

ORGANIC CHEMISTRY I
Fall 2023 Syllabus
Ingersoll Hall IH-2127 (Tue/Thurs 9:30-10:45am, in person)

Lecturer: Prof. Guillermo Gerona-Navarro

Office: 2146 Ingersoll

Email: ggerona@brooklyn.cuny.edu

Office Hours: Tuesdays 11am-12:15pm, Thursdays 11am-12:15 pm. (in person)

Online by appointment, blackboard collaborate ultra.

Introduction

This course is designed to introduce you to the fascinating field of organic chemistry. In its simplest definition, organic chemistry is the chemistry of carbon compounds. We will discover what makes carbon compounds unique from other branches of chemistry. We will begin by discussing the concepts of structure and bonding in organic molecules. Next, we will explore the preparation and reactions of various types of organic molecules, including alkanes, alkenes, alkynes, alkyl halides and carbonyl compounds. Finally, we will introduce you to a variety of techniques used by chemists to probe the structure of organic molecules (Nuclear Magnetic Resonance, Mass Spectroscopy and Infrared Spectroscopy)

Course Objectives

Individuals who successfully complete this course will be able to:

1. Define and employ the vocabulary of organic chemistry.
2. Draw correct structural representations of organic molecules.
3. Write reasonable transformations and mechanisms for alkanes, alkenes, alkynes, alkyl halides, alcohols, ethers and carbonyl compounds.
4. Employ stereochemical considerations when analyzing mechanisms and transformations.
5. Be knowledgeable of chemical reactions and be able to plan multistep syntheses employing them.
6. Be able to interpret spectroscopy and assign chemical structures using spectroscopic data.

Required Purchases For Lecture:

Organic Chemistry, 8th Edition by W. Brown, C.S. Foote, B.L. Iverson, E. Anslyn (7TH edition follows very closely)

2.- Molecular Modeling Set (Highly Recommended)

Recommended Purchases For Lecture:

1.- Solutions Manual for 8th Edition of the Textbook

2.- Organic Chemistry As a Second Language, First Semester Topics, 3rd Edition (2011)
by David Klein

General Guidelines for the Course

The lectures of the course will be given in person, as well as the recitation classes. In addition, I will be uploading videos on the blackboard site of the class that will reinforce the material taught in class and on my Youtube page (https://www.youtube.com/@GeronaNavarro_OrgoChem/videos). I will also upload a set of problems for every chapter. These problems are designed to complement those given in the textbook at the end of every chapter, not to replace them.

There will be two midterm exams and a final exam. Midterms will be given on Tuesday 10/17 and Tuesday 11/21 at 9:30am, during class time. The final exam is scheduled for Tuesday, December 19th at 8am. All exams will be given in person. In addition, there will be four quizzes and three assignments to complete. Quizzes will be given during recitation class time. More details about examinations are given in the course outline provided on page 8 and below in this document.

Administrative Dates

Friday 8/25 – Fall 2023 Classes Begin

Thursday 8/31 – Last day to add a course

Friday 9/1 – Grade of WD assigned to students who officially drop the course

Monday 9/4 – College Closed, Labor Day

Thursday 9/14 – Last day to drop a course with a grade of WD

Friday 9/15 – WN Grades Assigned, Grade of W assigned to students who officially drop the course

Friday 9/15 – Sunday 9/17 – No Class Scheduled

Sunday 9/24 – Monday 9/25 – No Class Scheduled

Monday 10/9 – College closed, No Classes Scheduled

Tuesday 10/10 – Conversion day, classes follow Monday Schedule

Wednesday 11/22 – No Classes Scheduled

Thursday 11/23 and Friday 11/24 – College closed

Monday 12/11 – Last Day to withdraw from a class with a grade of "W"

Monday 12/11 – Last day for Faculty to submit WN reversals

Monday 12/11 – Last day of classes

Tuesday 12/12 – Wednesday 12/13 – Reading Day

Thursday 12/14 to Wednesday 12/20 Final examinations.

