

**QUEENSBOROUGH COMMUNITY COLLEGE
CHEMISTRY DEPARTMENT**

CH-120: SECTIONS C5B

FUNDAMENTALS OF CHEMISTRY

LECTURE: 3 hours per week

CREDITS: 3

LABORATORY: 3 hours, every third week

TEXTBOOK AND LAB MANUAL:

FUNDAMENTALS OF CHEMISTRY, 2nd Edition
Morris Hein & Susan Arena
John Wiley & Sons, Inc., ISBN: 978-1-11900-015-0

NOTE: The textbook and lab manual are combined in one book. This is a custom version and can only be purchased at the QCC Bookstore.

COURSE DESCRIPTION:

This hybrid lecture and laboratory course is intended to provide students with basic knowledge of modern theory of general chemistry. The course covers the most essential topics of general chemistry, including classification and properties of matter; elements and compounds; atomic theory; the periodic table; chemical composition; chemical equations; acids and bases; and chemical bonding. In addition, this course includes five laboratory experiments to give students hands-on experience with some of the topics. Students are strongly encouraged to also take CH-121 (Fundamentals of Chemistry Laboratory). Successful completion of CH-120 and CH-121 lab satisfies the laboratory science requirement for the A.A. degree. This course is not open to students who have completed CH-151, 152, 251, 252.

CURRICULA FOR WHICH THE COURSE IS REQUIRED / RECOMMENDED:

- Life and Physical Sciences component of the CUNY Common Core.
- If taken with CH-121 lab: A.A. in Liberal Arts and Sciences (non-science concentration) and other non-science majors as a laboratory science elective.
- If taken with CH-121 lab: QCC/QC Dual/Joint A.A./B.A. Degree Program in Liberal Arts and Sciences and Childhood Education as a laboratory science elective.

GENERAL EDUCATIONAL OBJECTIVES:

- Students will use analytical reasoning to identify issues or problems and evaluate evidence in order to make informed decisions.
- Students will reason quantitatively and mathematically as required in their fields of interest and in everyday life.

EXPECTED STUDENT LEARNING OUTCOMES:

- Students will be introduced to the fundamental concepts of chemistry, including classification and properties of matter; elements and compounds; atomic theory; the periodic table; chemical composition; chemical equations; acids and bases; and chemical bonding.

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EXPECTED STUDENT LEARNING OUTCOMES (CONT.):

- Students will apply the scientific method by conducting laboratory experiments that focus on physical and chemical properties, reaction types, and chemical structure in order to demonstrate, apply, and reinforce the concepts taught in the lecture. By solving problems in lecture and performing experiments in the lab, students will learn how to gather and interpret their data, observations and results and how to present their conclusions.
- Students will work in groups of two to perform five experiments. They will be trained in laboratory safety, basic experimental methods and techniques, and proper waste disposal.
- Students will learn how to compose a formal laboratory report with a well-defined format for each experiment. The written report submitted by each individual student will include relevant theory, data and calculations, and analysis/discussion of results.
- Students will learn to obtain unbiased data and results by applying the concept of significant figures to experimental measurements and calculations, and by performing multiple trials in the laboratory whenever possible. Students will discuss the accuracy and precision of their results, as well as the limitations and assumptions of each experiment.

METHODS BY WHICH STUDENTS LEARNING WILL BE EVALUATED:

The overall grade will be computed from the components below.

- Exams: 40%
- In Class Activities/Quizzes: 10%
- Laboratory Performance and Report: 25%
- Final Exam: 25%
- Bonus: Take-home exam

EXAMS:

There will be five one-hour exams and a cumulative final exam. Your lowest exam grade will be dropped. A cumulative take-home exam will also be given to help you prepare for the final. **5% of this exam grade will be added to your total course grade as bonus points.** This exam cannot hurt your grade. More information will be provided in class.

IN CLASS ACTIVITIES/QUIZZES:

Students will work in groups to complete activity sheets. There will be a short individual quiz after each activity.

LABS:

There will be five three-hour lab sessions. (The titles and experiment numbers are listed on the class schedule.) This is separate from CH-121, which is a separate laboratory course. Students will demonstrate their preparedness for the lab by completing a pre-lab exercise. Students will work collaboratively in pairs on each experiment, but each student will write an individual lab report. The exact format for lab reports is found at the end of this document. **There will be no makeup labs or dropped lab grades.**

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ATTENDANCE/ABSENCE POLICY:

Attendance will be taken at every class. The Student Handbook states that a student will be considered excessively absent from a course and will receive a WU grade if the student has been absent for 15% or more of the total number of contact hours for the course. A WU is computed as an F in the student's GPA.

This course meets once per week. Therefore, students will receive a grade of WU if they have 3 or more unexcused absences.

Students who have valid excuses for missed classes should speak with their instructor and present documentation explaining the reason for the absence. Absences that have been excused by the instructor will not be counted toward a WU grade. However, excessive absences or lateness will significantly impede your progress in the course.

ACADEMIC INTEGRITY:

Academic honesty is taken extremely seriously and is expected of all students. All assignments must be the original work of the student (and partners or group, if applicable). All questions or concerns regarding ethical conduct should be brought to the course instructor. "It is the official policy of the College that all acts or attempted acts that are violations of academic integrity be reported to the Office of Student Affairs (OSA). At the faculty member's discretion and with the concurrence of the student or students involved, some cases, though reported to the OSA, may be resolved within the confines of the course and department. The instructor has the authority to adjust the offender's grades as deemed appropriate, including assigning an F to the assignment or exercise or, in more serious cases, an F to the student for the entire course" (Adopted from the QCC Academic Integrity Policy, 2/14/2005).

