sections 8 and 9. Sample Exercises 3-13, 18.

Chapter 7: Quantum model of atoms. All sections; Sample Exercises 1, 2, 4-16.

Chapter 8: Chemical Bonds. All sections, all sample exercises.

Chapter 9: Molecular Geometry. Sections 1-5 and 7; all sample exercises.

Chapter 10: Intermolecular Forces. Sections 1-4; sample exercises 1-5.

	Day	AM (9 - 11)	PM (12:30 unless otherwise noted)
WEEK ONE	M	Introductions Ch 1: Matter and Energy	Lab check-in and safety Math review (1:30)
	T	Ch 1: Matter and Energy Ch 2: Atoms, Ions, and Molecules	Lab: Density and sig figs
	W	Ch 2: Atoms, Ions, and Molecules Ch 3: Stoichiometry	(1:00) Ch 3: Stoichiometry
	Th	Quiz #1 Ch 3: Stoichiometry	Lab: Zinc iodide
	F	Ch 4: Solution Chemistry	(1:00) Ch 4: Solution Chemistry
WEEK TWO	M	Exam #1	(1:00) Ch 5: Thermochemistry
	T	Ch 5: Thermochemistry	Lab: Calorimetry
	W	Ch 6: Gases	Lab: Gases (half of class) Individual meetings -- half of class
	Th	Lab: Gases (half of class) Individual meetings -- half of class	Quiz #2 Ch 7: Quantum model
	F	Ch 7: Quantum model	Lab: Electron configurations
WEEK THREE	M	Exam #2	(1:00) Ch 7: Quantum model
	T	Ch 8: Chemical bonds (1:00)	Lab: Periodic properties
	W	Ch 8: Chemical bonds	(1:00) Ch 9: Molecular geometry
	Th	Quiz #3 Ch 9: Molecular geometry	Lab: Functional groups
	F	Ch 9: Molecular orbital theory	(1:00) Ch 9: Molecular orbital theory
WK 4	M	Ch 10: Intermolecular forces	Lab: Intermolecular forces
	T	Review	(1:00) Study session
	W	Final exam	