Chemistry 251 (Section D01)
Organic Chemistry I
Fall 2016

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Office Hours:
Monday: 11:00 am - 12:00 pm
Tues/Thurs: 8:30 am - 9:30 am
Wed/Friday: 12:00 pm - 1:00 pm

Mailbox location: N-203-C

Contact Instructions: Please place "CHM 251 D01" in Subject Line or use Blackboard Email tool. All emails will be returned within 48 hours excluding weekends. This is the best contact method.

CFCC General Education Competencies will incorporate all or some of the following:

√	1. Written Communication	√	5. Global Awareness
√	2. Oral Communication	√	6. Quantitative Skills
√	3. Critical Thinking	√	7. Understanding Scientific Concepts
√	4. Computer Skills		and Application

Course Overview

Course Description: CHM 251 Organic Chemistry I
This course provides a systematic study of the theories, principles, and techniques of organic chemistry. Topics include nomenclature, structure, properties, reactions, and mechanisms of hydrocarbons, alkyl halides, alcohols, and ethers; further topics include isomerization, stereochemistry, and spectroscopy. Upon completion, students should be able to demonstrate an understanding of the fundamental concepts of covered organic topics as needed in CHM 252.

Lecture hours per week: 3 **Lab hours per week:** 3 **Semester Credit Hours:** 4

Prerequisite: CHM 152 – General Chemistry II.

Course Structure: This course is structured to enhance learning and supplement lecture material with hands on application of chemistry topics discussed in the classroom. Exams, labs, and homework assignments will be used to monitor your grasp of the material and identify issues and correct them. There will a Lab assigned each week that will supplement lecture material. Homework will be given through the OWLv2 system. There will also be a mandatory cumulative final exam given at the end of the course. *Course outlines available by request.*

Course Objectives: Upon completion, students should be able to demonstrate a basic understanding of chemistry and their interrelationships of the following topics:

- structure and bonding
- acids and bases
- alkanes; structure & reactivity
- stereochemistry
- alkyl halides
- nucleophilic substitution and elimination reactions
- alkenes; structure, reactivity, & synthesis
- alkynes; structure, reactivity, & synthesis
- stereochemistry
- conjugated dienes and UV spectroscopy
- infrared spectroscopy
- mass spectrometry

Required Materials

Required Text: (3 required texts)

Organic Chemistry 8th Edition (with OWLv2 access)
McMurry
Cengage

Organic Chemistry Lab Manual 2nd Edition
UNCW
Kendall Hunt

Organic Lab Notebook
Brookscole.

Student Expectations

Attendance Policy

Students are expected to attend all class meetings as scheduled. Students who miss more than 20% of the scheduled class time automatically receive a failing grade (F) for the course. Attendance is mandatory prior to the course Census Date (10%) for a student to remain in any class. Also, expect that attendance will be taken for all class periods.

- Coming in after role is taken or leaving early will result in a tardy. Three tardies will account for one absence. Attendance will be taken daily at the beginning of lecture and lab. Make sure to keep track of your absences.
- Students are responsible for materials & assignments covered in their absence. If you miss a class, get the notes from a classmate.

Expected Workload

You should expect to spend 3-4 hours working outside of class for every hour in class.

Contingency Plans

Lecture: If there is an emergency and the instructor or an appropriate substitute does not meet with the class, wait fifteen minutes. Then, everyone in the class should sign a roll sheet and designate someone to take it to the Department Chair or Secretary in U436.

Technology: It helps alleviates many everyday problems and helps us achieve things we might never have been able to do without it, but each technology that we become dependent on adds another point where something can go wrong. Technology challenges can occur at the most inconvenient times. Students should prepare a plan to deal with these potential challenges. Turning in assigned activities after the due date/time because you could not log into OWLv2 or you could not access an assignment is not acceptable. If an activity is due Friday by midnight, do not wait until Friday evening to start it.

If technology does get in the way you should follow the Contingency Plan below:

- If there is an issue with OWLv2, please notify me immediately of the issue so I may investigate the issue. Scheduled maintenance is not an issue and you should plan accordingly to make sure homework is completed on time.

Grading

Course Grade Calculation

- **Homework (10%)**
- **Laboratory (30%)**
- **Exams (50%)**
- **Final Exam (10%)**

You can expect coursework to be graded within 1-3 weeks of the submission date.

Grade Scale

The Grading Scale for CFCC is as follows:

A = 92 – 100
B = 84 – 91
C = 76 – 83
D = 68 – 75
F = 0 – 67
W = Given on or before the 60 percent reporting date of the class
I = Incomplete— Used under Special Circumstances Only! A student has six weeks from the time the class ends to complete the coursework. (Student and instructor must fill out appropriate paper work.) If a student does not complete the coursework within the six-week period, a grade of F will replace the grade of I.

GENERAL COURSE REQUIREMENTS AND CLASS POLICY STATEMENTS

Things You Need During Class EVERY DAY: Calculator, Paper, and Writing Utensil

A. Testing

Exams (50%)

Four Exams will be given throughout the semester. You will have at least 1 week prior notice of an Exam. The lowest exam grade of the four exams will be dropped.

- Missed Exam: One make-up test for the lecture portion of this course might be allowed but only for an absence due to a valid, documented reason. If a make-up exam is allowed, the exam will be given during my office hours. Any lecture test not taken within one week of the scheduled date, or if the graded lecture test has been returned to the class, the test will be graded as a zero. If you know you are going to miss an exam, let me know in advance and arrangements will be made for you to take it ahead of time.

Final Exam (10%)

In addition to the four exams, there will be a final exam. The Final Exam is cumulative and mandatory.

- **Cell phones will not be permitted as a "Calculator Resource" during class, labs, or exams.**

B. Homework

Homework assignments will be given for each chapter covered in lecture. All homework will be run through **OWLv2**. In general, all HW assignments are posted the first day we start the material for the next exam and will be due by 11:59 pm the day before the exam. For example, Exam 1 will cover Chapters 1 and 2, HW 1 and HW 2 pertaining to Chapters 1 and 2 will be posted on the first day we start Chapter 1 and will be due at 11:59pm the night before Exam 1. No late homework assignments will be accepted. The lowest grade on all homework assignments will be dropped.

C. Laboratory Requirements

Lab work will consist of learning laboratory techniques and procedures, writing lab reports, interpreting results, reading and following directions. Organic Chemistry laboratory is a very intensive lab and requires a lot of time and preparation.

There will be a pre-lab assignment for each lab and it must be completed before participating in the lab. Pre-lab assignments will be collected at the beginning of the lab. You will work both individually and in small lab groups over the semester. Each student will turn in an individual lab report written in their own words regardless if you work in groups. Any copying of lab reports will result in a grade of a zero for that particular lab. If copying occurs more than once, the student will be given a failing grade for the course.

Missed Labs: Any missed labs will result in a "zero" for that lab activity. There are no make-up labs due to the complexity of labs and time constraints. Labs may extend over several lab sessions or weeks. Attendance for lab is extremely important!

Refer to the Lab syllabus for a more detailed description of requirements and expectations.

D. Class Policies

Late Assignments/Late Work Policy

All required course work is due on the date and time announced as outlined above, unless specified otherwise by the instructor. Work submitted after the announced due date and time will not be accepted after the due date. The instructor will consider special circumstances with prior notification only. These policies are discussed above.

Withdrawals

You are responsible for noting the deadline for withdrawal from the course. This is your responsibility. Withdrawals will not be given once the guidelines regarding attendance have been exceeded. Please familiarize yourself with the criteria and withdrawal deadline dates in the *CFCC Catalog and Student Handbook*

Academic Honesty/Plagiarism Policy

Please see Student Catalog for CFCC policy.

Students are expected to conduct themselves in a professional, academic manner appropriate to the college's mission as an institution of higher education. Examples of academic misconduct are plagiarism and cheating, discrimination, and lying.

Collaboration: Collaboration is a natural part of college and students will benefit greatly from working with other students on assigned activities. Collaboration becomes Academic Misconduct when two or more students jointly draft answers to assigned work. For example, students discussing how best to approach a problem or assignment is acceptable and even encouraged; however, students writing the same answer or choosing to copy someone else's answer is not acceptable.

Plagiarism: Plagiarism is defined as taking the words, ideas, or thoughts of another and representing them as one's own. If you use the ideas of someone else, provide a complete citation of the source work; if you use the words of another, present the words in the correct quotation notation (indentation or enclosed in quotation marks, as appropriate) and include a complete citation to the source.

Whether intentional or unintentional, plagiarism is not acceptable and will result in the student being assigned a grade of zero for the assignment and/or the course, at the instructor's discretion.

Expectations for Interaction

Students will be held to the highest standards of language and content in all interaction, whether online or in person. Abusive and derogatory language, actions, or content will not be tolerated. This non-discrimination policy includes face-to-face interactions, email, online discussions and all course related content and materials. To learn more about online interaction, please see "The Core Rules of Netiquette", from the book Netiquette by Virginia Shea at: www.albion.com/netiquette/corerules.html

Classroom Etiquette

There will be no food allowed in the classroom/labs

Cell phone usage is prohibited unless cleared with instructor for emergencies.

Students will be prohibited from audio/video recording lectures and/or labs

Student Services

Accommodation of Special Needs Based on Disability

Any student requesting classroom accommodations because of disability must present documentation to verify his/her disability. Documentation must be furnished to the Disabilities Service Coordinator, and this should be done prior to requesting accommodation by an instructor. On a confidential basis, the student, disabilities services and the instructor will determine the appropriate accommodations which will be provided in a manner that is consistent with the objectives, outcomes, and academic standards of the course. Absences may not exceed any class attendance policy.

IT Student HelpDesk

The IT Services Student Helpdesk provides first-level technical support to all students of Cape Fear Community College. They are available to assist students with basic computer and technical needs, including logging into Blackboard, myCFCC and WebAdvisor.

More information, including Hours, Location, and Contact Information is available at http://www2.cfcc.edu/studenthelpdesk/

Blackboard Help

Answers to common Blackboard questions can be found at http://www2.cfcc.edu/online/bb-faq or Ask Ray.

Learning Resource Center (LRC)

The LRC is located in the CFCC library and can be found online at http://cfcc.edu/learninglab. The LRC provides writing assistance, computer competency skills and tutoring.

Learning Resource Center (Library)

The CFCC Learning Resource Center (Library) provides students with the following resources: Books/Materials, Course Reserves, Computer/Internet Access, Online Databases/Journals, Group Study Space, and a Quiet Study Space.

The Learning Resource Center (Library) is located on the 2nd Floor of the L-Building (Downtown Campus) or on the 1st Floor of the McKeithan Center (North Campus) and can be found online at http://cfcc.edu/lrc.

Science Learning Lab

The Science Learning Lab is located in N-407. Tutors are available for all Biology, Chemistry, Geology and Physic courses. You must have your instructor sign a form to verify that you are enrolled in a Science course. You can pick up that form in N-407.

MyCFCC – Student Accounts

This is your student web portal - there you can access your class websites, email, and WebAdvisor (official academic info such as grades, transcripts, schedules, etc). Your official CFCC-provided email account is to be used for all e-mail correspondence with your instructors and CFCC staff. Some information from CFCC will ONLY be emailed to this address, and not sent through postal mail, so it is very important that you check this account. To access this account, visit the myCFCC portal - there is a link to the portal near the top of the CFCC.edu website. Login and click the Email link. Your username is part of your email address: user@mail.cfcc.edu. (Note if you've had a CFCC email address in the past, this one may differ because we've changed 'email' to 'mail' in the address.) This email account is provided to you as long as you are enrolled in classes (you can take the summer off), and may be used for personal email as well as academic email. The class websites linked from the portal are automatically created for every class - it is up to the instructors to decide whether and how to use them. Even if they are not used, you can send an email to your instructor by clicking the Send Email link on your class homepage.

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Additional Student Support and Academic Services

For a list of CFCC Student Support and Academic Services, please visit http://www2.cfcc.edu/online/student-support/.

Tobacco use is prohibited on all CFCC property.

Disclaimer: The instructor reserves the right, acting within the policies and procedures of Cape Fear Community College, to make changes, adjustments, additions and deletions in course content, first day handout, or instructional technique, without notice or obligations.

CHM 251 OUTLINE OF INSTRUCTION

Organic Chemistry (Bundle w/OWL), McMurry, 8th Edition.

Please Note: the schedule is tentative and may be changed at any time)

Chapter 1: Structure and Bonding

1.1 Atomic Structure: The Nucleus
1.2 Atomic Structure: Orbitals
1.3 Atomic Structure: Electron Configurations
1.4 Development of Chemical Bonding Theory
1.5 Describing Chemical Bonds: Valence Bond Theory
1.6 sp3 Hybrid Orbitals and the Structure of Methane
1.7 sp3 Hybrid Orbitals and the Structure of Ethane
1.8 sp2 Hybrid Orbitals and the Structure of Ethylene
1.9 sp Hybrid Orbitals and the Structure of Acetylene
1.10 Hybridization of Nitrogen, Oxygen, Phosphorus, and Sulfur
1.11 Describing Chemical Bonds: Molecular Orbital Theory (skip
1.12 Drawing Chemical Structures

Chapter 2: Polar Covalent Bonds; Acids and Bases

2.1 Polar Covalent Bonds: Electronegativity
2.2 Polar Covalent Bonds: Dipole Moments
2.3 Formal Charges
2.4 Resonance
2.5 Rules for Resonance Forms
2.6 Drawing Resonance Forms
2.7 Acids and Bases: The Brønsted–Lowry Definition
2.8 Acid and Base Strength
2.9 Predicting Acid–Base Reactions from pKa Values
2.10 Organic Acids and Organic Bases
2.11 Acids and Bases: The Lewis Definition
2.12 Noncovalent Interactions Between Molecules

Chapter 3: Organic Compounds: Alkanes and Their Stereochemistry

3.1 Functional Groups
3.2 Alkanes and Alkane Isomers
3.3 Alkyl Groups
3.4 Naming Alkanes
3.5 Properties of Alkanes
3.6 Conformations of Ethane
3.7 Conformations of Other Alkanes

Exam 1

Chapter 4: Organic Compounds: Cycloalkanes and Their Stereochemistry

4.1 Naming Cycloalkanes
4.2 Cis–Trans Isomerism in Cycloalkanes
4.3 Stability of Cycloalkanes: Ring Strain
4.4 Conformations of Cycloalkanes
4.5 Conformations of Cyclohexane
4.6 Axial and Equatorial Bonds in Cyclohexane
4.7 Conformations of Monosubstituted Cyclohexanes
4.8 Conformations of Disubstituted Cyclohexanes
4.9 Conformations of Polycyclic Molecules

Chapter 5: Stereochemistry at Tetrahedral Centers

5.1 Enantiomers and the Tetrahedral Carbon
5.2 The Reason for Handedness in Molecules: Chirality
5.3 Optical Activity
5.4 Pasteur's Discovery of Enantiomers
5.5 Sequence Rules for Specifying Configuration
5.6 Diastereomers
5.7 Meso Compounds
5.8 Racemic Mixtures and the Resolution of Enantiomers
5.9 A Review of Isomerism
5.10 Chirality at Nitrogen, Phosphorus, and Sulfur
5.11 Prochirality
5.12 Chirality in Nature and Chiral Environments

Chapter 6: An Overview of Organic Reactions

6.1 Kinds of Organic Reactions
6.2 How Organic Reactions Occur: Mechanisms
6.3 Radical Reactions
6.4 Polar Reactions
6.5 An Example of a Polar Reaction: Addition of HBr to Ethylene
6.6 Using Curved Arrows in Polar Reaction Mechanisms
6.7 Describing a Reaction: Equilibria, Rates, and Energy Changes
6.8 Describing a Reaction: Bond Dissociation Energies
6.9 Describing a Reaction: Energy Diagrams and Transition States
6.10 Describing a Reaction: Intermediates
6.11 A Comparison Between Biological Reactions and Laboratory Reactions

Exam 2

Chapter 7: Alkenes: Structure and Reactivity

7.1 Industrial Preparation and Use of Alkenes
7.2 Calculating Degree of Unsaturation
7.3 Naming Alkenes
7.4 Cis–Trans Isomerism in Alkenes
7.5 Alkene Stereochemistry and the E,Z Designation
7.6 Stability of Alkenes
7.7 Electrophilic Addition Reactions of Alkenes
7.8 Orientation of Electrophilic Additions: Markovnikov's Rule
7.9 Carbocation Structure and Stability
7.10 The Hammond Postulate
7.11 Evidence for the Mechanism of Electrophilic Additions: Carbocation Rearrangements

