# Chemical Principles | CHEM 161

*Spring 2020*

“We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard; because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to win.”

-John F. Kennedy, Rice University, 1962

### Instructors. Christopher B. Durr Stephen Cartier Richmond Ampiah-Bonney

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### Course Information. *Lecture* MWF *SC E110* 9:00 A – 9:50 A

*Discussion (01)* F *SC E212* 1:00 P – 1:50 P *Discussion (02)* F *SC E208* 1:00 P – 1:50 P *Discussion (03)* F *SC E212* 2:00 P – 2:50 P *Discussion (04)* F *SC E208* 2:00 P – 2:50 P *Discussion (05)* F *SC E212* 3:00 P – 3:50 P

### Additional Resources.

*Laboratory (01)* M *SC B117* 2:00 P – 5:00 P *Laboratory (02)* T *SC B117* 8:00 A – 11:00 A *Laboratory (03)* T *SC B117* 2:30 P – 5:30 P *Laboratory (04)* W *SC B117* 2:00 P – 5:00 P *Laboratory (05)* R *SC B117* 8:00 A – 11:00 A *Laboratory (06)* R *SC B117* 2:30 P – 5:30 P

* Lecture TA: Jonah Horowitz, Office Hours: TBD
* Dr. Innes: Moss Quantitative Center, SC D109, Office Hours: M – R 1 – 3 P jbinnes@amherst.edu. Individual appointments available online.

### Course Websites.

* Lecture handouts, and additional resources will be posted on **Moodle**.
* Daily online assignments will be posted on **Sapling Learning system.** The cost is covered by the department. *Instructions for registering are posted on Moodle*. Access code: ***cartier***

### Required Text.

**S. S. Zumdahl and D. J. DeCoste, Chemical Principles, 8th ed. (Brooks/Cole, 2015); ISBN-13: 978-1-305-58198-2** (same book used for 151/155) Copies of the textbook as well as a Study Guide are on reserve in Keefe Science Library. We recommend that you buy a used textbook. *It is acceptable to use the 5th, 6th, or 7th edition of Chemical Principles*, which were used at Amherst College in the not-too-distant past.

### Course Overview.

Introductory chemistry is the *foundation* of everything around us. Cancer therapies, smart phones, the human brain, coffee, art – anything with molecules falls into the study of chemistry. Chemistry embodies the spirit of a liberal arts education, because it concerns itself with everything and as a result *there is something in it for everyone*. (Yes, even you.)

In this course, we will begin to understand how the fundamentals you learned in CHEM151/155 can be applied to chemical reactions. Can we understand what’s happening at the microscopic level by observing macroscopic phenomenon? Can we predict whether a reaction will happen spontaneously? By coupling lecture and discussion with laboratory work you will get both fundamental and practical experience in answering these questions – giving you an invaluable set of skills to better understand the world around you.

### Course Philosophy.

You should think of the class as a team, all working towards the same goal. This will require participation from all students both inside and outside of class. Does a topic come easily to you? Try teaching a classmate who’s struggling. Teaching will help reinforce the concept for you, and hearing a topic explained in a different way, from a peer, will help the student who is struggling. Can’t wrap your head around something? **Come to office hours**, **ask questions**, **practice**. We believe every single student in this class can master the material if they put in the work and aren’t afraid to admit when they need help.

To reinforce this cooperative learning community students will take an active role in lectures, discussion sections, and labs. Research on learning and memory demonstrates that for many students, learning is enhanced when they are challenged to use their existing knowledge to consider concepts and problems **before** being given detailed explanations and solutions. This primes students to then receive the new information so that it connects more directly to their existing framework of knowledge. In addition, some studies suggest that **making mistakes and persisting through confusion** during the learning process engages regions of the brain that are associated with long- term learning to a greater extent than passively listening to a clear presentation. Finally, students are more receptive to being challenged and taking the risks necessary for such active-learning in supportive environments where **all are respected and the focus is on learning and working cooperatively instead of performance**. In service of these goals, the course will focus on the depth and quality of learning, not quantity.

### Class Expectations.

This class will strive to be an inclusive community, learning from the many perspectives that come from having differing backgrounds and beliefs. As a class community, we will aim to be respectful to all, regardless of ability, race, ethnicity, religion, gender expression, sexual orientation, economic circumstances, etc. We expect that all class participants, faculty, staff, and students, will create an environment that facilitates inquiry and self-expression, while also understanding and respecting how others' viewpoints may be different from our own.

