

Washtenaw Community College Comprehensive Report

CEM 222 Organic Chemistry II

Effective Term: Fall 2015

Course Cover

Division: Math, Science and Health

Department: Physical Sciences

Discipline: Chemistry

Course Number: 222

Org Number: 12320

Full Course Title: Organic Chemistry II

Transcript Title: Organic Chemistry II

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission:

Change Information:

Consultation with all departments affected by this course is required.

Rationale: 3-yr review

Proposed Start Semester: Fall 2015

Course Description: This course is the second of a two semester sequence. In this course, students will continue to learn nomenclature, stereochemistry, preparations, and reactions of organic compounds (aromatic compounds, organic oxygen and sulfur compounds, carbonyl compounds, carboxylic acids, amines) and biological compounds. Students will apply this knowledge by developing reaction sequences that can be used to synthesize various organic compounds from given starting materials. In the laboratory students will learn how to synthesize and isolate organic compounds and then characterize them using spectroscopic methods.

Course Credit Hours

Variable hours: No

Credits: 4

Lecture Hours: Instructor: 45 **Student:** 45

Lab: Instructor: 45 **Student:** 45

Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 90 **Student:** 90

Repeatable for Credit: NO

Grading Methods: Letter Grades

Audit

Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Level 3

Requisites

Prerequisite

CEM 211 minimum grade "C"

General Education

MACRAO

MACRAO Science & Math

MACRAO Lab Science Course

General Education Area 4 - Natural Science

Assoc in Applied Sci - Area 4

Assoc in Science - Area 4

Assoc in Arts - Area 4

Michigan Transfer Agreement - MTA

MTA Lab Science

Request Course Transfer

Proposed For:

Central Michigan University

Eastern Michigan University

Michigan State University

University of Michigan

Wayne State University

Western Michigan University

Student Learning Outcomes

1. Classify and name organic compounds based on their organic and biological functional groups, as well as apply nomenclature rules to recognize correct chemical names and formulas.

Assessment 1

Assessment Tool: Departmental Exam

Assessment Date: Fall 2018

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: all

How the assessment will be scored: answer key

Standard of success to be used for this assessment: 70% of students will score 75% or higher

Who will score and analyze the data: Department faculty

2. Recognize and apply spectroscopic data to organic structure analysis.

Assessment 1

Assessment Tool: Departmental Exam

Assessment Date: Fall 2018

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: all

How the assessment will be scored: answer key

Standard of success to be used for this assessment: 70% of students will score 75% or higher.

Who will score and analyze the data: department faculty

3. Perform laboratory procedures related to the synthesis, isolation, and analysis of organic compounds. Collect data, perform calculations and draw conclusions based on the results.

Assessment 1

Assessment Tool: Laboratory reports

Assessment Date: Winter 2019

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: all

How the assessment will be scored: departmentally-developed rubric
Standard of success to be used for this assessment: 70% of the students assessed will score 6 out of 9 or higher on the lab report.

Who will score and analyze the data: Department faculty

4. Relate stereochemistry of reactants to reaction type in order to predict synthetic pathways as well as products.

Assessment 1

Assessment Tool: Departmental Exam

Assessment Date: Fall 2018

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: all

How the assessment will be scored: answer key

Standard of success to be used for this assessment: 70% of students will score 75% or higher.

Who will score and analyze the data: department faculty

Course Objectives

1. Aromatic Compounds: Define aromaticity.
Matched Outcomes
2. Aromatic Compounds: Draw the major product, and reaction mechanism of electrophilic aromatic substitution reactions.
Matched Outcomes
3. Aromatic Compounds: Predict the effects of substituents on reaction products and rate.
Matched Outcomes
4. Aromatic Compounds: Show the major products of nucleophilic aromatic substitution and benzyne reaction types.
Matched Outcomes
5. Spectroscopy: Explain how the various types of spectroscopy work, including, IR, NMR, Mass Spec and UV-Vis.
Matched Outcomes
6. Spectroscopy: Interpret spectral data and relate to molecular structure.
Matched Outcomes
7. Spectroscopy: Predict spectral characteristics based on functional group.
Matched Outcomes
8. Oxygen and Sulfur Compounds: Identify and name the various oxygen and sulfur containing compounds: alcohols, ethers, epoxides, phenols, thiols, sulfides and disulfides.
Matched Outcomes
9. Oxygen and Sulfur Compounds: Draw the products of their major reaction types.
Matched Outcomes
10. Carbonyl Compounds: Identify and name the carbonyl containing compounds, aldehyde, and ketone.
Matched Outcomes
11. Carbonyl Compounds: Predict the products of their major reaction types: synthesis, oxidation, reduction, condensation, and nucleophilic addition reaction types.
Matched Outcomes
12. Carboxylic acids and their derivatives: Identify and name carboxylic acids and their derivatives: esters, acid halides, amides, anhydrides, and nitriles.
Matched Outcomes
13. Carboxylic acids and their derivatives: Show synthesis mechanisms for each derivative.
Matched Outcomes
14. Carboxylic acids and their derivatives: Draw reaction mechanisms for the main reaction types for each compound, including nucleophilic acyl substitution, carbonyl alpha-substitution, and carbonyl condensation reactions.
Matched Outcomes
15. Organic bases - Amines: Identify and name amine containing compounds.
Matched Outcomes

16. Organic bases - Amines: Show patterns of basicity.
Matched Outcomes
17. Organic bases - Amines: Show major reaction products.
Matched Outcomes
18. Biomolecules: Identify the different biomolecules; carbohydrates, lipids, and proteins.
Matched Outcomes
19. Biomolecules: Characterize each group and their functions.
Matched Outcomes
20. Biomolecules: Relate stereochemistry to function.
Matched Outcomes
21. Laboratory: Observe laboratory safety procedures.
Matched Outcomes
22. Laboratory: Keep a journal.
Matched Outcomes
23. Laboratory: Manipulate laboratory equipment.
Matched Outcomes
24. Laboratory: Interpret and follow written procedures.
Matched Outcomes
25. Laboratory: Collect and measure data, including spectroscopic techniques.
Matched Outcomes
26. Laboratory: Interpret and summarize data.
Matched Outcomes
27. Laboratory: Apply significant figures to measurements, calculations, and data analysis.
Matched Outcomes
28. Laboratory: Draw conclusions based on experimental results.
Matched Outcomes

New Resources for Course

Course Textbooks/Resources

Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

Level III classroom

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
Faculty Preparer: <i>Kathleen Butcher</i>	<i>Faculty Preparer</i>	<i>Oct 28, 2014</i>
Department Chair/Area Director: <i>Kathleen Butcher</i>	<i>Recommend Approval</i>	<i>Oct 30, 2014</i>
Dean: <i>Kristin Brandemuehl</i>	<i>Recommend Approval</i>	<i>Nov 05, 2014</i>
Vice President for Instruction: <i>Bill Abernethy</i>	<i>Approve</i>	<i>Jan 21, 2015</i>