

SYLLABUS - CHEM 244 ORGANIC CHEMISTRY II - SPRING 2025

Dr. Ed Brush

(NOTE: The PDF document on the course web page has clickable hyperlinks)

Instructor Information:

- **Where can you find me?** My office is DMF 407
- **How can you meet with me?** Feel free to stop in and chat about class, careers, research, etc.
 - Come to my Office Hours: Monday 11-1 & Tuesday 11-1
 - Make an appointment
 - My door is always “open”, so if you are in DMF feel free to stop by
- **Contact info:** ebush@bridgew.edu; 508-531-2116
- **Course Web page:** <http://webhost.bridgew.edu/ebush/>: Lecture and lab syllabi, video assignments, worksheets, and answer keys.
- **Class Meetings (DMF 477/481):** CHEM 244-001 MWF, 8:00 - 8:50 AM
CHEM 244-002 MWF, 10:10 - 11:00 AM
- **CHEM 244 Laboratory (DMF 477 & 481):** CHEM 244 Labs will begin the week of January 27. **PLEASE NOTE: Visorgogs** can be purchased at the [bookstore](#) or on [Amazon](#).



You belong in this class! All students deserve a safe learning environment, where everyone’s contributions are important and respected.

You have a right to accommodations! I am happy to work with any student to improve the delivery of course information and/or assessment tools. If you need accommodations, please contact **Student Accessibility Services** at SAS@bridgew.edu or 508-531-2194.

The health and safety of everyone in our class are shared responsibilities of students and instructor! If you are sick, or if you are not comfortable driving in icy or snowy weather, please do not attend class!

Please complete this [Class Survey](https://forms.gle/YqqQMvM8waa8uwrU7) by Friday, January 24 at 5:00 pm for Bonus Points (<https://forms.gle/YqqQMvM8waa8uwrU7>)

IMPORTANT DATES:

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|---------------------|--|
| January 29 (W): | Last day to Drop/Add |
| February 17 (M): | No classes – President’s Day |
| February 19 (W): | Monday Schedule (no Wednesday classes) |
| February 26 (W): | Careers in Biotech event in DMF from 12-3: <ul style="list-style-type: none"> • Opening remarks, 12:15 PM will be at 12:15 • Presentations about careers in biotech (lab work, IT and cyber work, data analysis, etc.) • Round table networking event followed by a network reception |
| March 10-14 (M-F): | No classes – Spring Break! |
| April 21 (M): | No classes – Patriots Day |
| April 25 (F): | Last day to withdraw |
| April 30 – May 15: | BSU’s Student Arts & Research Symposium (StARS) |
| May 5 (M): | Last day of classes |
| May 6 (T): | Reading Day |
| May 9 (F) & 12 (M): | Optional CHEM 244 Exam V (8-10 am) |
| May 12 or 13: | “I Survived Organic Chemistry” Pizza Party and T-Shirts! |

Inclusivity and Support in the Classroom

It is imperative, more so now than ever, to address questions related to diversity, equity, inclusion, respect and belonging. We are all aware of numerous insults on human life, but as scientists we must also understand the disproportionate injustices that impact human health and the environment. Diversity, Inclusion, Equity and Belonging are an integral part of the BSU strategic priorities. This is also critical in our CHEM 244 class, as students and instructor will work together to learn the basic concepts of organic chemistry. We will also collaborate on a class project to explore how green chemistry principles and practices will help us identify, understand and address key issues related to environmental justice. In order to alleviate the global environmental and human health impacts that continue to disproportionately burden environmental justice communities, it is imperative that we listen, learn and respect each other.

The field of Green and Sustainable Chemistry is uniquely positioned to provide an understanding of, and contribute solutions to, complex global problems. To accomplish this, we must be able to effectively collaborate with people who have diverse perspectives and life experiences in order to understand the challenges facing the world in the 21st century and develop and apply the strategies needed to help solve them.

I expect that we will all work together to create a respectful, supportive, and inclusive learning environment for you, your classmates, and me. We will foster individual and collective growth, self-discovery, and a sense of belonging. We will encourage a diversity of thoughts, perspectives and experiences, that honors your identities (including race, gender, class, sexuality, religion, ability, etc.). If you feel that your performance in this class is being impacted by your experiences in- or outside of class, please don't hesitate to come and talk with me.

