CH 203/218 Lecture Syllabus Fall 2022

Lectures

CH 203 A1: TR 8:00-9:15 am; SCI 109
Course Coordinator/Instructor: Dr. Rebecca Loy
E-mail: rnloy@bu.edu
Office hours: Monday 3:30-4:30 pm, Tuesday 4-5 pm, Wednesday 2-3 pm; SCI 200B
Personal Office: SCI 360

CH 203 A2: MWF 10:10-11,00 am; SCI 109
Instructor: Dr. Alexis Courtney
E-mail: alexislc@bu.edu
Office hours: Tue 3-4 pm, Wed 5:45-6:45 pm, Th 3-4 pm; SCI 200B
Personal Office: SCI 272A

CH 203 A3: TR 5:00-6:15 pm; HAR 105
Instructor: Dr. Emily Kerr
E-mail: efkerr@bu.edu
Office hours: Wed 3:00-4:30 pm, Fri 3:00-4:30 pm; SCI 200B

Prerequisite: CH 102, 110, or 112 with a C- or higher.

Course email address: ch203218@bu.edu

Objective
The primary goal of this course is to learn the fundamental principles of organic chemistry while developing analytical skills to think about solutions to organic chemistry problems. In this class, the emphasis will be on organic structure and the consequences of structure, reactivity, and reaction mechanisms.

HUB Units and Tools

Scientific Inquiry I: Students will identify and apply the major concepts of organic chemistry to explain phenomena in the biological and material world, and devise applications of organic chemistry for addressing real-world needs. This includes introductions to the way that scientists explain complex systems such as living organisms, drug discovery, polymer design, and explore the fundamental organic chemistry that lies behind the preparation, structure, and other characterization of important organic molecules.

These fundamentals will enable the understanding of more complex systems in biochemistry, strategies in drug discovery, polymer design, and explore the fundamental organic chemistry that lies behind the preparation, structure, and other characterization of important organic molecules. Students will probe deeply into the physical basis of organic chemistry-based phenomena.

Quantitative Reasoning I Many fundamental principles of organic chemistry are based on the laws of physics, which can be expressed mathematically. Students will learn how to apply these laws, both in lecture and in the laboratory, for quantitative explanation of observations, and also to make quantitative predictions as applied to reaction kinetics, thermodynamics, spectroscopy, stoichiometry and catalysis.

Outcome 1 – Core Concepts and Theoretical Tools in Quantitative Reasoning. This will be particularly prominent in understanding spectroscopy, as well in the laboratory wherein molar equivalency, concentrations, and yield calculations are critical. Understanding stoichiometry of organic reactions also requires quantitative reasoning, as

due the balance of kinetics and thermodynamics, particularly as they apply to reaction outcome (kinetic vs thermodynamic control). Kind of mirrors life in the sense of impulsive reactions (kinetics) vs long term reasoning (thermodynamics).
Outcome 2 – Interpretation of Quantitative Models. This outcome is especially important in spectral interpretation. Students will learn how spectroscopic adsorption of energy from the electromagnetic spectrum (i.e. how molecules interact with these energies) are signatures of specific structural features, and hence can be used to deduce structures. For kinetics vs thermodynamics - reaction coordinate diagrams are a commonly employed graphic representation that students will learn. Accurate drawing of molecular structures is also critical.
Outcome 3 – Communication of Quantitative Information. This outcome will be relevant in the lab reports the students write for each lab experiment. Students will also learn to present reaction mechanisms in a meaningful manner.
Outcome 4 – Recognize and Articulate Capacity and Limitations. Understanding the origin of experimental error, and what is reasonable error, and what is not, is always a component of the laboratory experience. Students will understand what is acceptable variation, and what is not. Especially emphasized is the understanding of significant figures.

