ORGANIC CHEMISTRY I

Fall 2017 Syllabus

Ingersoll 2310 (Tue/ Thurs from 9:30-10:45)

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 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:

1.- 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

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

Resources for Students:

1. Material on the website of Prof. Murelli, Prof. Contel and Prof. Horowitz
(http://userhome.brooklyn.cuny.edu/rpmurelli/course.html)
(http://userhome.brooklyn.cuny.edu/mariacontel)
(http://userhome.brooklyn.cuny.edu/ghorowitz/index.htm)
a. Recitation handouts

2. Highly recommended tutorial/supplement *a. http://masterorganicchemistry.com/organic-1/*

3. Library: Textbook, Solutions Manual & Molecular Models are on Reserve

4. Online Video Tutorials: http://www.youtube.com/user/freelanceteach

5. Online Tutorials: http://ochem.jsd.claremont.edu/tutorials.htm#

6. Animations of Reaction Mechanisms: www.chemtube3d.com

7. Supplementary Problems Online:
http://www.cem.msu.edu/~reusch/VirtualText/Questions/problems.htm
http://www.mc.maricopa.edu/~minger/CHM235.htm,
http://www.utdallas.edu/~scortes/ochem/

Dates of Quizzes and Exams

Quiz 1 – 9/12-9/18
Quiz 2 – 9/25 -9/29
Exam 1 – 10/3 (Tuesday, 12:15pm)
Quiz 3 – 10/30-11/3
Exam 2 - 11/7 (Tuesday, 12:15pm)
Quiz 4 – 11/13-11/17
Quiz 5 – 12/6-12/12
Final Exam – 12/13 (4:30pm)

Administrative Dates

Thursday 8/31 - Last day to add a course
Monday 9/4 – Labor Day holiday, College is Closed. No Classes Scheduled
Thursday 9/14 - Last day to drop a course without the grade of W
Friday 9/15 - First day to apply for a W grade (Course withdrawal period begins)
Tuesday 9/19 – Conversion Day, Classes Follow a Thursday Schedule
Wednesday-Friday 9/20-22 – No Classes Scheduled
Friday-Saturday 9/29-30 – No Classes Scheduled
Monday 10/9 – Columbus Day Holiday, No Classes Scheduled
Friday 11/10 – Course withdrawal period ends. Last Day to withdraw from a class with a grade of "W"
Tuesday 11/21 - Conversion Day, Classes Follow a Friday Schedule
Thursday-Sunday 11/23-26 – Thanksgiving Holiday. No Classes Scheduled
Wednesday 12/13 – Reading Day
Thursday-Wednesday 12/14-20 Weekday day/evening courses final examinations.

As per our department policy (not mine) students dropping the lecture must also drop the lab

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.

Final grades are calculated following the breakdown given below:

Lecture/Recitation

Quizzes 20%
Exam I 17.5%
Exam II 17.5%
Final Exam 40%
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.

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 of little study time or problems with how to study the material, for example.

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 this 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.

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, 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 immediately after they are completed and returned in your recitation section. 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.*

Quizzes

There will be five short quizzes (20 min, 20 points each) given throughout the semester. The best 4 quizzes out of the 5 will be totaled. Quizzes will be held at your respective recitation section. While with permission from the recitation instructor you are welcome to go to additional recitation sections to supplement your studies, you may not show up to another recitation section on the day a quiz is being held**.** In the event that you know or anticipate that you will be missing a quiz due to scheduling conflicts (ie religious holiday, family event, bayou adventure), you may ask for permission to take a quiz at one of the other recitation sections. *This must be done WITHIN 24 HOURS of the quiz, and any request made after then will not be granted. Students will NOT be allowed to go to the bathroom during the quizzes !!*

Re-grade Requests

While we are human, occasionally there is a mistake made on a quiz or exam. You are in your right to request re-grades. There are two ways to do this.

1. For any BLATANT mistakes including a right answer marked wrong (ie, you should have received FULL credit), or a number/ adding error: Please show your recitation instructor, and they will make the

first approximation judgment call on whether it constitutes a blatant mistake or not. If they do, they will give the quiz/exam to me for further evaluation, and if it truly is blatant, I will simply make the change accordingly or otherwise suggest a re-grade request form.

2. For any request related to partial credit (ie, if you come to me asking 'shouldn't I get more points for this?!?'), or one that is not deemed to be a blatant mistake by your recitation instructor: Fill out and submit in writing using the standardized re-grade request form, which can be found on Professor Horowitz's website (http://userhome.brooklyn.cuny.edu/ghorowitz/index.htm). Requests for a re-grade in this fashion will result in the re-grading of the entire exam, and you must accept your grade in the event that the grade turns out lower then your initial grade.

