

GENERAL CHEMISTRY I, CHEM 1200 EVENING –FALL 2023

Instructor:

Assoc. Prof. Emilio Gallicchio

E-mail: egallicchio@brooklyn.cuny.edu. Phone number: 731-581-5000 ext. 2249

Office: 5315A Ingersoll Hall (5th floor old building)

Office Hours: Mon. 5:00-6:00 PM, 9:15-9:45 PM; Tue. 11:15-12:15 PM; Wed. 11:00-11:30 AM

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

This text is available as a *free PDF* at <https://openstax.org/details/books/chemistry-2e>

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.

ONLINE SUPPLEMENTS AND INFORMATION:

- **Blackboard Course Page:** [2023 Fall Term General Chemistry I Lecture CHEM. 1200 M6AL M6BL M6CL \(Brooklyn College\)](http://bbhosted.cuny.edu) on <http://bbhosted.cuny.edu> (Use of Blackboard is required. Course material and info, including grades, are posted on the Blackboard page. A copy of this syllabus is available under “Syllabus”.)
- <https://www.brooklyn.edu/chemistry-biochemistry> (Chemistry Department Homepage)
- <https://www.brooklyn.edu/special-programs/pre-health/> (Pre-Health Professions website)
- <https://www.brooklyn.edu/lc/> (Brooklyn College Learning Center, free tutoring available)
- <http://userhome.brooklyn.cuny.edu/mkobrak/labvideos.html> (Lab instruction videos)
- <https://library.brooklyn.cuny.edu/resources> (College Library)

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

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 in the practice of science, including the nature of scientific evidence and the scientific method.
- 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.

COUNSELING *Health Profession Counseling*
Undergraduate Advisor

Dr. Benjamin N. Stewart
benjamin.stewart@brooklyn.cuny.edu
Prof. Andrzej Jarzecki
jarzecki@brooklyn.cuny.edu

LECTURE EXAMS: ALL EXAMS ARE HELD IN-PERSON IN THE LECTURE ROOM

FIRST EXAM: **Monday, October 16, 7:30-9:00 PM,**
SECOND EXAM: **Monday, November 20, 7:30-9:00 PM,**
FINAL EXAM: **Monday, December 18, 6:00-8:00 PM**

A 45 mins Q&A session starting at 6:30 PM will precede the first and second exams. No makeup exams are given for missed first and second lecture midterm exams. In case of a justified absence (i.e. a doctors' note), the grade on a missed midterm exam will be calculated from the weighted average of the other midterm test and the final exam (with a 40% weight on the midterm and a 60% weight on the final).

GRADING:

Your final grade will be a weighted average calculated as follows: 40% Two lecture exams 25% Recitation quizzes 35% Final Exam	Final grades are not curved, but are set according to the following scale: <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">95 or higher: A+</td> <td style="width: 50%;">65-68: C+</td> </tr> <tr> <td>82-95: A</td> <td>58-65: C</td> </tr> <tr> <td>80-82: A-</td> <td>55-58: C-</td> </tr> <tr> <td>78-80: B+</td> <td>50-55: D*</td> </tr> <tr> <td>72-78: B</td> <td>Less than 50: F</td> </tr> <tr> <td>68-71: B-</td> <td></td> </tr> </table> <p>*Note: 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.</p>	95 or higher: A+	65-68: C+	82-95: A	58-65: C	80-82: A-	55-58: C-	78-80: B+	50-55: D*	72-78: B	Less than 50: F	68-71: B-	
95 or higher: A+	65-68: C+												
82-95: A	58-65: C												
80-82: A-	55-58: C-												
78-80: B+	50-55: D*												
72-78: B	Less than 50: F												
68-71: B-													

IMPORTANT DATES:

Monday, September 4 College Closed – No classes scheduled
Monday, September 25 No classes scheduled
Monday, October 9 College Closed – No classes scheduled
Tuesday, October 10 Conversion Day – Classes follow a Monday schedule
Monday, December 11 Last day to withdraw from a course with a “W” grade
Thursday, December 14 Final Exams Begin
Wednesday, December 20 Final Exams End / End of Fall Semester

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 <https://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.

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>

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.

CHEM 1200 ASSIGNED READING AND HOMEWORK

The course is organized according to the learning modules described below. The assigned reading and corresponding set of textbook homework problems are listed for each learning module. Read the material at least once before the lecture, and spend some time on the in-chapter problems to reinforce it.

Textbook homework problems. Unless noted otherwise, assigned textbook problems listed for each learning module correspond to the end-of-chapter problems for the corresponding chapter of the textbook. 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. Textbook homework problems are assigned but not graded.

Online self-assessment tests. Online self-assessment tests will be available on the Blackboard course page for each learning module. You are strongly encouraged to take the self-assessment tests as many times as desired to check your basic understanding of the material covered in the lectures. Self-assessment tests are useful to check your understanding of the basic concepts but are not meant to fully prepare you for the exams. The automatically assigned grades on online self-assessment tests are not included in the course grade average.

Practice exams. Practice exams from previous editions of the course will be posted on the Blackboard course page. You are encouraged to work on the practice exams to further prepare you for the lecture tests.