Dates of Quizzes and Exams

Quiz 1 – 9/18 (Monday) – 9/22 (Friday) (Recitation Class Time)

Quiz 2 – 10/11 (Wednesday) – 10/17 (Tuesday) (Recitation Class Time)

Quiz 3 – 11/6 (Monday) – 11/10 (Friday) (Recitation Class Time)

Quiz 4 – 12/4 (Monday) – 12/8 (Friday) (Recitation Class Time)

Assignment 1 – 10/23 (M) - 10/27 (F)

Assignment 2 – 11/27 (M) - 12/1 (F)

Assignment 3 – 12/11 (M) - 12/15 (F)

Exam 1 – 10/17/23 (Tuesday, 9:30-10:45am, in person)

Exam 2 - 11/21/23 (Tuesday, 9:30-10:45am, in person)

Final Exam – Tuesday 12/19 (8 – 10 am, in person)

Course Grades

Every student must understand that I am actually **not grading** him/her, **you** are the one grading **yourself** with your performance throughout the semester. My main job regarding the grades is to make sure that the class is standardized so every student is treated fairly and equally. To this end, for example, I personally check that the level of difficulty of all the quizzes is the same, and that the same standards/criteria are used to grade every single quiz or exam (across all sections).

Final grades are calculated following the breakdown given below:

Lecture/Recitation

Quizzes 20%

Exam I 17.5%

Exam II 17.5%

Final Exam 35%

Assignments 10%

At the end of the semester, I will calculate your final average and assign letter grades **FOLLOWING** the college guidelines, as indicated below:

> 90 - A

> 80 - B

> 70 - C

> 55 - D

Other factors like significant improvement throughout the semester *may be* taken into account on a case-by-case basis. The performance in the final exam, since it is cumulative, is also a major factor in the final letter grade. Final grades are assigned based on your performance and **NOT** on personal issues/needs. Only information/data that is relevant to your own grade will be disclosed after the exams. I strongly suggest all of you to focus all your energy on your *own performance* and not on how other people performed, etc.

It is also important to understand that the standards of the class **DO NOT** change with the quality of the students of a given semester, i.e., standards for this class are **INDEPENDENT** of the average grade of the class. To pass the class you basically need to show that you have acquired the basic knowledge of the material (a passing grade), and that remains the same for every semester, regardless of the average of the class in the exam(s). Basically, a class with an average grade of 90 points will have the same standards/requirements/letter grades compared to one with an average grade of 20 points.

It is the student responsibility to take actions if the performance on the exam or quizzes is below your own expectations. Quizzes are a great way to assess how well you understand the material. If you are underperforming in the quizzes, say 50-60% of the grade, most likely you will get a similar result in the exams, or worse, since the exam questions will be of higher complexity. Low performance in the quizzes is usually indicative, for example, of little study time or problems with how to study the material.

I am more than willing to set appointments to discuss how you can improve your performance, tailor your study skills to your needs, etc, but this needs to be done **EARLY** in the semester, so the

problems can be fixed **ON TIME**. It is extremely important to look for help as soon as possible if your grades/performance are below the expectations that you have for the class.

Tips to improve your grade/ avoid failures in the class

- Quizzes count for 20% of the final grade, so scoring high in the quizzes, which are easier than the exams, will help you to boost/improve your final grade. They are also useful to assess your level of knowledge of the material. As I mentioned before, performing poorly in a quiz is a clear sign of a lack of understanding of the material being tested. Right at that moment, you should stop and think what is exactly happening. Do you need more hours of study? Are you studying correctly? etc.....look for help and change the approach ASAP if you find yourself here at some point.
- Students failing the first midterm exam or performing below their expectations should take this matter **extremely serious**. At that point, you still have time to improve/fix your problems with the class. Unless quick and clear action is taken, you should not expect a different result in the following exams. If you come to me looking for help at the end of the semester, I will have very little room to help you to get out of that position.
- If you are struggling, DO NOT stay alone, you must look for help (the more the merrier).
- You must be ready for the exams at least 3-4 days before the exam day. That way you will have time to review all the material, go over details, and you will also be able to get a reasonable amount of sleep the night before the exam. All these factors will improve your confidence and overall performance in the exam dramatically. To be ready 3-4 days before the exam, you need to plan and organize your study time accordingly and in advance.

