

Organic Chemistry I

CHEM-2411

Fall 2020 Section E01 3 Credits 08/12/2020 to 12/05/2020 Modified 08/15/2020

Description

The first course of a two semester sequence which provides a broad introduction to the basic principles, theories and applications of the chemistry of carbon compounds. Topics will include modern structural theory, organic nomenclature, stereochemistry, reaction mechanisms and kinetics, and an introduction to functional group chemistry. Also covers the interpretation of IR, NMR, and mass spectroscopy for the structure determination of organic compounds. CHEM 2411L may be taken concurrently.

Requisites

Prerequisites:

(CHEM 1212 Minimum Grade: B and CHEM 1212L Minimum Grade: C) or CHEM 1212K Minimum Grade: B

Corequisites:

CHEM 2411L

Contact Information

Instructor: Dr. Partha Ray

email: psray@westga.edu

Meeting Times

Online Class

Virtual Office Hours: MWF: 2-4 PM (please email me to set up a time: psray@westga.edu)

Materials

Required Textbooks: 1. Organic Chemistry: Structure, Mechanism, and Synthesis, by Robert J. Ouellette and J. David Rawn, Elsevier, 2014; ISBN: 978-0-12-800780-8. The online textbook is available free at:

https://galileo-usg-uwg-primo.hosted.exlibrisgroup.com/primo-explore/openurl?institution=UWG&vid=UWG_V1&url_ctx_fmt=null&rft.mms_id=9915452147102931&u.ignore_date_coverage=true&isServicesPage=true

Click Full text available at: Ebook Central Academic Complete-GALILEO (in the middle of the page).

Download chapters as PDF files (you may want to rename the files such as Ch01_Structure&Bonding). You will need Table of Contents and Ch01-Ch10, and pages 370 - 373 (from CH 11 & Section 17.2 from Ch 17), and Ch14.

Once downloaded, you can read them offline. I recommend that you print the pages.

2. Preparing for Your ACS Examination in Organic Chemistry: The Official Guide, by Dwaine & Lucy Eubanks, American Chemical Society, 2002.

Outcomes

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 quizzes, tests and final examination.

✓ Evaluation

Quizzes, Tests and Final Exam

There will be a quiz and a test each week according to the schedule shown. **Each quiz and 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.** Both quizzes and tests will consist of 10 multiple choice questions each. While you will have 60 minutes to complete a quiz (including a 5-minute grace period), you will have 20 minutes to complete a test (including a 3-minute grace period). Please note that the American Chemical Society (ACS) allows 1.57 minutes per question on its Organic Chemistry multiple choice exams. For the tests you will not be able to move backwards through question pages. You may see the questions you answered incorrectly during a 12h window the day after the quiz/test starting at 10 AM. **There are no make-up quizzes or tests**, so please make sure that you remember the dates (Wednesdays for quizzes and Fridays for tests).

The **final exam**, consisting of 35 multiple choice questions, will be available from 12 AM (00:00) to 11:30 PM (23:30) on **December 2**. You will have 60 minutes (including a 5-minute grace period) to complete the final exam and you will not be able to move backwards through question pages. **You must take the final exam to pass the class.**

All quizzes and tests, and the final exam are open book and open notes, but closed neighbor and internet (see Academic Honesty below).

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

Breakdown

Your grade will be based on the average of quizzes (10%), tests (70%) and final exam (20%).

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 completed for another class will not be accepted in this class.

☰ Assignments

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 4 videos 1 – 10 are from the Khan Academy (you should watch these before the Molecular Modeling Lab).

Note: I have not made any videos regarding functional groups (Ch2), or nomenclature since there are no concepts involved. You should be able to learn the rules for naming alkanes, alkenes, alkynes, and alkyl halides by yourself (there are, however, some nomenclature worked problems in some of the videos).

