**Chemistry 161: Accelerated General Chemistry**

**Block 3, 2018-19**

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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 161 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 and the physical properties of substances and solutions. In the second half of the class, we consider the rates and mechanisms of chemical reactions. We will study qualitative and quantitative aspects of chemical equilibria as applied to gas phase reactions and acid-base reactions. Finally, we will consider thermodynamics and relate thermodynamics to chemical equilibria.

**Learning Objectives (Educational Priorities and Outcomes):**

1. Become familiar with a wide variety of general chemistry concepts, as outlined above (Knowledge)
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. On most days, we will spend part of the time in lab; please wear lab-appropriate clothing and shoes to every class session. Andrea Pionek, the Chemistry Laboratory Instructor, 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.
* We will collect your problem sets and check to see that they are complete, but we 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.** We will check to see that problems have been completed, but we will not correct them.
* For problems that require more than a very simple calculation, you must show your work.
* Partial credit will be assigned for partially completed problem sets.
* 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 240

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 add up to more than 200 but will be scaled to 200 points. Andrea Pionek 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 161 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 her or his 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.** Skim the text and Sample Exercises 1-4 and 5-10. Be sure that the terms in **bold** are familiar to you. If any of the Sample Exercises are unclear, 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 1-7 and 9, except for Determining Concentrations in section 4; in section 9, we will stop after Considering Electron Transfer in Redox Reactions. We will come back to section 6 later in the block. Sample Exercises 1, 2, 4, 5, 7, 8, 11, 12, 15-17, and 22.

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

**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, 5, 8-16.

Reading notes for later chapters will be posted on Moodle.

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|  | **Day** | **Class topics (9:00-11:00)** | **Lab topics (12:30-3:00)** |
| W E E K O N E | M | Ch 1: Matter and energy | Lab safety and check-in |
|  | Ch 2: Atoms, ions, and molecules | Class after lab check-in: Ch 2 |
| T | Ch 3: Stoichiometry | Empirical formula lab |
|  | Ch 4: Solution chemistry |  |
| W | Ch 4: Solution chemistry | Calorimetry lab |
|  | Ch 5: Thermochemistry |  |
| Th | **Quiz #1: Ch 1-4** | **No lab; afternoon class begins at 1:00** |
|  | Ch 5: Thermochemistry | Ch 6: Gases |
| F | Ch 6: Gases | Gas laws lab |
|  | Ch 7: Quantum model of the atom |  |
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| W E E K T W O | M | **Exam #1: Ch 1-6 (morning)** | **No lab; afternoon class begins at 1:00** |
|  |  | Ch 7: Quantum model of the atom |
| T | Ch 7: Quantum model of the atom | Periodic properties lab |
|  | Ch 8: Chemical bonds |  |
| W | Ch 8: Chemical bonds | Functional groups lab |
|  | Ch 9: Molecular geometry |  |
| Th | **Quiz #2: Ch 8** | **No lab; afternoon class begins at 1:00** |
|  | Ch 9: Molecular geometry | Ch 10: Intermolecular forces |
| F | Ch 11: Solutions | Boiling point mini-lab |
|  | Ch 12: Solids | Classification of solids mini-lab |
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| W E E K T H R E E | M | **Exam #2: Ch 7-12 (morning)** | **No lab; afternoon class begins at 1:00** |
|  | Ch 14: Chemical kinetics (1:00) |  |
| T | Ch 14: Chemical kinetics | Kinetics lab |
|  | Pre-lab at 10:30 |  |
| W | Ch 15: Chemical equilibrium | Acid/base titration lab |
|  |  |  |
| Th | **Quiz #3: Ch 14** | **No lab; afternoon class begins at 1:00** |
|  | Ch 15: Chemical equilibrium | Ch 16: Acid/base equilibria |
| F | Ch 16: Acid-base equilibria | Acids and bases mini-lab |
|  |  | Salts mini-lab |
|  |  |  |  |
| W K 4 | M | Ch 16: Acid-base equilibria | Urea lab |
|  | Ch 18: Thermodynamics | Lab check-out |
| T | Ch 18: Thermodynamics | **No lab; afternoon class begins at 1:00** |
|  | Review |  |
| W | **Final exam: All chapters** |  |