This class will challenge you in different areas: studying skills, reasoning skills, commitment/dedication and responsibility, organization skills (how to plan and use your study time), your ability to take a test and to manage your time during the exams. Students who are committed and work hard since the very beginning, and on a regular basis, will have very high chances of succeeding. Those who fall behind will have a very hard time to catch up, due to the volume and nature of the material. You need time to learn and then process/digest the material so you can apply it to problems with a higher level of complexity.

Also, please, understand that due to the high volume of material expected to be covered in this class, the lectures are designed as a tool to help you understand the more important and challenging concepts of each chapter, and mostly to facilitate and support your independent study time. In order for you to get the most out of a lecture, you should read the material in advance so you get an idea of what is going to be discussed each day. In the last page of this syllabus you will find a course outline with detailed information regarding the topics to be covered in each lecture. Students who are disciplined enough as to follow this plan will get a substantially better understanding of the material discussed in class and in most cases that reflects into a very high performance in the quizzes and exams. On the other hand, those who come unprepared and fall behind will likely feel that I am going “too fast” and will retain very little of what is taught in the lecture time.

I have taken the time to write this based on my previous experiences with this course. It is imperative for every student to understand that this class is only for committed/dedicated students. This is not a class that you will pass studying 3 days before the exam after you have fallen behind for weeks.

I try to make myself always available, and I am also committed to help my students to succeed. Once again, if you need help, do not hesitate to contact me by email or during my office hours.

COURSE POLICIES AND PROCEDURES

All students should carefully and thoroughly read the section entitled "Academic Regulations and Procedures" in the Brooklyn College *Undergraduate Bulletin* for a complete listing of academic regulations of the College.

Academic Integrity:

The faculty and administration of Brooklyn College support an environment free from cheating and plagiarism. Each student is responsible for being aware of what constitutes cheating and plagiarism and for avoiding both. The complete text of the CUNY Academic Integrity Policy and the Brooklyn College procedure for policy implementation can be found at www.brooklyn.cuny.edu/bc/policies. If a faculty member suspects a violation of academic integrity and, upon investigation, confirms that violation, or if the student admits the violation, the faculty member MUST report the violation.

Cheating is any misrepresentation in academic work. Plagiarism is the representation of another person's work, words, or ideas as your own. Students should consult the Brooklyn College Student Handbook for a fuller, more specific discussion of related academic integrity standards. Academic dishonesty is punishable by failure of the "test, examination, term paper, or other assignment on which cheating occurred" (Faculty Council, May 18, 1954). In addition, disciplinary proceedings in cases of academic dishonesty may result in penalties of admonition, warning, censure, disciplinary probation, restitution, suspension, expulsion, complaint to civil authorities, or ejection. (Adopted by Policy Council, May 8, 1991.)

Students with Disabilities:

If you have a disability, it is the responsibility of the university to provide you with reasonable accommodations. In order to receive disability-related academic accommodations students must first be registered with the Center for Student Disability Services. Students who have a documented disability or suspect they may have a disability are invited to set up an appointment with the Director of the Center for Student Disability Services at (718) 951-5538. If you have already registered with the Center for Student Disability Services, please provide me with the course accommodation form and if necessary please schedule an appointment with me to discuss your specific accommodation needs.

Exams

There will be two mid term exams (one-hour and fifteen minutes), each worth 100 points. The final exam is a two-hours, cumulative exam, which is worth 100 points as well. Exams will be graded immediately after they are completed. If you require extra time because of a disability, please secure a note as soon as possible.

All exams will be given in person at the day and times announced here in the syllabus. Please, be sure to be on time for the exams, those who start late will only have available the time remaining until the scheduled end time of the exam. Electronic devices will no be allowed at any exam. Also, please, be aware that we take dishonest actions very seriously. Any student found cheating will be given an F for the course immediately and will be reported to the Chemistry Department and BC integrity committees. Thus, further disciplinary actions recommended by such committees may be taken in those cases.

