# CHEM 201: General Chemistry I (Lecture & Lab)

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Summer 2019

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| E-mail | mkahveci@roosevelt.edu | Web | blackboard.roosevelt.edu |
| Office | SCH 600 | Office Hrs | M Tu W Th 12:30–12:45 pm |
| Lecture | M Tu W Th 10 am–12:15 pm | Room | SCH 612 |
| Lab | M W 1–4 pm | Room | SCH 552 |
| Discussion | Tu Th 1–2:30 PM | Room | SCH 612 |

**Last Updated: 6/4/19**

## Course Description

This is the first semester of Roosevelt University's introductory chemistry series (CHEM 201,202). We will cover a range of topics including chemical formulas and equations, acids and bases, oxidation/reduction reactions, thermochemistry, atomic and molecular theory. The concepts learned in this course will be relevant to future studies in all areas of chemistry (e.g., biochemistry, organic, inorganic, physical, environmental, materials, and medicinal chemistry).

## Prerequisites

College Algebra (MATH 121 or equivalent), $C-$ or better. High school chemistry is helpful but not required.

## Co-requisite

Must simultaneously enroll in CHEM 201-10B, General Chemistry I Laboratory.

## Required Equipment

### Lecture

**Scientific calculator.** Bring to lecture, discussion & lab. Graphing calculators are encouraged but not required. A calculator is needed for midterm/final exams; no phones or other devices allowed.

### Laboratory

**Safety goggles.** Available in RU bookstore. Goggles are required. Standard eyeglasses or side-shield safety glasses are not acceptable.

**Lab coat.** Available in RU bookstore. Cloth coat required.

**Scientific calculator.** Bring to lecture, discussion & lab. Graphic calculators are encouraged but not required.

**Text.** Roosevelt University General Chemistry I Laboratory Manual. Available in RU bookstore and at Blackboard.

## Course Materials

### Lecture

**Text**
- Chemistry and Chemical Reactivity, 9th edition, Kotz, Treichel & Townsend, 2012. ISBN10: 1-133-94964-9; ISBN13: 978-1-133-94964-0.
- Please do not use an edition prior to the 8th edition.
- Both new and used copies are available from the RU Bookstore or through online retailers. The RU bookstore carries a soft cover edition for reduced price.

**Suggested**
- Student Solutions Manual to accompany Kotz & Treichel's Chemistry and Chemical Reactivity (available from the RU Bookstore or online sources).
- ACS General Chemistry Exam study guide; available from the ACS Examinations Institute: http://uwm.edu/acs-exams/students/student-study-materials/

**Additional.**
- Further readings and materials may be posted on Blackboard as needed.
- Check the Blackboard site regularly for announcements, labs, homework, quiz keys, etc.
- For your convenience, the lab manual will be available at the Blackboard website.

### Laboratory

Laboratory materials ancillary to the laboratory manual will be posted to Blackboard no later than 7 days prior to the upcoming lab. It is your responsibility to print and bring copies of all needed materials to lab. Students lacking the lab text, including completed pre-lab assignment, laboratory procedure, data pages and post-lab pages will not be admitted to laboratory.

## Chemistry Demystified

Chemistry is a special, unique branch of science that requires the learning of a symbolic language (akin to learning Hieroglyphics, Mandarin or Japanese) as much as learning and applying fundamental science concepts. Chemistry is all around us, yet we are incapable of observing it in its simplest, purest form. Therefore, learning chemistry requires students to build physical and mental abstract models of what scientist have come to understand about atomic and molecular structure based on supported theories. Furthermore, students must trust those models to make informed analytical decisions to solve problems. Chemical laws, rules, principles we use to build our models are dynamic and not concrete, and serve as fluid, general guides for effective inductive reasoning of a given scenario. Chemistry principles can't be applied universally and therefore can't be solely memorized. The true beauty of chemistry lies within the exceptions to the rule that makes up an expansive grey area. Chemistry exists as a separate branch of science, because the concepts can't be directly applied to all situations, but that every chemical system is unique and the expansive grey area continues to surprise and amaze as new systems are discovered. Chemistry is continually evolving. If the principles of chemistry could be applied universally, then chemistry would not exist as a separate branch of science, rather it would be a subtopic of physics. Therefore, to succeed, we must embrace and accept the unique subtleties inherent in the material, and have faith in our own understanding to unleash the secrets of each new chemical system. With guidance and coaching, students will not only learn the fundamentals, but acquire strong working knowledge. Couple this with fortified inductive reasoning skills, students will be able to synthesize and apply their own higher understanding to new situations and truly embrace this wonderful science. Your approach to the subject should be the same as you would approach sports, a craft, or skill, practice, practice, practice. "We learn more from our failures, than we do our successes" (author unknown)

