CHEM 3422: Organic Chemistry II (Online Class)
Summer 2020: Section 01

Instructor: Dr. Partha Ray:
email: psray@westga.edu (please do not use the CourseDen email)

Required Textbooks: “Organic Chemistry” by John McMurry, 9th Edition and
“Preparing for Your ACS Examination in Organic Chemistry: The Official Guide” by
Dwaine & Lucy Eubanks (2002).

Course Objective: The goal of this course is for you to use and build on the fundamental
principles and concepts of Organic Chemistry learned in CHEM 2411 (Organic
Chemistry I) and use them to solve Organic Chemistry problems. Hopefully, you will
realize how understanding the basic concepts and rules used in Organic Chemistry helps
us to comprehend biological processes and the importance of Organic Chemistry in the
design and synthesis of medicines, insecticides and herbicides, without which our lives
would be very different.

Tests and Final Exam

There will be a short test consisting of 10 multiple-choice questions for each chapter (10
points per test). Each test will be available on CourseDen (under Assessments then
Quizzes) from 12:00 AM (00:00) – 11:30 PM (23:30) on the dates shown below. The
tests are open book and open notes, however, once you start the test, you will have a
total of 20 minutes to complete it (this includes a 3 minute grace period), so pace
yourself accordingly. Please note that the ACS allows 1.57 minutes per question for its
Organic Chemistry multiple-choice tests. Your lowest test score will be dropped. There
are no make-up tests so if you miss or do not complete a test for any reason, that is the
one you will drop.

The final exam will be available on CourseDen (under Assessments then Quizzes)
from 12:00 AM (00:00) – 11:30 PM (23:30) on July 22. It will consist of 50 multiple-
choice questions and is styled like an ACS final which you must complete in 90 minutes
(this includes a 5 minute grace period). This is a comprehensive exam which will include
material from CHEM 2411 (Organic Chemistry I). Approximately half the questions
will be from part I material. The final exam is 20% of the total grade. You must take
the final to pass the class.

<table>
<thead>
<tr>
<th>Test</th>
<th>Date</th>
<th>Chapters</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Topics not covered in the tests are shown in parenthesis.</td>
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<tr>
<td>1</td>
<td>June 4</td>
<td><strong>14:</strong> Conjugated Compounds and Ultraviolet Spectroscopy (6, 9)</td>
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<tr>
<td>2</td>
<td>June 8</td>
<td><strong>15:</strong> Benzene and Aromaticity (7)</td>
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### Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>June 11</td>
<td>16: Chemistry of Benzene</td>
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<tr>
<td>June 15</td>
<td>17: Alcohols and Phenols (9)</td>
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<tr>
<td>June 18</td>
<td>18: Ethers and Epoxides (4,7,9)</td>
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<tr>
<td>June 22</td>
<td>19: Aldehydes and Ketones: Nucleophilic Addition Reactions (12)</td>
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<td>June 25</td>
<td>20: Carboxylic Acids &amp; Nitriles (3)</td>
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<td>June 29</td>
<td>21: Carboxylic Acid Derivatives and Nucleophilic Acyl Substitution Reactions (8, 9)</td>
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<tr>
<td>July 2</td>
<td>22: Carbonyl Alpha-Substitution Reactions</td>
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<tr>
<td>July 6</td>
<td>23: Carbonyl Condensation Reactions (11,13)</td>
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<tr>
<td>July 9</td>
<td>24: Amines (5, 9)</td>
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<tr>
<td>Final</td>
<td>Final Exam</td>
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### Grades:

A: 85-100; B: 75-84; C: 60-74; D: 50-59; F: 0-49.

Your grade will be based on the average of your best 10 tests (80%) and the final exam (20%). You must take the final exam to pass the class.

At the end of the semester, if your overall score is short of a higher grade by less than 1%, I will look at your viewing history of my video lectures on CourseDen to decide if you are deserving of the higher grade. Your viewing history must be at least 90% to qualify for this consideration.

Note: Extra credit is not allowed for this class, and work competed for another class will not be accepted in this class.

### Video Lectures

I have made the following video lectures to help you learn and understand the material. They are posted on CourseDen (under Content).

**Chapter 14:**
1. Conjugated Dienes: Stability and Reactions with HX
2. Diels-Alder Reactions
3. UV of Conjugated Molecules

**Chapter 15:**
1. Benzene: Stability and Aromaticity
2. Just for Fun: Why is Benzene Carcinogenic but Toluene is Not?

**Chapter 16:**
1. Electrophilic Aromatic Substitutions
2. Substituent Effects in Electrophilic Aromatic Substitutions
3. Nucleophilic Aromatic Substitutions, Benzyne, Oxidations & Reductions
4. Synthesis of Polysubstituted Benzenes
Chapter 17: 1. Properties of Alcohols and Phenols  
2. Preparations of Alcohols  
3. Conversion of Alcohols to Alkyl halides and Tosylates  
4. Conversion of Alcohols to Esters and Protection of Alcohols

Chapter 18: 1. Chemistry of Ethers  
2. Chemistry of Epoxides

Chapter 19: 1. Aldehydes and Ketones: Preparation, oxidation, and Introduction to Nucleophilic Addition Reactions  
2. Hydration; Addition of HCN and Grignard Reagents; Imine, Enamine, Oxime, and Hydrazone Formation and The Wolff-Kishner Reaction  
3. Acetal Formation, Wittig Reaction, Conjugate Nucleophilic Addition to α,β-Unsaturated Aldehydes and Ketones  
4. Just for Fun: What Causes Cataracts?

