

Mayville State University
CHEM 241/341
Organic Chemistry I

Bob Miess

Fall 2022

4 S.H.

Contact Information: Email: Robert.Miess@mayvillestate.edu Office: Classroom Building 108C, Phone: 800-437-4104 Ext. 34885 or direct 701-788-4885 if long distance isn't an issue for you, or on campus 348845.

Hours of Availability: Tuesday @ 4, Wednesday @ 10, Friday @ 4; other times by arrangement; my schedule is posted on the course Welcome! page

Instruction Mode: On Campus Face-to-Face, Zoom to Dakota State Bottineau

Meeting Times and Location: MTWF 11:00 – 11:50, SB 130(MSU)/ Nelson 115 (DCB)

Course Description

This course is an introduction to organic chemistry including structure and bonding, nomenclature, stereochemistry, functional groups, and spectroscopy for structure determination.

Pre-/Co-requisites

CHEM 122, General Chemistry II, is required as a pre-requisite for this course but may be waived with instructor approval with exigent circumstances.

CHEM 341L, Organic Chemistry I Lab, is a recommended co-requisite for this course. The lab will build on class discussion and provide opportunities to apply and observe the topics under discussion.

Purpose of the Course

The CHEM 341/342 course sequence is intended to be an introduction to the basic concepts of organic chemistry. In CHEM 341 we will study the chemistry of carbon compounds with an emphasis on bonding descriptions and the relationship to structure and chemical reactivity, stereochemistry, and basic reaction mechanisms. Classes of compounds used to discuss and illustrate these concepts include hydrocarbons (alkanes, alkenes, alkynes), alcohols, and haloalkanes.

The purposes of CHEM 341 include expanding the student's knowledge of chemical principles begun in General Chemistry, introducing the student to the foundations of organic chemistry including the relationship between the chemical and physical properties of a substance to its structure, and developing the skills to be successful in Organic Chemistry.

Organic chemistry is one of the recognized areas of the chemical universe and can be a daunting challenge because of all the information and skills to be mastered.

Organic chemistry nowadays almost drives me mad. To me, it appears like a primeval tropical forest full of the most remarkable things, a dreadful endless jungle into which one does not dare enter for there seems to be no way out.
Friederich Wohler, 1835

Course Objectives

The goals of the MSU Science program are to present current information on aspects of the physical world and to develop logical reasoning, sometimes mathematical, relating one process to another. Organic Chemistry I prepares the student to discuss and work with the basic principles of organic chemistry and its relationship to other disciplines as well as to describe different scientific models and how these models are used to stimulate scientific inquiry.

Students who have completed this course should be able to:

1. Name organic compounds.
 - What are the IUPAC rules for naming organic compounds?
 - How does structure affect the naming of organic compounds?
 - How do stereochemical concerns influence the naming of organic compounds?
2. Discuss and apply the descriptions of bonding to organic compounds and their reactions.
 - Draw Lewis Dot structures emphasizing the reactivity of a molecule.
 - What does VSEPR tell us about bonding in carbon compounds?
 - How do structure and bonding affect physical properties of organic compounds?
 - Compare and contrast the reactions of propane, propene, and propyne.
3. Discuss and apply basic organic reactions and their mechanisms. These include nucleophilic substitution, elimination, radical substitution, electrophilic addition, and pericyclic reactions.
 - Compare and contrast S_N1 , S_N2 , E1, and E2 reaction mechanisms and the conditions that favor them.
 - What reaction conditions favor substitution over elimination?

Program Student Learning Outcomes (SLOs) Addressed in This Course

The link to the Academic Program Student Learning Outcomes document can be found in the course shell Welcome! page. Following the link, leads to a document containing all learning outcomes pertaining to Essential Studies courses and all majors and minors. The document has an index, so you can quickly find the degree you are pursuing.

Each of the identified Chemistry program student learning outcomes are introduced or re-enforced in this course.

- **SLO #1:** Students will acquire a content knowledge base in the traditional chemistry core commensurate with career goals
- **SLO #2:** Students will communicate scientific information both orally and in writing
- **SLO #3:** Students will apply quantitative or qualitative theories of science to a broad variety of chemical problems (including experiential component)
- **SLO #4:** Students will construct and critically analyze scientific arguments

Course Improvements Based on Most Recent Assessment Findings

Program Assessment (SLO 1) – students have not been retaining content knowledge throughout the year at a rate comparable to their national peers. To address this, the Achieve homework system has been implemented to provide student opportunities to build their own skills by taking advantage of the provided hints and explanations available with each question at a more personalized pace, in an interactive environment, and to provide immediate feedback. Students will also be required to provide more than principle organic products for reaction questions on exams. The reaction questions involve students being presented with reactant(s) and reaction conditions and require them to analyze this given information and apply the concepts and theories discussed in class to determine the appropriate product(s). Students will need to analyze the reactant(s) identifying what

classes of molecules/functional groups they fall into, and the reagent(s) considering what sort of reactions they cause. Based on this information, students will be asked to finally provide the product or products generated.

Required/Recommended Materials

For CHEM 341/342 the following text is required:

Organic Chemistry, 2nd Edition (2006), Sorrell TN, University Science Books, Sausalito, CA.

[Achieve](#) access; course site: pcvfv8

Recommended Text:

Solutions to Exercises Organic Chemistry, 2nd Edition (2006), Sorrell TN, University Science Books, Sausalito, CA. A copy is on reserve in the Byrnes-Quanbeck Library. See the assistants or the librarians at the checkout desk for help.

Instructional Strategies

Multiple strategies will be utilized during the semester including direct instruction, modeling, and problem-based learning.

