



STATE UNIVERSITY OF NEW YORK  
COLLEGE AT ONEONTA

**CHEM 226 Summer 2013**

Section 1

**Elementary Organic Chemistry**

Instructor: Dr. Maurice O. Odago

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Office Hours: MW 12:00-1:00PM

**Lecture:** MTWR 10:15 AM-12: 15 PM, PSCI 122

**Laboratory:** TR 1:30-4:30 PM, HECO 228

### COURSE DESCRIPTION & PREREQUISITE (S)

Reviews the various functional groups of organic compounds with emphasis on structure, properties, reactions, and uses. Not open to majors in liberal arts chemistry. Includes laboratory. (LA)

**Prerequisite:** [CHEM 111](#) C- or better.

### TEXTBOOK AND OTHER COURSE MATERIALS

- Textbook: Organic Chemistry: A short Course 13<sup>th</sup> edition; by Hart, Hadad, Craine and Hart
- Owl access code for the text book
- **Clicker Options:** I will be providing clickers that you will use in class and you must return at the end the course in good shape in order to get a grade for this course any losses and/or damages will result to a replacement or equivalent fee on hold.
- Laboratory Safety Goggles
- Hayden-McNeil Student Lab Notebook (with carbonless copies)

### ADDITIONAL RESOURCES

**Course Webpage;** Course materials such as course syllabus, Power Points, lecture notes, and link to laboratory experiments are found on the course webpage:

<http://employees.oneonta.edu/odagomo/>

Please note during this course you will be required to complete online homework through OWL outside class. You will be will be expected to complete these homework before their due dates.

**Laboratory materials will be available online at:**

[https://mindtouch.oneonta.edu/Academic\\_Wikis/Chemistry\\_and\\_Biochemistry/CHEM\\_226\\_Elementary\\_Organic\\_Chemistry](https://mindtouch.oneonta.edu/Academic_Wikis/Chemistry_and_Biochemistry/CHEM_226_Elementary_Organic_Chemistry).

Students are required to print out, read the experiments and make notes/answer the pre-lab questions before you come to lab.

Reading the experiments for the first time during the labs will be considered unsafe and an indication of lack of readiness for lab.

You may be required by the lab instructor to leave the lab on grounds of safety and unpreparedness.

### **SUNY LEARNING OUTCOME OBJECTIVES**

Students will demonstrate an understanding of organic compounds, their properties, reactions and uses.

### **COURSE GOALS/OBJECTIVES**

*By the taking this course, the students should be able to:*

1. Write and interpret correct chemical structures and names of organic compounds.
2. Identify all common functional groups found in organic compounds.
3. Explain the major types of reactions involving transformation organic compounds.
4. Write and interpret simple reaction mechanisms for basic simple step organic reactions.
5. Relate the physical and chemical properties of organic compounds to their structure.
6. Interpret and draw inferences from some basic spectroscopic information/ data/ spectra used in structure determination and analysis of organic compounds, namely NMR, IR, Mass Spectrometry and UV-vis.
7. Relate the properties and structure of organic compounds to real life functions and applications.
8. Classify organic compounds by molecular frameworks, functional groups, and applications.

### **COURSE REQUIREMENTS**

Students are required to attend all scheduled lectures and laboratory experiments, complete all the assigned OWL homework, quizzes, exams and labs in order to meet the evaluation criteria of the course.

### **COURSE ACTIVITIES/TEACHING STRATEGIES**

The course will involve activities such as lecture, demonstrations, laboratory experiments, discussions, reviews, office hours and online homework.

### **ADDITIONAL UNIQUE ASPECTS OF COURSE**

#### **LABORATORY**

Laboratory work is an integral and essential part of this course and will represent a significant factor in your final grade (see above). You will not be granted credit for this course unless you satisfactorily complete the laboratory work; however, if you have taken the course previously at SUNY Oneonta and completed the laboratory work, a waiver *may* be granted. If you think that you might qualify for such a waiver, discuss your situation with the course instructor as soon as possible.

You will be expected to attend every scheduled meeting of your laboratory section. If you are forced to miss one of the labs

due to circumstances beyond your control, the instructor will attempt to arrange for you to attend some other laboratory section during the same week. If it is impossible to reschedule the experiment you should discuss methods of making up the work with your instructor.

Students will not be permitted to work in any laboratory section other than that for which they are scheduled. Students must not work in the laboratory with direct faculty supervision.