## Teaching Philosophy

As your instructor, I strive to provide an accessible and safe environment in which you are unhindered in your ability to learn and express your ideas. While doing so, I will present material in multiple ways in order to address all learning types. We will make use of visual aids, examples, and problem solving sessions, to guide you toward unlocking the secrets of general chemistry. Ultimately, I want you to think of me as your Sherpa on the journey to unlocking your potential and reaching your goals. I will show you the way to de-compartmentalize concepts forging strong connections to create a higher understanding that can be applied to new situations. I will guide and coach you on how to embrace the uncertainty that is inherent in chemistry to support your journey toward becoming a master problem solver. Above all, I will engage and challenge you to reach your highest potential. I will encourage you to reach deep and push past the fundamental understanding and help you to synthesize your own working knowledge. I will be your coach as you work toward creating strong inductive reasoning and problem solving skills that you can apply to this course and beyond in your career and personal life.

> "Whether you believe you can or can't succeed, you are right" - Henry Ford

## RU's Learning Goals

The University's three overall learning goals for undergraduate students are:

- Effective communication.
- Knowledge of discipline-focused content.
- Awareness of social justice and engagement in civic life.

## Course Expectations

- It is imperative that you utilize 2-3 hours outside of class for practice for every hour you spend in class and lab. To succeed in this course, you should put in 12-15 hours outside of class, every week, for reading, homework, pre-labs, lab reports, and study. This is not an exaggeration!
- Read the assigned sections before coming to class. As you read, take notes. Use these notes to supplement your notes in class. Lecture follows the text closely, so use your book as a resource.
- Do your reading and homework regularly to ensure that you understand and can apply the material. Start your homework as soon as we begin a new chapter. Later sections of the chapter will make more sense if you have already begun to digest earlier portions of the chapter.
- Remember to learn effectively, we must process new information effectively through use of as many senses as possible to create strong recall. To process new information into long term working knowledge: you need to see it, write it, speak it and connect it to prior knowledge.
- This course contains a lot of material, some of it difficult, and moves at a rapid pace. You may find it helpful to study with a friend or in a study group in order to help each other process the information mire effectively as described in the latter point. Do your best amongst yourselves first, but please do not hesitate to come to my office hours, schedule additional hours, or contact me by email or phone if you become stuck and frustrated.

## Laboratory Expectations

You will be assigned 10 (ten) lab experiments, scheduled as shown on the attached lecture-laboratory schedule. For each experiment, a completed pre-lab assignment must be shown for admittance to the laboratory. During lab, complete the data sheets and questions using the forms in your laboratory text using a permanent (ink) pen. Completed labs including pre-lab, workup, and post-lab questions are

due as posted. However, if you come prepared and work efficiently, you should be able to complete the majority of labs and their associated calculations and post-lab questions sheets entirely within the scheduled lab period.

- Dress appropriately for the lab, i.e., no shorts, above-the-knee skirts, skin tight pants (including leggings or yoga pants), open-toe shoes, hats, or loose long hair. Eye protection and appropriate clothing are required at all times. "Loaner" equipment including shoe coverings and lab coats are available for a fee. If you have not come prepared to work safely, you will be asked to leave.
- You must complete the pre-lab before lab, and make it available for checking off (initialing) by the instructor or teaching assistant at the beginning of lab. Pre-labs handed in as part of the final lab report without this initialing will not be counted, so you will lose 10 – 20% of the lab report grade.
- All calculations in lab sheets should clearly show units of input data and intermediate quantities as well as units of the final calculated values.
- Reports, weighted equally, are due in lab one week after the lab was completed. The lab report must include the completed pre-lab as well as any post-lab questions as well as your data. Late lab reports are penalized at 20% per day, and will not be accepted more than 3 days after the due date.
- You will work in pairs during the lab; in certain cases due to equipment limitations, you may work in small groups (3 – 4 students). Each group is expected to complete and turn in their own pre-lab and lab reports. If two separate groups are found handing in line-by-line identical or nearly-identical lab reports, both groups will receive a zero on that report. No credit will be given for plagiarized work.
- All students will be required, when applicable, to plot their data using MS Excel on their own. You may choose to bring your computer to lab. We will also have laptops available in lab for you to use as well.
- All assigned experiments can be completed within the assigned time if you come prepared, begin immediately, and work efficiently. If you fail to complete an experiment, you will receive partial credit for writing up what you have. Don't expect your instructor or teaching assistant to stay late so you can finish up; this is especially the case for our late evening time slot.

