CHEM-240: ORGANIC CHEMISTRY 1

Effective Term
Fall 2026

CC Approval
12/05/2025

AS Approval
12/11/2025

BOT Approval
12/18/2025

COCI Approval
03/05/2026

SECTION A - Course Data Elements

CB04 Credit Status
Credit - Degree Applicable

Discipline

Minimum Qualifications	And/Or
Chemistry (Master's Degree)	

Subject Code
CHEM - Chemistry
Course Number
240

Department
Chemistry

Division
Science and Engineering (SE)

Full Course Title
Organic Chemistry 1

Short Title
Organic Chemistry 1

CB03 TOP Code
1905.00 - Chemistry, General

CIP Code
40.0501

CB08 Basic Skills Status
NBS - Not Basic Skills

CB09 SAM Code
E - Non-Occupational

Rationale
Update DEI.

SECTION B - Course Description

Catalog Course Description

The first course of a two-semester sequence designed for pre-professional programs such as chemistry, chemical engineering, medicine and biology. Introduction to organic synthetic pathways, mechanisms, and spectroscopy. Lab work includes qualitative analysis of organic compounds, synthesis, extraction, separation and identification of compounds using physical properties, chemical reactivity, and spectral techniques.

SECTION C - Conditions on Enrollment

Open Entry/Open Exit

No

Repeatability

Not Repeatable

Grading Options

Letter Grade or Pass/No Pass

Allow Audit

Yes

Requisites

Prerequisite(s)

Completion of CHEM-121 with a minimum grade of C.

Requisite Justification

Requisite Description

Course in a Sequence

Subject

Chem

Course #

121

Level of Scrutiny

Required by 4-Year Institution

Explanation

Before entering the Organic Chemistry series, almost all CSU and UC (Including Sac State, UC Davis, and UC Berkeley) require completion of the General Chemistry series. At NVC the general Chemistry series concludes with Chem 121.

SECTION D - Course Standards

Is this course variable unit?

No

Units

5.0

Lecture Hours

54

Lab Hours

108

Outside of Class Hours

108

Total Contact Hours
162

Total Student Hours
270

Distance Education Approval

Is this course offered through Distance Education?
Yes

Online Delivery Methods

DE Modalities	Permanent or Emergency Only?
Hybrid	Permanent

SECTION E - Course Content

Student Learning Outcomes

	Upon satisfactory completion of the course, students will be able to:
1.	Communicate chemical and physical processes at the molecular level and how they relate to the macroscopic environment.
2.	Solve synthetic reaction pathways and mechanisms while demonstrating the reasoning clearly and completely.
3.	Implement laboratory techniques correctly using appropriate safety procedures and express them clearly in written laboratory reports.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1.	Solve complex reaction mechanisms.
2.	Synthesize compounds starting with simple ingredients.
3.	Determine the structure of organic compounds from spectrographic data.
4.	Name organic compounds based on their structure.

Course Content

Lecture Content

Carbon Compounds and Chemical bonds.

1. Introduction to Organic Chemistry.
2. Structure, isomerism, tetrahedral carbon.
3. Ionic and covalent bonds, polar bonds and resonance.
4. Molecular shape, polar molecules and molecular structure.
5. Quantum mechanics, atomic and molecular orbitals and hybridization.

Some Representative Carbon Compounds

1. Alkanes, sigma bonds.
2. Alkenes, alkynes and pi bonds.
3. Functional groups.
4. Acid-base reactions, Brönsted-Lowry and Lewis Theories.

Alkanes and Cycloalkanes.

1. Shapes, nomenclature and physical properties.
2. Conformations of alkanes and cycloalkanes, bond strain.
3. Substituted and polycyclic cycloalkanes.
4. Reactions of alkanes; substitution, halogenation and ring openings.
5. Sources of alkanes; petroleum and some syntheses.

Chemical Reactivity-Ionic, Nucleophilic Substitution and Elimination Reactions.

1. Breaking of bonds, intermediates, carbocations, free radicals and their stabilities.
2. Nucleophilic substitution; rates, kinetics, mechanism, SN1 and SN2 reactions.
3. Elimination reactions, E1 and E2.

Alkenes.

1. Nomenclature.
2. sp2 hybrids and structure.

3. Hydrogenation of alkenes, cycloalkenes.
4. Syntheses through dehydrohalogenation and dehydration.
5. Carbocation stability and rearrangements.
6. Catalytic affect in hydrogenation or dehydrogenation.
7. Reactions of Alkenes-Addition to the double bond.
8. Markovnikov's Rule, acid catalyzed addition of water, addition of sulfuric acid.
9. Dimerization and alkylation by carbocations.
10. Hydroboration, oxidation, halogenation and halohydrin formation.

Alcohols, Ethers, Epoxides, andThiols

1. Reactivity and properties of alcohols.
2. Synthesis and reactions of alcohols.
3. Synthesis and reactions of ethers and epoxides.
4. Synthesis and reactions of thiols.