Required Materials
(1) Textbook: Karty, Joel; *Organic Chemistry Principles and Mechanisms*, 3rd ed. Norton Publishing.
(2) Molecular models (optional, highly suggested): Many suitable styles (e.g., space-filling, ball-and-stick, framework) are available. Recommended: Duluth's MM-005 set.
(3) Lab coat, notebook and safety goggles (CH 203/218)
(4) Podia for lecture/prelab lecture (if in CH 203)

Grading Policy-CH 203

	Percentage
Prelecture Videos/Discussion Attendance	5%
Homework/Syllabus Quiz	10%
Labs	15%
Lecture exams	50% (12.5% each)
Final	20%

Grading Policy CH 218

	Percentage
Prelecture Videos/Discussion Attendance	5%
Homework/Syllabus Quiz	10%
Labs	20%
Lecture exams	46% (11.5% each)
Final	19%

Prelecture Videos
Before you come to lecture you will be expected to watch the prelecture videos for topics being covered. You will have until the lecture starts to watch the videos. The prelecture videos will introduce the topics that will be covered in lecture and should help prepare you for the lecture. The videos will have questions embedded in them that you are expected to answer. Links to these videos can be found on blackboard under the prelecture video tab on blackboard.
Orgo Prep videos will be the prelecture videos for the first week of lectures. If you completed 80% of the Orgo Prep course over the summer you will already have credit for these videos. If you did not participate in Orgo Prep or have less than 80% completion you will need to watch the Orgo Prep videos through blackboard no later than Friday, September 16 by 7 pm.

Lecture Attendance-Podia

We will be using the audience response system called Podia. Details on how to register for Podia are posted on blackboard. Please make sure you sign up for the Podia using your **BU email** to ensure that you get credit. Questions about lecture material will be asked during each lecture via Podia. If you answer 85% of the questions and get 50% of them correct, if your grade in the class is on a grade border you will be boosted to the higher grade. You must be physically present in the classroom to answer Podia questions. Answering Podia questions using another student's account is academic misconduct and will be treated accordingly. Instructions on how to register for Podia can be found on the lecture blackboard page. Podia costs $15 per semester.

Syllabus Quiz

A quiz on the syllabus will be part of your homework grade. The quiz will be available starting Tuesday, September 6 on gradescope and will remain open until Friday, September 16 at 7 pm.

Homework Assignments

There will be a weekly paper problem set that can be found under the homework tab on the lecture blackboard page, which is due on Wednesdays at 7 p.m. starting September 14. The assignment must be hand-written directly on the handout posted on blackboard and converted to a pdf. You are welcome to use a tablet and write directly on the pdf or you can take pictures of your answers and paste them into the homework document.
No late problem sets will be accepted under any circumstances so please don't ask. If an emergency occurs such as a hospitalization or death in the family, please contact us at ch203218@bu.edu. Your lowest homework grade will be dropped.

It is your responsibility to make sure that your homework gets uploaded correctly to gradescope. If you are having issue uploading please email ch203218@bu.edu with a copy of your homework assignment and we can upload the assignment for you.

Copying homework from another student is not allowed. If identical homework assignments are submitted, you will be brought up on academic misconduct charges. We encourage students to first try doing the homework assignments independently then check your answers with other students. **Again, copying is not allowed**.

Smartworks

Optional online homework on Smartworks (links on blackboard) will be due Mondays at 7 pm. If you answer 80% of the questions correctly you will get 5 extra points to your overall score in the course out of 1000 points. Late Smartworks assignments can be submitted up to a week late with a 10% penalty per day it is late. Please make sure to do the assignments through blackboard or the scores will not link to the blackboard gradebook. If you have any issues, please contact ch203218@bu.edu.

Discussion Sections

Discussions begin Monday, September 12. Attendance is mandatory.

Once a week, all students will participate in their scheduled discussion section. Each discussion will have two main parts: (1) a large group discussion and (2) small group problem solving. During the small group work, students will work in groups on problem solving (discussion worksheets), interactive exercises, and class-wide discussions. The discussion leader (TF) will be facilitating discussion and work with groups to help them with their work.

Students are expected to arrive on time and to actively participate in all of the lecture and discussion sections. A portion of your course grade (2.5%) will be awarded based on your discussion work, including (on-time) attendance and engagement (in group work and class-wide exercises) in discussion. If you do not show up on-

time and/or are not actively working on the worksheet during your discussion you will not get full credit for your discussion grade. Working on homework assignments during discussion is not allowed.