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES:

As stated in the current college catalog, any student who needs specific accommodations based upon the impact of a disability should register with the office of Services for Students with Disabilities (SSD) to be eligible for accommodations which are determined on an individual basis. The SSD office is located in the Science Building, room S132 (718-631-6257). Students should also contact their instructor privately to discuss their specific needs.

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FRIDAYS	CH-120 Topics/Activities	Hours	CH-121 Expt.
29 th Aug	Lab 1: Check-in Measurements (Expt. #2)	2 1	Check-in
5 th Sept.	Chap 1: An Introduction to Chemistry Chap 2: Standards for Measurements	1 2	Separation of the components of a mixture
12 th Sept.	In class activity #1: questions from Expt. #2 + handout Chap 3: Elements and Compounds	1 2	Chromatography
19 th Sept.	Exam #1: Chaps 1 and 2; Expt. #2 Lab 2: Identification of Selected Anions (Expt. 14)	1 2	Properties of substances: Density
23 rd Sept. Tue.	Chap 4: Properties of Matter Chap 5: Early Atomic Theory and Structure Chap 6: Nomenclature of Inorganic Compounds	1 1 1	Effect of temperature: Boiling and melting points
26 th Sept.	No Class		
3 rd Oct.	No Class		
10 th Oct.	In class activity #2: Chaps 3, 4, 5 and 6 Chap 10: Modern Atomic Theory and the Periodic Table	1 2	Electrical conductivity of solutions
17 th Oct.	Exam #2: Chaps 3, 4, 5, 6, Expt. 14 Lab 3: Lewis structures and Molecular Models (Expt. 17) Chap 11: Chemical Bonds	1 1 1	Qualitative analysis: Identification of common ions
24 th Oct.	In class activity #3: Chaps 10 and 11 Chap 7: Quantitative Composition of Compounds (7.1-7.3)	1 2	Lewis structures, VSEPR theory, molecular geometry
31 st Oct.	Exam #3: Chaps 10, 11 Chap 8: Chemical Equations	1 2	Water of hydration
7 th Nov.	Lab 4: Quantitative Preparation of Potassium Chloride (Expt. 15) In class activity #4: Chaps 7 and 8.	1 2	Empirical formula of magnesium-chlorine compound
14 th Nov.	Exam #4: Chaps 7 and 8 Chap 9: Calculations from Chemical Equations	1 2	Chemical properties: Chemical reactions
21 st Nov.	Chap 9: Calculations from Chemical Equations In class activity #5: Chap 9	3	pH determination of solutions
28 th Nov.	No Class		
5 th Dec.	Exam #5: Chap 9 Lab 5: Neutralization – Titration I (Expt. 22); Check-out Chap 15: Acids, Bases and Salts	1 2	Neutralization reaction: acid content in vinegar
12 th Dec.	Review Take-home exam is due (5% bonus to total course grade)	3	Lab exam
19 th Dec.	Final Exam (Cumulative: Chapters 1-11, 15)	2	Checkout

CH-120: FUNDAMENTALS OF CHEMISTRY – LABORATORY REPORT FORMAT

A lab report must be written after every experiment. You will usually have the same data as your partner, but your lab report is an independent assignment. **You will be given a template to complete for each experiment. The pre-lab section must be completed before class and shown to your instructor.** The rest will be completed as you perform the experiment and will later help you write your lab report. Each report will be due one week after the experiment is performed. Late assignments may be accepted at the discretion of your instructor and a penalty may be applied to your grade.

Typed lab reports are strongly encouraged. Please use the following format. Your lab instructor will inform you of their own additional instructions and requirements.

1. Your name and name of lab partner

2. Title of experiment and date performed

3. Objective

In 1-2 sentences, explain your primary goals and how you will achieve them. Use general terms, referring to techniques or methods, rather than describing specific procedures.

4. Introduction/Theory

Briefly describe the scientific principle behind the experiment. It may be based on the material in the lab manual, your text book, or other sources (include citations). Include relevant chemical reactions - this is a chemistry class!

5. List of materials and equipment

6. Summary of procedure and observations

Describe the experimental procedure in your own terms. Do not simply re-copy the steps from the manual. Be sure to describe only what you actually did, including any changes made to the procedure. If choices were possible, only indicate which one you made and explain why. Use the past tense and avoid the first person voice (I, we, us). Also include your observations such as color changes, release of vapor, etc. Diagrams are not required, but may be helpful.

7. Data and calculations

The lab manual provides sheets for data and results, which you should tear out and include in your lab report. Calculations must be neatly worked out and clearly labeled so they can be checked and given appropriate partial credit.

8. Conclusions and Sources of Error

Describe if and how the experimental objectives were met, and what scientific principles were investigated. Explain how your measurements are related to each other and your objective, and how they led to your results. **You should always summarize your final results.** When identifying an unknown, describe how you made this decision. You must also describe what could have led to incorrect or inaccurate results in this experiment, as well as steps that could be taken to prevent or correct the problems. This is different than a mistake or failure to follow instructions. Consider flaws in the experimental setup or assumptions that have been made.

9. Questions

Most experiments have a set of questions to answer or problems to solve. You must complete this section and turn it in as part of your final lab report.

The complete report will consist of the sections you have written, the data and question sheets, and the template sheet you completed during the experiment. Please attach them all together.