

Brooklyn College
Department of Chemistry
General Chemistry I (CHEM 1100) Syllabus

GENERAL CHEMISTRY I, CHEM 1100 – FALL 2012

IMPORTANT: If your science background is poor, consider taking CHEM 1050 instead of Chemistry 1100. See the last page for the *Choosing a First Course in Chemistry* sheet.

Required Texts:

- *Chemistry, The Central Science*, Brown, LeMay, Bursten, and Murphy, Prentice Hall Pub., 2011, 12th Edition
- *Experiments in General Chemistry*, M. N. KobraK, Ed., **THIRD** edition, Kendall/Hunt, Dubuque, IA, 2012

Required Items:

- Scientific calculator,
- Lock for lab drawer.--bring to first lab.
- Matches; dish detergent, roll of paper towels. (You will be given safety glasses in your lab kit.)

Graphing calculators are not allowed on exams!

Recommended Items:

- Lab coat or apron
- Study Guide to Brown, LeMay, Bursten, and Murphy, James C. Hill, 12th Ed., Prentice Hall
- Solutions to Exercises in Brown, LeMay, Bursten, and Murphy, R. Wilson, 12th Ed., Prentice Hall

Online Supplements and Info:

http://chemscript.brooklyn.cuny.edu/web/doc/2012_Fall_Syllabus_Chem1100.pdf

(syllabus on line)

<http://academic.brooklyn.cuny.edu/chem/howell/practice.htm> (old BC tests and exams)

<http://academic.brooklyn.cuny.edu/chem/index.htm> (Chemistry Department Homepage)

<u>Counseling</u>	<i>Coordinator for General Chemistry</i>	Prof. Ira Levine, 3315N inlevine@brooklyn.cuny.edu
	<i>Undergraduate Chemistry Advisor:</i>	Prof. Brian Gibney, 540NE bgibney@brooklyn.cuny.edu
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	<i>Health Profession Counseling:</i>	Prof. Silbering 2231B silbering@brooklyn.cuny.edu

See also the health professions handbook at

http://www.brooklyn.cuny.edu/pub/pdf/Pre-Health_Professions_Handbook_Revision.pdf

LECTURE TESTS:

- FIRST TEST: **Thursday, Oct. 11, 12:30 – 2:00 PM**, Covers Recitations 1–5
- SECOND TEST: **Thursday, November 15, 12:30 – 2:00 PM**, Covers Recitations 6–10
(for *recitation* material see pages 4–5)

NOTE: **NO** Makeup exams are given for Lecture Tests. We mean it.

Graphing calculators are not allowed on exams.

FINAL EXAM: **DECEMBER 14 (Friday), 8:00 AM – 10:00 AM**, rooms TBA

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NOTE: On Wed. Oct. 10, MONDAY classes meet.

Academic dishonesty is prohibited in the City University of New York

Cheating, plagiarism, internet plagiarism and obtaining unfair advantages are violations of policies of academic integrity and are punishable by penalties, failing grades, suspension and expulsion.

For more information about CUNY policy on academic integrity see

<http://www.brooklyn.cuny.edu/bc/policies/pdf/CUNY%20PolicyAcademicIntegrity.pdf>

Student Disability Services

In order to receive disability-related academic accommodations students must first be registered with the Center for Student Disability Services. Students who have a documented disability or suspect they may have a disability are invited to set up an appointment with the Director of the Center for Student Disability Services, Ms. Valerie Stewart-Lovell at 718-951-5538. If you have already registered with the Center for Student Disability Services please provide your professor with the course accommodation form and discuss your specific accommodation with him/her.

Lab Exemptions: Students who are repeating the course may be able to obtain laboratory exemptions. You may file a request for a laboratory exemption form in the Chemistry Department office (359 NE). Students who receive exemptions **must take the recitation quizzes** and have the option of taking the lab quizzes. Lab exemptions are not available after Sept. 7.

Drop Dates: Friday Sep. 14 is the last day to drop a course without a grade.