Learning Experiences

As a student in this class, you are expected to:

1. Complete assignments in a timely fashion. Late work is unacceptable and will be graded accordingly. If you need an extension, please let me know the reason and we can try to work something out.
2. Actively participate in the learning process. To participate effectively you need to be prepared so that you can ask and answer questions, draw your own conclusions, and think creatively as well as critically. If you do not understand something, speak out. Read the textbook as assigned!
3. Participation in the class discussion is strongly encouraged.

Instructional Technologies Utilized in this Course

- **Blackboard (Bb)** – MSU's learning management system

Expectations/Protocols

Student grades will be based upon your performances in the following areas:

Readings, assignments, class announcements, and important dates will be posted on the class Blackboard site. Achieve homework assignments will be made which are a minimum I feel need to be done to ensure competence with the material. There will additionally be problems from the textbook which will be reviewed in class but not graded.

There will be four quizzes to ensure that everyone is keeping up with the material. The quizzes will be based directly on the material under class discussion.

There will be three written exams (around Week 4/5, Week 9/10, Week 14/15). The tests will be like the problems from the book and Achieve (in an essay question format). The exam will include a selection of multiple-choice questions dealing with terminology, properties, as well as application of the material. I will post a sample exam on Bb which will be reviewed in class. The sample exam is for your review and will not be counted as a formal assignment.

Starting with the second exam, the exam will include a reaction question and a mechanism question.

A comprehensive Final Exam will be administered during the final exam week. This semester the exam is scheduled for Monday, December 12 at 11:00. We can work something out at DCB if needed.

Instructor/Student Communication

Students are accountable for all academic communications sent to their Mayville State University e-mail address and all information posted on the course Blackboard site.

I will respond to all emails sent Monday – Friday within 24 hours. Weekend emails will be addressed the first day of the next work week, typically by noon. If MSU classes are not meeting (i.e., for a holiday), I may not be in the office so, like on the weekend, I may not get back to you until the next working day.

Method of Evaluation/Grading

I will normally return graded work like exams and quizzes within 48 hours of receipt/due date. Please review any comments upon return. If you have questions regarding the feedback, please ask me.

You should know what your grade by simply looking at the “weighted total column” in the Blackboard gradebook.

Your final grade is based on the following weighting: Combined Quizzes total will count 20% of your course grade. Combined in class exams will count for 45%. The final exam will account for 15% of your course grade. The combined Achieve homework results will make up the remaining 20%.

The total of these percentages will be used to determine the final letter grade in the course using a traditional 90 (+) = A, 80 (+) = B, 70 (+) = C, 60 (+) = D.

Enrollment Verification/Participation

The U.S. Department of Education requires instructors to validate student enrollment. As this is a face-to-face course, attendance collected during the first ten days of the course and used for verification. Logging into the LMS is **NOT** considered attendance. If it is not validated by noon of the 10th day, your enrollment in this course will be at risk.

Late Arrivals

The grading system for students adding this course after the first day of instruction will be modified. The student will be graded only on the activities that transpired while the student is enrolled. Students will not be penalized for missed assignments, but the student is still responsible for learning the course material that was covered during their initial absence as it could appear on the quiz or exam.

Course Schedule: A schedule of activities will be posted on the class Blackboard site by the week. As this course is happening in the real world, things may change. If changes are needed, I will let everyone know and update the posted schedule. Due dates for the specific activities will be posted within the weekly schedule.

Important Student Information

Navigate to Blackboard > MaSU tab > Student Resources tab to find a document entitled, “Important Student Information,” which includes information about:

- ✓ Academic Grievance Concerns and Instructor English Proficiency
- ✓ Starfish - Student Success System
- ✓ Students with Documented Disabilities

- ✓ Academic Honesty
- ✓ Emergency Notification
- ✓ Continuity of Academic Instruction for a Pandemic or Emergency
- ✓ Family Educational Rights and Privacy Act of 1974 (FERPA)
- ✓ Diversity Statement

Bibliography:

Texts:

Carey, F.A. Giuliano R.M., Organic Chemistry, 8th Edition, McGraw-Hill Companies, Inc., USA, 2011

Web site:

Khan Academy: <http://www.khanacademy.org/>

Tutors:

Tutors are available through Student Learning Services with local student tutors. You can email Katie Richards (katie.richards.2@mayvillestate.edu) to set up arrangements. Please make sure to follow through with those arrangements. If you cannot make your appointment, please let the tutor know as far in advance as possible. There are also online tutoring services available through Ms. Richards as well. She can assist you in setting this service up as well as there is limit on the contracted time.

Tentative Schedule:

Block 1 (Week 1 – Week 5)

- Chapter 1 – The Structure of Organic Molecules
- Chapter 2 – Bonding in Organic Molecules
- Chapter 3 – The Conformations of Organic Molecules
- Chapter 4 – The Stereochemistry of Organic Molecules
- Exam 1 (C1 – C4)

Block 2 (Week 5 – Week 10)

- Chapter 5 – Chemical Reactions and Mechanisms
- Chapter 6 – Substitution Reactions of Alkyl Halides
- Chapter 7 – Substitution Reactions of Alcohols and Related Compounds
- Exam 2 (C5 – C7)

Block 3 (Week 10 – Week 15)

- Chapter 8 – Elimination Reactions of Alkyl Halides, Alcohols, and Related Compounds
- Chapter 9 – Addition Reactions of Alkenes and Alkynes
- Chapter 10 – Addition Reactions of Conjugated Dienes
- Exam 3 (C8 – C10)

Comprehensive Final Exam