

## Washtenaw Community College Comprehensive Report

### CEM 222 Organic Chemistry II Effective Term: Spring/Summer 2020

#### Course Cover

**Division:** Math, Science and Engineering Tech

**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:** Three Year Review / Assessment Report

**Change Information:**

**Consultation with all departments affected by this course is required.**

**Rationale:** This is a required course review - no changes implemented.

**Proposed Start Semester:** Winter 2020

**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

Ferris State University

Grand Valley State University

Michigan State University

Oakland 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. Apply nomenclature rules to recognize correct chemical names and formulas.

### **Assessment 1**

Assessment Tool: Departmental exam

Assessment Date: Spring/Summer 2022

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: Spring/Summer 2022

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: Spring/Summer 2022

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. Complete reaction mechanisms with products and reaction conditions.

**Assessment 1**

Assessment Tool: Departmental exam

Assessment Date: Spring/Summer 2022

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.
2. Aromatic Compounds: Draw the major product and reaction mechanism of electrophilic aromatic substitution reactions.
3. Aromatic Compounds: Predict the effects of substituents on reaction products and rate.
4. Aromatic Compounds: Show the major products of nucleophilic aromatic substitution and benzyne reaction types.
5. Spectroscopy: Explain how the various types of spectroscopy work, including infrared (IR), nuclear magnetic resonance (NMR), mass spectrometry and ultraviolet-visible (UV-Vis).
6. Spectroscopy: Interpret spectral data and relate the data to molecular structure.
7. Spectroscopy: Predict spectral characteristics based on functional group.
8. Oxygen and Sulfur Compounds: Identify and name the various compounds containing oxygen and sulfur: alcohols, ethers, epoxides, phenols, thiols, sulfides and disulfides.
9. Oxygen and Sulfur Compounds: Draw the products of their major reaction types.
10. Carbonyl Compounds: Identify and name the carbonyl-containing compounds: aldehyde and ketone.
11. Carbonyl Compounds: Predict the products of their major reaction types: synthesis, oxidation, reduction, condensation, and nucleophilic addition.
12. Carboxylic acids and their derivatives: Identify and name carboxylic acids and their derivatives: esters, acid halides, amides, anhydrides, and nitriles.
13. Carboxylic acids and their derivatives: Show synthesis mechanisms for each derivative.
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.
15. Organic bases - Amines: Identify and name amine-containing compounds.
16. Organic bases - Amines: Show patterns of basicity.
17. Organic bases - Amines: Show major reaction products.
18. Biomolecules: Identify the different biomolecules: carbohydrates, lipids, and proteins.
19. Biomolecules: Characterize each group and their functions.
20. Biomolecules: Relate stereochemistry to function.
21. Laboratory: Observe laboratory safety procedures.
22. Laboratory: Keep a journal.
23. Laboratory: Manipulate laboratory equipment.
24. Laboratory: Interpret and follow written procedures.
25. Laboratory: Collect and measure data, including spectroscopic techniques.
26. Laboratory: Interpret and summarize data.
27. Laboratory: Apply significant figures to measurements, calculations, and data analysis.

28. Laboratory: Draw conclusions based on experimental results.

## New Resources for Course

### Course Textbooks/Resources

Textbooks  
Manuals  
Periodicals  
Software

### Equipment/Facilities

Level III classroom  
Testing Center  
Computer workstations/lab

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
<b>Faculty Preparer:</b> <i>Nagash Clarke</i>	<i>Faculty Preparer</i>	<i>Aug 19, 2019</i>
<b>Department Chair/Area Director:</b> <i>Suzanne Albach</i>	<i>Recommend Approval</i>	<i>Aug 20, 2019</i>
<b>Dean:</b> <i>Victor Vega</i>	<i>Recommend Approval</i>	<i>Sep 17, 2019</i>
<b>Curriculum Committee Chair:</b> <i>Lisa Veasey</i>	<i>Recommend Approval</i>	<i>Sep 30, 2019</i>
<b>Assessment Committee Chair:</b> <i>Shawn Deron</i>	<i>Recommend Approval</i>	<i>Oct 04, 2019</i>
<b>Vice President for Instruction:</b> <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Oct 07, 2019</i>

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**Reason for Submission:** Three Year Review / Assessment Report

**Change Information:**

**Consultation with all departments affected by this course is required.**

**Course description**

**Outcomes/Assessment**

**Rationale:** Regular three year review as a result of assessment report.

**Proposed Start Semester:** Winter 2018

**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.

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**Variable hours:** No

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## **Requisites**

### **Prerequisite**

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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: Spring/Summer 2020

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

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Collect data, perform calculations and draw conclusions based on the results.

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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. Complete reaction mechanisms with products, reaction conditions and any relevant stereochemistry.

### Assessment 1

Assessment Tool: Departmental exam

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Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

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**New Resources for Course**

**Course Textbooks/Resources**

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- Manuals
- Periodicals
- Software

**Equipment/Facilities**

- Level III classroom
- Testing Center
- Computer workstations/lab

<b><u>Reviewer</u></b>	<b><u>Action</u></b>	<b><u>Date</u></b>
<b>Faculty Preparer:</b> <i>Nagash Clarke</i>	<i>Faculty Preparer</i>	<i>Jul 19, 2017</i>
<b>Department Chair/Area Director:</b> <i>Kathleen Butcher</i>	<i>Recommend Approval</i>	<i>Aug 21, 2017</i>
<b>Dean:</b> <i>Kristin Good</i>	<i>Recommend Approval</i>	<i>Aug 23, 2017</i>
<b>Curriculum Committee Chair:</b> <i>Lisa Veasey</i>	<i>Recommend Approval</i>	<i>Oct 18, 2017</i>
<b>Assessment Committee Chair:</b> <i>Michelle Garey</i>	<i>Recommend Approval</i>	<i>Oct 31, 2017</i>
<b>Vice President for Instruction:</b> <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Nov 06, 2017</i>