

## GENERAL CHEMISTRY I, CHEM 2060—FALL 2023

**Instructor:** Professor Terry Dowd e-mail: [TDowd@brooklyn.cuny.edu](mailto:TDowd@brooklyn.cuny.edu) **Office:** Rm 2157F Old Ingersoll  
**Office Hours:** Tues. 6:50-7:50 PM, Wed. 12:30-2:30

**REQUIRED TEXTS:** *Chemistry 2e*, P. Flowers, OpenStax, 2019

*This text is available as a free PDF at <https://openstax.org/details/books/chemistry>*

*It is also available free for Kindle at <http://www.amazon.com>*

*You can order a hard copy through <https://brooklyn.textbookx.com/adm/> or from <http://www.amazon.com> – but you can always print chapters from the PDF.*

**REQUIRED ITEMS** Scientific calculator

**PRE-/CO-REQUISITE REQUIREMENT:** You must be registered for Chem 1201 laboratory if you have not already completed it. You will not be permitted to take additional Chemistry courses if you do not complete the laboratory. ALSO Pre-calculus is required for Chem 2200/2201. If you intend to take those courses next, you must complete either Math 1011 or Math 1012, or be placed into a more advanced Math course (see Math Department for placement).

Learning Objectives for Chemistry 2060

Upon completion of this course, students should:

- Understand the basic physical principles underlying chemistry and be able to apply them both to qualitatively explaining phenomena and quantitatively predicting or interpreting outcomes.
- Understand and be able to explain fundamental ideas such as electron configuration, ionic and covalent bonding, predicting molecular shapes, properties of ideal gases, noncovalent interactions and phase transitions, properties of solutions and colligative properties.
- Students should be able to apply principles of chemistry to understanding its role in other fields (e.g. biology), while understanding its underpinnings in physics and mathematics.

**RECITATION SECTION**

This course includes a required recitation section that you will need to attend. Quizzes in your recitation section are part of your course grade. You will receive a separate syllabus for your recitation, but attendance in recitation is mandatory.

**LECTURE EXAMS:**

FIRST EXAM: Thursday October 12 in class

SECOND EXAM: Thursday November 16 inclass

FINAL EXAM: Tuesday December 19: 10:30 AM – 12:30 PM

*These are tentative exam dates. If students miss a midterm, an average of the other midterm and the final exam will replace the missing midterm grade. If students miss the final exam, they will receive a grade of INC for the course and will have the opportunity to make up the final exam after the start of the following academic year semester (Fall or Spring).*

**GRADING:**

Your final grade will be a weighted average calculated as follows:  <b>40% Two lecture exams</b> <b>25% Recitation quizzes</b> <b>35% Final Exam</b>	Final grades are not curved, but are set according to the following scale:	
	95 or higher: <b>A+</b> 82-95: <b>A</b> 80-82: <b>A–</b> 78-80: <b>B+</b> 72-78: <b>B</b> 68-71: <b>B–</b>	65-68: <b>C+</b> 58-65: <b>C</b> 55-58: <b>C–</b> 50-55: <b>D*</b> Less than 50: <b>F</b>
* <b>Note:</b> If you earn a grade of D, that is the grade you will receive. Requests to change it to an F will not be honored.		

**IMPORTANT DATES:**

<b>August 31</b>	Last day to add a course
<b>September 4</b>	College Closed
<b>September 14</b>	Last day to withdraw without a "W" grade
<b>September 15-17</b>	No Classes
<b>September 25</b>	No Classes
<b>October 9</b>	College Closed
<b>October 10</b>	CONVERSION DAY: Classes follow a Monday schedule
<b>November 22</b>	No Classes
<b>November 23-24</b>	College Closed
<b>November 25-26</b>	No Classes
<b>December 11</b>	Last day of classes, last day to withdraw from a course with a grade of "W"
<b>December 12-13</b>	Reading Day

**COUNSELING**

Health Professions Counseling	Benjamine N. Stewart, <a href="mailto:benjamin.stewart@brooklyn.cuny.edu">benjamin.stewart@brooklyn.cuny.edu</a>	Advice on preparing for health professions programs, including both choosing courses and identifying extracurricular activities.
Dept. of Chemistry Undergraduate Advisor	Andrzej Jarzecki, <a href="mailto:jarzecki@brooklyn.cuny.edu">jarzecki@brooklyn.cuny.edu</a>	Advice on choosing the right course in chemistry, declaring a major, and planning for a career in chemistry.
Chair, Department of Chemistry	Brian Gibney, <a href="mailto:bgibney@brooklyn.cuny.edu">bgibney@brooklyn.cuny.edu</a>	General concerns about studies in chemistry and specific issues that cannot be resolved first with the course instructor may be brought to the Chair's Office Hours 3:30-4:30 in 359 IA (no hours 10/12 or 11/2 in F 23).

