

This syllabus is provided as a general informational guide. Some of the information may vary depending on the specific course section and instructor. Different sections of the same course may require different textbooks. Verify the section specific textbook information in the CUNY's Academic Course Schedule Web Page. Modifications of the grading system presented here will be communicated by the instructors of the sections when they meet the class.

BOROUGH OF MANHATTAN COMMUNITY COLLEGE

The City University of New York

Department of Science

Title of Course Fundamentals of General, Organic and Biological Chemistry I **Class Hours** 3

Course Code CHE 121 **Laboratory Hours per Week** 3

Semester _____ **Credits** 4

Instructor Information (Phone#, Office#, email) _____

Course Description

This course is a two-semester course sequence that introduces principles and concepts of general, organic and biological chemistry. The laboratory will provide experimental applications of these chemical topics.

CHE 121-CHE 122 Two terms required. Liberal Arts Elective. Recommended for students intending to transfer to bachelor degree nursing and allied health science curricula.

CHE 121-CHE 122 cannot be granted credit to fulfill degree requirements for A.S. (Science) and for A.S. (Engineering Science).

CHE 121-CHE 122 does not meet science requirement for A.A. (Liberal Arts).

Basic Skills ACR 94, ENG 088 or ESL 54, and MAT 051

Prerequisites _____

Corequisites _____

Course Student Learning Outcomes (Students will be able to...)	Measurements (means of assessment for student learning outcomes listed in first column)
1. Students will be able to explain that living systems are made of elements and compounds with different chemical and physical properties. Water is a common solvent.	1. Exam questions, quizzes and laboratory assignments.
2. Students will be able to compare different kinds of chemical bonds in compounds, to contrast the names and formulas of the compounds and to explain their solubility in water.	2. Exam questions, quizzes and laboratory assignments.
3. Students will be able to identify different types of chemical reactions as well as the contrast of endothermic and exothermic reactions.	3. Exam questions, quizzes and laboratory assignments.
4. Students will be able to describe that many biological molecules are made of building blocks consisting of smaller organic molecular components with different functional groups.	4. Exam questions, quizzes and laboratory assignments.
5. Students will be able to apply mathematical skills solving problems such as density, moles, percent concentrations (mass/mass, mass/volume, and volume/volume), molarity, unit conversions and gas laws.	5. Exam questions, quizzes and laboratory assignments.

Below are the college's general education learning outcomes, the outcomes that are checked in the left-hand column indicate goals that will be covered and assessed in this course.

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	General Education Learning Outcomes	Measurements (means of assessment for general education goals listed in first column)
<input type="checkbox"/>	Communication Skills- Students will be able to write, read, listen and speak critically and effectively.	
X	Quantitative Reasoning- Students will be able to use quantitative skills and the concepts and methods of mathematics to solve problems.	To record experimental data with correct significant figures in the lab. To solve quantitative problems, e.g. density, concentrations, and conversions. To plot graphs with experimental data.
X	Scientific Reasoning- Students will be able to apply the concepts and methods of the natural sciences.	Exam questions, homework assignment, laboratory assignments and case studies.
<input type="checkbox"/>	Social and Behavioral Sciences- Students will be able to apply the concepts and methods of the social sciences.	
<input type="checkbox"/>	Arts & Humanities- Students will be able to develop knowledge and understanding of the arts and literature through critiques of works of art, music, theatre or literature.	
<input type="checkbox"/>	Information & Technology Literacy- Students will be able to collect, evaluate and interpret information and effectively use information technologies.	
<input type="checkbox"/>	Values- Students will be able to make informed choices based on an understanding of personal values, human diversity, multicultural awareness and social responsibility.	

Required Text

1. Timberlake, Karen C., General, Organic and Biological Chemistry: Structures of Life, 6th Edition. Pearson Prentice Hall (2018). ISBN-10: 0134730682. ISBN-13: 9780134730684
2. Timberlake, Karen C., Laboratory Manual for General, Organic, and Biological Chemistry, 3rd Edition. Pearson Prentice Hall (2014). ISBN-10: 0321811852| ISBN-13: 9780321811851.

