

# CH 005: BIO-ORGANIC CHEMISTRY

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**Originator**

rguinn

**Justification / Rationale**

Prerequisite change from CH 004 to CH 007.

**Effective Term**

Fall 2024

**Credit Status**

Credit - Degree Applicable

**Subject**

CH - Chemistry

**Course Number**

005

**Full Course Title**

Bio-organic Chemistry

**Short Title**

BIO-ORGANIC CHEMISTRY

**Discipline****Disciplines List**

Chemistry

**Modality**

Face-to-Face

**Catalog Description**

This course is a survey of organic chemistry and biochemistry with an emphasis on the health sciences. It covers the major functional groups of organic compounds. The biologically active macromolecules and their components are discussed. Bioenergetics and metabolism are a substantial part of this course. The course is intended for health sciences students in dental hygiene, physician assistant, and related programs. Note: This course, in conjunction with CH 003 or CH 007, satisfies the requirements for those Health Sciences programs that require one year of chemistry other than general chemistry. C-ID: CHEM 102

**Schedule Description**

This course is a survey of organic chemistry and biochemistry with an emphasis on the health sciences. This course, in conjunction with CH 003 or CH 007, satisfies the requirements for those Health Sciences programs that require one year of chemistry other than general chemistry. Prerequisite: CH 003 or CH 007 IGETC: 5A, 5C

Note: Beginning Spring 2024 CH-004 is becoming CH-007. Students who have already taken CH-004 will be allowed to register for this class and do not need to take CH-007.

**Lecture Units**

3

**Lecture Semester Hours**

54

**Lab Units**

1

**Lab Semester Hours**

54

**In-class Hours**

108

**Out-of-class Hours**

108

**Total Course Units**

4

**Total Semester Hours**

216

**Prerequisite Course(s)**

CH 003 or CH 007

**Required Text and Other Instructional Materials****Resource Type**

Book

**Author**

Smith, J., G.

**Title**

General, Organic, Biological Chemistry

**Edition**

4th

**City**

New York, NY

**Publisher**

McGraw-Hill Education

**Year**

2018

**College Level**

Yes

**Flesch-Kincaid Level**

12

**ISBN #**

9781259883989

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**Resource Type**

Manual

**Author**

Heasley, V.L., Christensen, V.J., Heasley, G.E.

**Title**

Laboratory manual for Bio-Organic Chemistry

**Publisher**

Pearson

**Year**

2015-01-01

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**For Text greater than five years old, list rationale:**

There is no newer version of that particular laboratory manual. However, since reproducibility is at the very heart of the science, these labs work as well in 2023 as they did in 2015.

**Class Size Maximum**

20

**Entrance Skills**

Describe the concepts of chemical bonding.

**Requisite Course Objectives**

CH 003-Demonstrate an understanding of the fundamental concepts of chemistry with their applications to human affairs.

CH 003-Discuss major historical chemistry discoveries which have been a part of human social and technological development.

CH 007-Describe the major principles of chemistry.

CH 007-Identify and distinguish the major categories of inorganic and organic chemical and biochemical reactions.

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**Entrance Skills**

Describe the different types of chemical reactions.

**Requisite Course Objectives**

CH 003-Demonstrate an understanding of the fundamental concepts of chemistry with their applications to human affairs.

CH 003-Solve chemistry problems with the coupled recognition that calculation methods in chemistry are shared in other domains such as business, economics, and technology.

CH 003-Demonstrate the ability to collect and interpret the data

CH 007-Balance reactions and perform stoichiometry calculations.

CH 007-Describe the major groups of biological molecules and their essential functions in metabolism.

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**Entrance Skills**

Predict the physical and chemical properties of a compound based on its structure.

**Requisite Course Objectives**

CH 003-Demonstrate an understanding of the fundamental concepts of chemistry with their applications to human affairs.

CH 003-Solve chemistry problems with the coupled recognition that calculation methods in chemistry are shared in other domains such as business, economics, and technology.

CH 003-Demonstrate the ability to raise questions and how to formulate them clearly

CH 007-Illustrate and name the major functional groups of organic compounds.

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**Entrance Skills**

Demonstrate laboratory techniques safely.

**Requisite Course Objectives**

CH 003-Demonstrate use of tools and instruments involved in making findings in chemical behavior.

CH 003-Demonstrate the ability to work in teams and to respect other people's opinions

CH 007-Collect and interpret data in the laboratory setting.

CH 007-Collaborate respectfully with fellow students in the laboratory.

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**Course Content**

1. Review of chemical bonding principles.
2. Alkanes, alkenes, and the concept of isomerism.
3. The physical and chemical properties and nomenclature of alkanes, alkenes, aromatics, alcohols, ethers, thiols, aldehydes, ketones, amines, carboxylic acids, and their derivatives.
4. The chemical nature and structural features of carbohydrates, amino acids, proteins, and lipids.
5. The transport and homeostatic mechanisms of the body.
6. Energy production in the cell.

7. Catabolic and anabolic pathways for monosaccharides, amino acids, and lipids.
8. The interrelationships of the metabolic pathways.

### Lab Content

1. Perform reactions typical of the functional groups of organic compounds.
2. Examine carbohydrates by specific tests and use of a polarimeter.
3. Examine the acid-base properties and other reactions of amino acids and proteins.
4. Perform standard tests to identify functional groups and types of macromolecules.
5. Use thin layer chromatography to identify analgesics.