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. In the event of absence from the final exam, students must apply to the Academic Advisement Center for permission to take a make up final examination given during following semester. No make-up final 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. Attendance to recitation classes will account for 5% of the final grade. Recitation will be spent working on problem solving. Students are expected to actively participate in this activity. 5 quizzes will be administered throughout the semester. Make-up quizzes will not be allowed for their first missed quiz. In the event that a student misses 2 or more quizzes, make-ups MIGHT be allowed, but only with valid excuses for all of the missed quizzes, and after careful consideration of your professor and me.

Recommendation Letters:

If you need or think that you may need a recommendation letter from me at some point in the future, regardless of when you need it, you should email me at the end of the semester to ensure a greater likelihood of accurate personal anecdotes in your letters. I will only write recommendation letters to students who score A in the class and that I happen to know relatively well, therefore, you should make a point of coming to my office hours occasionally and participate so that I may know who you are.

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, Horowitz 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.*

COURSE OUTLINE

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

Topic	**Tentative Dates**	**Reading (8th Edition)**
- How to study Organic Chemistry ? How can I succeed in this class ? - Covalent Bonding and Shapes of Molecules, Molecular Orbital Theory.	8/29, 8/31, 9/5, 9/7	Lewis Structures, Hybridization, Polar and non Polar Molecules, Functional Groups, Resonance. Molecular Orbital Theory, (**1.1-1.10**)
Quiz 1	9/11 (M)- 9/15(F)	**Topics: 1.1-1.10**
Alkanes and Cycloalkanes	9/12, 9/14	**2.2 – 2.6, 2.8**
Stereochemistry	9/19, 9/26	Chirality, Stereoisomerism, Naming Chiral Centers, Aciclyc and Cylic Molecules with two or more stereocenters (**3.1-3.8**)
Acids and Bases	9/28	Arrhenius and B-L acid and bases. Relative Strenghts of Acids and Bases, pka (**4.1-4.7**)
Quiz 2	9/25 (M) - 9/29 (F)	**Topics: 2.2-2.6, 2.8, 3.1-3.5**
Exam 1: *Tuesday, 10/03/17* **Topics:** - *Chapter 1*: 1.1-1.10 - *Chapter 2*: 2.2-2.6, 2.8 - *Chapter 3*: 3.1 – 3.8 The exam will take place during common hours (12:15pm – 1:30pm)		
Nucleophilic substitution and β-elimination	10/5, 10/10, 10/12	Mechanisms of Nucleophilic Substitution and β-elimination. Substitution vs β-elimination (**9.1-9.9**)
Reaction of Alkenes	10/17, 10/19, 10/24	Reaction Mechanisms, Electrophilic Addition, Hydroboration-oxidation, Oxidation, Reduction (**6.2-6.7**)
Quiz 3	10/30 (M) - 11/3 (F)	**Topics: 9.1-9.9, 6.2-6.7**
Reaction of Alkynes	10/26, 10/31	Acidity of Alkynes, Preparation of Alkynes, Electrophilic Addition, Hydration of Alkynes, Reduction, synthesis (**7.4-7.9**)
Halogenation of Alkanes	11/2	Preparation of Haloalkanes, Mechanism of Halohalogenation, Regioselectivity: Hammond's

		postulate, Allylic halogenation (**8.4-8.8**)
Exam 2: *Tuesday, 11/07/17* **Topics:** - *Chapter 4*: 4.1-4.7 - *Chapter 9*: 9.1-9.9 - *Chapter 6*: 6.2-6.7 The exam will take place during common hours (12:15pm – 1:30pm)		
Halogenation of Alkanes	11/9	Preparation of Haloalkanes, Mechanism of Halohalogenation, Regioselectivity: Hammond's postulate, Allylic halogenation (**8.4-8.8**)
Quiz 4	11/13 - 11/17	**Topics: 7.4-7.9, 8.4-8.8**
Organometallic Reactions	11/14, 11/16	Organomagnesium and Organolithium Compounds – **15.1A-C** Alkyl Cuprates – **15.2A-C**
Thanksgiving Holiday (No Lecture Scheduled on 11/21 and 11/23)		
NMR	11/28, 11/30, 12/5	13.1-13.12
IR	12/7	12.1-12.4
Mass Spectroscopy	12/7	14.1-14.3
Quiz 5	12/6 (Wed) - 12/12 (Monday)	**Topics: 15.1A-C-15.2A-C, 13.1-13.12, Synthesis**
Lab Exam: *Tuesday 12/12*		
Final Exam is Scheduled for Wednesday, Dec 13th at 4:30pm (2h)		