Other Resources

Use of Technology (If Applicable)

Evaluation and Requirements of Students

There will be a minimum of four one-hour examinations (12.5% each, total 50%), a comprehensive final examination (25%) and fulfillment of all laboratory assignments (25%).

Class Participation

Participation in the academic activity of each course is a significant component of the learning process and plays a major role in determining overall student academic achievement. Academic activities may include, but are not limited to, attending class, submitting assignments, engaging in in-class or online

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activities, taking exams, and/or participating in group work. Each instructor has the right to establish their own class participation policy, and it is each student's responsibility to be familiar with and follow the participation policies for each course.

BMCC is committed to the health and well-being of all students. It is common for everyone to seek assistance at some point in their life, and there are free and confidential services on campus that can help.

Single Stop www.bmcc.cuny.edu/singlestop, room S230, 212-220-8195. If you are having problems with food or housing insecurity, finances, health insurance or anything else that might get in the way of your studies at BMCC, come by the Single Stop Office for advice and assistance. Assistance is also available through the Office of Student Affairs, S350, 212-220- 8130.

Counseling Center www.bmcc.cuny.edu/counseling, room S343, 212-220-8140. Counselors assist students in addressing psychological and adjustment issues (i.e., depression, anxiety, and relationships) and can help with stress, time management and more. Counselors are available for walk-in visits.

Office of Compliance and Diversity www.bmcc.cuny.edu/aac, room S701, 212-220-1236. BMCC is committed to promoting a diverse and inclusive learning environment free of unlawful discrimination/harassment, including sexual harassment, where all students are treated fairly. For information about BMCC's policies and resources, or to request additional assistance in this area, please visit or call the office, or email olevy@bmcc.cuny.edu, or twade@bmcc.cuny.edu. If you need immediate assistance, please contact BMCC Public safety at 212-220-8080.

Office of Accessibility www.bmcc.cuny.edu/accessibility, room N360 (accessible entrance: 77 Harrison Street), 212-220-8180. This office collaborates with students who have documented disabilities, to coordinate support services, reasonable accommodations, and programs that enable equal access to education and college life. To request an accommodation due to a documented disability, please visit or call the office.

BMCC Policy on Plagiarism and Academic Integrity Statement

Plagiarism is the presentation of someone else's ideas, words or artistic, scientific, or technical work as one's own creation. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism. Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has guides designed to help students to appropriately identify a cited work. The full policy can be found on BMCC's Web site, www.bmcc.cuny.edu. For further information on integrity and behavior, please consult the college bulletin (also available online).

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Lecture Syllabus

Week	Title	Pages
1	Chemistry and Measurements 2.1 Units of Measurement 2.2 Measured Numbers and Significant Figures 2.3 Significant Figures in Calculations 2.4 Prefixes and Equalities 2.5 Writing Conversion Factors 2.6 Problem Solving Using Unit Conversion 2.7 Density	27-29 30-31 32-35 36-39 40-43 44-47 49-53
2	Matter and Energy 3.1 Classification of Matter 3.2 States and Properties of Matter 3.3 Temperature 3.4 Energy 3.5 Energy and Nutrition 3.6 Specific Heat 3.7 Changes of State	64-66 67-69 70-73 74-76 77-78 80-81 82-88
3	Atoms 4.1 Elements and Symbols 4.2 The Periodic Table 4.3 The Atom 4.4 Atomic Number and Mass Number 4.5 Isotopes and Atomic Mass 4.6 Electron Energy Levels 4.7 Electron Configurations 4.8 Trends in Periodic Properties	100-101 102-104 107-109 110-111 113-116 117-122 122-126 129-134
4	Nuclear Chemistry 5.1 Natural Radioactivity 5.2 Nuclear Reactions 5.3 Radiation Measurement 5.4 Half-Life of a Radioisotope 5.5 Medical Applications Using Radioactivity 5.6 Nuclear Fission and Fusion	146-148 149-155 156-158 159-161 163-165 166-167
5-6	Ionic and Molecular Compounds 6.1 Ions: Transfer of Electrons 6.2 Ionic Compounds 6.3 Naming and Writing Ionic Formulas 6.4 Polyatomic Ions 6.5 Molecular Compounds: Sharing Electrons 6.6 Lewis Structures for Molecules and Polyatomic Ions 6.7 Electronegativity and Bond Polarity 6.8 Shapes and Polarity of Molecules 6.9 Intermolecular Forces in Compounds	175-178 179-181 182-185 186-189 190-193 194-196 199-201 202-206 207-209
7	Chemical Reactions and Quantities 7.1 Equations for Chemical Reactions 7.2 Types of Reactions 7.3 Oxidation-Reduction Reactions 7.4 The Mole 7.5 Molar Mass 7.6 Calculations Using Molar Mass	224-230 230-234 235-237 238-242 242-244 245-247

