

DEPARTMENT OF CHEMISTRY

Organic Chemistry I (CHEM 2400; CRN 81745; 3 credits)

Fall 2019

Instructor: Dr. Nilmi Fernando
Office: 832 Langdale Hall
E-mail: nfernando1@gsu.edu; Phone: 404-413-5490
Lecture: MWF: 2:00 – 3:10 pm in Library South 102
Office Hours: MWF: 12:00 – 1:30 pm or by appointment

Required Texts: 1. “Organic Chemistry”, 9th Edition (recommended), By John McMurry
2. Preparing for Your ACS Examination in Organic Chemistry: The Official Guide, ISBN 0-9708042-1-0

Optional Texts: 1. Organic Chemistry I & II: A Student Workbook”, ISBN # 978-0-7575-8271-4, By Keith O. Pascoe
2. Organic Chemistry I as a Second Language, 2nd Ed, by David Klein ISBN -13 978-0470-12929-

Weekly online quizzes will be conducted in iCollege, the GSU online platform.

Communication: Please send emails from your GSU student e-mail account. Put the course name in the subject line. (Do not send emails from iCollege).
Check iCollege for announcements and daily updates.

Students in this class are expected to:

- gain an understanding of hybridization and geometry of atoms and the 3-D structure of organic molecules
- gain an understanding of the reactivity and stability of organic molecules based on structure, including conformation and stereochemistry
- gain an understanding of nucleophiles, electrophiles, electronegativity, and resonance.
- be able to use their understanding of organic mechanisms to predict the outcome of reactions.
- analyze and plan multi-step syntheses of organic compounds.
- apply knowledge gained from class to solve problems.
- demonstrate inquiry skills that will enable them to formulate questions and to develop explanation of organic concepts.
- demonstrate confidence as independent thinkers and life-long learners.

Grading Scheme:

Four in-class exams will be given during the semester from which the lowest grade will be dropped, if all 4 exams are taken. The average score from the remaining three exams will count 65% of your final grade. You are strongly encouraged to take all four 'in-class' exams. There will be no make-up exams. An excused absence grade will be replaced by the exam grade immediately following the missed exam. A class roll will be passed around during the exam. ***ANY STUDENT who does NOT sign the roll will receive a Zero for that exam even if a test is submitted.**

iCollege quizzes: The best 10 quiz grades out of 11 will be counted, if all 11 quizzes are taken, toward 10% of the final grade. There will be no make-up quizzes. Missed quizzes will be recorded as zero.

Homework will count for a total of 5% of the final grade. The 10 best grades will be counted if all 11 hw assignments are completed. Homework is due in class on Monday, at the end of the lecture without any exceptions. Late homework assignments will not be accepted.

Final exam ACS National Exam will count 20% of the final grade. You cannot make up the final exam, nor can you take it early or later than the assigned date and time.

Tentative Letter Grades:

*A+	=	95%
A.	=	90%
A-	=	87%
B+	=	84%
B	=	80%
B-	=	77%
C+	=	74%
C	=	70%
C-	=	67%
D	=	60%
F	=	< 60%

Note: C- is not a passing grade for a science major and will not allow you to register for 2410

***Without including any extra credit. An "A" in the final exam is also required.**

Tentative Teaching Schedule:

Note: Deviations from this schedule may be necessary

Week of...	Monday	Wednesday	Friday
August 26 th	Lecture	Lecture	iCollege Q1; Lecture
September 2 nd	Holiday	Lecture, HW 1 due	iCollege Q2; Lecture
September 9 th	Lecture, HW 2 due	Lecture	iCollege Q3; Lecture
September 16 th	Lecture, HW 3 due	Lecture	Exam 1
September 23 rd	Lecture, HW 4 due	Lecture	iCollege Q4; Lecture
September 30 th	Lecture, HW 5 due	Lecture	iCollege Q5; Lecture
October 7 th	Lecture, HW 6 due	Lecture	iCollege Q6; Lecture
October 14 th	Lecture, HW 7 due	Exam 2	Lecture
October 21 st	Lecture, HW 8 due	Lecture	iCollege Q7; Lecture
October 28 th	Lecture, HW 9 due	Lecture	iCollege Q8; Lecture
November 4 th	Lecture	Lecture	iCollege Q9; Lecture
November 11 th	Exam 3	Lecture	Lecture
November 18 th	Lecture, HW 10 due	Lecture	iCollege Q10; Lecture
November 25 th	Holiday	Holiday	Holiday; iCollege Q11
December 2 nd	Lecture, HW 11 due	Lecture	Lecture
December 9 th	Exam 4	No Class	No Class
December 16 th	ACS Exam		