Friday, Nov. 9 is the last day to apply for non penalty withdrawal (*i.e.*, W grade). See your lab instructor or the course coordinator for advice. **To withdraw, you MUST file a form in the Registrar's Office (either electronically or in person) and go to the stockroom to CHECK OUT from the laboratory.**

Note: You may transfer (possibly with a W) to CHEM 1050 (old CHEM 1.1), a slower paced course, if Chem 1100 is too difficult for you. The LAST day to switch to CHEM 1050 is **Sept. 7** and may be done only if seats are available in CHEM 1050.

GRADING:

Your final grade will be determined as follows:

- 30% Two lecture tests
- 20% Minimum of five recitation quizzes*
- 18% Laboratory reports and performance
- 7% Two laboratory quizzes
- 25% Final Exam

**The lecturer may adjust recitation quiz grades in sections where the recitation quiz average is substantially too high or too low in relation to the lecture exam averages.*

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CHEM 1100 Lecture Schedule

Unless specific sections are indicated, you are responsible for the whole chapter.

For best results, read the assigned material before lecture.

Lecture #	Topics	Assigned Reading
1, 2	Math Review, Dimensional Analysis, Basic Concepts	Appendix A.1 Chapter 1 (memorize Table 1.2)
3, 4	Elements, Compounds, Ions, Periodic Table	Chapter 2 (memorize Tables 2.4 and 2.5)
5, 6	Chemical Equations, Moles, Empirical Formulas	Chapter 3.1–3.5
7, 8	Stoichiometry, Limiting Reagents	Chapter 3.6–3.7
9, 10	Chemical Reactions, Molarity, Solution Stoichiometry (<u>Omit</u> Oxidation Numbers, p 139)	Chapter 4
11–13	Thermochemistry	Chapter 5
14, 15	Gases	Chapter 10
16–18	Atomic Structure, Periodic Properties	Chapter 6, Chapter 7.1–7.6
19, 20	Ionic and Covalent Bonding, Polarity	Chapter 8
21, 22	Molecular Shape, Dipoles	Chapter 9.1–9.3
23, 24	Intermolecular Forces, Phase Changes	Chapter 11.1, 11.2, 11.4, 11.5
25, 26	Concentration, Solubility, Colligative Properties	Chapter 13.1–13.5
27, 28	Phase Diagrams, Solids	Chapter 11.6, 12.1, (12.2--may be omitted if short of time)

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Homework Assignments

Many Students who "did well" in high school chemistry do not get good grades in college chemistry. The reason: they fail to develop the learning skills and problem-solving skills necessary for the advanced level of chemistry at Brooklyn College. The big difference between high school and college is the large amount of work you must do on your own and the emphasis we place on THINKING (instead of memorizing). Your key to success? Learning how to study properly and doing LOTS of homework! Falling behind in reading and homework is a SERIOUS MISTAKE. Organize your life around your coursework and keep up with the assignments.

As you read the textbook, do the exercises and example problems in the chapter. In other words, read and work your way through the chapter. After working through each chapter work out the assigned homework problems. Note well there will not be enough time in class for your instructor to go over every assigned problem. A good indicator of the kinds of problems found in tests is the homework problems. See your teacher during office hours for extra help.

NOTE: Your workshop instructor has the option of completing an assignment one week after the scheduled meeting.