Stereochemistry

1. Structural and stereoisomers.
2. Chirality, enantiomers and the R-S system.
3. Optical activity and molecules with more than one chiral carbon.
4. Reactions and production of enantiomers, stereospecific reactions.
5. Relative and absolute configurations.
6. Reactions that involve inversion, racemization and resolution.

Alkynes

1. Nomenclature.
2. sp hybrid and structure.
3. Acidity of terminal alkynes, acetylene.
4. Additions to alkynes, metal acetylides.
5. Synthesis and reactions of alkynes.
6. Chemical Reactivity-Free Radical and Addition Polymers.
7. Mechanism of chlorination of alkanes.
8. Stabilities of free radicals and their addition to alkenes.
9. Polymerization.

Lab Content

1. Methods of separation and purification
   a. Simple and Fractional Distillation
   b. Liquid-liquid extraction
   c. Recrystallization
   d. GC/TLC/Column Chromatography
2. Spectroscopic Identification
   a. FT-IR
   b. NMR
   c. GC-MS
3. Multistep syntheses
   a. Synthesis of butyl methyl ether from butanol
   b. Synthesis of Tylenol

Methods of Instruction

Methods of Instruction

Types	Examples of learning activities
Lab	Lab techniques are taught during a 4 hour lab period once per week.
Lecture	Students attend three hours of lecture per week.
Discussion	Two 1-hour short discussions on the weekly lab or lecture material
Experiments	Students are required to attend a four hour lab period where they do experiments in groups.
Observation and Demonstration	In-class demonstrations and online videos are shown to solidify and expand the lecture material.

Online Adaptation

Types	Examples of learning activities
Lecture	Lectures will be similar to those in person but broadcast synchronously or asynchronously through zoom.

Instructor-Initiated Online Contact Types

E-mail Communication
Video or Teleconferencing

Student-Initiated Online Contact Types

Discussions
Group Work

Course design is accessible

Yes

Methods of Evaluation

Methods of Evaluation

Types	Examples of classroom assessments
Exams/Tests	Exams include but are not limited to questions that are short answer, multiple choice, prediction of the products of reactions, written demonstration of the steps of chemical reactions, and calculations related to percentage of products and prediction of spectroscopic shifts. The final grade will be based upon the sum of the points gained out of the total number of points available (about 650 points). Grades are awarded as 100%-90% A, 89%-80% B, 79%-70% C, 69%-60% D, less than 60% F.
Quizzes	Quizzes reflect what is to be expected on an exam. Therefore, quizzes follow the same format as an exam but with far fewer questions. Quizzes include short answer questions, multiple choice, prediction of the products of reactions, written demonstration of the steps of chemical reactions, and calculations related to percentage of products and prediction of spectroscopic shifts. Quiz grades are based on the sum of the points available for each quiz (10 to 20 points each). Grades are awarded as 100%-90% A, 89%-80% B, 79%-70% C, 69%-60% D, less than 60% F.
Lab Activities	Students will work in groups and share experimental equipment. Students are asked to perform an experiment using proper experimental techniques and then spectroscopically identify their product, analyze it for the percent yield, and calculate its purity. These results are then written up and turned in as lab reports. Each student turns in their own lab report. These reports are graded and turned back to the students. Lab grades are based on the sum of the points available for each lab report (10 to 20 points each). Grades are awarded as 100%-90% A, 89%-80% B, 79%-70% C, 69%-60% D, less than 60% F.

Assignments

Reading Assignments

Students must read the text and material found online. They must read their lab manual and follow directions to successfully complete the lab.

Writing Assignments

Students must write lab reports each week.

SECTION F - Textbooks and Instructional Materials

Material Type

Textbook

Author

K. Peter C. Vollhardt, Neil E. Schore

Title

Organic Chemistry: Structure and Function

Edition/Version
8th Edition

Publisher
W. H. Freeman

Year
2018

Rationale
Book update from the previous edition

ISBN #
1319079458

Material Type
Manual

Author
S.E. Fawl

Title
Organic Chemistry I - Laboratory Manual

Publisher
Fountainhead Press

Year
2018

SECTION G - Diversity, Equity and Inclusivity

How does your course and/or course outline of record reflect strategies for accommodating and engaging diverse student populations, advancing equitable outcomes, and fostering inclusion for all students?
This course supports diverse student populations through the use of multiple representations of concepts, varied applications, and technology. Strategies may also include collaborative learning, transparent assessment practices, low-cost resources, alternative formative assessment, structured opportunities for direct communication with the instructor, and opportunities for students to connect course material to their own experiences, fostering equitable outcomes and an inclusive classroom environment.

Course Codes (Admin Only)

CB00 State ID
CCC000313019

CB10 Cooperative Work Experience Status
N - Is Not Part of a Cooperative Work Experience Education Program

CB11 Course Classification Status
Y - Credit Course

CB13 Special Class Status
N - The Course is Not an Approved Special Class

CB23 Funding Agency Category
Y - Not Applicable (Funding Not Used)

CB24 Program Course Status
Program Applicable

Allow Pass/No Pass
Yes

Only Pass/No Pass
No