### Equal Access.

Each of you is an important and valued member of this class. If you have a documented disability that requires accommodations, we will do everything we can to make sure that you have what you need to learn and succeed. College policy requires that you register with Accessibility Services for coordination of your academic accommodations. You can reach them via email at accessibility@amherst.edu, or via phone at 413-542-2337. Once you have your accommodations in place, Dr. Durr will be glad to meet with you privately during his office hours or at another agreed upon time to discuss the best implementation of your accommodations. We understand that some students might have reservations coming to us about accommodations, that professors will “judge” or “think less of” students that get the help they need, please believe us when we say that is ***NOT*** the case in this class.

### Image of Bloom's TaxonomyCourse Design.

We have designed the components of CHEM 161 to enhance the development of critical thinking skills and mastery of chemistry through scaffolding learning activities and assessments that support progress up the levels of Bloom’s revised taxonomy of learning:

### Studying.

If you ask more seasoned STEM students: what do you wish you knew as a first-year that you know now? Many of them will answer: how to study. Now is the time to be honest with yourself – do you know how to study for a class like CHEM 161? If the answer is ‘Yes’ that’s great to hear, if the answer is

‘No’ don’t be discouraged, you’re in good company. Learning how to study is an investment of your time, not just for this class, but for *all* classes. The faster you learn what works for you the better off you’ll be. We are absolutely here to help, but we can’t tell you what to do, not because don’t want to, but because everyone learns and studies differently. *Use your resources*, the Q-Center, your TA’s, the book, the internet, all can be helpful in discovering how you can best master the material.

### Office Hours.

Come to office hours if you want to do better in the class. It’s really that simple. Ask any professor you want, they will tell you that the students who routinely come to office hours have more confidence and mastery over the material. In office hours, we have the time to better understand what style of learning works best for *you*. We can troubleshoot your specific issues and give you strategies to overcome them. We would love to see each and every one of you at an office hour every week. Here are the most common reasons we hear students don’t come to office hours and what we have to say about them:

### I can’t make the office hours you have scheduled.

We completely understand that. You’re busy and scheduling can be a nightmare. Between classes, labs, extracurriculars, having a social life, eating and sleeping, it can be hard to make it to an office hour set in stone. We try to help by setting a diverse schedule of office hours. Between Drs. Durr, Cartier, Ampiah-Bonney, Innes and the class TA we have 18+ different hours you can attend each week, *BUT* if none of those work you can *still* email one of us and we can set up a time. It’s really not a big deal, we do it all the time.

### I’m intimidated by office hours.

We’re sorry to hear that’s been your experience in the past, but it doesn’t have to be your experience in this class. Remember, we honestly and truly *want* you to show up. Office hours give us a chance to teach, and *teaching is what we’re here for*.

### Office hours don’t help.

We respectfully disagree. If office hours aren’t working for you, *please* let us know. We may just need to adapt our strategy to ensure we’re addressing how you learn. We can pull resources from all over the College to make office hours as effective as possible.

### Course expectations for students.

* Approach course material and activities with curiosity, openness, and trust that instructors have designed this semester to support the learning of all students
* Engage in problem-solving activities that require persistence to move from necessary confusion to hard-won (and lasting) insight and learning
* Approach challenges with the attitude of: "let me review my tools and make some attempts to tackle this" instead of "I have no idea how to do this" or "how am I supposed to know this?"
* Visit office hours to get to know the instructors and other students, to ask questions and test your understanding by discussing the material, and to work with us to figure out how you can best learn chemistry
* Actively engage in class activities, including: having your phone turned off, taking notes, using the clickers, sharing ideas with your neighbor and the larger class
* Work in groups, including: sometimes meeting outside of class hours, continuing a discussion assignment, reflecting on your contributions and those of your partners, testing your understanding by helping others
* Put in 6-8 hours work per week outside of class, including: reading and taking notes on the textbook, reviewing lecture handouts and writing their own study guides, completing daily online Sapling assignments and written assignments, preparing for labs and completing lab reports.
* Regularly check the moodle site for resources and to take personal responsibility for meeting deadlines.
* Embrace the fact that you’re not perfect. You’ll make mistakes in this class, and that’s okay.

### Course Expectations for Professors.

* Approach course material and activities with curiosity and openness, and trust that students have done all they can to support their own learning objectives.
* Come to class organized, enthusiastic and prepared.
* Return graded work in as promptly as possible. If you’re responsible for meeting deadlines, then we should be too.
* Be patient and understanding when students don’t understand a concept.
* Regularly update Moodle and google calendar sites with resources to better help students engage the material.
* Embrace the fact that we’re not perfect. We’ll make mistakes in this class, and that’s okay.

### Clickers.

Lecture will occasionally incorporate clicker questions. You must pick up clickers before class on Monday, February 3rd. They must be picked up from Seeley Mudd 110. Please see attached instructions.