CHEM 244 COURSE DESCRIPTION, GOALS, and LEARNING OBJECTIVES

Course Description.

CHEM 244 Organic Chemistry II (4 credits). This is the second semester of an introductory course in organic chemistry designed for students majoring in biology, chemistry, earth sciences, and geography. CHEM 244 carries four credits earned by three hours of lecture, one hour of recitation, and three hours of laboratory work weekly. **Prerequisite: minimum C- grade in CHEM 243.**

My goals are to help you:

- See that Organic Chemistry is essential to our everyday lives, and that almost everything around you is composed of organic molecules, including the biomolecules in your own body and the numerous bioorganic reactions occurring in all living organisms.
- See that the field of organic chemistry is dynamic, exciting and essential to all life processes.
- See why Organic Chemistry is essential for careers in the biological, chemical, environmental, health and medical sciences, as well as biochemistry, genetics, the pharmaceutical sciences and medicinal chemistry careers
- Learn more about Green Chemistry and Chemical Sustainability for the design and synthesis of benign chemical materials, the development of safer products for consumers, and to help identify, understand and propose solutions to environmental justice issues in our world
- Build self-confidence to conduct undergraduate research

These goals will be accomplished through the following objectives in the lecture and laboratory:

- 1) This course will help you build a solid foundation of facts, concepts, and fundamental principles in organic chemistry that you will be able to apply to intermediate and advanced courses in biology, biochemistry, chemistry, and geological sciences, as well as to research in any of these fields;
- 2) Through *student-centered learning* you will develop the confidence and skills to:
 - a. take charge and responsibility for your own learning
 - b. working collaboratively with other students as you discover and understand new information
 - c. develop skills in problem solving, critical thinking and decision making
- 3) The lab portion of the course will clarify some concepts discovered in lecture, and will help you develop confidence to apply laboratory methods to conduct research and create new knowledge in organic chemistry;
- 4) You will gain a better appreciation of how collaborating with other students who have diverse backgrounds, life experiences and skills can help you to use your chemistry content knowledge to identify and understand big global problems, and contribute to their solutions.

Learning Outcomes CHEM 244 Organic Chemistry II Lecture. Students who successfully complete this course will be able to...

- Apply the basic principles that govern covalent bonding concepts to the structure of organic compounds including the octet rule, Lewis structures, formal charge, hybridization and resonance;
- Recognize families of organic compounds based on their functional groups, and apply nomenclature rules to draw formulas, structures, and write the names of organic compounds;
- Explain the role of chemical structure, hybridization, resonance and inductive effects on acid/base strength, and apply acid/base theory to correlate structure and reactivity in the context of the reactions and mechanisms of organic compounds;
- Draw and name structures and stereoisomers; recognize and assign configurations;
- Apply knowledge of functional group reactivity to propose reasonable mechanisms for basic organic chemistry reactions using “curved arrow” designations, and apply knowledge of reaction mechanism to predict and explain the outcome of a reaction, relative reactivity, and stereochemistry.
- Explain and apply the concept of aromaticity and determine if a compound is aromatic, anti-aromatic, or nonaromatic;
- Describe the techniques of Nuclear Magnetic Resonance spectrometry, Infrared spectroscopy, and Mass Spectroscopy, and use spectroscopic data to determine molecular structures;
- Plan multi - step synthesis of organic compounds using retrosynthetic analysis and functional group interconversions.

CHEM 244 COURSE REQUIREMENTS AND RESOURCES

Attendance and Group Work Policy.

Class attendance and group work are critical to your success. In our “flipped” classroom you have a responsibility to your group by: (1) coming to class on-time, (2) being prepared with your notes from the assigned videos, and (3) being actively engaged in problem solving. We cover material at a rapid pace and if you fall behind it is very difficult to catch up.

- I track your attendance through daily worksheets, and make note if you arrive late to class.
- If you consistently miss class or arrive late, I will request a meeting to talk about how we can do better.
- You will lose worksheet points if you miss an excessive number of classes, or consistently arrive to class late.

Missing Class or Arriving Late.

