

**CHEMISTRY 2110**  
**Fall 2019 Syllabus**  
**Ingersoll Extension 113 (Thurs from 12:30-2pm)**

---

**Lecturer:** Dr. Guillermo Gerona-Navarro

**Office:** 2146 Ingersoll

**Email:** ggerona@brooklyn.cuny.edu

**Office Hours:** Tues 10:50-12:15, Thurs 10:50-12:15 (2146A)

**Phone:** 718-951-5000 x3619\*

\* 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.- Chemistry 2e (free e-book, <https://openstax.org/details/books/chemistry-2e>) by P. Flowers, K. Theopold, R. Langley and W. R. Robinson.
2. Organic Chemistry, 8<sup>th</sup> Edition by W. Brown, C.S. Foote, B.L. Iverson, E. Anslyn (7<sup>TH</sup> edition follows very closely)
- 3.- Molecular Modeling Set

### **Administrative Dates**

*Tuesday 8/27 – Fall 2019 Classes Begin*

*Monday 9/2 – Labor Day Holiday, College is Closed. No Classes Scheduled*

*Monday 9/2 – Last Day to Add a Course*

*Thursday 9/5 – Classes Follow a Monday Schedule*

*Monday 9/17 - First day to withdraw from a course with a grade of W (Course withdrawal period begins)*

*Monday-Tuesday 9/30, 10/1 – No Classes Scheduled*

*Tuesday-Wednesday 10/8, 10/9 – No Classes Scheduled*

*Monday 10/14 – College is Closed.*

*Wednesday 10/16 – Classes Follow a Monday Schedule*

*Tuesday 11/5 – Course withdrawal period ends. Last Day to withdraw from a class with a grade of "W"*

*Thursday-Friday 11/28, 11/29 – Thanksgiving Recess – No Classes Schedule, College Closed*

*Saturday-Sunday 11/30, 12/1 – Thanksgiving Recess – No Classes Schedule, Campus Open*

*Friday 12/13– Reading Day / Final Examination*

*Saturday-Friday 12/14-12/20 Final examinations.*

### **Dates of Quizzes and Exams**

*Exam 1 – 10/10 (Thursday, 12:30pm)*

*Exam 2 - 11/21 (Thursday, 12:30pm)*

*Final Exam – 12/16 (3:30pm)*

### **Course Grades**

My main job regarding the grades is to make sure that the class is standardized (across all sections) so every student is treated fairly and equally. To this end, for example, I personally check the level of difficulty of all the exams, and that the same standards/criteria are used to grade every student.

Final grades are calculated following the breakdown given below:

Exam I 30%

Exam II 30%

Final Exam 35%

Attendance 5%

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](http://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 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 after they are completed and returned in your next class (hopefully !). If you require extra time for written exams because of a disability, please secure a note as soon as possible. Make sure you come to the exam ON TIME !!. Those who arrive late will only be allowed to take the exam if no one has exited the room. No one will be allowed to take the exam after the first student leaves the room. Students will NOT be allowed to go to the bathroom during the exams. Electronic devices will no be allowed at any exam, you will only use your pen/pencil.

### **Absence from Examinations:**

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

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.

