CHEM 12B Course Outline as of Fall 2020

CATALOG INFORMATION

Dept and Nbr: CHEM 12B Title: ORGANIC CHEMISTRY
Full Title: Organic Chemistry
Last Reviewed: 1/27/2020

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	5.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	5.00	Lab Scheduled	6.00	17.5	Lab Scheduled	105.00
		Contact DHR	0		Contact DHR	0
		Contact Total	9.00		Contact Total	157.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 262.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
The second semester of an intensive one-year program based upon modern theoretical concepts of organic chemistry. All aspects of fundamental organic chemistry are studied, including nomenclature, chemical and physical properties, reactions and synthesis. The study includes theoretical aspects, reaction mechanisms, and multistep synthesis. Students transferring from a four year college or university are expected to complete this sequence prior to their junior year.

Prerequisites/Corequisites:
Course Completion of CHEM 12A

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: The second semester of an intensive one-year program based upon modern theoretical concepts of organic chemistry. All aspects of fundamental organic chemistry are studied, including nomenclature, chemical and physical properties, reactions and synthesis. The study includes theoretical aspects, reaction mechanisms, and multistep synthesis. Students

transferring from a four year college or university are expected to complete this sequence prior to their junior year. (Grade Only)
Prerequisites/Corequisites: Course Completion of CHEM 12A
Recommended:
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**		Effective:	Inactive:
CSU GE:	**Transfer Area**		Effective:	Inactive:
	B1	Physical Science	Spring 2000	
	B3	Laboratory Activity		
IGETC:	**Transfer Area**		Effective:	Inactive:
	5A	Physical Sciences	Spring 2007	
	5C	Fulfills Lab Requirement		

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:
UC Transfer:	Transferable	Effective:	Fall 1981	Inactive:

CID:
CID Descriptor: CHEM 160S Organic Chemistry for Science Majors Sequence A
SRJC Equivalent Course(s): CHEM12A AND CHEM12B

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Propose a synthetic route, predict the mechanisms for each step in the synthesis, and perform the synthesis and purification of a specified product from a list of given starting materials, while following common safety regulations and procedures.
2. Use nuclear magnetic resonance (NMR), infrared (IR), gas chromatography-mass spectrometry (GC-MS), and/or ultraviolet-visible data to elucidate the structures of unknown compounds and known compounds, and evaluate the success of the synthesis of a specific compound.

Objectives:
At the conclusion of this course, the student should be able to:
1. Name a wide variety of organic compounds.
2. Predict and explain relative physical and chemical properties for a wide variety of organic molecules.
3. Predict the products and describe the mechanisms for a wide variety of organic compounds using fundamental chemical principles.
4. Effectively communicate observations and subsequent conclusions by means of written laboratory reports.

Topics and Scope:

LECTURE MATERIAL
I. Alcohols, Ethers, Epoxides and Related Sulfur Compounds
II. Aldehydes and Ketones
III. Enols and Enolates
IV. Carboxylic Acids and Derivatives
V. Amines
VI. Aromatic Compounds
VII. Aryl Halides and Phenols
VIII. Heterocyclic Compounds
IX. Carbohydrates
X. Lipids
XI. Amino Acids and Proteins
XII. Nucleic Acids

LABORATORY MATERIAL
I. Gas Chromatography-Mass Spectrometry
II. NMR, IR, UV-VIS Spectroscopy
III. Multistep Organic Synthesis
IV. Separation, Purification and Qualitative Spectroscopic Analysis

Assignment:

Lecture-Related Assignments:
1. Specific reading and study assignments (40 - 50 pages per week)
2. Completion of end-of-chapter exercises (20 - 25 problems per week)

Lab-Related Assignments:
1. Laboratory experiments (10 - 15): identification of unknowns and products of reactions by physical, instrumental, and spectroscopic methods
2. Laboratory practical

Lecture- and Lab-Related Assignments:
1. Lecture and laboratory exams (3 - 6)
2. Comprehensive final exam (such as American Chemical Society (ACS) Organic Chemistry Exam)
3. A literature research project on "An Interesting Organic Molecule" (optional)
4. A written laboratory report on each experiment detailing accomplishments
5. Quiz(zes) (0 - 15)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports, An Interesting Organic Molecule report (optional)	Writing 10 - 25%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab reports, homework exercises, study assignments	Problem solving 5 - 15%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Laboratory experiments, lab practical	Skill Demonstrations 10 - 20%

Exams: All forms of formal testing, other than skill performance exams.

Lecture and laboratory exams, quiz(zes), final exam (such as ACS Org Chem Exam)	Exams 50 - 75%

Other: Includes any assessment tools that do not logically fit into the above categories.

Class participation	Other Category 0 - 5%

Representative Textbooks and Materials:

Organic Chemistry. 3rd ed. Klein, David. Wiley. 2017
Organic Chemistry. Bruice, Paula Yurkanis. Pearson. 2016
Organic Chemistry. 11th ed. Cary, Francis and Guiliano, Robert. McGraw Hill. 2019
Understanding the Principles of Organic Chemistry: A Laboratory Experience. Pedersen, Steven and Myers, Arlyn. Brooks/Cole. 2011 (classic)
Introduction to Organic Laboratory Techniques: A Microscale Approach. 5th ed. Pavia, Donald and Lampman, Gary and Kriz,George. Brooks/Cole. 2013 (classic)
Multiscale Operational Organic Chemistry. 2nd ed. Lehman, John. Pearson. 2009 (classic)