**There are no make-up labs.** If you miss your regular lab due to an unexcused absence, you may not make up the lab later or in another lab section, and your grade on that lab will be zero. If you must miss lab for a valid reason, then contact your instructor ahead (phone, phone message, email message) with the reason you expect to be absent in order to determine whether the absence would be excused.

## Evaluation

Progress in the course will be monitored by in-class and/or online quizzes (short answer/essay, multiple choice, or calculations), class activities (attendance and participation in in- class problem solving), problem sets, two midterms, laboratory, and a final exam. Science majors must earn a $C-$ or better to apply the course to their major. Science majors receiving a grade of $D+$ or lower must repeat the entire course, including lecture and lab.

***A single grade will be issued for both the lecture and the lab, where the lab score constitutes 25% of the overall course grade. i.e., You will get the exact same grade for CHEM 201-10A and for CHEM 201-10B or C, based on the scale below, regardless of whether you did better in lab than in lecture or vice versa.***

| | Weight |
|---|---|
| Midterm Exams | 20.0% |
| Final Exam | 25.0% |
| Quizzes (1 drops) | 15.0% |
| Assignments (1 drops) | 15.0% |
| Laboratory | 25.0% |

Letter grades will be assigned based on the following lower thresholds (3 significant figures used).

| A | | B | | C | | D | | F | |
|---|---|---|---|---|---|---|---|---|---|
| | Threshold | | Threshold | | Threshold | | Threshold | | Threshold |
| $A$ | $\geq 93.0\%$ | $B+$ | $\geq 87.0\%$ | $C+$ | $\geq 77.0\%$ | $D+$ | $\geq 67.0\%$ | $F$ | $\geq 0.0\%$ |
| $A-$ | $\geq 90.0\%$ | $B$ | $\geq 83.0\%$ | $C$ | $\geq 73.0\%$ | $D$ | $\geq 63.0\%$ | | |
| | | $B-$ | $\geq 80.0\%$ | $C-$ | $\geq 70.0\%$ | $D-$ | $\geq 60.0\%$ | | |

### Homework

Homework assignments are due one week after the completion of the chapter, unless there is a conflict with an exams or holiday. All tentative homework due dates can be found on the "Tentative Lecture Schedule". Late homework assignments will be penalized 20% for each day late.

### Quizzes

Quizzes will cover material from the previous lecture topic and will typically occur the next discussion after the homework due date. Quizzes are not allowed to be reattempted. Late or missed quizzes will earn a zero and will count as one of the dropped quizzes.

### Mid-term Exams

Two mid-term exams will be given, both in class. For mid-term exams, you will be given a Periodic Table and any equations or physical constants you are not required to memorize for use during in-class midterms. Mid-term exams are utilized in this course as both an assessment tool as well as a learning tool. As the course builds upon itself continuously, it is imperative that a solid foundation is attained.

### Final Exam

Final exam will be given in class. It will be cumulative, which all topics are included.

### Make-up Policy

***There are no make-up quizzes or exams***. If you miss a quiz or exam due to an unexcused absence (or due to academic dishonesty, see below), you may not make it up and your grade on that quiz or exam will be zero. In the case of excusable absences, provide documentation before class; in case of emergencies, provide documentation as soon as possible after a missed class; generally, emergencies must be verified, such as with a nurse or physician's note. Your grade will be pro-rated based on the class and your performance on other quizzes and exams.

## Lecture Policies

- Bring your text, a calculator, and note-taking materials to every class (a computer may also be helpful). This is important because we will sometimes need calculators and books for group work. I will not supply "loaner" calculators–you must bring your own.
- Please do not hesitate to raise your hand and ask questions during lecture if you are unclear on some point.

