CH 010A: ORGANIC CHEMISTRY I

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Originator
rguinn

Justification / Rationale
Textbook update

Effective Term
Fall 2020

Credit Status
Credit - Degree Applicable

Subject
CH - Chemistry

Course Number
010A

Full Course Title
Organic Chemistry I

Short Title
ORGANIC CHEMISTRY I

Discipline

Disciplines List
Chemistry

Modality
Face-to-Face

Catalog Description
This course is the first of a two-semester sequence covering the basic principles and concepts of organic chemistry. An in-depth study is made of the bonding of carbon, stereochemistry, and the reactivity of alkanes, alkyl halides, alkenes, alkynes and alcohols. Addition, elimination, substitution and free radical reactions are discussed. Infrared Spectroscopy, Mass Spectrometry and Nuclear Magnetic Resonance Spectroscopy are being covered in detail. The course is designed for chemistry, biology and pre-professional majors.

Schedule Description
This course is the first of a two semester sequence covering the basic principles and concepts of organic chemistry. Prerequisite: CH-001B IGETC: 5A, 5C

Lecture Units
4

Lecture Semester Hours
72

Lab Units
1

Lab Semester Hours
54

In-class Hours
126

Out-of-class Hours
144

Total Course Units
5
Total Semester Hours
270

Prerequisite Course(s)
CH 001B

Required Text and Other Instructional Materials

Resource Type
Book

Author
Smith, J. G.

Title
Organic Chemistry

Edition
5th

City
New York

Publisher
McGraw-Hill Education

Year
2017

College Level
Yes

Flesch-Kincaid Level
12

ISBN #
9780078021558

Resource Type
Manual

Author
Mayo, D.W., Pike, R.M., Forbes, D.C

Title
Microscale Organic Laboratory, 6th ed

Publisher
John Wiley Sons

Year
2016-01-06

Class Size Maximum
20

Entrance Skills

Delineate the concepts of atomic and molecular orbitals.

Requisite Course Objectives

CH 001B-Describe the laws of thermodynamics and compute energy changes in reactions.
CH 001B-Describe the kinetics of reactions, perform calculations using rate laws and describe basic reaction mechanisms.
CH 001B-Analyze the nature of chemical equilibria, the Law of Mass Action and perform calculations involving equilibria, weak acids and bases, pH, buffers and slightly soluble substances.
CH 001B-Delineate simple organic and biochemical functional groups and their reactions.

Entrance Skills

Discuss chemical reactions.

Requisite Course Objectives

CH 001B-Describe the kinetics of reactions, perform calculations using rate laws and describe basic reaction mechanisms.
CH 001B-Analyze the nature of chemical equilibria, the Law of Mass Action and perform calculations involving equilibria, weak acids and bases, pH, buffers and slightly soluble substances.

Entrance Skills

Describe the concept of functional groups.

Requisite Course Objectives

CH 001B-Delineate simple organic and biochemical functional groups and their reactions.

Course Content

1. Review of atomic and molecular orbitals, bonding theories, acids and bases.
2. Alkanes and the concept of isomerism.
3. Stereochemistry of chiral molecules and geometric isomers.
4. Nucleophilic and electrophilic substitution reaction mechanisms.
5. Alkenes,alkynes, alkyl halides, and alcohols and their physical and chemical properties.
6. Addition, elimination, and free radical reactions.
7. Infrared Spectroscopy, Mass Spectrometry, Proton and Carbon Nuclear Magnetic Resonance Spectroscopy.

Lab Content

Crystallization, melting point, boiling point, refractive index, paper chromatography, column chromatography, simple and fractional distillation, extraction, molecular modeling, elimination reactions, organic synthesis reactions, Grignard reaction, IR, H-NMR, C-NMR, GC-MS.