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	7.7 Mole Relationships in Chemical Equations 7.8 Mass Calculations for Chemical Reactions 7.10 Energy in Chemical Reactions	248-250 251-252 258-259
8	Gases 8.1 Properties of Gases 8.2 Pressure and Volume (Boyle's Law) 8.3 Temperature and Volume (Charles's Law) 8.4 Temperature and Pressure (Gay Lussac's Law) 8.5 The Combined Gas Law 8.6 Volume and Moles (Avogadro's Law) 8.7 The Ideal Gas Law 8.8 Partial Pressures (Dalton's Law)	276-279 281-282 284-285 286-288 289-290 291-293 293-295 298-300
9	Solutions 9.1 Solutions 9.2 Electrolytes and Nonelectrolytes 9.3 Solubility 9.4 Solution Concentrations and Reactions 9.5 Dilution of Solutions 9.6 Properties of Solutions	311-314 314-317 319-324 325-333 335-337 338-344
10	Reaction Rates and Chemical Equilibrium 10.1 Rates of Reactions 10.2 Chemical Equilibrium 10.3 Equilibrium Constants 10.4 Using Equilibrium Constants 10.5 Changing Equilibrium Conditions: Le Chatelier's Principle	356-359 360-362 363-365 366-368 369-374
11-12	Acids and Bases 11.1 Acids and Bases 11.2 Bronsted-Lowry Acids and Bases 11.3 Strengths of Acids and Bases 11.4 Dissociation of Acids and Bases 11.5 Dissociation of Water 11.6 The pH Scale 11.7 Reactions of Acids and Bases 11.8 Buffers	383-384 385-387 388-392 393-395 395-397 398-404 405-408 409-410
13	Introduction to Organic Chemistry: Alkanes 12.1 Organic Compounds 12.2 Alkanes 12.3 Alkanes with Substituents 12.4 Properties of Alkanes Functional Groups Alcohol, ether, aldehyde, ketone, carboxylic acid, and ester	427-429 430-432 433-437 438-441 See back cover of textbook, bottom.
14	Biomolecules 15.1 Carbohydrates 15.6 Disaccharides 15.7 Polysaccharides 17.1 Lipids 17.2 Fatty Acids 17.3 Waxes and Triacylglycerols 19.1 Proteins and Amino Acids 19.2 Proteins: Primary Structure 19.3 Protein Structure: Secondary Structure 21.1 Components of Nucleic Acids	522-523 542-544 546-548 587-587 588-589 594-595 661-662 665-666 670-671 722-723

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	21.2 Primary Structure of Nucleic Acids	725-726
	21.3 DNA Double Helix and Replication	727-729

Laboratory Syllabus

Experiment	Title	Pages
	Laboratory Safety and Procedures	
1	Measurement and Problem Solving	1-10
2	Conversion Factors in Calculations	11-22
3	Density and Specific Gravity	23-34
5	Energy and Matter	47-60
6	Atoms and Elements	61-71
8	Nuclear Chemistry	85-94
9	Compounds and Their Bonds	95-108
10	Chemical Reactions and Equations	109-120
11	Moles and Chemical Formulas	121-131
12	Gas Laws	133-153
15	Soluble and Insoluble Salts	167-178
14	Solutions, Electrolytes and Concentration	155-166
18	Reaction Rates and Equilibrium	201-212
20	Acid-Base Titration	225-234
21	Organic Compounds: Alkanes	235-250