Quizzes

There will be four short quizzes (15 min, 20 points each) given throughout the semester. Quizzes will be held in recitation class, at the beginning of the class. In the event that you know or anticipate that you will be missing a quiz due to scheduling conflicts (i.e. religious holiday, family event) or if you have a medical reason, please, email me asap and explain/justify clearly the reasons why you are missing the quiz. I will make the decision once you provide the proper documentation and review your case. If you notify me in advance, you may be given the opportunity to take the quiz with another section that same week. If you have a justified reason to miss the quiz at the very last minute and there is no other section to accommodate you, you may be excused for that quiz. If no documentation or proper reason is provided for missing a quiz, you will receive a grade of zero for that quiz.

Absence from Examinations:

No make up examinations will be given to students who are absent from lecture examinations or recitation quizzes. Please, understand that due to the size of the class under no circumstances this policy is negotiable. For those students who miss one of the midterm exams with a valid excuse (documented), the final grade will be calculated by increasing the weight of the final exam in the average calculation. A grade of zero for lecture will be given if both lecture midterm exams are missed.

Make-up quizzes are unlikely to be allowed. In the rare event that a student misses a quiz and only if there is a situation considered a valid and documented excuse by me, that quiz will not be averaged in the final quiz grade. Otherwise, the student will receive a zero in the corresponding quiz.

In the event of a justified absence from the final exam, students may be entitled to receive an incomplete grade (INC) and will take a make up final examination during following semester. In order to receive an INC grade, the student must be passing the class and must present solid and documented proof to justify the absence. No INC grade will be given to any student who is failing the course heading into the final.

Expectations for Recitation and Lectures:

Students are expected to attend all recitation and lectures meetings and to arrive on time. For lectures, students are expected to read the topic to be discussed BEFORE the class and to have watched all the videos provided by me. If you fail to do so, you will impact negatively your level of understanding significantly. Attending to lectures prepared makes a huge difference and more importantly it will save you study time later on, when you are getting ready for quizzes and exams. Recitation will be spent working on problem solving. Students are expected to actively participate in this activity.

Due to the volume of material planned to be covered in this class there is no time for repetition. This is not a class designed to come to lectures having no idea about the topic to be covered. Please, be aware that this class REQUIRES a large amount of independent study time.

Learning Tips:

Organic chemistry is not hard but it does require a lot of work. Learning Org Chemistry is very much like learning a foreign language (being a foreign I can assure you this!). First, you will need to learn the vocabulary in terms of names, structures, and types of functional groups. Next, you will

need to learn the rules of grammar. For example, how an alkene will react with a hydrogen halide, etc. After this, you should be able to construct chemical sentences (plan synthesis of organic compounds, predict reactivity, reaction mechanisms, etc). By **understanding** this “language”, and **NOT BY MEMORIZING IT !!!**, you should be able to rationalize unfamiliar reactions and mechanisms through analogy. One of my main goals in this class is to develop/improve your reasoning and critical thinking skills, and that will be the focus of my approach throughout the semester.

Understanding the material will require a **REGULAR** program of **active studying**. No substitution exists for using a pencil and paper to draw and redraw structures, write reactions, and explore stereochemistry. Attend **ALL** the lectures and recitation sessions.

Some other useful and effective tips:

- Read the suggested reading material **BEFORE** each lecture and write down the main points.
- **AFTER** each lecture, summarize the major ideas and concepts in your notes within 24 hours of the class. This will improve the level of retention and learning dramatically.
- Supplement your notes with material learned by reading the textbook. It is **IMPERATIVE** to have a thorough and deep understanding of the concepts before solving problems. Once you think you understand the material, do the suggested problems. If you cannot complete the problems without referencing your notes or the textbook, put them down and study the concepts **AGAIN**.
- **Master the material from the previous lecture before going to the next one.**
- Spend a few minutes each day in review.