**Academic dishonesty is prohibited in the City University of New York.**

The faculty and administration of Brooklyn College support an environment free from cheating and plagiarism. Each student is responsible for being aware of what constitutes cheating and plagiarism and for avoiding both. The complete text of the CUNY Academic Integrity Policy and the Brooklyn College procedure for policy implementation can be found at <http://www.brooklyn.edu/policies>. If a faculty member suspects a violation of academic integrity and, upon investigation, confirms that violation, or if the student admits the violation, the faculty member **MUST** report the violation. Students should be aware that faculty may use plagiarism detection software. Students caught cheating may be given a range of possible academic sanctions up to and including the assignment of a failing grade for the course. This is in addition to any possible disciplinary sanction assigned by the college administration.

### **Student Disability Services**

The Center for Student Disability Services (CSDS) is committed to ensuring students with disabilities enjoy an equal opportunity to participate at Brooklyn College. In order to receive disability-related academic accommodations, students must first be registered with CSDS. Students who have a documented disability or suspect they may have a disability are invited to schedule an interview by calling (718) 951-5538 or emailing Josephine.Patterson@brooklyn.cuny.edu If you have already registered with CSDS, email Josephine.Patterson@brooklyn.cuny.edu or testingcsds@brooklyn.cuny.edu to ensure accommodation emails are sent to your professor.

### **Student Bereavement Policy**

Students who experience the death of a loved one during the semester should consult the student bereavement policy here: <https://www.brooklyn.edu/policies/bereavement/>

### **Sexual And Gender-Based Harassment, Discrimination, and Title IX**

Brooklyn College is committed to fostering a safe, equitable, and productive learning environment. Students experiencing any form of prohibited discrimination or harassment, on or off campus, can find information about the reporting process, their rights, specific details about confidentiality, and reporting obligations of Brooklyn College employees at the Office of Diversity and Equity.

### **Names and Pronouns:**

Campus emails and rosters may be inconsistent with the name you regularly go by. During and outside of class, we all have the right to be called by the name we go by and by the pronoun(s) we use. For your reference, Brooklyn College has a vibrant and welcoming LGBTQ+ Resource Center for students, faculty, & staff: <https://www.brooklyn.edu/lgbtq-center/>

### **Non-Attendance Due to Religious Beliefs**

Students who are unable to attend class due to religious observations should consult the Brooklyn College Undergraduate Bulletin for the college's policy, and contact the lecturer to discuss the issue. Students must come forward with the issue in a timely manner.

### **Pass-Fail Option:**

Details regarding taking courses on a pass/fail basis are given in the Brooklyn College bulletin. Students interested in this option should read the bulletin carefully, as they may not be eligible to do so; questions should be directed to the Registrar. Also note that the deadline to declare an intention to take a course Pass-Fail varies from semester to semester, but generally falls within the first two weeks of the course (contact the Registrar for the specific date). After this deadline, it is impossible to take the course Pass-Fail.

### **Useful Contact Information:**

Chemistry Department:

<http://www.brooklyn.cuny.edu/web/academics/schools/naturalsciences/undergraduate/chemistry.php>

Pre-Health Professions Website:

<https://www.brooklyn.cuny.edu/web/academics/special-programs/prehealth.php>

Brooklyn College Learning Center (free tutoring available)

<http://www.brooklyn.cuny.edu/web/academics/centers/learning.php>

### **ONLINE INFORMATION:**

**Please check Blackboard Announcements for information on slides to download for class, quizzes and exams. I post the syllabus there as well.**

**Chem 2060 Assigned Reading**

Below is the assigned reading and a corresponding set of homework problems. Read the material at least once before the lecture, and spend some time on the in-chapter problems to reinforce it. Unless noted otherwise, problems listed as Homework correspond to the end-of-chapter problems for the corresponding chapter. Answers to odd-numbered problems are at the end of the text. If you are instructed to memorize something, the test will be written assuming you have done so.

