CHEM 12A Course Outline as of Fall 2020

CATALOG INFORMATION

Dept and Nbr: CHEM 12A Title: ORGANIC CHEMISTRY
Full Title: Organic Chemistry
Last Reviewed: 2/10/2020

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:
For students majoring in chemistry, biochemistry, chemical engineering, or a closely related field such as molecular and cell biology. The first 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 to a four-year college or university are expected to complete this sequence prior to their junior year.

Prerequisites/Corequisites:
Course Completion of CHEM 1B OR CHEM 3B OR CHEM 4B

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: For students majoring in chemistry, biochemistry, chemical engineering, or a closely related field such as molecular and cell biology. The first 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 to 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 1B OR CHEM 3B OR CHEM 4B
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 150	Organic Chemistry for Science Majors I, with Lab
SRJC Equivalent Course(s):	CHEM12A
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. Identify and explain the basic concepts, terminology, and theories of organic chemistry and biochemistry.
2. Relate the molecular level structures of organic and biological compounds to their physical and chemical properties.
3. Propose appropriate synthetic routes for organic compounds, use reaction mechanisms to explain those routes, and modern analytical methods to analyze and identify the products.
4. Perform laboratory experiments safely and interpret observations in order to validate theoretical ideas.
5. Maintain laboratory notebook and complete written reports detailing conclusions based on the notebook record.

Objectives:
At the conclusion of this course, the student should be able to:

1. Predict and explain three-dimensional structures, including conformational changes, for organic compounds.
2. Name organic compounds.
3. Predict structures for products of organic reactions.
4. Predict and explain relative physical properties and reactivities of organic compounds.
5. Suggest appropriate methods for the syntheses of organic compounds.
6. Predict and explain mechanisms for organic reactions.
7. Make observations and apply chemical concepts in the laboratory.
8. Use common laboratory techniques to synthesize, isolate, purify, and identify organic compounds.
9. Analyze compounds by instrumental methods.

Topics and Scope:

LECTURE MATERIAL
I. Bonding and structure of organic compounds
II. Alkanes, cycloalkanes and alkyl halides
III. Stereochemistry
IV. Alkenes, alkynes and alcohols
V. Nucleophilic substitution and elimination reactions
VI. Dienes and polyenes
VII. Aromaticity and aromatic compounds
VIII. Spectroscopy

LABORATORY MATERIAL
I. Crystallization
II. Melting point determination
III. Spectroscopy
IV. Distillations
V. Chromatography
VI. Extraction
VII. Nuclear magnetic resonance (NMR) spectroscopy
VIII. Infrared (IR) spectroscopy
IX. Isolation of organic compounds
X. Synthesis of organic compounds
XI. Structure determination
XII. Maintaining a research-style laboratory notebook

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 notebook records detailing experimental observations
3. Laboratory practical

Lecture- and Lab-Related Assignments:
1. Lecture and laboratory exams (4 - 6) plus a comprehensive final exam

2. A written laboratory report on each experiment detailing accomplishments (10 - 15 experiments)
3. 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	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.

Lab skill technique/accurate lab results (practical), lab notebook, laboratory experiments	Skill Demonstrations 10 - 20%

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

Lecture and laboratory exams, quiz(zes), final 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)