You are allowed to miss up to 2 discussions throughout the semester without a penalty, but we do recommend you attend all of the discussion sessions. Any absences including excused absences will count as part of your 2 missed discussions. If you miss more than 2 discussions, please email ch203218@bu.edu to discuss options. You are not allowed to attend another discussion under any circumstances so make sure you can attend the discussion you are enrolled in.

If you are an athlete and know that you will be missing more than 2 discussions please email ch203218@bu.edu as soon as you know about the absences. If prior notice is not given before the missed discussion occur, they will not be excused and will count towards your final grade. Please try to find a discussion time that does not conflict with your athletic schedule.

Lecture exams

Thursdays, 6:30-7:45 pm

Extended time exam: 6:05-8:00 pm (1.5 time), 5:30-8 pm (2 times)

Exams	**Date**
Exam 1	Thursday, September 29
Exam 2	Thursday, October 20
Exam 3	Thursday, November 10
Exam 4	Thursday, December 8
Final Exam	TBD

Extended time exam: You must have a letter from the BU Office of Disabilities Services saying you need extended time. Please fill out the form below and attach your accommodation letter. Please do not directly email your instructor with accommodation letters.

https://bostonu.qualtrics.com/jfe/form/SV_6rncIbHhFeFpgSa

No make-up lecture exams are given for any reason, so please do not ask for a make-up lecture exam. Do not make travel plans that conflict with the lecture exams. If you must miss a lecture exam due to a serious medical or other emergency, you should notify your lecture instructor and email ch203218@bu.edu in advance and request an excused absence. Documentation verifying the emergency will generally be required. If the nature of the emergency makes it impossible for you to notify your lecture instructor about your missed exam ahead of time, you should contact them as soon as possible afterwards. Absences for documented religious observances will be excused according to the specifications of the University Policy on Religious Observance. Please make sure to communicate about religious observances as far in advance as possible (and no later than one week before the observance, per university policy). If you have an excused absence, your missed exam score will be replaced with the score from the final exam. Only 1 missed exam grade can be replaced. If more than one exam is missed, please contact your instructor for options.

If you are ill either before or during the exam and can't complete the exam, please notify the proctor as soon as possible. If you take the entire exam it will count towards your overall score in the class no matter what occurs.

Lab questions: On each exam for CH 203/218 there will be at least 1 lab question related to techniques and content that was covered in the lab portion of the course.

Final exam

A cumulative 2-hour final exam will be administered during the finals period. Final exams are graded on a 100-point scale. See the "Incompletes" section of this syllabus for policies concerning missed final exams.

Regrades of exams

All exams will be graded on gradescope. Please check your exams for adding/grading (clerical) errors. If you find an issue, please fill out the exam regrade form. The link for these regrade forms can be found on the lecture blackboard site. You will have 1 week after the exam to submit regrades after the graded exams have been posted on gradescope. Except for clerical errors, regrade requests will be a reevaluation of the entire exam. Your grade can both go up or down if you submit a regrade request. Last year 1/3 of the exam grades went down after a regrade for CH 203.

Gradescope

We will be using the online program called gradescope for submission and grading of homework assignments, prelab questions, lab reports and exams. You will have 2 different gradescope pages. One page will be for exams and homework and one for lab. When these gradescope pages are available you should receive an email from gradescope letting you know you have been added.

For homework and lab worksheets you will need to scan written work. There are many scanning apps available for smart phones. Below is a document from gradescope on apps you can download to scan, tips on scanning and how to submit a pdf.

https://gradescope-static-assets.s3-us-west-2.amazonaws.com/help/submitting_hw_guide.pdf

Lab

The laboratory coordinator gives full details concerning lab grades in a separately prepared lab syllabus. You must complete all of the labs except the one dropped lab to pass the class. The lab portion of the course is 15% if you are in CH 203 and 20% if you are in CH 218 of your overall grade in the course.

Letter grades

Course grades are calculated by the following formulas:

CH 203

$(1.25 \times \text{EX}) + (2 \times \text{F}) + (1.5 \times L) + 0.5\ \text{D} + H$ Where *EX* are your 4 in-class exams out of 100 points each, F is the final out of 100 points, *L* is your lab score based on 100 points, *H* is your homework score out of 100 points and D is your discussion score and prelecture questions out of 100 points.