Chapter 20: 1. Carboxylic Acids: Properties, Preparation, and Reactions  
2. Nitriles: Preparation and Reactions

Chapter 21: 1. Acid Derivatives: Nucleophilic Acyl Substitution Reactions  
2. Just for Fun: How do Penicillin and Cephalosporins Actually Work?

Chapter 22: 1. Chemistry of Enols  
2. Chemistry of Enolates

Chapter 23: 1. Aldol and Related Reactions  
2. Claisen, Michael, and Robinson Reactions  
3. Just for Fun: Mechanism Based Approach to Drug Discovery

Chapter 24: 1. Amines: Structure, Basicity, and Preparation  
2. Amines: Reactions

Review  There are 5 review video lectures (20 – 30 minutes each) to help you prepare for the final exam. Also, you should work through all the problems in the ACS study guide.

Just for Fun: The Story of Aspirin

Some Advice on How to Study for This Class

1. Read the nomenclature section of the chapter (if there is one) and work the in-chapter problems. Since there are no concepts involved here, I have not made any videos of these. You should be able to learn the naming sections by yourself.
2. Look at the video lectures and write your own notes. There is no better way to learn and retain the material than to write your own notes. Reading notes made
by someone else is not a good way to understand the material in this class. The PowerPoint notes provided by the publisher are on CourseDen, but these are only useful after you understand the material and not before. As I said, I would encourage you to make your own notes.

3. Read the appropriate material in the textbook of the sections you viewed in my videos and add to your notes.

4. Work all the in-chapter problems and check your answers in the study manual (if you do not have one, then check at the end of the textbook (Appendix D).

5. After you have finished each chapter, test yourself with the multiple-choice problems from the ACS book (the relevant problems numbers are posted on CourseDen (Under Content then ACS Questions).

6. If you have time, work on some of the end of chapter problems related to the topics you studied (the problems are grouped in sections based on topic).

7. Take the test on CourseDen. Remember, you have 20 minutes to answer 10 questions (including the grace period; ACS allows for 1.57 minutes per question for its tests).

8. Repeat steps 1-7 for each chapter.

9. When you tackle multiple-choice questions, the best strategy is NOT to look at the answers (when possible). Work out the solution using rules, concepts, mechanisms, synthetic strategies, and/or spectral data as appropriate. Provided you understand what you are doing, the answer you arrive at should be the correct answer. No need to waste time looking at the other options, move on to the next question. Remember, time is a factor in an exam. Also, you should become so familiar with mechanisms, that you can visualize the mechanism without drawing it all out which takes up valuable exam time. This comes with practice. Do not just memorize the mechanism, try and understand the concepts behind the arrow pushing. Yes, this class will take a lot of your time. Unfortunately, there are no quick and easy ways to learn and understand this material. I am sure that you already know this from learning the material from part I.

**Academic Honesty:**

The exams are open book, “closed-neighbor”. You are permitted to refer to your textbook and notes and use scratch paper to work out problems (these should be destroyed after each test and the final exam). However, you are NOT allowed to use the open internet or other people for answers to the questions. You may not take pictures of the questions. Behavior following the UWG honor code is expected.

**Virtual Office Hours:** Tu,F: 2 PM – 5 PM (please email to set up a time: psray@westga.edu NOT through CourseDen).
Discussion Forums

Discussion forums for Chapters 14 – 24 and review questions for the final exam are available on CourseDen. You are encouraged to ask questions using these forums so that other students can also benefit from the answers. However, if you are more comfortable emailing me, that is fine too. Although I will try to respond to your questions as soon as I can, please allow me 24 hours to answer.

Supplemental Instruction (SI)

Mr. Russel Ives is the Student Instructor for this class, and he will contact you with more information about this useful resource and you are encouraged to use it.

All Students Please Note!

For important policy information, i.e., the UWG Honor Code, Email, and Credit Hour policies, as well as information on Academic Support and Online Courses, please review the information found in the Common Language for Course Syllabi documentation at http://www.westga.edu/assetsDept/vpaa/Common_Language_for_Course_Syllabi.pdf. Additions and updates are made as institution, state, and federal standards change, so please review it each semester.

Learning Outcomes

1. Reason and think analytically in solving problems and making decisions in matters involving organic chemistry. Attainment of this learning outcome will be reflected by the students ability to:
   - Select reagents to accomplish appropriate functional group transformations.
   - Draw the product of a chemical reaction.
   - Indicate the appropriate stereochemistry of organic molecules.

2. Apply a basic understanding of the systematic methods of scientific inquiry, principles and procedures to investigate problems. Attainment of this learning outcome will be reflected by the students ability to:
   - Describe the mechanism of particular organic reactions.
   - Analyze IR, NMR and Mass Spectral signals to determine the structure of unknown organic molecules.

3. To communicate organic chemistry with clarity.
Successfully complete tests and final examination.