Examination questions will be similar to examples covered in the lectures, practice exam problems, and textbook problems. You should work on as many of these as possible before recitation section, and bring any questions you have on the work to your recitation and lecture instructors. Remember: Office hours and your recitation time are your chance to get help with things you do not understand. If you have not done the homework, you will get little out of them and you will likely not be prepared for the exams.

Learning Modules

Topics	Assigned Reading and Problems
1. Math Review, Dimensional Analysis Basic concepts	Chapter 1: Problems 17, 18, 23, 25, 27, 29, 30, 32, 37, 38(a,d,e,f), 40, 45, 47, 49, 51, 53, 71, 77(e), 85, 87, 89, 97 + Supplementary Problems (Factor Label Method & Unit Conversion) Memorize: You must know the name and symbols of the first 36 elements of the periodic table, plus the following elements: Ag, Au, Pt, Hg, Sn, and I. You do <u>not</u> have to know their atomic numbers from memory (you will always have a periodic table), but you need to be able to write the symbol if given the name, and vice versa. Memorize: You must know the metric prefixes from femto- to Giga-, as given in Table 1.3. You need to know the prefix (nano-), the 1-letter abbreviation ("n"), and the power of 10 (10^{-9}). Memorize: You need to know the relationships between metric units, and be able to convert between them (e.g. kg to g, or °C to K). You do not need to know English units or their conversions to metric.
2. Elements, Compounds, Ions, the Periodic Table, Chemical Formulas, Chemical Equations	Chapter 2 , sections 2.1,2.3-2.6: Problems 1, 5, 7, 11, 15, 17, 19, 23, 25, 27, 29, 31, 33, 39, 41, 43, 49. Chapter 4 , section 4.1 (omit Equations for Ionic Reactions): Problems 3, 5 Memorize: <i>You will be given a table of ions. You should know the name, formula, and charge of each.</i>
3. Moles, Empirical Formulas, Basic Reaction Stoichiometry	Chapter 3 , sections 3.1-3.2: Problems 3, 5, 9, 11, 13, 17, 19, 21, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43. Chapter 4 , section 4.3: Problems 43(a,b), 45(a,c,e), 49, 51, 53
4. Advanced Reaction Stoichiometry, Reactions in Solution	Chapter 4 , sections 4.4: Problems 61 (sodium chloride = NaCl, diatomic chlorine = Cl ₂), 63, 65, 67, 71, 73. Chapter 4 , section 4.1 (Equations for Ionic Reactions): Problems 11(b,c) Chapter 4 , section 4.2: Problems 13, 15, 17(b Al only, d K only), 19(a,b,c,f), 21, 23(a,b,d), 25(a,c), 33
5. Molarity, Solution Stoichiometry, Quantitative Analysis	Chapter 3 , sections 3.3: Problems 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67. Chapter 4 , section 4.5: Problems 47, 57, 79, 81, 83, 87, 89, 91, 93, 95.
First Midterm Exam, October 16, 7:30 PM, Covers Modules 1 to 5	
6. Thermochemistry	Chapter 5: Problems 3, 4(a), 5(a), 7, 8, 9, 11, 13, 19, 21, 23, 25, 27, 29, 33, 35, 37, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 69, 71, 73, 75, 77, 79, 81, 83, 85
7. Gases	Chapter 9 , sections 9.1-9.5: Problems 5, 6, 7, 9, 13, 25, 27, 28, 29, 31, 33, 35, 37, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 81, 85, 87, 91, 93, 95
8. Quantum Mechanics, Atomic Structure, Periodic Properties	Chapter 6: Problems 3, 5, 7, 9, 11, 13, 21(repeat for H), 23, 27, 35, 37, 45, 49, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83
9. Chemical Bonding, Molecular Structure	Chapter 7 , sections 7.1-7.4: Problems 3, 5, 7, 9, 11, 13, 14, 15, 17, 21, 23, 25, 27, 29, 31, 35, 37, 39, 41, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63 Chapter 7 , sections 7.6 (omit Molecular Polarity and Dipole Moment): Problems 91, 93, 95, 105, 111, 115
Second Midterm Exam, November 21, 7:30 PM, Covers Modules 6 to 9	
10. Strength of Chemical Bonds, Polarity, Chemical	Chapter 7 , section 7.5: Problems 65, 67, 77, 79, 81, 83 Chapter 7 , section 7.6 (Molecular Polarity and Dipole Moment): Problems 97(a,d,e,g), 99 Chapter 2 , section 2.7: 51, 53, 55(a,b,c,d,f), 57(a,b,c,d,f), 59(a,b,c,d,e)

Nomenclature	
11. Intermolecular Forces, Phase Transitions, Phase Diagrams	Chapter 10 , sections 10.1 & 10.3-10.4: Problems 5, 7, 9, 11, 13, 15, 19, 21, 31, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 62, 63
12. Solutions. Colligative Properties	Chapter 3 , section 3.4: Problems 69, 71, 73, 75, 79 Chapter 11 , sections 11.1-11.4: 5(a,b,c,e), 9, 11, 15, 19, 21, 25, 31, 33, 35, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 59, 61, 63, 65, 67
	Final Exam, December 18, 6:00 PM, Cumulative

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 21st 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 among 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.