CH 218

$(1.15 \times \text{EX}) + (1.9 \times \text{F}) + (2 \times L) + 0.5\ \text{D} + H$ Where *EX* are your 4 in-class exams out of 100 points each, F is the final out of 100 points, *L* is your lab score based on 100 points, *H* is your homework score out of 100 points and D is your discussion score and prelecture questions out of 100 points.

Grade ranges are:

$\text{A} \geq 930$

$930 > \text{A}- \geq 900$

$900 > \text{B}+ \geq 850$

$850 > \text{B} \geq 800$

$800 > \text{B}- \geq 750$

$750 > \text{C}+ \geq 700$

$700 > \text{C} \geq 650$

$650 > \text{C}- \geq 600$

$600 > \text{D} \geq 500$

$500 > \text{F}$

There are no extra-credit projects to offset poor performance on exams. Please do not ask to have your course grade gratuitously raised because you fail to satisfy the GPA requirements of your program of study, scholarship, etc.

Lecture Topics

Reading and Homework

To derive the maximum benefit from the lecture, do the assigned reading from the text or the before class: in this way, you can pay more attention to what is being said in the lecture. Studying organic chemistry means doing problems. Yes, you must read and memorize, but most of your study time should be devoted to solving problems. Do not look at the answer until you have given the problem a serious try. Work the in-chapter problems pertaining to the assigned sections in the text, do as many end-of-chapter problems needed to gain mastery of the material. Some of the end of the chapter questions will be on your exams.

Recall that there is also mandatory homework due every week. Please keep current with the lecture material: cramming the night before an exam usually fails to produce adequate results because most students cannot effectively absorb the subject matter in a short amount of time.

CH 203/218 Topics Fall 2022 (This is a rough outline, some topics might be covered on different week than the one that is given below)

Week	Date	Lecture Topics	End of the Chapter Questions
1	Sept 5	Intro 1.1-1.2 Shorthand Notation 1.12 Dash/Wedge Notation 2.2 Lewis Structures/Formal Charge 1.5-1.6, 1.9 Polar covalent bonds 1.7 Resonance structures 1.10-1.11 Functional Groups Ch 1.13 Not covered in lecture but review: Ch 1.3-1.4, 1.8	Ch 1.1-1.41
2	Sept 12	Nomenclature of Alkanes A.1-A.7 Naming of Alkenes and Alkynes B.1-B.2 VSEPR Theory 2.1 Valence Bond Theory and MO Theory: 3.1-3.11 Hybridization and Resonance Acyclic conformational analysis 4.1-4.3 Read on your own: 2.3, 2.4	A.19-1.22, A.24, 2.1-2.13, B.9, B.14, Ch. 3.1-3.15, 3.20, 3.21, 3.23, 3.24, 3.41, 3.43, 4.1-4.11
3	Sept 19	Ring Strain 4.3 Conformers: Cyclohexane and chair flips 4.5 Substituted cyclohexanes: 4.7-4.9 Constitutional isomers 4.10-4.12 Defining Configurational Isomers 5.1 Diastereomers: Double bond configurations 3.7/5.8	4.12, 4.19-4.26, 4.50, 4.52, 4.53, 4.56, 4.27-4.37, 4.45-4.49, 5.17-5.20
4	Sept 26	Enantiomers 5.2-5.3 Chirality 5.4 Chiral Centers 5.5 R/S 5.6	Ch 5.1-5.16