Reading and Homework Assignments for Weekly Recitation Meetings

Meeting #	Assigned Material
Meeting 1 Read: Homework:	Math Review, Dimensional Analysis, Basic Concepts Chapter 1 (Memorize Table 1.2) If you have difficulty with the math problems, consider transferring to Chemistry 1.1. Practice Exercises a–d, p. 1053 Chapter 1, Problems 7,11,13,14,15,17,19, 22, 25c, 26d, 27,28a, 33,35,37,39,43,45, 47a,b,d,f, 72
Meeting 2 Read: Homework:	Elements, Compounds, Ions, Periodic Table Chapter 2 (Memorize Table 2.4 and 2.5) Chapter 2, Problems 9, 11, 16, 23, 25, 29, 35, 37, 41, 43, 45, 49, 52, 55, 59, 61, 65, 67, 69, 70, 71, 103
Meeting 3 Read: Homework:	Chemical Equations, Moles, Empirical Formulas Chapter 3.1–3.5 Chapter 3, Problems 1,9,11,13,17,19,21,23a,b, 25a,27,28,33,35,39,43,45,49,51,53,57
Meeting 4 Read: Homework:	Stoichiometry, Chemical Reactions Chapter 3.6, 3.7, and Chapter 4.1–4.2 Chapter 3, Problems 7, 61, 62, 78, 81, 84, 106 Chapter 4, Problems 12, 15, 19, 21, 24
Meeting 5 Read: Homework:	Acid-Base Reactions, Oxidation of Metals Chapter 4.3, 4.4 Chapter 4, Problems 31, 32, 37, 39, 45a, 47, 51b,c, 53, 56
Meeting 6 Read: Homework:	Molarity, Solution Stoichiometry Chapter 4.5, 4.6 Chapter 4, Problems 59, 60, 61, 67, 71, 72, 75, 76, 81, 83, 85

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Meeting 7 Read: Homework:	Thermochemistry Chapter 5 Chapter 5, Problems 13, 14, 15, 23, 25, 26, 27, 39, 43, 46, 47, 51, 53, 55, 57, 62, 65, 67, 69, 73, 76, 83(a)
Meeting 8 Read: Homework:	Gases Chapter 10.1–10.8 Chapter 10, Problems 6, 7, 21, 25, 28, 29, 31, 32, 36, 37, 41, 43, 49, 53, 54, 58, 59, 63, 65, 71, 75, 77, 84, 85, 92
Meeting 9 Read: Homework:	Atomic Structure Chapter 6 Chapter 6, Problems 11, 12, 13, 15, 16, 17, 19, 21, 23, 27, 28, 29, 35, 37, 39, 51, 52, 53, 55, 56, 57a,b, 61, 65, 66, 69, 71, 73, 75
Meeting 10 Read: Homework:	Periodic Properties, Ionic Bonding Chapter 7.1–7.6, and Chapter 8.1–8.3 Chapter 7, Problems 11, 15, 19, 21, 23, 24, 25, 31, 34a, 37, 39, 42, 47, 61, 71 Chapter 8, Problems 9, 13, 15, 19, 22, 23, 24, 26
Meeting 11 Read: Homework:	Covalent Bonding, Bond Energy, Polarity Chapter 8.4–8.9 Chapter 8, Problems 31, 33, 35, 37, 40, 41, 47, 48a,b, 51, 53, 54, 55, 56, 63, 64, 69, 92
Meeting 12 Read: Homework:	Molecular Shape, Dipoles Chapter 9.1–9.3 Chapter 9, Problems 15, 22, 23, 25, 27a,b,c, 28, 29, 31, 39, 43, 46, 96
Meeting 13 Read: Homework:	Intermolecular Forces, Phase Changes, Solubility, Concentrations Chapter 11.1, 11.2, 11.4, 11.5, and Chapter 13.1–13.4 Chapter 11, Problems 9, 10, 15, 17, 18, 21, 23, 25, 41, 45, 49, 51, 53, 55 Chapter 13, Problems 15, 16, 25, 33, 34, 37, 39, 41, 43, 45, 48, 49, 51
Meeting 14 Read: Homework:	Colligative Properties, Phase Diagrams, Solids Sections: 13.5, 11.6, 12.1, (12.2) Chapter 13, Problems 65, 71, 72, 74, 79, 80 Chapter 11, Problems 59, 61, 62 Chapter 12, Problems 7, 9, 11, 21

NOTE: Your instructor has the option of scheduling a two-hour recitation session for the 14th meeting.

CHEM 2100 (General Chemistry II) First Assignment (next semester)

It is necessary to do some preparatory work before your first meeting in Chemistry 2100.