Chapter/Sections	Topics
1	<ol style="list-style-type: none">1. sp^3 hybridization2. sp^2 & sp hybridization3. Formal charges, polar covalent bonds, dipole moments4. Resonance
3	<ol style="list-style-type: none">1. Acid Base Chemistry2. Reaction Mechanisms3. Stability of Carbon Intermediates
4	<ol style="list-style-type: none">1. Conformations of ethane2. Conformations of propane3. Conformations of butane4. Newman projections practice5. Newman projections practice 26. Conformations of cyclohexane7. Drawing chair conformations8. Monosubstituted cyclohexane9. Disubstituted cyclohexane10. Polysubstituted cyclohexane11. Conformations of cyclohexane12. Chlorination of alkanes13. Worked examples
5	<ol style="list-style-type: none">1. Alkenes-structure & properties2. Reduction & stability of alkenes

6	<ol style="list-style-type: none"> 1. Addition of HX to alkenes 2. Addition of X₂ to alkenes 3. Hydration of alkenes 4. Reactions with carbenes & RCO₃H 5. Reactions with OsO₄, O₃ & KMnO₄
7	<ol style="list-style-type: none"> 1. Reactions of alkynes
8	<ol style="list-style-type: none"> 1. Chirality and optical activity 2. Fischer projections, Diastereomers & meso compds 3. Production of Stereogenic Centers 4. Resolution of Enantiomers
9.1, 9.2, 9.4, 9.6, 9.13, 17.2, and p370 - 373	<ol style="list-style-type: none"> 1. Alkyl halides from Alcohols 2. Allylic bromination 3. Grignard & Organolithium Reagents 4. Gilman Reagents
9.7 – 9.9; 10.1, 10.3, 10.4	<ol style="list-style-type: none"> 1. SN2 Reactions 2. SN1 Reactions
9.14 – 9.16; 10.5, 10.6	<ol style="list-style-type: none"> 1. E2 Reactions 2. E1 Reactions & Summary
14	<ol style="list-style-type: none"> 1. Proton NMR Part 2. Proton NMR Part 2 3. Carbon-13 NMR

Schedule

#	Quiz Date	Test Date	Chapter(s)/Sections
1	8/19	8/21	Ch1 (Structure & Bonding): 1.2 – 1.6, 1.12 - 1.19
2	8/26	8/28	Ch4 (Alkanes & Cycloalkanes): All sections except 4.10
3	9/2	9/4	Ch1 (Structure & Bonding): 1.7 – 1.9; Ch2: Part 1 All sections

4	9/9	9/11	Ch3 (Intro to Reaction Mechanisms): 3.1, 3.3, 3.4, 3.8, 3.9, 3.12
5	9/16	9/18	Ch5 (Alkenes: Structure and Properties): All sections
6	9/23	9/25	Ch6 (Alkenes: Addition Reactions): 6.1 – 6.6 (includes oxymercuration & hydroboration, see video lectures)
7	9/30	10/2	Ch6 (Addition Reactions): 6.7 – 6.10
8	10/7	10/9	Ch7 (Alkynes): All sections (includes oxymercuration & hydroboration, see video lectures)
9	10/14	10/16	Ch8 (Stereochemistry): All sections except 8.12
10	10/21	10/23	Ch9 (Organohalides): 9.1, 9.2, 9.4, 9.6, 9.13; Ch17: 17.2, Ch11: (p370 – 373; allylic bromination)
11	10/28	10/30	Ch9: 9.7 – 9.9; Ch10: 10.1, 10.3, 10.4 (Substitution Reactions)
12	11/4	11/6	Ch9: 9.14 – 9.16, Ch10: 10.5, 10.6 (Elimination Reactions)
13	11/11	11/13	Ch14 (NMR): 14.1 – 14.10
			Final Exam: 12/2

* Course Policies and Resources

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.

Institutional Policies

Academic Support

Accessibility Services: Students with a documented disability may work with UWG Accessibility Services to receive essential services specific to their disability. All entitlements to accommodations are based on documentation and USG Board of Regents standards. If a student needs course adaptations or accommodations because of a disability or chronic illness, or if he/she needs to make special arrangements in case the building must be evacuated, the student should notify his/her instructor in writing and provide a copy of his/her Student Accommodations Report (SAR), which is available only from Accessibility Services. Faculty cannot offer accommodations without timely receipt of the SAR; further, no retroactive accommodations will be given. For more information, please contact [Accessibility Services \(https://www.westga.edu/student-services/counseling/accessibility-services.php\)](https://www.westga.edu/student-services/counseling/accessibility-services.php).

Center for Academic Success: The [Center for Academic Success \(http://www.westga.edu/cas/\)](http://www.westga.edu/cas/) provides services, programs, and opportunities to help all undergraduate students succeed academically. For more information, contact them: 678-839-6280 or cas@westga.edu.

