

**Bergen Community College**  
**Division of Mathematics, Science and Technology**  
**Physical Science Department**

**Course Syllabus**  
**CHM-212 Organic and Biochemistry**

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Course Title:	CHM 212 Organic and Biochemistry
Prerequisites:	MAT011 or a passing score on the New Jersey Basic Skills Exam, CHM 100, CHM 112 or CHM 140
Course Description:	CHM 212 is designed to give students an understanding of organic and biochemistry. The study of Organic Chemistry will emphasize a function-group approach to organic reactions. Topics in biochemistry will include carbohydrates, proteins, lipids, nucleic acids, bioenergetics, enzymes, and biosynthetic pathways.
Textbook:	<u>Introduction to General, Organic &amp; Biochemistry</u> , F. Bettelheim, W. Brown, M. Campbell, S. Farrell and O. Torres, 11 <sup>th</sup> Edition, Cengage Learning, 2016. ISBN: 9781305717343

**STUDENT LEARNING OBJECTIVES:** As a result of meeting the requirements in this course, students will be able to:

1. Students will learn to recognize organic compounds and complete organic reactions. Students will be assessed based on their performance on written examination and quizzes. Assessment will also be based on performance in the laboratory and the students' analysis of experimental data.
2. Students will be able to identify each of the major classes of biochemical compounds. Students will be evaluated based on performance on written examinations and quizzes.
3. Students will learn how to recognize organic reactions as part of metabolic pathways. Students will be evaluated based on performance on written examinations and quizzes.
4. Students will be able to discuss new developments in the study of recombinant DNA. Students will be evaluated based on performance on written examinations and quizzes. Assessment will also be based on performance in the laboratory and the students' analysis of experimental data.
5. Students will be able to explain the application of chemical principles to medical applications. Students will be evaluated based on performance on written examinations and quizzes.

Course Content:

<u>Chapter</u>	<u>Topic</u>	<u>Student Learning Objectives</u>
10	Organic Chemistry Sources of organic compounds, Structural Formulas, Functional Groups	2, 3
11	Alkanes Constitutional Isomer, Nomenclature, Cycloalkanes, Cis-Trans Isomers, Physical and Chemical Properties	1, 2, 3, 5
12	Alkenes and Alkynes Structure, Nomenclature, Physical and Chemical Properties, Polymerization	1, 2, 3
13	Benzene and Its Derivatives Structure, Nomenclature, Chemical Properties	1, 2, 3, 5
14	Alcohols, Ethers and Thiols Structure, Nomenclature, Physical and Chemical Properties	1, 2, 3, 5
17	Aldehydes and Ketones Structure, Nomenclature, Chemical Properties Keto-enol Tautomerism	1, 2, 3, 5
16	Amines Structure, Nomenclature (Omit IUPAC nomenclature), Physical and Chemical Properties	1, 2, 3, 5
8 <i>Omit, Sec. 8.9</i>	Acids & Bases Acid Strength, Conjugate Acid-Base Pairs, Properties, pH, Buffers	1, 5
18	Carboxylic Acids Structure, Nomenclature, Physical and Chemical Properties, Soaps	1, 2, 3, 5
19	Carboxylic Anhydrides, Esters, and Amides Structure, Preparation, Chemical Properties, Phosphoric Esters and Anhydrides, Polymerization	1, 2, 3, 5
15	Chirality: The Handedness of Molecules Enantiomers, R, S System, Optical Activity	1, 2, 3, 5
20	Carbohydrates Monosaccharides, Cyclic Structure, Reactions, Disaccharides, Oligosaccharides and Polysaccharides	1, 2, 3, 5
22	Proteins Protein Functions, Amino Acids, Formation, Structural Organization, Denaturation	1, 2, 3, 5

