

CHEMISTRY 2110
Fall 2023 Syllabus
Ingersoll 2127 (Mondays, 12:25-2:05 pm)

Lecturer: Dr. Guillermo Gerona-Navarro

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Office Hours: Tues 12:30-2pm, Thursday 12:30-2pm

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* If you get my voice mail, send an email. I do not check my voicemail messages often.

Introduction

This course is designed to reinforce old and learn new concepts directly related to the structure and chemical reactivity of organic molecules, which are not covered in depth in general chemistry courses. Therefore, it is intended to provide the students with the solid background needed to succeed in organic chemistry, biochemistry as well as in other advanced chemistry and biology courses.

We will begin by discussing basic concepts of general chemistry in depth and to analyze/understand their periodic trends. Next, we will cover bonding theories in chemistry in order to understand the shape and electronic distribution of inorganic and organic molecules and thus predict their reactivity. We will also learn to properly draw organic molecules, to visualize them in space (3D) and will introduce the concept of chirality. Finally, we will learn the basics physical chemistry principles to understand reaction mechanisms, and to use the curve arrow symbolism to represent the flow of electrons in simple acid/base reactions in chemistry. Overall, this course will help the students to improve their reasoning and studying skills and to learn problem solving strategies that are key to succeed in their future career endeavors.

Specific Course Objectives

Individuals who successfully complete this course will be able to:

1. Use fluently basic chemistry concepts such as electronic distribution of atoms, atomic radius, electronegativity, polarizability. Predict periodic trends of such concepts.
2. Understand in depth the Lewis model of bonding, as well as covalent bonding theories in chemistry, including valence-shell electron-pair repulsion theory, valence bond theory and Molecular Orbital Theory.
3. Draw correct structural representations of organic molecules.
4. Visualize molecules in space (3D), identify their main symmetry elements and chiral centers.
5. Assign Configuration in Chiral centers.
6. Learn the basis of the curved arrow symbolism to show the flow of electrons in acid/base reactions and to properly represent the structure of delocalized systems (resonance theory).
7. Use the geometry and the electronic distribution of molecules to predict and understand reactivity patterns in chemistry.
8. Understand the concept of "reaction mechanism". Properly draw and interpret reaction coordinate diagrams.

9. Learn problem-solving strategies and studying skills that are crucial to succeed in organic chemistry as well as in other advanced chemistry and biology courses.

Recommended Books:

1.- *Thinking Organically 2.3*, Mark Kobrak, Open Educational Resource, 2021. Available as a free PDF here:

<https://drive.google.com/file/d/1yIpDp34gSQFP0rc10KFvfG2aOWQAWCg6/view?usp=sharing>

2.- Chemistry 2e (free e-book, <https://openstax.org/details/books/chemistry-2e>) by P. Flowers, K. Theopold, R. Langley and W. R. Robinson.

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

4.- Molecular Modeling Set

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 Exams

Exam 1 – 3/2 (Thursday, 3:40pm)

Exam 2 – 4/27 (Thursday, 3:40pm)

Final Exam –

Course Grades

My main job regarding the grades is to make sure that every student is treated fairly and equally. Final grades are calculated following the breakdown given below:

Exam I 30%

Exam II 30%

Final Exam 40%

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.

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, Ms. Valerie Stewart-Lovell 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 thirty minutes), each worth 100 points. The final exam is a two-hour, cumulative exam, which is worth 100 points as well. If you require extra time for written exams because of a disability, please secure a note as soon as possible. Make sure you start the exam ON TIME !

Absence from Examinations:

No make up examinations will be given to students who are absent from lecture examinations. 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.

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 that justify the absence. No make-up final will be given to any student who is failing the course heading into the final.

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	Recommended Reading
<p>"Atomic and Bonding Theories"</p> <ul style="list-style-type: none"> - Atomic Structure and Symbolism - Electronic distribution of atoms. - Periodic variations in element properties: Atomic Radius, Electronegativity, Polarizability. - Lewis Model of Bonding: Ionic and Covalent Bonds, Lewis Symbols and Structures. 	8/28	<p>Chemistry 2e: 2.3, 6.4, 6.5, 7.1-7.3</p>
<p>"Atomic and Bonding Theories" (Cont)</p> <ul style="list-style-type: none"> - Lewis Model of Bonding: Formal Charges, Octet Rule. - Drawing Organic Molecules (Lines and Angle Notation, structural formulas) - Valence-shell electron-pair repulsion theory - Practice Problems 	9/11	<p>Chemistry 2e: 7.4-7.5, 20.1-20.4</p> <p>Organic Chemistry: 1.2, 1.3, 1.4, 2.1</p>
<p>"Atomic and Bonding Theories" (Cont)</p> <ul style="list-style-type: none"> - Valence Bond Theory (Hybridization) 	9/18	<p>Chemistry 2e: 8.1-8.3</p> <p>Organic Chemistry: 1.6</p>
<p>"Atomic and Bonding Theories" (Cont)</p> <ul style="list-style-type: none"> - Valence Bond Theory (Cont, Practice problems) 	10/2	<p>Chemistry 2e: 8.4</p>
<p>"Atomic and Bonding Theories" (Cont)</p> <ul style="list-style-type: none"> - Molecular Orbital Theory of Homonuclear Diatomic Orbitals 	10/10 Tuesday	<p>Chemistry 2e: 8.4</p>
<p>First Midterm Exam, Monday 10/16</p>		
<p>Topics:</p> <ul style="list-style-type: none"> - Atoms and Bonding Theories (excluding MOT). 		
<p>"Atomic and Bonding Theories" (Cont)</p> <ul style="list-style-type: none"> - Molecular Orbital Theory of Homonuclear Diatomic Orbitals (Cont, Practice Problems) 	10/23	<p>Organic Chemistry: 1.7</p>
<p>"Atomic and Bonding Theories" (Cont)</p> <ul style="list-style-type: none"> - Resonance Theory: The curved arrow symbolism 	10/30	<p>Chemistry 2e: 7.4</p>

		Organic Chemistry: 1.8
“Atomic and Bonding Theories” (Cont) - Resonance Theory: The curved arrow symbolism (Cont, Practice Problems)	11/6	Chemistry 2e: 7.4 Organic Chemistry: 1.8
“Symmetry and Stereochemistry” - Symmetry in Molecules - Chirality - Isomerism - Sawhorse, Newman and Fisher projections	11/13	Organic Chemistry: 2.2, 2.6, 3.1
“Symmetry and Stereochemistry” (Cont) - Practice problems - Review	11/20	Organic Chemistry: 3.2, 3.3
Second Midterm Exam, Thursday 11/27 Topics: <ul style="list-style-type: none"> - Molecular orbital Theory - Resonance Theory: The curved arrow symbolism - Symmetry and Stereochemistry 		
“Organic Chemistry Reactions Elementary Steps” - Bond formation and bond breaking - Reaction Mechanisms, Free energy diagrams, transition states, reaction coordinates - Curved arrow notation in simple acid/base reactions.	12/4	Organic Chemistry: 4.5
“Organic Chemistry Reactions Elementary Steps” - Bond formation and bond breaking - Reaction Mechanisms, Free energy diagrams, transition states, reaction coordinates - Curved arrow notation in simple acid/base reactions.	12/11	Organic Chemistry: 4.5
Final Exam is Scheduled for Monday December 18th 10:30-12:30pm		