University Writing Center: The [University Writing Center \(https://www.westga.edu/writing/\)](https://www.westga.edu/writing/) assists students with all areas of the writing process. For more information, contact them: 678-839-6513 or writing@westga.edu.

Online Courses

UWG takes students' privacy concerns seriously: technology-enhanced and partially and fully online courses use sites and entities beyond UWG and students have the right to know the privacy policies of these entities. For more information on privacy and accessibility for the most commonly used sites, as well as technology requirements visit the [UWG Online \(https://uwgonline.westga.edu/\)](https://uwgonline.westga.edu/) site.

Students enrolled in online courses can find answers to many of their questions in the [Online/Off-Campus Student Guide \(http://uwgonline.westga.edu/online-student-guide.php\)](http://uwgonline.westga.edu/online-student-guide.php).

If a student is experiencing distress and needs help, please see the resources available at the [UWG Cares \(http://www.westga.edu/UWGCares/\)](http://www.westga.edu/UWGCares/) site. [Online counseling \(https://www.westga.edu/student-services/counseling/index.php\)](https://www.westga.edu/student-services/counseling/index.php) is also available for online students.

Honor Code

At the University of West Georgia, we believe that academic and personal integrity are based upon honesty, trust, fairness, respect, and responsibility. Students at West Georgia assume responsibility for upholding the honor code. West Georgia students pledge to refrain from engaging in acts that do not maintain academic and personal integrity. These include, but are not limited to, plagiarism, cheating, fabrication, aid of academic dishonesty, lying, bribery or threats, and stealing.

The University of West Georgia maintains and monitors a confidential Academic Dishonesty Tracking System. This database collects and reports patterns of repeated student violations across all the Colleges, the Ingram Library, and the School of Nursing. Each incidence of academic dishonesty is subject to review and consideration by the instructor, and is subject to a range of academic penalties including, but not limited to, failing the assignment and/or failing the course. Student conduct sanctions range from verbal warning to suspension or expulsion depending on the magnitude of the offense and/or number of offenses. The incident becomes part of the student's conduct record at UWG.

Additionally, the student is responsible for safeguarding his/her computer account. The student's account and network connection are for his/her individual use. A computer account is to be used only by the person to whom it has been issued. The student is responsible for all actions originating through his/her account or network connection. Students must not impersonate others or misrepresent or conceal their identities in electronic messages and actions. For more information on the University of West Georgia Honor Code, please see the [Student Handbook \(https://www.westga.edu/administration/vpsa/handbook-code-of-conduct.php\)](https://www.westga.edu/administration/vpsa/handbook-code-of-conduct.php).

UWG Email Policy

University of West Georgia students are provided a MyUWG e-mail account. The University considers this account to be an official means of communication between the University and the student. The purpose of the official use of the student e-mail account is to provide an effective means of communicating important university related information to UWG students in a timely manner. It is the student's responsibility to check his or her email.

Credit Hour Policy

The University of West Georgia grants one semester hour of credit for work equivalent to a minimum of one hour (50 minutes) of in-class or other direct faculty instruction AND two hours of student work outside of class per week for approximately fifteen weeks. For each course, the course syllabus will document the amount of in-class (or other direct faculty instruction) and out-of-class work required to earn the credit hour(s) assigned to the course. Out-of-class work will include all forms of credit-bearing activity, including but not limited to assignments, readings, observations, and musical practice. Where available, the university grants academic credit for students who verify via competency-based testing, that they have accomplished the learning outcomes associated with a course that would normally meet the requirements outlined above (e.g. AP credit, CLEP, and departmental exams).

HB 280 (Campus Carry)

UWG follows University System of Georgia (USG) guidance: [http://www.usg.edu/hb280/additional_information#\(http://www.usg.edu/hb280/additional_information\)](http://www.usg.edu/hb280/additional_information#(http://www.usg.edu/hb280/additional_information))

You may also visit our website for help with USG Guidance: [https://www.westga.edu/police/campus-carry.php\(https://www.westga.edu/police/campus-carry.php\)](https://www.westga.edu/police/campus-carry.php(https://www.westga.edu/police/campus-carry.php))

Mental Health Support

If you or another student find that you are experiencing a mental health issue, free confidential services are available on campus in the [Counseling Center](#). Students who have experienced sexual or domestic violence may receive confidential medical and advocacy services with the Patient Advocates in [Health Services](#). To report a concern anonymously, please go to [UWGcares](#).