Unless you are informed otherwise, laboratory reports will be due the following lab meeting after the completion of the experiment.

In order to protect your vision you will be **required to wear safety glasses** while you are in the laboratory. If you violate this rule you become a hazard to yourself as well as those around you. Therefore, you may be asked to leave the laboratory if you do not wear safety glasses.

Laboratory reports are to represent your own original work. You will sometimes work with other students to collect data, but your written report, including calculations must be your own work. Additional safety information is found in the Departmental Policy below.

#### **DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY POLICY ON COURSE ATTENDANCE, PERFORMANCE, PARTICIPATION AND BEHAVIOR**

1. Students are expected to attend all scheduled course sessions and should be prepared by reading in advance any relevant material assigned or provided. Participation (defined by interacting with the instructor, working problems at the board, individually or in groups, using personal response "Clicker" systems and other mechanisms defined in the syllabus) is expected.
2. Students are reminded that instructors are not required to accept assignments submitted late, except in instances allowed according to College policies. College Policies as defined in the Student Code of Conduct apply to lecture, recitation and laboratory portions of all courses.
3. Laboratories are an integral part of education in chemistry courses. As a result, participation in all laboratories scheduled for a course is expected. Unless alternate activities are scheduled, students can expect that their laboratory section will meet each week, and failure to attend laboratories may lead to failure in the course.
4. The minimum acceptable grade for a chemistry course prerequisite is a C-. For example, a student with a D+ in General Chemistry I may not enroll in Elementary Organic Chemistry. This standard applies to all Chemistry prerequisites for all Chemistry courses.
5. **The laboratory for a course must be passed**, normally by earning 60% of the available score or points for the laboratory, in order to pass the course. Exceptions may be noted in syllabus.
6. Students are expected to bring to laboratory the laboratory manual (or printout of the experiment), a laboratory notebook (if required), a calculator, ruler or other materials as specified by the instructor or in the syllabus.

7. Students are not allowed to work in the laboratory without direct faculty supervision.
8. Unless announced in advance, **SAFETY GOGGLES (WHICH PROVIDE A COMPLETE SEAL AROUND THE EYES AND ARE EQUIPPED WITH INDIRECT VENTS) ARE REQUIRED TO BE WORN AT ALL TIMES IN THE LABORATORY. STUDENTS ARE REQUIRED TO PROVIDE THEIR OWN SAFETY GOGGLES.**
9. Open-toed shoes (e.g. sandals, "Birkenstocks", flip-flops, etc.), unrestrained long hair, excessively loose clothing and other items, which may be easily ignited or snag on apparatus are not allowed.
10. Food, drink, candies; cosmetics, tobacco products, etc. are not allowed in the laboratory.
11. Students are expected to be attentive to the material and any experiments and apparatus in the laboratory. The following must be turned off and stored away from the laboratory bench while in laboratories:
  - Portable music players (e.g. iPods, MP3 players and the like)
  - Cellular telephones, pagers, text messaging devices and the like
  - Other portable electronic devices as defined by the laboratory instructor
12. Horseplay, practical jokes, "goofing around" or interfering with other students' work is not allowed in the laboratory.
13. Students should not expect to be able to makeup missed laboratory sessions or experiments. If a makeup session is possible, it will be at the discretion of the laboratory instructor and will normally be during the same week as the missed laboratory section.
14. Students will not be permitted to work in any laboratory section other than that they are registered for unless they have the **written approval** of both their regular instructor AND the instructor in the section they wish to enter.

Course instructors may modify these guidelines as necessary to meet the requirements of individual courses or chemical specialties in consultation with the Department Chairperson. Students should expect to receive a copy of these guidelines in their course syllabus or be given a copy by the course instructor (either in paper form or by electronic mail).

## COURSE OUTLINE

The course will cover the following topics in the order listed.