- Students might miss class or arrive late for a variety of legitimate reasons, such as illness, weather, personal emergencies, heavy traffic, car issues, waking up late, etc.
- If you are going to miss class or arrive late, send me an email **before class, if possible**.
- PLEASE do not email me if you are diving!!!!!!!!
- I expect all students to do their best to arrive to class on time to work with your group. If you consistently arrive late, I will first give you a warning, then there will be a one-point worksheet penalty for every minute you are late.
- If you know well ahead of time that you will miss a class (such as attending a conference), let me know as early as possible.
- On the day of the missed class, I will send you the worksheet by email as a PDF document.
- You must be able to print and complete the worksheet, then email the worksheet back to me as a single, PDF document by 10 pm. If you need more time, you must let me know before 10 pm.
- The [Genius Scan](#) app will use your phone’s camera to make a PDF document of the worksheet.
- **I will not accept photos of your worksheet.**
- I will not accept any worksheets after I’ve posted the answer key.
- You can use this make-up option up to three times during the semester.

I encourage all students to bring a laptop/tablet to every class.

You can use your computer to answer questions on worksheets and for project work. All students are expected to have access to a computer and the technology to access the internet.

Required Software.

- You will need to use **Microsoft Word, Microsoft Teams, and Adobe PDF.**
- You can download the Microsoft Office Suite here: <https://www.bridgew.edu/ccs/online/student/technical-requirements>.
- You might need to email me completed class worksheets as PDF documents. I strongly encourage you to find an app that will use your phone's camera to create PDF documents, such as [Genius Scan](#).

Course Resources.

All course resources (class videos, documents) can be accessed through my CHEM 243-244 course webpage: <http://webhost.bridgew.edu/ebrush/>.

E-mail.

You are responsible for all e-mail communications sent by your instructor and your classmates to your BSU e-mail account. It is important that you check your BSU e-mail every day.

Peer Leader Office Hours.

The organic chemistry Peer Leaders will hold office hours to help you master course material covered during the week.

Textbook Requirement.

There are numerous on-line resources for learning organic chemistry. For this reason, I do not have specific textbook requirement. **However all students are required to identify an organic chemistry resource to help you succeed in this course.** Here are some options (also listed on the course web page):

- CHEM 243-244 Organic Chemistry Web Page (<http://webhost.bridgew.edu/ebrush/>).
- Buy a used organic chemistry text on-line (check with me before buying).
- Sign-out an organic chemistry textbook from Dr. Brush
- Here are two good on-line resources:
 - [Khan Academy Organic Chemistry \(videos\): \(https://www.khanacademy.org/science/organic-chemistry\)](https://www.khanacademy.org/science/organic-chemistry)
 - [LibreTexts Organic Chemistry Textbook: https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_\(Wade\)_Complete_and_Semesters_I_and_II/Map%3A_Organic_Chemistry_\(Wade\)](https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_(Wade)_Complete_and_Semesters_I_and_II/Map%3A_Organic_Chemistry_(Wade))

Course Notebook.

All students are required to maintain a paper notebook or binder, or e-notebook for your course material. You are expected to bring your notebook to class every day. There will be unannounced checks of your course notebook that will count as worksheet points.

Responsibilities of the student.

By registering for this course, you have accepted the responsibility expected of all BSU students: ***it is the student's responsibility to take the initiative to learn the course material!*** Examples include:

- respecting yourself, your classmates, Peer Leaders, and the course instructor
- coming to class and lab prepared and on time
- taking exams as scheduled
- notifying the course instructor ahead of time if you will miss a class
- collaborating on worksheet problems in class
- keeping an up-to-date lecture notebook
- turning in assignments on time
- taking advantage of office hours

Responsibilities of the instructor.

I will work to create a respectful, supportive, and inclusive learning environment that fosters individual and collective growth, self-discovery, and a sense of belonging. Together, we will encourage a diversity of thoughts, perspectives and experiences, that honors all our identities (including race, gender, class, sexuality, religion, ability, etc.).

GRADING POLICY – Subject to Change!

Grading Instrument	Points	% of final grade
Group Worksheets (10 points each worksheet, scaled to 150 points)	150	15%
Exams (individual, 4 x 150 points each)	600	60%
Group Project	100	10%
Lab grade	150	15%
TOTAL	1000	100%

Final Grade.