Semester midpoint: October 15th; last day to withdraw with a 'W' Final (ACS) Exam: December 16th at 1:30 pm in 102 Library South

List of topics taught in CHEM 2400 (McMurry, 9th edition)

- 1. Chapter 1: Structure and Bonding**
Atomic structure (nucleus, orbitals, electronic configurations), chemical bond theory (valence bond theory and molecular orbital theory), hybridization (carbon, nitrogen, oxygen, phosphorus and sulfur), drawing chemical structures.
- 2. Chapter 2: Polar Covalent Bonds; Acids and Bases**
Electronegativity, dipole moments, formal charges, resonance, acids and bases (the Brønsted-Lowry definition, pKa, acid and base strength, organic acids, organic bases, the Lewis definition).
- 3. Chapter 3: Organic Compounds: Alkanes and their Stereochemistry**
Functional groups, alkane and alkane isomers, alkyl groups, naming alkanes, properties of alkanes, conformations of alkanes.
- 4. Chapter 4: Organic Compounds: Cycloalkanes and their Stereochemistry**
Naming cycloalkanes, *cis-trans* isomerism in cycloalkanes, stability of cycloalkanes (ring strain), conformations of cycloalkanes, conformations of cyclohexanes (monosubstituted, disubstituted, trisubstituted etc).
- 5. Chapter 5: Stereochemistry at Tetrahedral Centers**
Enantiomers and the tetrahedral carbon, chirality, optical activity, sequence rules for specifying configuration, diastereomers, meso compounds, racemic mixtures

and the resolution of enantiomers, a review of isomerism, chirality at nitrogen, phosphorus and sulfur, prochirality.

6. Chapter 6: An Overview of Organic Reactions

Types of organic reactions, how organic reactions occur (mechanisms), radical reactions, polar reactions, using curved arrows in polar reaction mechanisms, describing a reaction (equilibria, rates, energy changes, bond dissociation energies, energy diagrams, transition states, intermediates).

7. Chapter 7: Alkenes: Structure and Reactivity

Industrial preparation and use of alkenes, calculating degree of unsaturation, naming alkenes, *cis-trans* isomerism in alkenes, E/Z designation in alkenes, stability of alkenes, electrophilic addition reactions of alkenes (Markovnikov's rule), carbocation structure and stability, carbocation rearrangements.

8. Chapter 8: Alkenes: Reactions and Synthesis

Preparation of alkenes, reactions of alkenes: halogenation, halohydrin formation, hydration (oxymercuration and hydroboration), hydrogenation (reduction), oxidation (epoxidation, hydroxylation, cleavage to carbonyl compounds), addition of carbenes (cyclopropane synthesis), reaction stereochemistry (addition of water to an achiral and a chiral alkene).

9. Chapter 9: Alkynes: An Introduction to Organic Synthesis

Naming alkynes, preparation of alkynes (elimination reactions of dihalides), reactions of alkynes (halogenation, addition of HX, hydration, reduction, oxidative cleavage), alkyne acidity (formation of acetylide anions), alkylation of acetylide anions, an introduction to organic synthesis.

10. Chapter 10: Organohalides

Naming and structure of alkyl halides, preparation of alkyl halides (addition of HX to alkenes, radical halogenation of alkanes, allylic bromination of alkenes, from alcohols), stability of allyl radical, reactions of alkyl halides (Grignard reagents), organometallic coupling reactions, oxidation and reduction in organic chemistry.

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

The S_N2 , S_N1 E2, E1 and E1cB reactions and their characteristics, Zaitsev's rule, the E2 reaction and cyclohexane conformation.

• **Notes:**

- If you miss an exam for any reason that score will be dropped automatically. **NO MAKE-UP EXAMS WILL BE GIVEN.** Students missing an exam will be expected to submit a written note and documentation. A student will not be excused from more than one test for any reason.
- If you have concerns regarding the grade assigned to your exams you must submit your answer sheet for re-grading along with a written explanation of the concern. This submission must be made within one week of the date the exam was returned.
- Students need to show their GSU Panther I.D. card when taking exams.
- The instructor reserves the right to assign seating during exams and quizzes.
- The final grades will ONLY be posted in PAWS. Grades are not emailed or given via phone.