### **Chapters**

Chapter 1: Introduction to Bonding and Isomerism

Chapter 2: Alkanes and Cycloalkanes; Conformational and Geometric Isomerism

Chapter 5: Stereoisomerism

### **Quiz 1 May 30, 2013**

Chapter 12: Spectroscopy and Structure Determination C-13 IR

Chapter 3: Alkenes and Alkynes

### **Exam 1 June 4, 2013**

Chapter 4: Aromatic Compounds

Chapter 6: Organic Halogen Compounds: Substitution and Elimination Reactions

Chapter 7: Alcohols, Phenols, and Thiols

Chapter 8: Ethers and Epoxides

### **Quiz 2 June 13, 2013**

Chapter 9: Aldehydes and Ketones

### **Exam 2 June 18, 2013**

Chapter 10: Carboxylic Acids and Their Derivatives

Chapter 11: Amines and Related Nitrogen Compounds

### **Quiz 3 June 25, 2013**

**A Comprehensive Final Exam: Thursday June 27, 2013 at 10:15 AM -12:15PM in PSCI 122**

## CHEM. 226 Summer 2013 Schedule

	M	T	W	R	Labs are on Tuesday and Thursday of every week
Week 1	No classes 5/27/2013	5/28/2013: Classes begin  C1: Introduction to bonding and isomerism (general chemistry review), The atom and electron arrangement, Ionic and Covalent compounds, carbon and the covalent bond, C-C single bonds, Polar covalent bonds, Multiple covalent bonds, Valence, Isomerism, Structural formulas, Abbreviated formulas, formal charge, resonance, arrow formalism	5/29/2013  The sp <sup>3</sup> hybrid orbitals, Classification according to molecular framework and functional groups  C2: Alkanes and Cycloalkanes occurrence, structure and nomenclature, Physical properties, conformations and isomerism, Reactions of alkanes, free-radical chain reaction mechanism for halogenation	5/30/2013  C5: Stereoisomerism Chirality and enantiomers, R-S, E-Z conventions and the, <i>Cis-Trans</i> isomers, polarized light and optical activity, Properties of enantiomers, Fischer projections formulas, diastereomers and meso compounds, Stereochemistry and chemical reactions and resolution of racemic mixtures  <b>Quiz 1</b>	Tuesday 5/28/2013 L1: Introduction to lab, lab safety and rules  Vitamin C Determination  Thursday 5/30/2013  L2: Introduction to the Chemistry software;  Melting point expt
Week 2	6/3/2013  C12: Spectroscopy and Structure Determination: Principles of Spectroscopy, NMR Spectroscopy; <sup>1</sup> H NMR and <sup>13</sup> C NMR, IR, UV-vis and Mass Spectrometry	6/4/2013  C3: Alkenes and Alkynes; Nomenclature, bonding, addition reactions,  <b>Exam 1</b>	6/5/2013  C4: Aromatic Compounds; Benzene structure, orbital model of benzene nomenclature of aromatic compounds. EAS reactions, Halogenation, nitration, sulfonation, alkylation and acylation, Ortho, Para-directing and Meta-directing	6/6/2013  C6: Organic Halogen Compounds: SN1 and SN2 Reactions, E1 & E2 reactions	Tuesday 6/4/2013 L3: Molecular modeling  Thursday 6/6/2013  L4: DBA-Synthesis

Week 3	6/10/2013 C7: Alcohols, Phenols, and Thiols; classification, nomenclature, properties, Acidity and basicity of alcohols and phenols,	6/11/2013 Dehydration reactions, reactions with alkyl hydrogen halides, and oxidations  C8: Ethers and Epoxides	6/12/2013  C9: Aldehydes and Ketones, Nomenclature, synthesis and the carbonyl group	6/13/2013 <b>Quiz 2</b>  Problem solving on previous chapters	Tuesday 6/11/2013 L5 Extraction of essential oils by steam distillation  Thursday 6/13/2013 L6 Spectroscopy
Week 4	6/17/2013  Nucleophile additions to the carbonyl; Alcohols, (acetals and hemiacetal formation) Hydration, Grignard and Acetylide addition	6/18/2013  Nitrogen nucleophiles, reduction and oxidation of carbonyl compounds, Keto-Enol tautomerism, the $\alpha$ -hydrogen, Aldol Condensation  <b>Exam 2</b>	6/19/2013  C10: Carboxylic Acids and Their Derivatives,  Physical properties, the effect of structure on acidity,	6/20/2013  Preparation of carboxylic acids from; primary alcohols, aromatic side chains, Grignard reagents with CO <sub>2</sub> and hydrolysis of cyanides (nitriles)	Tuesday 6/18/2013 L7; Hydrocarbons  Thursday 6/20/2013 L8: Aspirin synthesis
Week 5	6/24/2013 Carboxylic acid derivatives; esters and their preparation by Fischer esterification and Nucleophilic Acyl substitution. Lactones, saponification, reaction of esters with Grignard reagents, Reduction of esters.	6/25/2013 C11: Amines and Related Nitrogen Compounds; classification and structure of amines, Nomenclature and physical properties, Preparation of Amines; by alkylation of ammonia and amines and reduction of nitrogen compounds  <b>Quiz 3</b>	6/26/2013 Basicity of Amines Chiral Amines Resolving agents and Reaction of Amines with Strong acids, Diazonium compounds	<b>6/27/2013</b>  <b>Final Exam</b>	Tuesday Lab 9: Imine synthesis part 1  Thursday L10: Imine synthesis part 2  Check out in lab