Assigned at the end of the semester based on the following scale: A's (90+), B's (80-89), C's (70-79), D's (60-69), F (<60). All graded work will be assigned a numerical score that will not be curved. **Note: an "A" grade requires a 95% average, and a "C-" requires a 70% average.**

Return of Course Work to Students.

I will return graded work to you as quickly as I can. I will not list your grades in Blackboard so its important that you keep your own record of graded work. All worksheets, exams and answer keys will be posted to the course web page.

Group Worksheets.

Your goal is to earn 150 "Worksheet Points" (15% of your grade). This can be accomplished by:

- Daily group worksheets in class. You will collaborate with your group on each worksheet for a group grade. **Point deductions will be made if you arrive late or leave early.**
- My worksheets are designed with the assumption that you have: (1) watched the videos, (2) taken notes, (3) have your notebook open on your bench, and (4) are working with your group in solving worksheet problems.
- Your up-to-date course notebook will be periodically checked, and count as 10-20 worksheet points.
- **Bonus Points.** All students have the opportunity to earn up to 20 "Bonus Points" that will offset missed worksheets, and/or low scores on daily worksheets.

Exams.

- There will be a total of four exams (150 points each). You will be provided with a detailed Study Guide that lists the topics covered on each exam. There will also be an in-class review the class prior to each exam.
- If you miss an exam, you can take a make-up exam on the class day following the scheduled exam date. Each student gets **one make-up exam, but only if you provide documentation for an illness or an emergency.** If you miss additional exams, for any reason, you will get a zero score.
- Please note that all students have the option to replace your **lowest** exam grade by taking the optional "Exam V" at the end of the semester. There is no formal final exam.
- **Optional "Exam V".** On Reading Day, I will notify each student about their "final" course grade. Students will then have the option of accepting that "final" grade, or taking "Exam V" to replace their lowest exam grade and improve their final grade. Exam V will be given during the final exam period, will be the same length and format as a semester exam. You will be told in advance what topics will be covered.

CHEM 243-244 Class Project: Green Chemistry Contributions to Addressing Issues of Environmental Justice.

The class project requires: (1) group work, (2) the reading of assigned material or watching assigned videos outside of class, (3) the completion of group work in MS Teams, and (4) a group presentation at the StARS Symposium.

What are some of the big societal problems in the world today? Who is most affected by these issues? Is there a role for chemistry in identifying, understanding, and solving these problems? In our CHEM 243 class, you will be engaged in a class project to explore big, global problems, and investigate how *green and sustainable chemistry* can provide solutions. Our context comes from the [UN Sustainable Development Goals](#) (SDGs), the world's "to-do" list, that offers an agenda to address world-wide challenges of poverty, protecting the planet and ensuring prosperity.

Chemists must play a key role in achieving these goals. As part of our normal class work you will identify examples of environmental justice and/or climate justice, and learn how green and sustainable chemistry may contribute solutions. You will each learn to appreciate the unique skills that individual students can bring to a project team, and apply your chemistry knowledge to understanding the challenges and opportunities of carbon capture. Outcomes of this project include:

- Your group will present your project at the BSU StARS Symposium. Your group will work together preparing and giving a presentation on the class project. This presentation grade will be part of your Project Grade.
- Be able to answer the question on how organic chemistry can contribute to solving global problems.

Flipped Classroom.

In the flipped classroom, basic information will be made available prior to class through short, YouTube video “lectures”. URL links to these videos are posted on the class web page and allow students to learn from anywhere, and at your own pace. This way we can spend valuable class time making sense of the material through problem solving! You can discuss course concepts with other students, the Peer Leaders, and the course instructor.

For you to take full advantage of the flipped classroom the following points are critical:

- For each class you will be assigned 1-3 lecture videos (see schedule below).
- **Before coming to class**, you will watch the videos and **take notes in your required course notebook**.
- You may not watch lecture videos during class.
- **During class**, you will work together in groups of 4-5 students on class worksheets for a group grade. Group worksheets may NOT be done individually or outside of class.
- My worksheets are designed with the assumption that you have:
 - (1) watched the videos **BEFORE** coming to class
 - (2) taken notes in your required notebook
 - (3) have your notebook open on your bench, and
 - (4) are working with your group in solving worksheet problems.
- **Point deductions will be made:**
 - If you consistently arrive to class late or leave early.
 - If you watch the assigned videos during class time.
- Worksheets and answer keys will be posted to the class web page by 5 PM for your practice and review.
- If you are consistently unprepared for class, I will request a meeting to discuss how we can do better.