**Homework is assigned but not graded.**

<b>Gases</b>	<b>Chapter 9</b> , sections 9.1-9.5: Problems 5, 6, 7, 9, 13, 17, 27, 28, 29, 31, 33, 35, 37, 43, 45, 47, 49, 53, 55, 57, 59, 63, 65, 67, 71, 75, 78, 81, 85, 95
<b>Quantum Mechanics, Atomic Structure, Periodic Properties</b>	<b>Chapter 6</b> : Problems 3, 5(a), 7, 9, 10, 11, 18, 21(repeat for H), 22, 23, 27, 30, 35, 36, 37, 45, 49, 54, 55, 57, 58, 59, 61, 63, 64, 66, 67, 68, 69, 71, 76, 77, 79, 81, 83, 84
<b>Chemical Bonding, Molecular Structure, Polarity</b>	<b>Chapter 7</b> , sections 7.1-7.4: Problems 3, 5, 7, 11, 13, 14, 15, 17, 20, 21, 23, 29, 31, 32, 35, 37, 39, 45, 47, 51, 55, 59, 63, 64, 65, 67, 77, 80, 81, 83 <b>Chapter 7</b> , sections 7.5-7.6: Problems 91, 93, 97, 99, 105, 106
<b>Intermolecular Forces, Phase Transitions, Phase Diagrams</b>	<b>Chapter 10</b> , sections 10.1 & 10.3-10.4: Problems 1, 3, 4, 5, 9, 10, 11, 12, 13, 18, 21, 31, 35, 37, 41, 43, 51, 53, 55, 57, 59, 61, 62, 63, 65, 69
<b>Solutions Colligative Properties</b>	<b>Chapter 11</b> , sections 11.1-11.4: 5, 6, 9, 10, 11, 18, 20, 21, 23, 28, 31, 33, 35, 37, 38, 45, 46, 47, 48, 49, 50, 54, 55, 59, 61 <b>Chapter 3</b> , section 3.4: 71, 73, 76

## Chemistry Careers In and Out of the Laboratory

A degree in chemistry opens doors to dozens of exciting and rewarding careers. Here are just a few possibilities.

- Get involved in product development, manufacturing, or quality control for companies producing anything from chemicals to pharmaceuticals to textiles.
- Go on to obtain a MS or PhD in chemistry, biochemistry, biotechnology, bioinformatics, pharmacology, or any other biomedical field, and take a leading role in medical research. Design and test new drugs and medical devices.
- Get involved in sales and marketing for chemical and pharmaceutical firms. Companies are always looking for people with a strong technical background to market their products, and will pay top dollar for them.
- Go into the field as an environmental chemist to study and protect the natural world.
- Use your skills in interesting and challenging ways, from evaluating risk for insurance firms to restoring artwork for museums.
- Work in law enforcement, in anything from forensic investigation to health and safety regulation. Or work inside the political process at a government agency to help formulate policy on scientific, medical and environmental issues.
- Pursue a career in patent law and help bring the next great scientific breakthrough to the market. Or work in the U.S. Patent and Trademark Office to ensure that inventors' rights are protected.

### Salary Information

Chemistry Degree	Median Base Salary. NY region*
BA or BS	\$85,000
MS	\$97,867
PhD	\$110,000

\* From A. Widner, "What US chemists made in 2021, according to the ACS salary survey," *Chemical and Engineering News*, October 31, 2021

Salaries for chemists are high, but do not do justice to the excitement of the field. Science as it is practiced today is collaborative, and chemists have abundant opportunities to travel, to work with interesting people, and to present the results of their work in ways that have a profound influence on the world. Science will shape the world of the 21<sup>st</sup> century, and you have the chance to be part of that process.

## Medical School, the Chemistry Major, and You

**Fiction #1:** Being a chemistry major will hurt my chances for medical school, because the hard courses may lead to a lower GPA.

**Fact:** Students majoring in mathematics and the physical sciences (this includes Chemistry) have the highest medical school acceptance rate of any major:

Primary Undergraduate Major	Acceptance Rate
Mathematics and Physical Sciences (including Chemistry)	42.3%
Biology and Health Sciences	36.0%
Humanities and Social Sciences	37.2%
Other	33.5%

Based on data for the entering class of 2021, reported by the American Association of Medical Colleges

Table compiled from data available at <https://www.aamc.org/>

**Fiction #2:** Chemists have to take a lot of hard courses so they don't have time to do volunteer work, research, and other activities that help with medical school applications.

**Fact:** A student who has completed his or her requirements for medical school can obtain a chemistry degree with as few as five additional courses. This leaves plenty of time for other activities.

**Fiction #3:** If I don't get into medical school, I may be stuck working in a lab all day.

**Fact:** Chemists have enormous opportunities outside the lab. Chemical and pharmaceutical companies desperately need managers and salespeople with chemical knowledge, and will pay top dollar for them. Chemists also find work in finance, insurance, law, government and manufacturing. Go to the American Chemical Society website on Careers (<https://www.acs.org/content/acs/en/careers.html>) and use the "College to Career" link.

### Some other advantages of being a chemistry major:

- Chemistry majors can receive credit for performing research work with a faculty mentor. This means the time you spend on research gets you closer to graduating and your research experience appears on your transcript.
- Chemistry majors get the skills they need to perform advanced laboratory work, so they can get better research positions, accomplish more and get stronger letters of recommendation from their mentors.
- Thanks to generous donations by alumni, the Department of Chemistry is able to give out more than \$5,000 every year in fellowships, scholarships and awards. These are an aid to both the pocketbook and the resumé.