

**LAGUARDIA COMMUNITY COLLEGE
NATURAL SCIENCES DEPARTMENT**

SCC 252

Organic Chemistry 2

Spring 1 2017

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Course Description: This course is the second of a two-semester sequence emphasizing synthesis, structure, reactivity and mechanisms of reactions. In this course we will build upon material learned in Organic 1. Specific goals include: to develop a broad understanding of mechanistic principles, particularly applied to aromatic substitutions, nucleophilic additions, and nucleophilic acyl substitutions. Recognize reagents associated with chemical reactions and apply them to multistep synthesis. Understand the applications of a variety of carbon-carbon bond forming reactions in retro synthetic analysis, and apply all these principles to biologically relevant molecules, particularly carbohydrates, lipids, and amino acids.

Materials: **Text:** Organic Chemistry 10th edition, Francis A Carey & Robert M Giuliano McGraw Hill, 2017
Lab Manual: Macroscale and Microscale Organic Experiments 6th edition, Kenneth L Williamson, Houghton Mifflin, 2008.
Lab Book: Bound laboratory notebook.
Software: Subscription to Connect
This program will be used for homework and reading material
Safety Goggles: All students are required to bring safety goggles to EVERY lab session
Scientific Calculator: All students are required to have their own calculator, **Not** cell phone calculators. Borrowing calculators will not be allowed during exams nor quizzes.
Pushing Electrons: A Guide to Students of Organic Chemistry, 3rd edition, Daniel P. Weeks (optional).

Some Advice: The amount of material covered in this 12 week course is considerable. Please stay current with the chapters and homework. This course is cumulative, the ideas and concepts introduced early will be used to develop strategies not only later in this course but also in organic II. Do not wait for the last minute to study or try to cram for this class, this is impossible!
Do not attempt to memorize. Success in this course is based on understanding WHY reactions happen and How mechanisms occur. Many

of the concepts in this course will become clear after you've had a chance to analyze and review. This review period is essential therefore you need to schedule regular study periods of at least 4 hours per day because as the semester progresses playing catch-up will be impossible. Write, write and re-write your notes! Listening to lectures and looking at slides will lull you into thinking that you understand the material but this is not so, only by writing and again re-writing the notes will you truly understand the ideas and reactions.

Form study groups with your colleagues, network! You will be amazed at how much you can help each other.

Make the most of the resources you have available, other books, online sites, tutoring and OFFICE HOURS! Do not wait till the day before a major exam to find the instructor---that will be too late.

Finally stay focused and involved, if you give organic chemistry a chance it's really fun, Good Luck!

Instructional Objectives:

Successful students will learn, understand and be able to apply the following concepts; Structure Determination using Spectroscopy including Mass spectrometry, UV-Vis, NMR and IR. Conjugation and aromaticity. Nomenclature, structure, properties, synthesis, reactions, and spectroscopy of the following functional groups: dienes and conjugated systems, aromatics, ketones, aldehydes, amines, carboxylic acids and derivatives of carboxylic acids. Introductory concepts of biochemistry including the areas of carbohydrates, amino acids, proteins. To cultivate an appreciation of the role of organic chemistry in various biochemical processes.

Evaluation:	Exams (3)	300 points
	Cumulative Final	200 points
	Homework (12) @ 10 each	100 points
	Lab Reports (10) @ 25 each	250 points
	Lab protocols 10 @ 5 pts each	50 points
	Pre-Lab Quizzes (10) @ 5 each	50 points
	Lab Exam Final	50 points
	Total	1000 points

Grading Standards: A minimum of 60% of 1000 points must be earned in order to receive a passing grade for the course (D-)

Grading Scheme:	A = 93-100%	A- = 90-92.9%	
	B+ = 87-89.9%	B = 84-86.9%	B- = 80-83.9%
	C+ = 77-79.9%	C = 73-76.9%	C- = 70-72.9%
	D+ = 67-69.9%	D = 63-66.9%	D- = 60-62.9%
	F = less than 60%		

Academic Integrity Policy:

Students are required to observe the College Policy regarding cheating on examinations and quizzes. A complete statement of the policy is available at the student counseling services. Academic Dishonesty is prohibited in the City University of New York and is punishable by penalties ranging from a grade of F” on a given test, research paper or assignment, to an “F” in the course, or suspension or expulsion from the College. For more information see:

<http://library.laguardia.edu/files/pdf/academicintegritypolicy.pdf>

Attendance Policy: Attendance at all class sessions, lecture and laboratory, is essential for proper understanding and mastery of the course material. A student who is absent from more than one laboratory session seriously jeopardizes his/her grade for the course.

Make-up Policy: There will be no make-up exams or quizzes. A student who has missed a test or quiz must have a doctor's note. **There will be no make-up labs.**

Cell Phone Policy: The use of cell phones, smart phones, or other mobile communication devices is disruptive, and is therefore prohibited during class. Except in emergencies, those using such devices must leave the classroom for the remainder of the class period. **The use of cell phones in class is prohibited.**

Online Homework and Reading Assignments:

Online - All DIGITAL: You can purchase Connect (no print book, but includes the complete eBook and access to all course content) directly from the course website listed below. To register and purchase Connect without the print book, follow the steps below.