# COURSE OUTLINE

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

Topic	Tentative Dates	Recommended Reading
<p style="text-align: center;"><b>“Atomic and Bonding Theories”</b></p> <ul style="list-style-type: none"> <li>- Atomic Structure and Symbolism</li> <li>- Electronic distribution of atoms.</li> <li>- Periodic variations in element properties: Atomic Radius, Electronegativity, Polarizability.</li> <li>- Lewis Model of Bonding: Ionic and Covalent Bonds, Lewis Symbols and Structures.</li> </ul>	8/29	<p><b>Chemistry 2e:</b> 2.3, 6.4, 6.5, 7.1-7.3</p>
<p style="text-align: center;"><b>“Atomic and Bonding Theories” (Cont)</b></p> <ul style="list-style-type: none"> <li>- Lewis Model of Bonding: Formal Charges, Octet Rule.</li> <li>- Drawing Organic Molecules (Lines and Angle Notation, structural formulas)</li> <li>- Valence-shell electron-pair repulsion theory</li> <li>- Practice Problems</li> </ul>	9/12	<p><b>Chemistry 2e:</b> 7.4-7.5, 20.1-20.4</p> <p><b>Organic Chemistry:</b> 1.2, 1.3, 1.4, 2.1</p>
<p style="text-align: center;"><b>“Atomic and Bonding Theories” (Cont)</b></p> <ul style="list-style-type: none"> <li>- Valence Bond Theory (Hybridization)</li> </ul>	9/19	<p><b>Chemistry 2e:</b> 8.1-8.3</p> <p><b>Organic Chemistry:</b> 1.6</p>
<p style="text-align: center;"><b>“Atomic and Bonding Theories” (Cont)</b></p> <ul style="list-style-type: none"> <li>- Valence Bond Theory (Cont, Practice problems)</li> </ul>	9/26	<p><b>Chemistry 2e:</b> 8.4</p>
<p style="text-align: center;"><b>“Atomic and Bonding Theories” (Cont)</b></p> <ul style="list-style-type: none"> <li>- Molecular Orbital Theory of Homonuclear Diatomic Orbitals</li> </ul>	10/3	<p><b>Chemistry 2e:</b> 8.4</p>
<p>First Midterm Exam, Thursday 10/10</p>		
<p><b>Topics:</b></p> <ul style="list-style-type: none"> <li>- Atoms and Bonding Theories (excluding MOT).</li> </ul>		
<p style="text-align: center;"><b>“Atomic and Bonding Theories” (Cont)</b></p> <ul style="list-style-type: none"> <li>- Molecular Orbital Theory of Homonuclear Diatomic Orbitals (Cont, Practice Problems)</li> </ul>	10/17	<p><b>Organic Chemistry:</b> 1.7</p>

<p><b>“Atomic and Bonding Theories” (Cont)</b></p> <ul style="list-style-type: none"> <li>- Resonance Theory: The curved arrow symbolism</li> </ul>	10/24	<p><b>Chemistry 2e:</b> 7.4</p> <p><b>Organic Chemistry:</b> 1.8</p>
<p><b>“Atomic and Bonding Theories” (Cont)</b></p> <ul style="list-style-type: none"> <li>- Resonance Theory: The curved arrow symbolism (Cont, Practice Problems)</li> </ul>	10/31	<p><b>Chemistry 2e:</b> 7.4</p> <p><b>Organic Chemistry:</b> 1.8</p>
<p><b>“Symmetry and Stereochemistry”</b></p> <ul style="list-style-type: none"> <li>- Symmetry in Molecules</li> <li>- Chirality</li> <li>- Isomerism</li> <li>- Sawhorse, Newman and Fisher projections</li> </ul>	11/7	<p><b>Organic Chemistry:</b> 2.2, 2.6, 3.1</p>
<p><b>“Symmetry and Stereochemistry” (Cont)</b></p> <ul style="list-style-type: none"> <li>- Practice problems</li> <li>- Review</li> </ul>	11/14	<p><b>Organic Chemistry:</b> 3.2, 3.3</p>
<p>Second Midterm Exam, Thursday 11/21</p> <p><b>Topics:</b></p> <ul style="list-style-type: none"> <li>- Molecular orbital Theory</li> <li>- Resonance Theory: The curved arrow symbolism</li> <li>- Symmetry and Stereochemistry</li> </ul>		
<p><b>“Organic Chemistry Reactions Elementary Steps”</b></p> <ul style="list-style-type: none"> <li>- Bond formation and bond breaking</li> <li>- Reaction Mechanisms, Free energy diagrams, transition states, reaction coordinates</li> <li>- Curve arrow notation in simple acid/base reactions.</li> </ul>	12/5	<p><b>Organic Chemistry:</b> 4.5</p>
<p><b>“Organic Chemistry Reactions Elementary Steps”</b></p> <ul style="list-style-type: none"> <li>- Bond formation and bond breaking</li> <li>- Reaction Mechanisms, Free energy diagrams, transition states, reaction coordinates</li> <li>- Curve arrow notation in simple acid/base reactions.</li> </ul>	12/12	<p><b>Organic Chemistry:</b> 4.5</p>
<p><b>Final Exam is Scheduled for Monday, Dec 16<sup>th</sup> at 3:30pm (2h)</b></p>		