- Please turn all cell phones to vibrate before class. No texting or iPods allowed. If I see you texting or watching videos I will give you one warning before asking you to leave the class. While it is appropriate to use laptop computers to take notes or follow along with posted lecture notes, surfing the web is inappropriate. It distracts other students and is rude. If I see you doing this, I will ask you to stop, or if necessary, to leave.
- Please do not do homework or work on lab reports during lecture. This work should be done out of class, in lab, or sometimes in time set aside during discussion section.
- Quiz keys and exam keys will be posted on the BlackBoard site.
- You are responsible for checking your e-mail and BlackBoard daily. Class email communications will be sent to your student@mail.roosevelt.edu account.

## Tentative Schedule

| Week | Day | Date | Course Overview | Discussion/Lab | HW Due |
|---|---|---|---|---|---|
| 1 | Tu | 28-May | Lecture 1 | Safety, Check-in | |
| | W | 29-May | Lecture 2, 3 | Lab 1 | |
| | Th | 30-May | Lecture 4, 5 | Quiz 1 (§1) | HW 1 (§1) |
| 2 | M | 3-Jun | Lecture 6, 7 | Lab 3 | |
| | Tu | 4-Jun | Lecture 8, 9 | Quiz 2 (§2) | HW 2 (§2) |
| | W | 5-Jun | Lecture 10, 11 | Lab 4 | |
| | Th | 6-Jun | Lecture 12, 13 | Quiz 3 (§6, §7) | HW 3 (§6, §7) |
| 3 | M | 10-Jun | Lecture 14, 15 | Lab 8 | |
| | Tu | 11-Jun | Mid-Term Exam 1 | | |
| | W | 12-Jun | Lecture 16, 17 | Lab 9 | |
| | Th | 13-Jun | Lecture 18, 19 | Quiz 4 (§8, §9) | HW 4 (§8) |
| 4 | M | 17-Jun | Lecture 20, 21 | Lab 10 | |
| | Tu | 18-Jun | Lecture 22 | Quiz 5 (§3, §4) | |
| | W | 19-Jun | Lecture 23 | Lab 5 | |
| | Th | 20-Jun | Lecture 24 | | HW 5 (§9, §3, §4) |
| 5 | M | 24-Jun | Lecture 25, 26 | Lab 6 | |
| | Tu | 25-Jun | Mid-Term Exam 2 | | |
| | W | 26-Jun | Lecture 27 | Lab 7 | HW 6 (§5, §11, §12) |
| | Th | 27-Jun | Review | Quiz 6 (§5, §11, §12) | |
| 6 | M | 1-Jul | Final Exam | | |

***Changes to this syllabus may be made when deemed appropriate.***

### Lecture Content

| | Topic |
|---|---|
| Lecture 1, 2 | Introduction / §1 – Basic Concepts |
| Lecture 3, 4, 5 | §2 Atoms, Molecules, and Ions |
| Lecture 6, 7, 8 | §6 The Structure of Atoms |
| Lecture 9, 10, 11 | §7 Atomic Structure and Period Trends |
| Lecture 12, 13, 14 | §8 Bonding and Molecular Structure |
| Lecture 15, 16 | §9 Orbital Hybridization and Molecular Orbitals |
| Lecture 17, 18 | §3 Chemical Reactions |
| Lecture 19, 20 | §4 Stoichiometry |
| Lecture 21, 22, 23 | §5 Principles of Chemical Reactivity |
| Lecture 24, 25 | §11 Gases and Their Properties |
| Lecture 26, 27 | §12 Intermolecular Forces and Liquids |

### Laboratory Content

| | Experiment | Lab Date | Report Due |
|---|---|---|---|
| Lab 1 | Densities of Plastics and Solutions | 29-May | 30-May |
| Lab 3 | The Empirical Formula of an Oxide | 3-Jun | 4-Jun |
| Lab 4 | The Thermal Decomposition of a Hydrate | 5-Jun | 6-Jun |
| Lab 8 | Atomic Emission Spectra | 10-Jun | 11-Jun |
| Lab 9 | Absorption Spectrum of Cobalt(II) Chloride | 12-Jun | 13-Jun |
| Lab 10 | Geometrical Structures of Molecules | 17-Jun | 18-Jun |
| Lab 5 | Chemical Reactions | 19-Jun | 20-Jun |
| Lab 6 | Determination of the Acid Content in Vinegar | 24-Jun | 25-Jun |
| Lab 7 | Thermochemistry and Hess's Law | 26-Jun | 27-Jun |

***Reports are due at the following discussion hour. You may ask questions and finalize the reports before the session ends.***

## Policies

### Academic dishonesty

The university's policies on issues such as plagiarism, recycling, cheating and other forms of academic dishonesty can be found in the undergraduate catalog at
http://catalog.roosevelt.edu/undergraduate/policies/academic-integrity-policy
and the graduate catalog at
http://catalog.roosevelt.edu/graduate/policies/academic-integrity
Additional guidelines for avoiding plagiarism are available here:
https://www.roosevelt.edu/current-students/academics/academic-integrity.