If you fail to do this, you may find your review before an exam a major learning experience and you will become overwhelmed by what seems like an unreasonable amount of material. **You cannot cram for an organic exam!** (I really cannot emphasize this enough)

Here are some online video resources to “get ahead” that I thought were nice:

Khan Academy

(www.khanacademy.org/science/organic-chemistry/alkenes-alkynes/alkene-reactions/v/introduction-to-reaction-mechanisms) *IUPUI Organic Chemistry*

(<http://www.youtube.com/watch?v=snz-3a4ux8c>) *Prof. Jonathan Gough (Long Island University)*

(<http://www.youtube.com/watch?v=0JEyMYTKqCY>,

Do the all the textbook problems plus problems posted on blackboard as well on Prof. Murelli and Contel websites.

– *Study with a partner or in a group.* Organic Chemistry is hard to master alone. Try to explain the concepts and the reaction mechanisms to your fellow students, friends, relatives, even people who don't know anything about it, once you are able to explain a concept clearly and properly to ANYONE, then you can be sure that you know it really well.

– Don't be afraid to ask for help. Get help immediately if you get stuck. **HOWEVER!!!!** *Practicing problems without knowing what you are doing is likely to lead to bad habits and be a waste of your time or worse. If you begin to practice problems just for the sake of practicing problems and you aren't learning anything, or you don't feel like you aren't understanding why you are doing what you are doing, you need to take a step back. THIS is why it is important that you make time for yourself to study Organic Chemistry for as much as is needed. Also, make sure you are getting feedback on your*

problems from someone that knows what they are doing.

Sexual And Gender-Based Harassment, Discrimination, and Title IX

Brooklyn College is committed to fostering a safe, equitable, and productive learning environment. Students experiencing any form of prohibited discrimination or harassment, on or off campus, can find information about the reporting process, their rights, specific details about confidentiality, and reporting obligations of Brooklyn College employees at the Office of Diversity and Equity.

Gender-based harassment is unwelcome conduct of a nonsexual nature based on an individual's actual or perceived gender, including conduct based on gender identity, gender expression, and/or nonconformity with gender stereotypes.

Sexual harassment is unwelcome conduct of a sexual nature—such as unwelcome advances and requests for sexual favors. Bullying, intimidation, and harassment based on actual or perceived sexuality is discriminatory.

Brooklyn College encourages individuals who have experienced sexual harassment, gender-based harassment, or sexual violence to report the incident(s) to campus authorities, even if they have reported it to outside law enforcement and regardless of whether the incident(s) occurred on campus. Students may seek resolution through the Student Affairs office, Dean of Students, the Diversity and Equity Office, the Title IX Coordinator, or Public Safety. Confidential resources on campus include the Office of Personal Counseling, The Women's Center, and the Health Clinic. Appropriate action can include formal disciplinary action, including termination of employment, and suspension or expulsion of students.

Names and Pronouns:

Campus emails and rosters may be inconsistent with the name you regularly go by. During and outside of class, we all have the right to be called by the name we go by and by the pronoun(s) we use. For your reference, Brooklyn College has a vibrant and welcoming LGBTQ+ Resource Center for students, faculty, & staff: <https://www.brooklyn.edu/lgbtq-center/>

COURSE OUTLINE

Tentative Classes and Exam/Quizzes Schedule (**Subject to Change**)