Flipped Class Advantages:

- Learning becomes a shared responsibility between students and instructor
- Flexible learning environment that goes where you go
- You can learn at your own pace
- You can catch up on missed work
- You can review at any time
- We can spend more class time for in-depth learning and discussion
- Instructor works more closely with students
- Improved engagement and collaboration between students



Edited graphic from ViewSonic: <https://www.viewsonic.com/library/education/what-is-the-flipped-classroom-model/>

CHEM 244 TOPICS AND WEEKLY SCHEDULE – Subject to Change!

Videos 12-1 to 12-4	Multistep Synthesis: The Grignard Reaction
Videos 9-1 to 9-7	Infrared Spectroscopy and Nuclear Magnetic Resonance Spectrometry
Videos 14-1 to 14-3	Introduction to Aromatic Compounds
Videos 15-1 to 15-7	Reactions of Aromatic Compounds
Videos 16-1 to 16-4	Aldehydes & Ketones – Nucleophilic addition to the carbonyl carbon
Videos 17-1 to 17-4	Carboxylic Acids and Their Derivatives – Nucleophilic addition-elimination reactions
Videos 18-1	Reactions at the α -carbon of carbonyl compounds – Enols and enolates
Videos 19-1 to 19-2	Condensation and conjugate addition reactions of carbonyl compounds (Aldol condensation)
Videos 3-2, 3-3, 24-2	Acid & Bases, Biopolymers

Dates	<u>CHEM 244 Videos</u>	Classwork
January 22 (W)	Introduction to CHEM 244; <u>Mechanism Review</u>	Worksheet “Zero”; Class Project Review
January 24 (F)	Worksheet “Zero”; Class Project Review	Worksheet “Zero” due; <u>class survey due</u>
January 27 (M)	12-1 to 12-2	Worksheet #1
January 29 (W)	12-3 to 12-4; Last day to Drop/Add	Worksheet #2
January 31 (F)	Group Project Work	Objective I
February 3 (M)	9-1 to 9-2	Worksheet #3
February 5 (W)	9-3 to 9-4	Worksheet #4
February 7 (F)	9-5 to 9-6	Worksheet #5
February 10 (M)	9-7	Worksheet #6
February 12 (W)	EXAM I REVIEW	Worksheet #7
February 14 (F)	EXAM I	
February 17 (M)	NO CLASSES – President’s Day	Project-2
February 19 (W)	Group Project Work; MONDAY SCHEDULE	Objective II
February 21 (F)	14-1 to 14-2	Worksheet #8
February 24 (M)	14-3 to 15-1	Worksheet #9
February 26 (W)	15-2 to 15-3	Worksheet #10
February 28 (F)	15-4 to 15-5	Worksheet #11
March 3 (M)	15-6 to 15-7	Worksheet #12
March 5 (W)	EXAM II REVIEW	Worksheet #13
March 7 (F)	EXAM II	
March 10-14 (M-F)	SPRING BREAK	
March 17 (M)	Group Project Work	Objective III
March 19 (W)	16-1 to 16-2	Worksheet #14
March 21 (F)	16-3	Worksheet #15
March 24 (M)	No Class – ACS Conference	
March 26 (W)	16-4	Worksheet #16
March 28 (F)	17-1 to 17-2	Worksheet #17
March 31 (M)	17-3	Worksheet #18
April 2 (W)	17-4	Worksheet #19
April 4 (F)	Group Project Work	Objective IV
April 7 (M)	EXAM III REVIEW	Worksheet #20
April 9 (W)	EXAM III REVIEW	Worksheet #21
April 11 (F)	EXAM III	
April 14 (M)	18-1	Worksheet #22
April 16 (W)	Group Project Work	Objective V
April 18 (F)	19-1	Worksheet #23
April 21 (M)	NO CLASSES – Patriot’s Day	
April 23 (W)	19-2	Worksheet #24
April 25 (F)	3-2, 3-3, 24-2	Worksheet #25
April 28 (M)	3-2, 3-3, 24-2	Worksheet #26
April 30 (W)	EXAM IV REVIEW	Worksheet #27
MAY 2 (F)	EXAM IV	
May 5 (M)	No class!	
May 6 (T)	Reading Day (grades sent by email)	
May 9 and 12	OPTIONAL EXAM V	
May 12 or 13	“I Survived Organic Chemistry” Party (11 am – 1 pm)	

BSU RESOURCES FOR STUDENT SUCCESS

The Academic Achievement Center.