ELL Resources

If you are a student having difficulty with English language skills, and / or U.S. culture is not your home culture, specialized resources are available to help you succeed. Please visit the [E.L.L. resource page](#) for more information.

COVID-19

Proctored Exams/Online Instruction: Students should be aware and plan ahead for the possibility of having to complete all courses and/or exams online or in a proctored environment. This means talking with your instructors about what minimum technical requirements (software and hardware) will be required should your class move online or a student's personal needs dictate. This also includes making plans for internet access at whatever location participation may occur.

Virtual or in-person proctored exams, if your instructor should require them, may result in an additional cost to the student. Please discuss these details with your instructor or see the information provided here.

Face Coverings: Effective July 15, 2020, University System of Georgia institutions, including the University of West Georgia, will require all faculty, staff, students, and visitors to wear an appropriate face covering while inside campus facilities/buildings where six feet social distancing may not always be possible. Face covering use will be in addition to and is not a substitute for social distancing.

Face coverings are not required in campus outdoor settings where social distancing requirements are met. Anyone not using a face covering when required will be asked to wear one or must leave the area.

Reasonable accommodations may be made for those who are unable to wear a face covering for documented health reasons.

Student FAQs: For more information about UWG COVID-19 guidance for students visit the [Student FAQ webpage\(https://www.westga.edu/student-services/health/coronavirus-info/return-to-campus/students-faq-return-to-campus.php\)](https://www.westga.edu/student-services/health/coronavirus-info/return-to-campus/students-faq-return-to-campus.php).

Additional Items

Discussion Forums: Discussion forums for each chapter 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.

Announcements: You should check announcements frequently on Courseden for updates.

Advice on How to Study For This Class

1. 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. Notes are only useful after you have understood the material.

2. Read the appropriate material in the textbook of the sections you viewed in the videos and add to your notes.
3. Work the in-chapter problems and check your answers at the end of the book.
4. Test yourself with the multiple-choice problems from the ACS book (the relevant problem numbers are posted on CourseDen (Under Content then ACS Questions)).
5. 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).
6. Take the quiz on CourseDen on Wednesdays (starting 8/19). You will have 60 minutes to complete the quiz including a 5-minute grace period. Review the topics of questions you answered incorrectly. You must understand *why* the answer is what it is. The answers to your incorrect responses will be available for 12h starting at 10 AM the day after each quiz and test.
7. Take the test on Fridays (starting on 8/21). Remember, you have 20 minutes to answer 10 questions (including the grace period; ACS allows for 1.57 minutes per question for its multiple-choice tests).
8. When you tackle multiple-choice questions, the best strategy is NOT to look at the given 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 simple mechanisms, that you should be able to visualize the mechanism without drawing it all out which takes up valuable exam time. This comes with practice after you have drawn out similar mechanisms several times in different problems. Do not just memorize the mechanism, try and understand the concepts behind the mechanistic 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. You must have self-discipline and good study habits to succeed in this class. I am sure that there are a hundred and one things that you would rather be doing than reading about organic chemistry. It is my hope, however, that once you begin to understand the material, you may actually enjoy the subject!
9. Organic chemistry builds on itself, meaning that the rules and concepts you learn in the earlier chapters will be reused and built upon in later material including Organic Chemistry II. Questions will often assume you have understood the rules and concepts from earlier material. So, the better you understand when and how to use the rules and concepts this semester, the better prepared you will be for Organic Chemistry II.
10. Repeat steps 1-7 for each quiz/test according to the schedule above.

Overall Course Objective

The goal of this course is for you learn the fundamental concepts, rules, and language of Organic Chemistry and use them to solve Organic Chemistry problems. Organic Chemists communicate mostly by drawing structures and mechanisms and interpreting physical data, particularly, spectroscopic data. It is hoped that you will learn how to begin communicating as an Organic Chemist and I hope that you will build on this foundation in Organic Chemistry II (CHEM 3422). 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, crop-protection chemicals, and polymers without which our lives would be considerably more precarious, as COVID-19 is demonstrating.