		Exam 1 Review **Exam 1, Thursday, September 29 (6:30-7:45 pm)**	
5	Oct 3	Drawing Stereoisomers 5.9 Examples Physical and Chemical Properties 5.12 Separating Configurational Isomers 5.13 Optical Activity 5.14 Chirality of Biomolecules 5.15-5.16 Intro to NMR 17.1-17.2 NMR: Unique signals, shielding 17.3 Time scale of NMR 17.4 Chemical Shift: 17.5 Predicting chemical shift 17.6 Integration 17.8	Ch, 5.43-5.51, 5.54, 5.57, 5.58, 5.60, 5.61, 5.64-5.66 Ch. 17.1 (a, d-i), 17.2-17.12, 17.20-17.22
6	Oct 10	Monday, holiday, Substitute Monday on Tuesday, October 11. All Tuesday classes canceled. Simple splitting 17.9 Coupling Constants and Complex Splitting 17.10 Signal Resolution 17.11 Diastereotopic protons	Ch. 17.23-28, 17.36-17.49
7	Oct 17	Elucidating molecular structure from NMR 17.14 Introduction to Reaction Mechanisms 6.1 Proton Transfer Outcomes 6.2 Chemical Equilibrium 6.3 Gibbs Free Energy 6.4-6.5 Functional Groups and Acidity 6.6 Relative strengths of charged and uncharged acids 6.7 Exam 2 Review **Exam 2, Thursday, October 20 (6:30-7:45 pm)**	Ch 6.1-6.8, 6.12, 6.15-6.28
8	Oct 24	Relative Acidities of Protons on Atoms with like Charges 6.8 Strategies for Ranking Acids and Bases 6.9 Electron Donating and Withdrawing groups Mechanism: proton transfer 7.1 Electrophiles/Nucleophiles	Ch. 6.29-6.42, 6.49-6.67

9	Oct 31	S_N2 Mechanism 7.2 Bond breaking and making 7.3 Nucleophilic Addition/Elimination 7.4 E2 Mechanism 7.5 Electrophilic Addition/Elimination 7.6 Carbocation Rearrangements 7.7 Driving Force for Chemical Reactions 7.8 Carbocations and charge stability 7.9 MO Theory behind Chemical Reactions C.1-2 Reasonableness of a Mechanism 8.6 S_N1 Mechanism 8.1 S_N2 Mechanism Revisited	Ch. 7.1-7.15 Ch.7.16-7.39, C.1-C.9
10	Nov 7	E1 Mechanism 8.2 E2 Mechanism Revisited Kinetics 8.3-8.4 Stereochemistry 8.5 Exam 3 Review **Exam 3, Thursday, November 10 (6:30-7:45 pm)**	Ch. 8.1-8.48
11	Nov 14	Resonance-Delocalized intermediates 8.7 Competition between S_N2, S_N1, E2 and E1 9.1-9.12 Reactions of Alcohols and Strong Acid	Ch. 9.1-9.37, 9.42-9.50
12	Nov 21	Reactions of Alcohols with Strong Acids Continued Thanksgiving holiday (November 23-35)	
13	Nov 28	Organic Synthesis 10.1-10.3 Ether Formation 10.4 Formation of Epoxides by Nucleophilic Substitution 10.8 Amines and Quaternary Ammonium salts from Alkyne alkylation Alkylation of Alpha carbon 11.4 Epoxides as substrates 10.7 Opening of Epoxides with carbon nucleophiles 11.2 Converting Alcohols to alkyl halides 10.5 Halogenation of Alpha carbons 10.6	Ch. 10.1-10.59, 11 Ch. 11.9-11.15, 11.27-11.32
14	Dec 5	Synthetic traps 11.4 Strategies for Success in Synthesis 11.5 **Exam 4 Review**	Ch. 11.1-11.8, 11.16-11.19, 11.34-11.40

Website: The syllabus, lecture notes, practice exams, study guides, etc., are posted at learn.bu.edu

Podia: Podia is an online forum to ask questions about the lecture material. We prefer you use Podia to ask lecture questions than directly emailing your instructors as we can get back to you faster and other students can see the answers to your questions. Please email your instructor if you have questions about course policy.
Podia Rules
1) Please only post questions about course content.
2) If you ask a question about a problem please include a screenshot of the question so we can respond more quickly.
3) Any inappropriate comments will be immediately deleted and you will receive a warning from the instructor. Please do not use Podia to comment about course policy or exam scores.
4) We will allow you to post anonymously to your classmates, but it will not be anonymous to instructors.