- **No programmable calculators are allowed in class nor in exams.** Cell phones and pagers/beepers are absolutely prohibited during exams. Cheating in exams will cause you to receive a 'F' for the course

Class Preparation and attendance: Students are **expected** to attend all lectures. As a courtesy to your fellow students, please arrive on time and do not leave during the lecture. Students are solely responsible for the timely completion of all assignments, absence being no excuse. **Suggested reading assignments given during the course of a lecture should be completed before the next lecture.**

Chemistry Departments Student Integrity Policy: The Department of Chemistry follows the University policy on academic honesty published in the "Faculty Affairs Handbook" and the "On Campus: The Undergraduate Co-Curricular Affairs Handbook". All tests taken must represent the student's individual, unaided effort. To receive or offer information or use of *any* unauthorized supplementary material during any examination will be considered cheating. In addition all laboratory work performed in conjunction with this course must represent your individual effort. Only original data obtained by your own *in-laboratory* experimentation are permitted to be used, except when *expressly authorized* by your laboratory instructor. Data from supplementary sources, handbooks, reference literature, etc. must be *clearly referenced* (title, author, volume, pages(s), etc.). Falsification or destruction of data constitutes cheating as well. Conduct disruptive of class, examinations, or laboratories *or* falsification or destruction of information related to chemistry courses will be taken as a violation of the policies of the Board of Regents of the University System of Georgia and the Georgia State University Student Code of Conduct, Section 6.0. Any suspected offense may be referred to the Department's Chairman and/or the Dean of Students for appropriate disciplinary action.

Class will never be cancelled unless an official from the Chemistry Department gives the class personal notification. Don't assume a note to be enough without checking the Department's office.

The University requires that faculty members must, on a date after the mid-point of the course to be set by the Provost (or his/her assignee)

1. Give a **WF** to all students who are on their rolls but are no longer taking the class and
2. Report the last day the student attended or turned in an assignment. Students who are withdrawn may petition the Departmental Chair for reinstatement into their classes.

To be successful in this course,

Attend class: There is a very good correlation between class attendance and how well a student will do in this course. Some students may be able to teach themselves from the book, but generally, students who struggle most are the ones who miss class often.

Be prepared: You will get the most out of class if you have read the sections to be covered that day.

Ask questions: If you don't understand something, ask the instructor in class, after class, or during office hours.

Keep up: This course is cumulative and covers a lot of content. You must revise after every lecture on the same day. Everybody's study habits are different: flashcards, review outlines, practice problems, reaction lists, etc.

Practice, Practice, Practice: Organic chemistry, like any skill, is best learned by practice. Work as many example problems as you can find. Start with assigned problem sets, questions from the textbook, recommended workbook, SI worksheets, but also look for other sources of problems if you need to. When working problems, make sure that you understand why the correct answer is the right one.

Learn fundamental concepts: Organic chemistry is very difficult to learn by memorization. If you understand the concepts, you will find it much easier to keep track of the large amount of information, and more importantly be able to apply it on the tests. Again, practice, practice, practice!!!

Get help early: If you get behind, it can be very difficult to catch up. If you feel you are falling behind, increase your effort. Go to the Chemistry tutoring Center (Sports Arena 105). Come to office hours more often. If you feel you need more help, consider hiring a tutor.

Collect all returned graded exams, worksheets and quizzes. Go over the questions you got wrong and ask the instructor for clarification. This way you don't make the same mistake again.

Make use of FREE support services: office hours, SI sessions, Chemistry Tutoring Center (Sports Arena 105), Student Support Services (SSS)-STEM (contact: Deidre Steed, dsteed1@gsu.edu, 404-413-1682, in person: 145 sparks Hall).

CHEM 2401– starts the 2nd week of classes: This is a problem solving class to help you with the lecture. The credits count toward your GPA but not towards your degree. Grading is based on your attendance. Check GoSolar for more details.

*Students with Disabilities: Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which an accommodation is sought.

*A student who intends to observe a religious holiday should make that intention known in writing to the instructor prior to the absence. A student who is absent for the observance of a religious holy day shall be allowed to take an exam or complete an assignment scheduled for that day within a reasonable time after the absence.

*Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation.