CHE 204 Organic Chemistry II
Spring 2017

Dr. Gail Vojta
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Phone: 524-7159
Email: gvojta@carrollu.edu

Lecture: MWF: 9:20-10:30 am; Main 206
Lab: Jaharis 215 M: 1:20-4:10 (Section A) T: 1:00-3:50 (Section B)

Office Hours: T: 9:30-11 am; F: 11-12:30 pm; and by appointment

Iverson and Iverson, Student Study Guide and Solutions Manual, 7th ed.,
Brooks/Cole,(recommended)
Access to online homework (Sapling)

Lab Equipment: Safety glasses/goggles, lab apron, lab notebook with duplicate pages

Prerequisite: CHE 203 Organic Chemistry I

Course Description: The course examines the preparation and reactions of other functional
groups containing oxygen and/or nitrogen such as alcohols, aldehydes, ketones, amines, etc. with
emphasis on reaction mechanisms. Carbonyl compounds will be examined in detail. The use of
spectroscopic methods (MS, IR, NMR) to identify compounds is treated extensively. This is the
second semester of a two semester sequence. Accordingly, principles covered in the first semester
will be revisited in the second.

Learning Outcomes:
At the completion of the course students should,
1. understand the basic definitions, concepts, and relationships of organic chemistry
2. understand the mechanistic nature of organic chemistry
3. recognize the importance of functional groups in predicting reaction outcomes
4. understand the basic principles of chemical health and safety in the lab
5. acquire basic laboratory skills
6. demonstrate competency in written communication

Course Objectives:
1. To define the terminology organic chemists use to explain phenomena.
2. To define the fundamental principles that explain how atoms bond and form
3-dimensional structures.
3. To outline the methods organic chemists use to visualize and represent chemical reactions
and show how some molecules undergo conformation change.
4. To define the classification systems used in organic chemistry and in doing so
categorize chemical reactivity on the basis of functional groups.
5. To emphasize the need for careful lab practice in handling chemicals and discuss
the reactivity of certain compounds.
6. To understand the different skills required to carefully carry out reactions at the
micro- and macro-scale levels.
7. To outline the proper role of a lab-book for the research scientist.
Grading: 4 Exams: 55%  
Final Exam: 15%  
Quizzes/Homework: 10%  
Lab: 20%  

Four unit exams will be given. The final exam will be the ACS standardized exam. The exam covers all aspects of CHE 203 and CHE 204. The exam consists of 70 multiple choice questions.

Grading will be based on the following scale:
A: 93-100%  
A/B: 88-92.9%  
B: 82-87.9%  
B/C 78-81.9%  
C: 70-77.9%  
D: 60-69.9%  
F< 60%  

Tentative Exam Schedule:
- Wednesday, Feb. 8 (Chapters 21-22)
- Monday, Mar. 6 (Chapters 13, 14, 16)
- Wednesday, April 5 (Chapters 17-19)
- Wednesday, April 26 (Chapters 20, 23, 25)

Final Exam  
Monday, May 8 8:00 am

Quizzes: Several quizzes will be administered in class throughout the semester. They will be announced at least one day in advance.

Homework: There will be three types of homework:

1. Written assignments that will be turned in to be graded: Approximately 2-3 problem sets will be assigned throughout the semester. No late assignments will be accepted.

2. Online assignments: Online homework sets will be assigned for each chapter. You will need access to the Sapling program. This access can be purchased online from the publisher. Due dates are posted at the Sapling course site and I will also post these on our eLearning site.

3. Suggested problems: These are problems listed at the end of each chapter and are recommended. They will not be turned in for a grade. Each student should have access to the Student Study Guide and Solution Manual to help with learning.

Laboratory: You must be enrolled in a laboratory section to complete this course. You must receive a passing grade in lab (60%) to pass the course Two unexcused lab absences will result in a failing grade. Your lab work will be assessed on the quality of your lab reports and record keeping skills, as reflected in your lab notebook. Most experiments will be conducted individually.

Grading for Lab:

For each experiment, you will be graded on the following:

Prelab information: 5 pts Due at the beginning of lab in your notebook

Report Sheets/Abstract: 10-20 points Due at the beginning of lab one week following the experiment
Lab notebook pages: 20 points Due at the beginning of lab one week following the experiment

Report sheets and lab notebook pages are due at the beginning of your lab class the week following the completion of the experiment Some reports will also require a typed abstract. Guidelines and examples of abstracts will be posted on eLearning and reviewed in lab.
Pre-lab information: Before coming to lab, your notebook should contain the following information: title of experiment, reference to text or handout, chemical equation and statement of purpose, and a table of organic reagents and products. The table should include the name, chemical formula, chemical structure, molar mass, concentration of acids and bases, density of organic liquids, mp/bp of organic reagents and products, and approximate volumes, grams and moles to be used (reagents only). Also include calculations used to determine moles and identify limiting reagent. Lastly, there should be notes about safety concerns. Your notebooks will be checked and initialed by the instructor at the beginning of lab.

Lab Notebooks All writing in the lab notebook should be done in blue or black ink. Each experiment should include procedural notes and observations as well as a results section. This should include a description of your final product (appearance, mp/bp, and analysis of relevant spectra). You should compare your result to the expected result and make suggestions for ways to improve the experiment.

Grading rubric for the lab notebook:

Procedure—5 pts.
- Amounts used
- Record of what you did, not simply a copy of the lab text (diagrams are often useful)
- Times, temps required

Observations—5 pts
- Record of what was observed while conducting lab: color changes, temperature changes, descriptions of reaction mixtures
- Data collected (mp’s, mass measurements)

Results—5 pts.
- Description of final product—mp/bp and other physical properties (color, texture)
- Amount of final product
- Calculation of percent yield
- Table of key IR bands and/or NMR peaks (and analysis of other spectra collected)

Conclusion—5 pts
- Statement of results (Go back to purpose. For example, “Aspirin was synthesized by the esterification of salicylic acid by acetic anhydride.”)
- State % yield
- Summarize evidence that the product is indeed the expected product. For example, state the experimental mp/bp and compare it to reported mp/bp., and explain how spectral data confirms the identity of the product.
- Provide suggestions for improving the procedure.

How to Succeed: Since this class builds on CHE 203, the same studying strategies apply to this course as to CHE 203. You will need to work problems often and even repetitively. Whether you are learning mechanisms or how to interpret spectral data, you need to take time to write out structures. A notebook just for working problems is helpful. Asking questions early and often will also help you stay on track. I am here to help you learn. Also, we will have an SI leaders to help you with your studying.
**Make-up policy:** Attendance is mandatory for all laboratories, quizzes and exams. If a student is aware that he/she will need to be absent the day of a quiz or exam, arrangements to complete the assignment need to be made in advance of the exam or quiz date. Unexpected absences, if properly verified, may be sufficient for a make-up quiz or exam.

**Attendance policy:** There is no official attendance policy; however, attendance is a key to success in this class. If you must miss class, please check our LMS course site to find out what you have missed. I will be taking attendance during the first two weeks as required by university policy.

**Classroom Etiquette:** Please turn cell phones off during class. Texting during class is a distraction to you as well as to others around you. If your behavior disrupts class, you will be asked to leave the class.

**Accommodations for Disabilities** “Students with documented disabilities who may need accommodations or any student considering obtaining documentation should make an appointment with Ms. Marti Bledsoe, our disability coordinator, no later than the first week of class. She can be reached by calling 524-7335 or contacting her via e-mail at mbledsoe@cc.edu.”

**eLearning Course Site:** Our course has an eLearning course site. At this site, you will be able to review the daily schedule for the class, find files for handouts given in class and keep track of the grades you receive on all assignments.

**Plagiarism and Academic Integrity:** The Carroll College Academic Integrity Policy is located in your student handbook. If a student violates this policy in any way, I reserve the right to impose a sanction of failure on the assignment/assessment or failure in the course.

**Tentative Schedule:**

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<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Lab</th>
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<tr>
<td>1/25</td>
<td>Chapter 21: Aromaticity</td>
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<td>1/27</td>
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<td>Nitratation of Naphthalene (ML30)</td>
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<td>Chapter 22: Reactions of Benzene</td>
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<td>Dry Lab—Report Writing</td>
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<td>2/6</td>
<td>Exam 1—Chapters 21 and 22</td>
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<td>Chapter 13: NMR Spectroscopy</td>
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<td>2/13</td>
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<td>Synthesis of Triphenylmethanol (E30 Part A)</td>
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<td>2/15</td>
<td>Chapter 14: Mass Spectrometry</td>
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<td>2/17</td>
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<td>Complete E30 Part A</td>
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<td>Air Oxidation of Fluorene (ML 32)</td>
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<td>Chapter 16: Aldehydes and Ketones</td>
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<td>Dry Lab: Spectroscopy Problems (Due at the end of lab)</td>
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<td>Exam 2: Chapters 13, 14, &amp; 16</td>
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<td>Date</td>
<td>Chapter 17: Carboxylic Acids</td>
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<td>3/3-3/17</td>
<td>Spring Break</td>
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<td>3/20</td>
<td>Chapter 18: Derivatives of Carboxylic Acids</td>
<td>Synthesis of Dimedone (E46)</td>
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<td>3/27</td>
<td>Chapter 19: Enolate Anions and Enamines</td>
<td>Complete E46</td>
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<td>ML 37 Hydrolysis Rates of Esters</td>
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<td>4/3</td>
<td>Review</td>
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<td>4/5</td>
<td><strong>Exam 3:</strong> Chapters 17-19</td>
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<td>4/7</td>
<td>Chapter 20: Conjugated Systems</td>
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<td>Chapter 20</td>
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<td>4/12</td>
<td>Chapter 23: Amines</td>
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<td>No class—Good Friday</td>
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<td>4/17</td>
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<td>Identification of an Unknown</td>
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<td>4/21</td>
<td>Chapter 25: Carbohydrates</td>
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<td><strong>Exam 4:</strong> Chapters 20, 23, 25</td>
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<td>4/28</td>
<td>Chapter 29: Organic Polymer Chemistry</td>
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<td><strong>Final Exam</strong> 8:00 am</td>
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**Suggested Problems:** These problems are found at the end of each chapter.

Chap. 21: 9 (as needed), 13-17, 32, 34, 35, 38, 51a-i, 51b-d
Chap. 22: 7-9, 14-17, 19-21, 28, 31a,b, 32, 33, 35
Chap. 13: 9, 12, 13, 15-17, 19, 23, 24
Chap. 14: TBA
Chap. 16: 15 (as needed), 18-21, 24, 30-33, 42, 43, 51, 52, 54, 74
Chap. 17: 8, 10, 18-23, 25, 26, 32, 33, 46a, b, and d
Chap. 18: 12, 14, 19, 20, 22-25, 27, 32, 37, 43, 63a-d
Chap. 19: 18, 19, 21, 22, 24, 29, 33, 46, 49, 51, 71 (extra challenge!), 73 (good review)
Chap. 20: 16-19, 23, 28, 30, 31, 34, 42
Chap. 23: 25, 27, 29, 30, 33, 34, 45, 49, (44—good review)
Chap. 25: 11, 12, 16-24, 38, 39, 44

For extra practice with interpreting NMR spectra, try the problems from these chapters:
Chap. 16: Problem 16
Chap. 17: Problem 17
Chap. 18: Problems 16 and 18
Chap. 21: Problems 23, 24, 27, 30, 31
Chap. 23: Problem 24

For extra practice with interpreting NMR spectra data and mass spectra data, try the problems from Chapter 21: 20-22

The instructor and the University reserve the right to modify, amend or change the syllabus (course requirements, grading policy, etc.) as the curriculum and/or program require(s).