### Disability

Roosevelt University complies fully with the Americans with Disabilities Act. Details about ADA and Roosevelt's policies and practices are found in the following link:
https://www.roosevelt.edu/student-experience/disability-services.
If you have a condition or disability that requires reasonable accommodation, please alert your instructor or the Academic Success Center as soon as possible, certainly before any assignment or classroom activity that requires accommodation. The Academic Success Center is located in AUD1050 (inside the Library) in Chicago, and the phone number is 312-341-3818. In Schaumburg, the office is in room 125, and the phone number is 847-619-7978. Email Adam Wouk or Danielle Smith at dsmith51@roosevelt.edu.

### Withdrawal/Incomplete Grades Rules

### Incomplete (I)

A grade of Incomplete may be given only with the consent of the instructor and appropriate notification to the registrar. An Incomplete grade specifies to the student and to the registrar that only a small portion of the total semester's work needs to be completed (e.g., the student must take a final examination, complete a paper, or similar requirements), that the student is academically able to complete the work, and that the student has presented a satisfactory reason to the instructor for not completing the work within the deadline of the regular semester. Students must complete the course requirements prior to the end of the following term. A student may also be given an extension of an Incomplete due to extraordinary circumstances, for example if the instructor will not be available during the following semester to ensure that the work is completed. Under such circumstances, the instructor will submit an extension date in writing to the registrar. The Incomplete grade will be removed when the instructor submits a letter grade evaluating academic progress (A, B, C, D, P,

F) within the above deadline. If no grade is submitted and no extension granted, the registrar will automatically convert the Incomplete grade on the deadline date to the default grade (B, C, D, or F) submitted by the faculty member at the time of granting the original Incomplete grade.

### Withdrawal (W)

The final date for an official withdrawal from this class (meaning a "W" would appear on your transcript) is 6/17/19. In order to withdraw after that date, you must petition for a late withdraw with the registrar. Petitions are granted only for non-academic reasons after the deadline. You should consult your academic advisor if you are considering withdrawing from a course. If you receive financial aid, also check with your financial aid counselor to assure that aid isn't affected by withdrawing from a class. The complete withdrawal policy is here: https://www.roosevelt.edu/current-students/academics/register-classes.

### Religious holidays

Roosevelt University policy requires written notification to the instructor within the first two weeks of the term. Any work you miss because of a religious holiday can be made up. You can see the full policy here: https://www.roosevelt.edu/policies/religious-holidays.

### Student code of conduct

Students enrolled in the university are expected to conduct themselves in a manner compatible with the university's function as an educational institution.
https://www.roosevelt.edu/current-students

### Title IX

Roosevelt University cares greatly about the health and well-being of our students, staff, faculty, and guests to our campuses. Federal law, specifically Title IX, and the University Sexual Misconduct Policy require that all employees are mandated reporters of incidents involving sexual or gender-based violence or harassment.

Disclosures made to faculty or teaching assistants (TAs) about sexual or gender-based harassment, sexual assault, dating violence, domestic violence, and/or stalking on or off campus must be forwarded to the Title IX Coordinator. The above listed staff are Responsible Employees and therefore are mandated to report. The Title IX office will contact any student who discloses an incident regarding student rights, including the option to request an investigation, interim safety measures, and/or academic accommodations. In certain circumstances, the Title IX Coordinator may need to proceed with an investigation, even if none is requested, if there are safety risks to the student or campus community. Participation in the process is voluntary.

If you want a confidential place to disclose sexual assault, sexual harassment or intimate partner violence, there are two confidential advisors on campus who are not mandated reporters. They are: Audrey Guy (312)244-0577, LaDonna Long (312)244-0426. Both are available via phone all hours. The Counseling Center (430 S. Michigan Avenue Room 470 Phone: 312-341-3548) staff are also NOT mandatory reporters and therefore not required to report a disclosure to the Title IX Office.