Chapter 8: Alkenes: Reactions and Synthesis

8.1 Preparing Alkenes: A Preview of Elimination Reactions
8.2 Halogenation of Alkenes: Addition of X2
8.3 Halohydrins from Alkenes: Addition of HOX
8.4 Hydration of Alkenes: Addition of H2O by Oxymercuration
8.5 Hydration of Alkenes: Addition of H2O by Hydroboration
8.6 Reduction of Alkenes: Hydrogenation
8.7 Oxidation of Alkenes: Epoxidation and Hydroxylation
8.8 Oxidation of Alkenes: Cleavage to Carbonyl Compounds
8.9 Addition of Carbenes to Alkenes: Cyclopropane Synthesis
8.10 Radical Additions to Alkenes: Chain-Growth Polymers
8.11 Biological Additions of Radicals to Alkenes
8.12 Reaction Stereochemistry: Addition of H2O to an Achiral Alkene
8.13 Reaction Stereochemistry: Addition of H2O to a Chiral Alkene

Chapter 9: Alkynes: An Introduction to Organic Synthesis

9.1 Naming Alkynes
9.2 Preparation of Alkynes: Elimination Reactions of Dihalides
9.3 Reactions of Alkynes: Addition of HX and X2
9.4 Hydration of Alkynes
9.5 Reduction of Alkynes
9.6 Oxidative Cleavage of Alkynes
9.7 Alkyne Acidity: Formation of Acetylide Anions
9.8 Alkylation of Acetylide Anions
9.9 An Introduction to Organic Synthesis

Exam 3

Chapter 10: Organohalides

10.1 Names and Properties of Alkyl Halides
10.2 Preparing Alkyl Halides from Alkanes: Radical Halogenation
10.3 Preparing Alkyl Halides from Alkenes: Allylic Bromination
10.4 Stability of the Allyl Radical: Resonance Revisited
10.5 Preparing Alkyl Halides from Alcohols
10.6 Reactions of Alkyl Halides: Grignard Reagents
10.7 Organometallic Coupling Reactions
10.8 Oxidation and Reduction in Organic Chemistry

Chapter 11: Reactions of Alkyl Halides: Nucleophilic Substitutions and Eliminations

11.1 The Discovery of Nucleophilic Substitution Reactions
11.2 The SN2 Reaction
11.3 Characteristics of the SN2 Reaction
11.4 The SN1 Reaction
11.5 Characteristics of the SN1 Reaction
11.6 Biological Substitution Reactions
11.7 Elimination Reactions: Zaitsev's Rule
11.8 The E2 Reaction and the Deuterium Isotope Effect
11.9 The E2 Reaction and Cyclohexane Conformation
11.10 The E1 and E1cB Reactions
11.11 Biological Elimination Reactions
11.12 A Summary of Reactivity: SN1, SN2, E1, E1cB, and E2
Exam 4

Chapter 12: Structure Determination: Mass Spectrometry and Infrared Spectroscopy

12.1 Mass Spectrometry of Small Molecules: Magnetic-Sector Instruments
12.2 Interpreting Mass Spectra
12.3 Mass Spectrometry of Some Common Functional Groups
12.4 Mass Spectrometry in Biological Chemistry: Time-of-Flight (TOF) Instruments
12.5 Spectroscopy and the Electromagnetic Spectrum
12.6 Infrared Spectroscopy
12.7 Interpreting Infrared Spectra
12.8 Infrared Spectra of Some Common Functional Groups

Chapter 14: Conjugated Compounds and Ultraviolet Spectroscopy

Stability of Conjugated Dienes: Molecular Orbital Theory
14.2 Electrophilic Additions to Conjugated Dienes: Allylic Carbocations
14.3 Kinetic versus Thermodynamic Control of Reactions
14.4 The Diels–Alder Cycloaddition Reaction
14.5 Characteristics of the Diels–Alder Reaction
14.6 Diene Polymers: Natural and Synthetic Rubbers
14.7 Structure Determination in Conjugated Systems: Ultraviolet Spectroscopy
14.8 Interpreting Ultraviolet Spectra: The Effect of Conjugation
14.9 Conjugation, Color, and the Chemistry of Vision
Final Exam: Cumulative Multiple Choice