| Topic | Tentative Dates | Reading (8 th Edition) |
|---|-----------------|-----------------------------------|
| - How to study Organic Chemistry ? How can I succeed in this class ? <p style="text-align: center;"><u>Chapter 1</u> “Covalent Bonding and Shapes of Molecules”</p> - Electronic Structure of Atoms (1.1, <u>Independent Study</u>) - Lewis Model of Bonding (Lewis Structures, Octet Rule, Ionic and Covalent Bonds, formal charges) (1.2, <u>Independent Study</u>) - Drawing Organic Molecules (Lines and Angle Notation, structural formulas) (1.2, <u>Independent Study</u>) - Functional Groups (1.3, <u>Independent Study</u>) - Basic General Chemistry Concepts (electronic distribution of atoms, electronegativity, atomic radius) (<u>Independent Study</u>) - Bond Angles and Shapes of Molecules (1.4, VSEPR) - Polar and nonpolar Molecules (1.5, <u>Independent Study</u>) - Valence Bond Theory (Hybridization) | 8/29 | 1.1-1.5 |
| <p style="text-align: center;"><u>Chapter 1</u> “Covalent Bonding and Shapes of Molecules”</p> - Basic Principles of Quantum Mechanics - MOT (organic molecules and delocalized systems) - Resonance Theory | 8/31 | 1.6-1.7, 1.9 |
| <p style="text-align: center;"><u>Chapter 1 (Cont)</u></p> - Resonance Theory - Summary | 9/5, 9/7 | 1.8 |
| <p style="text-align: center;"><u>Chapter 2</u> “Alkanes and Cycloalkanes”</p> - Structure of Alkanes - Constitutional Isomerism - Conformation of Alkanes - Nomenclature of Alkanes and Cycloalkanes | 9/12 | 2.1-2.5 |
| <p style="text-align: center;"><u>Chapter 2</u> “Alkanes and Cycloalkanes” (cont)</p> - Conformations of Cycloalkanes - Cis/Trans Isomerism in Cycloalkanes Stereoisomers: Conformational Stereoisomers, Configurational Stereoisomers (enantiomers and diastereomers, introduction to stereochemistry) | 9/14 | 2.5-2.6 |

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| <p align="center">Chapter 3 "Stereoisomerism and Chirality"</p> <ul style="list-style-type: none"> - Newman and Sawhorse projections - Chirality, Stereoisomerism, Naming Chiral Centers, Acyclic and Cyclic Molecules with two or more stereocenters. | 9/19 | 3.1-3.3 |
| <p align="center">Chapter 3 "Stereoisomerism and Chirality" (Cont)</p> <ul style="list-style-type: none"> - Acyclic and Cyclic Molecules with two or more stereocenters (cont), Fisher Projections, Optical Activity, Significance of Chirality in the Biological World, Separation of Enantiomers (resolution) | 9/21 | 3.4-3.9 |
| <p>Quiz 1 9/18 (Monday) - 9/22 (Friday), Recitation Class Time</p> <p>Topics:</p> <ul style="list-style-type: none"> - Chapter 1: 1.1-1.9 - Chapter 2: 2.1-2.6 | | |
| <p align="center">Chapter 13 "Nuclear Magnetic Resonance Spectroscopy"</p> <ul style="list-style-type: none"> - Nuclear Spin States - Orientation of Nuclear Spins in an applied magnetic field - Nuclear Magnetic Resonance - An NMR Spectrometer - Equivalent hydrogens: Concept and Examples | 9/26 | 13.1-13.5 |
| <p align="center">Chapter 13 "Nuclear Magnetic Resonance Spectroscopy"</p> <ul style="list-style-type: none"> - Signal Areas - Chemical Shifts - Basic Problems: Predicting number of signals and chemical shift in aliphatic and aromatic molecules | 9/28 | 13.6-13.9 |
| <p align="center">Chapter 13 (Cont)</p> <ul style="list-style-type: none"> - The Origins of Signal Splitting - Signal Splitting: Examples - Stereochemistry and Topicity - ¹³C NMR - Interpretation of NMR Spectra: Summary - Practice Problems | 10/3 | 13.9-13.12 |
| <p align="center">Chapter 13 (Cont)</p> <ul style="list-style-type: none"> - <u>Problems</u> | 10/5 | 13.1-13.12 |
| <p align="center">Chapter 4 "Acids and Bases"</p> <ul style="list-style-type: none"> - Arrhenius and B-L Acid and Bases - Using Curve Arrows in Acid-Base reactions - Acid Dissociation Constants, pka. Relative Strengths of Acids and Bases. | 10/12 | 4.1-4.7 |