Course Objectives

	Objectives
Objective 1	Describe the ways in which carbon forms bonds and the differences between inorganic and organic compounds.
Objective 2	State the relevance of acids and bases to organic chemistry.
Objective 3	Explain the concepts of constitutional isomers and stereoisomerism.
Objective 4	Describe the chemical properties of the alkanes, alkenes, alkynes, haloalkanes, alcohols.
Objective 5	Learn and apply the following reaction mechanisms: of nucleophilic substitution and elimination, addition reaction and free radical substitution reactions.
Objective 6	Learn how to acquire and interpret IR, Mass, proton NMR, and carbon NMR spectra.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Analyze spectroscopic data to draw plausible conclusions about molecular structure.
Outcome 2	Write a mechanism for an organic reaction.
Outcome 3	Develop an experimental narrative, recorded in a laboratory notebook.
Outcome 4	Perform an organic synthesis safely and accurately.

Outcome 5 Predict unimolecular and bimolecular substitution and elimination reaction outcomes when given reagents and reaction conditions.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Collaborative/Team	Laboratory experiments are done in pairs or groups. Often experimental techniques are taught once or twice by the faculty, and then the student is tasked with teaching fellow students the same technique.
Technology-based instruction	Power Point presentations, animation.I post lecture notes, sample quizzes, handouts, grades on CANVAS.
Participation	Students participate in lecture, activities, and laboratory experiments to analyze various aspects of chemical systems.
Lecture	Lecture presentations including visual aids, power point presentations, animation. Handouts summarizing lecture material.
Laboratory	Laboratory work to give “hands-on” knowledge. The laboratory sessions have a large theoretical component.The students learn how to use different instruments like: FT-IR, GC, GC-MS, NMR, Abbe Refractometer, melt-temp, distillation glass equipment, analytical balances, syringes, and pipettes.
Skilled Practice at a Workstation	Students are trained to use software associated with common methods of spectroscopic analysis.

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	Students are assigned several packets of spectra that they will use as evidence to establish the identity of the molecule represented by those spectra.	Out of Class Only
Tests/Quizzes/Examinations	Quizzes and exams consist of multiple-choice, short-answer, and long-answer questions. All quizzes, exams, and the Final exam are cumulative and include questions that require the synthesis of knowledge from separately-learned concepts to be appropriately answered. The bulk of outside-of-class time studying for these quizzes and exams, as they make up the majority of their grade.	In and Out of Class
Group activity participation/observation	Students work in groups in lecture to participate in in-class activities. Students work in pairs or groups in lab to perform the experiments.	In Class Only

Laboratory projects	Students perform roughly 11-12 experiments. Each experiment takes three to six hours in the laboratory wherein they put into practice theories discussed in the lecture. Students will spend roughly five to six hours preparing for an upcoming laboratory experiment. This will include reading provided materials pertaining to the experiment, watching provided hyperlinks to videos and written instructions about various laboratory techniques, finding and tabulating information (particularly safety information) about the chemicals they intend to use, and explaining any predictions they might have about the outcome of the experiment they will perform. For each experiment the student keeps a laboratory notebook, writing a detailed narrative of how they prepared for the experiment, how the experiment was performed, what results came of it, and what conclusions could be drawn from the recorded results. Students spend roughly 40 hours per semester outside of class preparing for and writing up laboratory reports for experiments done in lab.	In and Out of Class

Assignments

Other In-class Assignments

1. Lecture quizzes
2. Lecture exams
3. Laboratory experiments

Other Out-of-class Assignments

1. Laboratory reports
2. Lecture homework assignments

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
Not applicable

Support Course Status
Course is not a support course

C-ID
CHEM 160S

Allow Audit
No

Repeatability
No

Materials Fee
No

Additional Fees?
No

Approvals

Curriculum Committee Approval Date
11/05/2019

Academic Senate Approval Date
11/14/2019

Board of Trustees Approval Date
12/19/2019

Chancellor's Office Approval Date
6/08/2020

Course Control Number

CCC000241442

Programs referencing this course

Chemistry UC Transfer Pathway AS Degree (http://catalog.collegeofthedesert.eduundefined?key=274/)
Liberal Arts: Math and Science AA Degree (http://catalog.collegeofthedesert.eduundefined?key=29/)
Chemistry AS-T Degree (http://catalog.collegeofthedesert.eduundefined?key=41/)