Help outside of class
1) Come to office hours (instructors, discussion TFs, lab TFs)
2) Podia: Best place to get answers if you can't come to office hours. Please post a screenshot of the
3) Private tutoring: A list of recommended tutors can be found on the blackboard page, not free
4) ERC tutoring: The Education Resource Center offers free peer led tutoring. If you are interested in this option, make sure to sign-up early in the semester as they do run out of tutors.

Letters of Recommendation
We will write a letter of recommendation for anyone in this class, however we will give an honest opinion, as is the duty of all recommenders. You should be aware that this is a large class, and it is difficult to say much in such a letter other than to give your grade. For this reason, except for special circumstances, we cannot write the letter until the semester is over and your final grade is determined. We will also describe the course with the following paragraph:

"Organic Chemistry CH 203 is a large organic chemistry class, which meets for 8 lecture hours each week, with a three one-hour discussion. The laboratory component has 10 labs per semester."

You MUST waive your rights to review the letter, or we will not write it. You should ask us first whether we can write a supporting letter or not. Also, we must have a minimum 14 days notice. Otherwise, we cannot guarantee we will get the letter out on time.

Academic Conduct
All students at Boston University are expected to maintain high standards of academic honesty and integrity. The Chemistry Department treats cheating with zero tolerance. Here, cheating refers to any violation of the student academic conduct code. There are no small infractions. All instances of misconduct will be reported to the Dean's office. It is the responsibility of every student to be aware of the Academic Conduct Code's contents and to abide by its provisions, as detailed at: http://www.bu.edu/academics/resources/academic-conduct-code/

Collaboration/Chegg
We highly recommend that you find other students to study with for this course. That being said, **all exams and quizzes must be done individually**. No course materials (homework, lab handouts, exams, quizzes) are allowed to be posted online including Chegg. If we find any course materials posted online it will be immediately considered academic misconduct and be reported to the university. We have no tolerance for the use of Chegg for the course. We reserve the right to not count any assignment that is posted on Chegg for the entire course.

Commitment to Diversity, Equity & Inclusion
We are committed to making this class an inclusive community where everyone can learn, regardless of experience in prior classes, physical or mental health, or any other barriers that may present themselves. If you

ever have a concern about course structure/material or your interaction with it, we are always open to discussing & enacting approaches to help you get the most out of our class together.

Incompletes

If, for a valid reason that is corroborated by documentation and communicated to the lecturer in advance, you miss the final exam, you will be given an incomplete (I) grade. You must be in good academic standing (i.e., not failing the course) to be considered for an incomplete. You must meet with the lecturer to draw up a schedule for making up a missed final exam. An incomplete grade automatically and permanently changes to a failing grade (F) 12 months after the completion of the course. Incompletes based on your failing to satisfactorily complete the laboratory portion of the course are left to the discretion of the laboratory coordinator.

Students with disabilities

Students having disabilities and whom the Boston University Office of Disabilities Services approves for special accommodation should present documentation to that effect to the lecturer by Friday, May 28, so that acceptable arrangements for taking exams can be made. Students presenting such documentation must take all exams at a special venue arranged by the lecturer.

Absences due to Illness

We hope that all of you will remain healthy throughout the semester, and are able to fully engage and participate in the course. If you did unfortunately become ill, we require that you follow the protocols mandated by the University under those circumstances. The course attendance and engagement policies already reflect substantial flexibility to allow for absences of short to moderate length due to illness. Please make sure to contact your instructor immediately about any absences that will last beyond a couple of days. In the case of a prolonged illness that is not already covered by the course absence policies, we will work with the CAS Dean's office to determine the best course of action for any given student.

Concerns

If you are experiencing difficulty, please contact your course instructor without delay. If dropping the course appears to be in your best interest, we still would like to work through the decision with you. We are also happy to advise you on appropriate choices for your academic program. If you drop the course by Tuesday, October 11, 2022 no record of it will appear on your transcript. After that date, until the end of the day Monday, November 14, 2022 you may drop the course but with a W grade (withdrawn).

Copyright

This syllabus is simply a rough outline of how the course should progress. If unforeseen circumstances arise, the instructor reserves the right to change the syllabus or adjust the tentative schedule as necessary.