Chapter 14 Sections 14.1–14.3 (omit Sec. 14.4)

Chapter 14, Problems 2, 17, 19, 21, 23a,b,c, 25, 27, 30, 31, 33, 34, 37

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LABORATORY EXPERIMENTS

Before coming to laboratory, read the scheduled experiment and any other material assigned. Unless otherwise noted, page numbers refer to your laboratory manual. You must bring the lab manual to each lab class.

Brooklyn College recognizes the importance of reproductive hazard awareness and protection. During laboratory exercises students may be exposed to chemical reagents that may present specific risks to reproductive health, especially students who are pregnant. Therefore, it is strongly recommended that you do not take the following course if you are pregnant. If you become pregnant during the semester, please consult with your laboratory instructor.

NOTE: **SAFETY GOGGLES MUST BE WORN IN THE LABORATORY!** The goggles must be indirectly-vented to offer splash protection; direct vented goggles (sold by hardware stores for impact protection) are not suitable. The campus bookstore sells appropriate goggles. **If your instructor observes you violating eye protection or other safety policies, you can be removed from the laboratory and/or given a 10% (or higher) penalty on your laboratory report grade.**

Scientific data requires special treatment. It must be recorded in non-erasable ink your lab book immediately after a measurement is taken; partners cannot copy each others' data at a later time. **Altering or copying data outside of the laboratory represents academic dishonesty and will be prosecuted as such if observed.** Further, you will receive no credit for any lab report that includes data that are not your own. If your data are messy, you may copy them over onto a final report, but you must include your original data when you turn in your report.

Lab reports are due in lab the week after the experiment was concluded unless you obtain permission from your instructor. All lab reports not handed in will receive a grade of zero.

If your lab instructor is **not** grading the lab reports and returning them to you, please **notify the lecturer.**

From meeting four (Expt. 3) on, you are required to hand in an outline described at the end of the lab schedule.

Laboratory Breakage. In some schools, a laboratory fee is charged everyone. Our practice is to charge you only for the replacement cost of any items you lose or break. After check out, a bill will be prepared which you may pay at the bursar's office the following semester.

NOTE: If you have checked in for any lab course **you must check out** even if you only attend class for one or two weeks before dropping the course. Students who fail to check out will be charged a fee of **\$50** plus the cost missing or broken equipment. Students who drop a course must go to the stockroom to check out **as soon as possible.**

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Meeting	Laboratory Assignment
1	<u>Introduction to Laboratory</u> <i>Check in, Lab safety, laboratory techniques, balances, reading volumes in calibrated glassware, using burets and pipets, transferring liquid samples.</i>
2	<u>Experiment 1: Density and Measurement</u> <i>Return safety quiz</i>
3	<u>Experiment 2: Introduction to Gravimetric Analysis</u> <i>Gravimetric determination of water of crystallization.</i>
4	<u>Experiment 3: Synthesis of Zinc Iodide</u>
5	<u>Experiment 4: Basics of Chemical Reactions</u>
6	<u>Experiment 5: Volumetric Analysis: Acid-Base Titration</u> (This is a long experiment)
7 and	<u>Experiment 6: Introduction to Calorimetry.</u> (Note: If you are repeating the lab have the second edition of the lab manual, you can get copies of experiments 7 and 8 from the stockroom.)
8	<u>Experiment 7: Evaluation of the Gas Law Constant</u>
9	<u>Experiment 8: Determining Atomic Emission by Spectroscopy</u> (Short experiment)
10	<u>Experiment 9: Synthesis of Aspirin</u>
11	<u>Experiment 10: Spectrophotometric Analysis of Aspirin</u>
12	<u>Experiment 11: Intermolecular Forces and Physical Properties</u>
13	<u>Experiment 12: Determination of Molecular Weights by the Method of Freezing-Point Depression</u>
14	Check out and Review <u>No experiments are permitted.</u>

PREPARATION FOR LABORATORY

To help prepare you for lab, you are required to hand in before each lab (except the experiment in week 2) a sheet stating (a) what quantities are to be measured and (b) what quantities are to be calculated from the measurements. For an experiment where there are no measurements, just state briefly what you are to do and what you are to observe.