The AAC provides students with academic services and resources that propel them toward successful and timely degree completion. The AAC is the largest hub of student academic services on campus, offering services both online and in-person. The AAC is comprised of four major support areas: Academic Advising (first-semester freshmen), Student Accessibility Services, Learning Assistance (Academic Coaching and Tutoring), and Testing Services.

Learning Assistance (LA) consists of both Academic Coaching and Tutoring.

Tutoring areas include: Math Services, the Accounting & Finance Lab, Writing Studio, Tutoring Central (100/200 introductory and Core Curriculum courses), and Second Language Services. To make an appointment for Tutoring or Academic Coaching, please sign into our platform, [Accudemia](#), using your BSU credentials.

Student Accessibility Services.

As a member of the Bridgewater State University community, it is my goal to create a learning experience that is accessible for all students – including those with disabilities. BSU’s commitment to students with disabilities is not only shaped by legal requirements but is also driven by our commitment to social justice and ensuring a fully accessible University experience to our community. Students with disabilities are encouraged to collaborate with Student Accessibility Services to confidentially explore accommodations and other resources available to them. SAS can be reached at SAS@bridgew.edu or 508.531.2194.

Assistance in Contacting Faculty for Documented Medical Challenges, Injury or Family Emergencies.

If a student will be absent for illness, medical reasons, or exceptional personal reasons for more than three (3) consecutive class days, the Center for Student Support may be asked to notify the student’s faculty regarding the student’s absences and request flexibility in attendance and work owed, if possible. This flexibility is at the sole discretion of the faculty. Students will be required to provide verifiable documentation regarding the reason for the absences to the Center for Student Support through [this form](#). In addition to the form, you can contact Eileen Estudiante at lestudiante@bridgew.edu or call her at 508-531-1819 if you have any questions.

Student Code of Conduct.

The Student Code outlines expectations for student conduct, including provisions related to the University’s COVID-19 Safe Return Plan. Bridgewater State University is a community dedicated to the lifelong success of all students. All students are expected to adhere to the core values of the university community which include civility, fairness, inclusivity, and respect for others’ dignity. The *Student Code of Conduct* defines the rights and responsibilities of students and provides a process for responding to allegations of student misconduct in a way that aligns with [the university’s values](#).

Title IX and Sexual Violence

The Office of Equal Opportunity and the Title IX Coordinator work to ensure that all members of the campus community flourish in a supportive and fair climate. See <https://studentbridgew.sharepoint.com/sites/OfficeofEqualOpportunity> to learn more. Note the site provides a page for Title IX and a page for Discrimination and Harassment. Each page contains a report form that you may utilize to report concerns of sexual violence, relationship violence, stalking, sexual harassment, or protected category based discrimination and harassment. (The associated form indicates that it "is unlawful to retaliate against a student, employee or any other person affiliated with the University for filing a complaint or for cooperating in an investigation of a complaint.”). To learn more about Title IX please visit: <https://www.bridgew.edu/office/titleix>. The Sexual Violence Advocacy and Support Center is a *confidential* support resource for all community members who have experienced sexual, gender-based, or relationship violence and stalking. Students seeking support can fill out this form: [SVAS Center Support Form \(maxient.com\)](#)

BSU Student Emergency Fund.

The Student Emergency Fund (SEF) is designed to support BSU students facing financial hardships resulting from an unexpected emergency or crisis situation. Funds awarded are to help alleviate the short-term financial needs of the student. <https://studentbridgew.sharepoint.com/sites/StudentSupport/SitePages/BSU-Student-Emergency-Fund-and-American-Rescue-Plan-Act-Grant.aspx>