### To Enroll in Sapling Learning.

We will notify you when instructions are posted to the moodle website.

### Intellectual Responsibility.

Students enrolled in Chemistry 161 are expected to abide by the Amherst College Statement of Intellectual Responsibility (*Statement of Intellectual Responsibility*, *Statement of Respect for Persons*, and *Statement of Freedom of Expression and Dissent*: https://[www.amherst.edu/65945)](http://www.amherst.edu/65945%29) All questions, answers and comments in class and in the online forum must show respect for your classmates and instructor. In addition, particular attention should be paid to the statement, “…the College considers it a violation of intellectual responsibility to submit work that is not one’s own or otherwise to subvert the conditions under which academic work is performed by oneself or by others.” The specific implications of the statement for Chemistry 161 are:

1. **Laboratory work:** Many experiments are done with a partner, and you are encouraged to discuss experimental design and interpretation with your classmates. However, the data you record and the written reports you submit must be your own. Copying or paraphrasing of others’ lab reports, or using data that does not appear in your own lab notebook, constitutes a violation of the code of intellectual responsibility. If you have collaborated in obtaining data, you must acknowledge the collaboration in your report. If you have used data other than your own, the source of the data should be indicated.
2. **Assignments:** You are encouraged to discuss the problems with your classmates. However, when your discussions are over, you are expected to be able to work through all problems by yourself. The solutions that you submit should represent your understanding of the problems.
3. **Quizzes and exams:** Giving or receiving assistance during a quiz or exam is dishonest; the use of a smartphone or other networkable electronic device may be construed as “giving or receiving assistance” and thus their use in any capacity is not permitted. All work submitted must be one’s own. This policy applies to regularly scheduled quizzes and exams, make-up quizzes and exams, and any subsequent discussion concerning them.

# Course Components

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|  | **Activity** | **Points****(100)** | **Due (subject to****change)** | **Purpose** | **Format** | **Notes** |
| **Learning Evaluation** | **Quizzes** | 20 | In discussion 2/14, 4/3 | Individually, practice higher level problems in an exam-like setting | 25 minutes to individually work exam level problems | All required. Can rework Quiz to score up to 80% |
| **In-Term Exams** | 30 | 3/5, 4/23 | Demonstrate mastery and ability to apply and synthesize concepts in new ways | 2 hr evening exam (7-9 PM) | All required. |
| **Final Exam** | 15 | Finals period, TBD | 3 hours during finals | Required to pass |
| **earning Enhancement & Assessment** | **Lab** | 15 | Prelab due at beginning, lab report 1 week later | Prepare for and summarize lab | Plan procedure, make observations, record data, perform analysis, answer discussion questions | Completion of all labs & submission of all reports required to pass |
| **Weekly Homework** | 7.5 | Every Friday in Discussion | Working more complex mathematical questions by hand. | Assigned from the book. | Lowest score will be dropped |
| **Daily Online Sapling** | 5 | Before each lecture | Practice the basics required to develop understanding of concepts | Plan on 1 hour reading & 20-30 min to complete | 3 Lowest score will be dropped |
| primed for class by reading ahead | ~5 Conceptual Questions |
| **Active Engagement** | 7.5 | Every class, discussion, one-minute papers, occasional pre- or post- class work | Apply concepts, strategize problem solving, explain understanding, interpret and discuss data | Discuss with neighbor and report to class, submit clicker questions | Regular attendance, positive attitude, respectful behavior |
| Practice working together | Help others during lab, office hours, discussion, work problems on dry erase boards | No texting or cell phone use |
| Learn from mistakes, experiment with different learning approaches, develop your own framework for chemistry and for learning college- level science | utility value writing, exam- wrappers, meetings with instructors | Ask & answer questions, communicate productively with classmates |

**Typical Office Hour Schedule**

## Time 10 AM

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|  |  |  | Cartier10 AM – 12 PM A210 |  |  |
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|  |  |  |  |  |  |
|  | Innes1 – 3 PM D109 | Innes1 – 3 PM D109 |  | Innes1 – 3 PM D109 |  |
| Ampiah-Bonney1:30 – 3:30 PM |
|  |  |
|  |  | Durr3 – 5 PM E208 | Durr3 – 5 PM E208 |  |  |
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| Ampiah-Bonney4:30 – 5:30 PM |
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| Cartier7 – 9 PM A210 |  |  |  |  |  |
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1. AM
2. AM
3. PM
4. PM
5. PM
6. PM
7. PM
8. PM
9. PM
10. PM

Sunday Monday Tuesday Wednesday Thursday Friday