23	<i>Omit Sec. 23.2</i> 23.8	Enzymes Terminology, Factors Influencing Activity, Mechanisms, Regulation, Medical Uses	1, 2, 3, 5
25		Nucleotides, Nucleic Acids and Heredity Nucleic Acid Structure, Classes of RNA, Genes, DNA Replication, DNA Repair, DNA Amplification	1, 2, 3, 4, 5
26	<i>Omit Sec. 26.6</i>	Gene Expression and Protein Synthesis Transcription, Translation, Mutations, Recombinant DNA, Gene Therapy	1, 2, 3, 4, 5
21	<i>Sec. 21.10 &amp; 21.11</i> <i>Optional</i>	Lipids Structure and properties of Triglycerides and Complex Lipids, Membranes	1, 2, 3, 5
27	<i>Omit Sec. 27.8</i>	Bioenergetics, How the Body Converts Food to Energy Krebs Cycle, Electron Transport, Chemiosmotic Pump and ATP	1, 2, 3, 5
28		Specific Catabolic Pathways. Carbohydrate, Lipid, and Protein Metabolism – Sec. 28.1-28.3 only Glycolysis	1, 2, 3, 5
29		Biosynthetic Pathways - Sec. 29.1-29.2 optional Biosynthesis of Carbohydrates	1, 2, 3, 5

NOTES: The laboratory work is an integral part of the course. Students must complete the laboratory work in order to receive a passing grade in the course.

EVALUATION: A. Examination (and quizzes)..... 75%  
B. Laboratory work..... 25%  
TOTAL .....100%

ADDITIONAL

- NOTES:
1. Students will be required to demonstrate the ability to explain concepts studied in this course. Examinations will include essay questions. Instructors may require additional writing assignments.
  2. The scheduled examinations must be completed in order for the student to receive a grade in the course. A student will be allowed either to take one make-up exam or to use his/her final examination grade in place of one missed examination. At the discretion of the instructor this policy may be modified.
  3. The course material is cumulative. Students experiencing difficulty with any segment of the course should see the instructor promptly as well as acquaint themselves with the tutorial services at the Tutoring Center.

## INSTRUCTIONAL RESOURCES:

1. Chemistry for Today: General, Organic and Biochemistry, Spencer L Seager, Michael R. Slabaugh, 6<sup>th</sup> Edition, Brooks/Cole, Belmont, 2008.
2. General, Organic and Biochemistry, Katherine Denniston, Joseph J. Topping and Robert L. Caret, 7<sup>th</sup> Edition, McGraw-Hill, New York, NY, 2011
3. Biochemistry: The Molecular Basis of Life, Trudy McKee and James R. McKee, 4<sup>th</sup> Edition, Oxford University Press, Inc., New York, NY, 2009.

**FACULTY ABSENCE PROCEDURE:** A daily listing of cancelled classes will appear in designated glass cases. Students can consult these cases before going to class. If students find a class cancelled which has not been listed, they should report this to the Evening Office C107 or the Divisional Dean's Office, A-304.

## SERVICES FOR STUDENTS WITH DISABILITIES

Bergen Community College aims to create inclusive learning environments where all students have maximum opportunities for success. Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Specialized Services at 201-612-5269 or via email at [ossinfo@bergen.edu](mailto:ossinfo@bergen.edu) for assistance.

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CHM212SCO

## CHM 212 LAB SCHEDULE

Laboratory Experiments for General, Organic and Biochemistry, Fredrick A. Bettelheim and Joseph M. Landesberg, 8th Edition, Brooks/Cole, 2013 ISBN:978-1-133-10602-1

<u>Week</u>	<u>Experiment</u>	<u>Student Learning Objectives</u>
1 & 2	Check in, Experiment 21 - Structure of organic compounds: use of molecular models I and modeling with Spartan	1, 2, 3
3	Experiment 24 – Classification and Identification of Hydrocarbons	1, 2, 3
4 & 5	Experiment 31 - Isolation of caffeine from tea leaves TLC and IR Analysis	1, 2
6 & 7	Functional Group Analysis – Experiments 25 & 26 and Computer Simulation (Handout)	1, 2, 3
8	Experiment 27 – Properties of Carboxylic Acids and Esters or Experiment 30 - Synthesis of Acetylsalicylic Acid (Aspirin) TLC of analgesics	1, 2, 3, 5
9	Determination of Vitamin C Concentration by Titration	2, 3, 5
10	Experiment 32 – Carbohydrates	1, 2, 3, 5
11	Quantitative Determination of Albumin (Handout).	2, 3, 5
12 & 13	Determination of CaCO <sub>3</sub> in antacid tablets	1, 2, 4
14 & 15	DNA Fingerprinting (Handout) Clean up, Check out	1, 2, 4

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