## ASSIGNMENTS

### OWL HOMEWORK

Homework will use the OWL system served by the University of Massachusetts. The system is "mastery" based, meaning that you can work on an assignment as long as you want and try questions as many times as you want, until succeeding. There is no penalty for getting an answer wrong. There is only a penalty for not eventually getting it right. The login address is:

<https://owl.cengage.com/owlc/user/loginpage.cgi?Server=owl-sunyoneontahart13e&UserType=Student>

Your login is SUCO + your email address up to the @ sign. So, mine is **SUCOodagomo**.

Your password is your **A00** student number, including the A.  
Assignments will be made weekly and will be due at midnight on Sunday.

#### TEST DATES & COVERAGE

**Exam 1-** June 4, 2013 (Chapters 1, 2, 3, 5 and 12)

**Exam 2-** June 18, 2013 (Chapters 4, 6, 7, 8 and 9)

**Final Exam-** June 27, 2013 (The final exam will be comprehensive covering all chapters)

#### LATE ASSIGNMENTS & MAKE-UP TEST POLICY

There will be **NO** make-ups for exams, quizzes and labs. Any missed exams, quizzes or labs will result to a zero grade for the respective activity. Exceptions may be possible for conflicting pre-planned sporting activities and/or in extraordinary circumstances, where documentary proofs will be required.

#### METHOD OF EVALUATION

Evaluation will be based on the following grading criteria.

2Hour Exams, 150 points each = 300 points

Comprehensive Final Exam = 200 points

OWL Homework = 100 points

Laboratory = 100 points

Quizzes = 100 points

**Total = 800 points**

**Letter grade ranges on a percentage basis are:**

**A** 90.0 – 100%

**C** 70.0 – 73.9%

**A-** 87.0 – 89.9%

**C-** 67.0 – 69.9%

**B+** 84.0 – 86.9%

**D** 64.0 – 66.9%

**B** 80.0 – 83.9%

**E** Below 64%

**B-** 77.0 – 79.9%

**C+** 74.0 – 76.9%

Attendance in lectures is required. There are 20 class meetings throughout the semester. Each student expected to attend all classes, labs, complete all assignments, quizzes and exams in order to obtain a grade in the course. *Absences may be excused for distant sports events, medical issues or family emergencies if – and **only** if – appropriate documentation is offered.* In such cases, the student is responsible for the work covered in his/her absence and must make arrangements with the instructor to make up for any tests missed.



<b>ADA (AMERICAN WITH DISABILITIES ACT) STATEMENT</b>
Students Diagnosed with a Disability – All individuals who are diagnosed with a disability are protected under the Americans with Disabilities Act, and Section 504 of the Rehabilitation Act of 1973. As such, you may be entitled to certain accommodations within this class. If you are diagnosed with a disability, please make an appointment to meet with Student Disability Services (SDS), 209 Alumni Hall, ext. 2137. All students with the necessary supporting documentation will be provided appropriate accommodations as determined by the SDS Office. It is entirely your responsibility to contact SDS and concurrently supply me with your accommodation plan, which will inform me exactly what accommodations you are entitled to. You will only receive accommodations once you provide me with an SDS accommodation plan. Any previously recorded grades will not be changed.
<b>EMERGENCY EVACUATION/SHELTER-IN-PLACE PROCEDURES</b>
In the event of an emergency evacuation (i.e., fire or other emergency), our laboratory classes meeting in the Human Ecology building room 228 are directed to reassemble at the Chase Gymnasium so that all persons can be accounted for. Evacuation from our lecture hall in IRC 2 is to the Fine Arts Theater. Complete details of the emergency evacuation, shelter-in-place, and other emergency procedures can be found at <a href="http://www.oneonta.edu/security">http://www.oneonta.edu/security</a> . All students are also encouraged to register for NY Alert for immediate notification of campus emergencies on or near the campus.