Bookstore: Your bookstore has a package which includes the full loose-leaf version of the text and a two year Connect access code (you will need this code to access the online study modules and materials). The ISBN for this package is as follows: **9781260036909**. The bookstore also has available just a Connect access code if you would like to go all digital (includes eBook and two year access) with the following ISBN: **9781260036879**. To register for Connect, follow the steps below.

How to Register for Connect

1. Go the section web address:
<http://connect.mheducation.com/class/scc-251-170a>
2. Click the “**Register Now**” Button.
3. Enter your email address.
 - a. If you already have a McGraw-Hill account you will be prompted for your password.
 - b. If you do not have a McGraw-Hill account you will be asked to create one.
4. To access Connect:
 - a. If you already have a registration code (for example, included in the print package from the bookstore), enter it in the “**Have a registration code?**” section.
 - b. If you do not have an access code, select “**Buy Online**” (valid credit card required).
 - c. If you wish to purchase at a later time, you may begin a 14-day **Courtesy Access** period at this time. You will be prompted to upgrade to full Connect access before your courtesy access period expires. You **must** purchase full Connect access in order to maintain access to your course assignments and materials
5. Complete the registration form, and click “**Submit**”

Technical Support

If you need Technical Support (forgotten password, wrong code, etc.) please contact the McGraw-Hill Education **Customer Experience Group (CXG)** at:

(800) 331-5094

www.mhhe.com/support

Laboratory: A complete, accurate record is an essential part of laboratory work. A lab report will be required for each lab performed. Your lab reports must be recorded in a bound laboratory notebook. The required format of the lab reports is shown in your laboratory manual. You will be expected to have

all of the relevant information and create a protocol about the running of an experiment entered in your notebook before coming to laboratory so that your lab manual should not be needed when you are conducting the actual experiment. All lab reports must also be submitted through safe assign first as a draft and then as a final version. A hardcopy will be handed into the instructor.

Topics covered: **Week 1/2** Conjugated dienes, Electrophilic addition, Diels Alder Reaction
Spectroscopy of Conjugated Dienes

Week 3 Benzene and Aromaticity: Aromatic Compounds, Nomenclature
Structure and Stability. Aromaticity and the Huckel $4n+2$ Rule
Spectroscopy of Aromatic Compounds

Week 4 Chemistry of Benzene: Electrophilic Aromatic Substitution
Freidel-Crafts Reaction, Alkylation and Acylation Substituent effect in
Substituted Aromatic Rings Nucleophilic Aromatic Substitution

Week 5 Alcohols and Phenols: Naming Alcohols and Phenols
Preparation and reactions of Alcohols and Phenols

Week 6 Ethers and Epoxides: Thiols and Sulfides
Preview for Carbonyl compounds

Week 7 Aldehydes and Ketones: Nomenclature and synthesis.
Oxidation of Aldehydes and Ketones
Nucleophilic Addition Reactions of Aldehydes and Ketones,
Hydration, Cyanohydrin formation, Addition of Grignard
Nucleophilic additions of ketones and aldehydes: Imine and enamine
formation with amines, acetal formation with alcohols, Wolff-Kishner and
Wittig reactions

Week 8 Carboxylic Acids and Nitriles: Nomenclature, Properties,
Substituent Effects on Acidity. Carboxylic Acids and Nitriles:
Carboxylic Acid Derivatives: nomenclature and properties
Nucleophilic Acyl Substitutions, Fischer Esterification Reaction

Week 9 Chemistry of Acid Halides, Chemistry of Acid Anhydrides, Ester
and amides. Keto-Enol Tautomerism
Alpha Halogenation of Aldehydes and Ketones
Hell-Volhard-Zelinskii Reaction

Week 10/11 Reactivity of Enolate Ions, Haloform Reaction Alkylation of Enolate
Ions Aldol Condensation Claisen Condensation, Michael Reaction.

Week 12 Amines: Nomenclature, Properties, and Basicity Reductive Synthesis and reactions Amination Hoffman and Curtis Rearrangements Aryl Amines and Heterocyclic compounds spectroscopy amines

Lab Safety: Please be aware where safety equipment is located (Safety Shower, Eye Wash Station, Fire Extinguishers, Fire Blankets, First Aid Kits and Emergency Exits). Students are required to wear safety glasses at ALL times for laboratory work and to observe all safety rules. In the lab there is **no smoking, no eating, no drinking, no open toe shoes or sandals and you MUST have goggles for every lab**. These rules exist for your safety and the safety of everyone in the lab. If you violate any of these rules you will be asked to leave the lab and you will receive a zero grade for that lab.

Lab Experiments: Week 1	Lab Safety Procedures, Lab Reports and Reference Style
Week 2	Extraction of Carboxylic acid, Phenol and a Neutral compound
Week 3	Aldol condensation: Synthesis of Dibenzalacetone
Week 4	Gas Chromatography: Dehydration of 2-methyl-2-butanol
Week 5	Infrared and GC Spectroscopy
Week 6	Borohydride Reduction of 2-Methylcyclohexanone
Week 7	Oxidation of Cyclohexanol to Cyclohexanone
Week 8	Friedel-Crafts Acylation of Ferrocene
Week 9	Grignard Synthesis of Triphenylmethanol
Week 10	Chemiluminescence: Synthesis of a cyalume and luminol
Week 11	Dyes: Coupling reactions of diazotized salts (Synthesis of Orange II and Methyl Orange)
Week 12	Lab Final

There will be a 15 min quiz before each lab