What you hand in should be no more than 4 to 5 lines long and must **not** include the detailed procedure of the experiment.

If you do not hand this in, your instructor will deduct 5% from your grade for that lab report.

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.
- 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 insure that inventors' rights are protected.

Salary Information

Chemistry Degree	Median Starting Salary*	Median Base Salary (all chemists)**
BA or BS	\$38,000	\$69,800
MS	\$60,000	\$80,000
PhD	\$76,000	\$98,000

*From *Chemical and Engineering News*, March 14, 2011 pp 49-53.

**From *Chemical and Engineering News*, Dec. 12, 2011,33.

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. Chemists do sometimes have to change jobs or make career choices, but their skills are likely to remain in demand. A skilled chemist is a valuable commodity.

As with most professions, chemistry has been affected by the recent downturn in the economy. The following quotation is from *Chemical & Engineering News*, Nov. 7, 2011, p. 5 (<http://cen.acs.org/articles/89/i45/Employment-Outlook-Clouded.html>)

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“The job market for chemists has not been bright over the past few years. Even before the onset of the Great Recession, mergers and acquisitions in the pharmaceutical industry and the trend toward outsourcing fine and custom chemical synthesis to companies in China, India, and elsewhere had cut into chemical employment in the U.S. The recession exacerbated the employment woes of too many chemists.

Although the Great Recession ended more than two years ago, as Rovner points out, unemployment remains high. Chemists and chemical engineers have fared better than members of the general population, but their situation has not been rosy. U.S. unemployment peaked at 10.1% in 2009; among ACS members, unemployment reached 3.9% in 2009 compared with 2.3–2.4% in 2007–08. Among new chemistry graduates, the situation was much worse, with unemployment climbing from 7.2% in 2007 to 11.4% in 2009.

The grim employment outlook may—emphasize may—be easing somewhat. Rovner reports that unemployment among new graduates in 2010 was 10.7% and, among ACS chemists and chemical engineers, it was 3.8%. The bloodletting in pharma may be declining. Pharma job cuts announced during the first three quarters of 2011 totaled about 19,000—still an awful number but far better than the more than 43,000 announced during the same period in 2010 and the more than 58,000 announced during the first three quarters of 2009.”

For discussions of the job outlook for chemists, see:

<http://cen.acs.org/articles/89/i50/Employment-Salary-Survey.html>

<http://cen.acs.org/articles/89/i45/Anemic-Recovery-Restrains-Hiring.html>

<http://www.bls.gov/oes/current/oes192031.htm>

<http://www.bls.gov/oco/ocos049.htm#outlook>

<http://www.freerepublic.com/focus/f-news/2904039/posts>

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 the physical sciences (this includes Chemistry) have nearly the highest medical school acceptance rate of any major:

Primary Undergraduate Major	Acceptance Rate
Physical Sciences (including Chemistry)	49.4%
Biological Sciences	42.7%
Humanities	49.5%
Social Sciences	44.6%

Based on data for the entering class of 2011, reported by the American Association of Medical Colleges

Table compiled from data available at www.aamc.org/download/161692/data/table18.pdf

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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 four 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. Take a look at the other side of this page, or come to the Chemistry Office and ask to see the "Careers in Chemistry" folder.

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 \$20,000 every year in fellowships, scholarships and awards. These are an aid to both the pocketbook and the resumé.
- Brooklyn College's first Rhodes Scholar of the 21st Century is a Chemistry major.

For more information, contact the departmental advisor: Prof. Brian Gibney, (718) 951-5458; bgibney@brooklyn.cuny.edu

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CHOOSING A FIRST COURSE IN CHEMISTRY

Some students enroll in a first course in chemistry that is not appropriate for them. The following information will help you make sure you are in the right course. If you decide you are in the wrong course, you should make any change as soon as possible. For further advice, consult your instructor, the Chemistry Department Deputy Chair in 359NE, or the Health Professions Advisor.

