

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.

CHE 121 Fundamentals of General, Organic and Biological Chemistry I Fall 2018

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 CHE121 **Laboratory Hours per Week** 3

Semester Fall 2018 **Credits** 4

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

Course Description

Fundamentals of General, Organic and Biological Chemistry I CHE 121

Fundamentals of General, Organic and Biological Chemistry II CHE 122

4 credits. 3 hrs. lecture and 3 hrs. lab (per term)

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 _____

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Student Learning Outcomes

Course Student Learning Outcomes	Measurements
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 is 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. (Check at least one.)

	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.	
<input checked="" type="checkbox"/>	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.
<input checked="" type="checkbox"/>	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.	

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CHE 121 Fundamentals of General, Organic and Biological Chemistry I Fall 2018

<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.

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%).

College Attendance Policy

At BMCC, the maximum number of absences is limited to one more hour than the number of hours a class meets in one week. For example, you may be enrolled in a three-hour class. In that class, you would be allowed 4 hours of absence (not 4 days). In the case of excessive absences, the instructor has the option to lower the grade or assign an F or WU grade.

Academic Adjustments for Students with Disabilities

Students with disabilities who require reasonable accommodations or academic adjustments for this course must contact the Office of Services for Students with Disabilities. BMCC is committed to providing equal access to all programs and curricula to all students.

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 website, www.bmcc.cuny.edu. For further information on integrity and behavior, please consult the college bulletin (also available online).

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CHE 121 Fundamentals of General, Organic and Biological Chemistry I Fall 2018

Lecture Syllabus

Week	Title	Pages
1	Chemistry and Measurements	
	2.1 Units of Measurement	27-29
	2.2 Measured Numbers and Significant Figures	30-31
	2.3 Significant Figures in Calculations	32-35
	2.4 Prefixes and Equalities	36-39
	2.5 Writing Conversion Factors	40-43
	2.6 Problem Solving Using Unit Conversion	44-47
	2.7 Density	49-53
2	Matter and Energy	
	3.1 Classification of Matter	64-66
	3.2 States and Properties of Matter	67-69
	3.3 Temperature	70-73
	3.4 Energy	74-76
	3.5 Energy and Nutrition	77-78
	3.6 Specific Heat	80-81
	3.7 Changes of State	82-88
3	Atoms	
	4.1 Elements and Symbols	100-101
	4.2 The Periodic Table	102-104
	4.3 The Atom	107-109
	4.4 Atomic Number and Mass Number	110-111
	4.5 Isotopes and Atomic Mass	113-116
	4.6 Electron Energy Levels	117-122
	4.7 Electron Configurations	122-126
	4.8 Trends in Periodic Properties	129-134
4	Nuclear Chemistry	
	5.1 Natural Radioactivity	146-148
	5.2 Nuclear Reactions	149-155
	5.3 Radiation Measurement	156-158
	5.4 Half-Life of a Radioisotope	159-161
	5.5 Medical Applications Using Radioactivity	163-165
	5.6 Nuclear Fission and Fusion	166-167
5-6	Ionic and Molecular Compounds	

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CHE 121 Fundamentals of General, Organic and Biological Chemistry I Fall 2018

6.1	Ions: Transfer of Electrons	175-178
6.2	Ionic Compounds	179-181
6.3	Naming and Writing Ionic Formulas	182-185
6.4	Polyatomic Ions	186-189
6.5	Molecular Compounds: Sharing Electrons	190-193
6.6	Lewis Structures for Molecules and Polyatomic Ions	194-196
6.7	Electronegativity and Bond Polarity	199-201
6.8	Shapes and Polarity of Molecules	202-206
6.9	Intermolecular Forces in Compounds	207-209
7	Chemical Reactions and Quantities	
7.1	Equations for Chemical Reactions	224-230
7.2	Types of Reactions	230-234
7.3	Oxidation-Reduction Reactions	235-237
7.4	The Mole	238-242
7.5	Molar Mass	242-244
7.6	Calculations Using Molar Mass	245-247
7.7	Mole Relationships in Chemical Equations	248-250
7.8	Mass Calculations for Chemical Reactions	251-252
7.10	Energy in Chemical Reactions	258-259
8	Gases	
8.1	Properties of Gases	276-279
8.2	Pressure and Volume (Boyle's Law)	281-282
8.3	Temperature and Volume (Charles's Law)	284-285
8.4	Temperature and Pressure (Gay Lussac's Law)	286-288
8.5	The Combined Gas Law	289-290
8.6	Volume and Moles (Avogadro's Law)	291-293
8.7	The Ideal Gas Law	293-295
8.8	Partial Pressures (Dalton's Law)	298-300
9	Solutions	
9.1	Solutions	311-314
9.2	Electrolytes and Nonelectrolytes	314-317
9.3	Solubility	319-324
9.4	Solution Concentrations and Reactions	325-333
9.5	Dilution of Solutions	335-337
9.6	Properties of Solutions	338-344
10	Reaction Rates and Chemical Equilibrium	

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CHE 121 Fundamentals of General, Organic and Biological Chemistry I Fall 2018

	10.1 Rates of Reactions	356-359
	10.2 Chemical Equilibrium	360-362
	10.3 Equilibrium Constants	363-365
	10.4 Using Equilibrium Constants	366-368
	10.5 Changing Equilibrium Conditions: Le Chatelier's Principle	369-374
11-12	Acids and Bases	
	11.1 Acids and Bases	383-384
	11.2 Bronsted-Lowry Acids and Bases	385-387
	11.3 Strengths of Acids and Bases	388-392
	11.4 Dissociation of Acids and Bases	393-395
	11.5 Dissociation of Water	395-397
	11.6 The pH Scale	398-404
	11.7 Reactions of Acids and Bases	405-408
	11.8 Buffers	409-410
13	Introduction to Organic Chemistry: Alkanes	
	12.1 Organic Compounds	427-429
	12.2 Alkanes	430-432
	12.3 Alkanes with Substituents	433-437
	12.4 Properties of Alkanes	438-441
	Functional Groups Alcohol, ether, aldehyde, ketone, carboxylic acid, and ester	See back cover of textbook, bottom.
14	Biomolecules	
	15.1 Carbohydrates	522-523
	15.6 Disaccharides	542-544
	15.7 Polysaccharides	546-548
	17.1 Lipids	587-587
	17.2 Fatty Acids	588-589
	17.3 Waxes and Triacylglycerols	594-595
	19.1 Proteins and Amino Acids	661-662
	19.2 Proteins: Primary Structure	665-666
	19.3 Protein Structure: Secondary Structure	670-671
	21.1 Components of Nucleic Acids	722-723
	21.2 Primary Structure of Nucleic Acids	725-726
	21.3 DNA Double Helix and Replication	727-729

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Laboratory Syllabus

Expt.	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

Updated on
March 13, 2018