### Course Objectives

Objectives	
Objective 1	Describe the ways in which carbon forms bonds and the differences between inorganic and organic compounds.
Objective 2	Explain and visualize the concept of isomerism.
Objective 3	Describe the chemical properties of the functional groups and compounds containing them.
Objective 4	Distinguish different classes of molecules based on their physical and chemical properties.
Objective 5	Outline and elaborate on the process of energy production and use within the cell.
Objective 6	Delineate and explain the major catabolic and anabolic pathways of monosaccharides, lipids, amino acids, and their interrelationships.
Objective 7	Outline the major nutritional requirements.
Objective 8	Discuss the major transport and homeostatic mechanisms of the body.

### Student Learning Outcomes

Upon satisfactory completion of this course, students will be able to:	
Outcome 1	Analyze collected data to draw plausible conclusions.
Outcome 2	Relate organic chemical concepts to human metabolic processes.
Outcome 3	Apply organic and biochemical terminology to processes found in living systems.
Outcome 4	Perform basic organic and biochemical laboratory experiments safely and accurately.

### Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Discussion	Classroom discussion to improve critical thinking.
Lecture	1. Lecture presentations including visual aids. 2. Handouts summarizing lecture material.
Laboratory	Laboratory work to give "hands-on" knowledge. The laboratory sessions have a large theoretical component.

**Methods of Evaluation**

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Written homework	<p>The laboratory assignments will be graded for ability to follow directions and for clarity of presentation. Laboratory assignments are weekly and take three hours each at minimum, usually longer.</p> <p>Worksheets related to specific lecture concepts are provided. There is at least one worksheet per chapter (this semester has 13 chapters), each worksheet is multiple pages, and would likely take an hour for a student already familiar and comfortable with the concepts covered on the worksheet. Graded assignments from previous semesters are also provided for extra practice.</p> <p>Quizzes may be in class or out of class. Out of class quizzes are short but conceptually more challenging than in-class assessments' therefore the student is expected to expend more time and focus per question here, with about one week allotted to complete each quiz. At least four quizzes are given throughout the semester.</p>	In and Out of Class
Student participation/contribution	Students are expected to participate in problem-solving during lecture, including in-class questions and worksheets.	In Class Only
Mid-term and final evaluations	There will be a comprehensive final examination on the lecture material.	In Class Only
Tests/Quizzes/Examinations	Examinations including multiple-choice, short-answer, and long-answer questions. There are at least four exams and four quizzes in a given semester, along with one Final Exam.	In Class Only
Laboratory projects	<p>Students will read through an upcoming laboratory experiment, answer pre-laboratory questions outside of class to show they are prepared, then come to class and perform the laboratory experiment.</p> <p>While performing the experiment they will write down relevant observations and results.</p> <p>After lab they will answer several follow-up questions to test their understanding of the experiment and its results.</p> <p>All of this information before, during, and after the experiment will be committed to writing and turned in at a later date.</p> <p>Experiments are performed weekly, for a total of 14 experiments. It is expected that for each experiment the student will spend, at minimum, two hours preparing for the experiment, and two hours after to make sense of the data collected during the experiment so that coherent answers to the postlab questions can be formulated. All of these estimations are minimum estimations.</p>	In and Out of Class

**Assignments**
**Other In-class Assignments**

1. Examinations consisting of multiple-choice, short-answer, and long-answer questions.
2. Quizzes consisting of multiple-choice and short-answer questions.
3. Laboratory experiments and associated handouts.

**Other Out-of-class Assignments**

1. Quizzes consisting of short-answer and long-answer questions.
2. Laboratory handouts.

**Grade Methods**

Letter Grade Only

**COD GE**

C1 - Natural Sciences

**CSU GE**

B1 - Physical Science  
B3 - Laboratory Activity

**IGETC GE**

5A - Physical Science  
5C - Science Laboratory

**MIS Course Data****CIP Code**

40.0501 - Chemistry, General.

**TOP Code**

190500 - Chemistry, General

**SAM Code**

E - Non-Occupational

**Basic Skills Status**

Not Basic Skills

**Prior College Level**

Not applicable

**Cooperative Work Experience**

Not a Coop Course

**Course Classification Status**

Credit Course

**Approved Special Class**

Not special class

**Noncredit Category**

Not Applicable, Credit Course

**Funding Agency Category**

Not Applicable

**Program Status**

Program Applicable

**Transfer Status**

Transferable to both UC and CSU

**General Education Status**

Y = Not applicable

**Support Course Status**

N = Course is not a support course

**C-ID**

CHEM 102

**Allow Audit**

Yes

**Repeatability**

No

**Materials Fee**

No

**Additional Fees?**

No

**Approvals****Curriculum Committee Approval Date**

04/20/2023

**Academic Senate Approval Date**

04/27/2023

**Board of Trustees Approval Date**

05/19/2023

**Chancellor's Office Approval Date**

06/22/2023

**Course Control Number**

CCC000638458

**Programs referencing this course**Liberal Arts: Math and Science AA Degree (<http://catalog.collegeofthedesert.eduundefined/?key=29>)Health Science AS Degree (<http://catalog.collegeofthedesert.eduundefined/?key=65>)Nutrition and Dietetics AS-T Degree (<http://catalog.collegeofthedesert.eduundefined/?key=7>)