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| <ul style="list-style-type: none"> - Position in the equilibrium in Acid-Base Reactions - Thermochemistry and Mechanisms of Acid-Base Reactions - Thermochemistry and Mechanisms of Acid-Base Reactions (cont) - Molecular Structure and Acidity - Lewis Acids and Bases | | |
| Quiz 2 10/11 (Wednesday) – 10/17 (Tuesday), Recitation Class Time | | |
| Topics: <ul style="list-style-type: none"> - Chapter 3: 3.1 – 3.8 - Chapter 13: 13.1 – 13.12 | | |
| Exam 1: Tuesday, 10/17/23 (9:30-10:45am, in person) | | |
| Topics: <ul style="list-style-type: none"> - Chapter 1: 1.1-1.9 - Chapter 2: 2.2-2.6 - Chapter 3: 3.1 – 3.8 - Chapter 13: 13.1 – 13.12 | | |
| Assignment 1 Due (Recitation Class) 10/23 (Monday) – 10/27 (Friday) | | |
| <p style="text-align: center;">Chapter 9:</p> <p style="text-align: center;">“Nucleophilic Subst. and β-Elimination”</p> <ul style="list-style-type: none"> - Nucleophilic Substitution in Haloalkanes. Reasoning Nuc. Subs and Elimination reactions: Analyzing reactive substrates and Leaving Groups - SN2 Reactions: Mechanism, Stereochemistry, Kinetic, Thermodynamic (Energy Diagrams, Hammond Postulate) Exp. Evidences, Substrate Reactivity (Steric Hindrance, 1o, 2o vs 3o Haloalkanes) - Analysis of Several SN2 Reactions (Examples) | 10/19 | 9.1-9.4 |
| <p style="text-align: center;">Chapter 9:</p> <p style="text-align: center;">“Nucleophilic Subst. and β-Elimination”</p> <ul style="list-style-type: none"> - SN1 Reactions: Mechanism, Stereochemistry, Kinetic, Thermodynamic (Energy Diagrams, Hammond Postulate), Experimental Evidences, Substrate Reactivity (1o, 2o vs 3o Haloalkanes) - SN1 Reactions: Carbocation stability (Resonance, Inductive and Hyperconjugation effect) - Skeletal rearrangements (linear and cyclic haloalkanes) - Effect of Solvents and Nucleophiles in SN1 and SN2 reactions - Analysis of Several Nucleophilic Substitution Reactions (Examples) | 10/24 | 9.1-9.4, 6.3A (p249-251) |

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| <p style="text-align: center;"><u>Chapter 9 (Cont)</u></p> <ul style="list-style-type: none"> - β-Elimination - E1 Mechanism: Thermodynamic, Regioselectivity - E2 Mechanism: Thermodynamic, Regioselectivity, Stereoselectivity in linear and cyclic haloalkanes) - Nucleophilic Substitution vs Elimination (Flow chart for Subst/Elimination reaction mechanisms, and some examples). - Neighboring group participation Summary (Examples) | 10/26 | 9.5-9.7 |
| <p style="text-align: center;"><u>Chapter 9 (Cont)</u></p> <ul style="list-style-type: none"> - Summary (Examples) | 10/31 | 9.8-9.10 |
| <p style="text-align: center;"><u>Chapter 6 "Reactions of Alkenes"</u></p> <ul style="list-style-type: none"> - Reasoning the Reactivity of Alkenes - Thermodynamic of Addition Reactions (Independent Study, Section 6.1C) - Electrophilic Addition Reactions: Addition of: HX, H₂O/H⁺, Br₂/Cl₂ (anti-stereoselectivity in linear alkenes), Br₂/Cl₂ (anti-stereoselectivity in linear and Cyclic alkenes, stereospecificity, chiral products), HOBr/HOCl (anti-stereoselectivity and regioselectivity, chiral products) - Oxymercuration/Reduction (regioselectivity and stereoselectivity, chiral products) | 11/2 | 6.1-6.4 |
| <p>Quiz 3 11/6 (Monday) - 11/10 (Friday), Recitation Class Time</p> <p>Topics:</p> <ul style="list-style-type: none"> - Chapter 4: 4.1 - 4.7 - Chapter 9: 9.1-9.9 | | |
| <p style="text-align: center;"><u>Chapter 6 "Reactions of Alkenes" (Cont)</u></p> <ul style="list-style-type: none"> - Hydroboration/Oxidation (regioselectivity and stereoselectivity, chiral products) - Comparison between acid catalyzed hydration, Oxymercuration/Reduction and Hydroboration/Oxidation (Examples) - Oxidation Reactions: OsO₄/RCOOH (Mechanism, Stereospecificity), Ozonolysis. Reduction Reactions: Catalytic Hydrogenation (Mechanism) | 11/7 | 6.5-6.7 |
| <p style="text-align: center;"><u>Chapter 7 "Reactions of Alkynes"</u></p> <ul style="list-style-type: none"> - Structure and Acidity of Alkynes - Nomenclature of Alkynes (independent study) - Preparation of Alkynes (internal and terminal alkynes) - Electrophilic Addition Reactions: Addition of HBr, Br₂ Hydroboration/Oxidation | 11/9 | 7.1, 7.2, 7.4-7.7 |

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| <p align="center">Chapter 7 “Reactions of Alkynes”</p> <ul style="list-style-type: none"> - Addition of HgSO₄. (terminal and internal alkynes) (keto-enol tautomerism) - Reduction Reactions: Catalytic hydrogenation to alkanes, Stereoselective hydrogenation to alkenes (lindlar’s catalyst and metal/ammonia) - Summary: Examples - Retrosynthetic Analysis: Synthesis Problems. | 11/14 | 7.7-7.9 |
| Review Class | 11/16 | |
| Exam 2: Tuesday, 11/21/23 (9:30pm-10:45am, in person) | | |
| <p>Topics:</p> <ul style="list-style-type: none"> - Chapter 4: 4.1–4.7 - Chapter 9: 9.1-9.9 - Chapter 6: 6.2-6.7 - Chapter 7: 7.1, 7.4-7.9 | | |
| Assignment 2 Due (Recitation Class) | | |
| 11/27 (M) – 12/1 (F) | | |
| <p align="center">Chapter 8 “Halogenation of Alkanes”</p> <ul style="list-style-type: none"> - Haloalkanes: Bond length and Bond Strengths - Nomenclature of Haloalkanes (Independent Study) - Free Radicals: Structure and Stability. - Analysis of BDE for Selective C-H bonds (Csp³-H, Csp²-H, Csp-H, Allylic/Benzylic C-H) - Halogenation of Alkanes: Energetics. Calculating enthalpy of Rxns from BDE values, interpreting this data. - General Mechanism of Halogenation of Alkanes - Regioselectivity of Bromination and Chlorination reactions of Alkanes (Revisiting the Hammond Postulate). | 11/28 | 8.1, 8.2, 8.4-8.5 |
| <p align="center">Chapter 8 “Halogenation of Alkanes” (Cont)</p> <ul style="list-style-type: none"> - Halogenation of alkanes (Review) - Allylic Halogenation - Benzylic Halogenation - Radical Addition to Alkenes (HBr/ROOH) - Reactions Roadmap (Examples covering rxns of chapters 9, 6, 7 and 8) | 11/30 | 8.5-8.6, 8.8 |
| <p align="center">Chapters 11 and 15:</p> <p align="center">“Epoxides and Organometallic Compounds”</p> <ul style="list-style-type: none"> - Organolithium and Organomagnesium compounds - Gilman Reagent - Synthesis and reactions of Epoxides | 12/5 | 15.1A-C, 15.2A-C 11.7, 11.8A-C, 11.9 |
| <p align="center">Synthesis</p> <ul style="list-style-type: none"> - Reactions Roadmap (Overview of Reactions and Mechanisms from chapters 6,7,8 and 9) - Synthesis Problems | 12/7 | 15.1A-C, 15.2A-C 11.7, 11.8A-C, 11.9 |

Quiz 4

12/04 (Monday) - 12/08 (Friday), Recitation Class Time

Topics:

- *Chapter 8: 8.1, 8.2, 8.4-8.6, 8.8*
- *Chapter 11/15: 11.7, 11.8A-C, 11.9, 15.1A-C, 15.2A-C*
- *Synthesis*

Assignment 3 Due

12/11 (Monday) - 12/15 (Friday)

Final Exam is Scheduled for Tuesday, December 19th at 8am (2h, in person)