



STATE UNIVERSITY OF NEW YORK  
COLLEGE AT ONEONTA

**CHEM 226 Spring 2013**

Sections 1, 2, 3, 4 & 5

**Elementary Organic Chemistry**

Instructor: Dr. Maurice O. Odago

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Phone 607-436-3480

Office Hours: W 12:00-2:00PM

Lecture HIRC #2, MWF 10:00AM-10:50AM

**Laboratory:**

Section 1: F, 12:00-2:50 PM, HECO 228

Section 2: F, 3:00-5:50 PM, HECO 228

Section 3: T, 8:30-11:20 AM, HECO 228

Section 4: W, 1:00-3:50 PM, HECO 228

Section 5: T, 1:00-3:50 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:** Buy directly from [TurningPoint NXT](#) (School Code = **W5bH**) Laptop or Smartphone with ResponseWare subscription (\$17/year) iPhone, iPod Touch, iPad, Blackberry (download ResponseWare app) Android phones are not formally supported, yet, but may work through a web browser.
- Molecular model kit
- 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 that in the course of the semester, I may begin using a different website to host our materials. You will be informed accordingly of any changes.

**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

#### Exam 1: February 13, 2013

Chapter 12: Spectroscopy and Structure Determination C-13 IR

Chapter 3: Alkenes and Alkynes

Chapter 4: Aromatic Compounds

Chapter 6: Organic Halogen Compounds: Substitution and Elimination Reactions

#### Exam 2: March 20, 2013

Chapter 7: Alcohols, Phenols, and Thiols

Chapter 9: Aldehydes and Ketones

Chapter 16: Carbohydrates

Chapter 10: Carboxylic Acids and Their Derivatives

Chapter 11: Amines and Related Nitrogen Compounds

Chapter 17: Amino Acids, Peptides and Proteins

#### Exam 3: May 1, 2013

Chapter 15: Lipids and Detergents

Chapter 8: Ethers and Epoxides (Reading assignment)

**A Comprehensive Final Exam: Friday 10, 2013 at 8:00-10:30am in HIRC 2**

## CHEM. 226 Spring 2013 Schedule

F	M	W	Lab are on F-T-W week
		1/16: Classes begin C1: Introduction to bonding and isomerism (general chemistry review) The atom and electron arrangement,	
1/18: Ionic and Covalent compounds, carbon and the covalent bond, C-C single bonds	1/21: Polar covalent bonds, Multiple covalent bonds, Valence, Isomerism, Structural formulas	1/23: Abbreviated formulas, formal charge, resonance, arrow formalism and the sp <sup>3</sup> hybrid orbitals	1/18-1/23 L1: Introduction to lab, Lab safety, rules and Surveys (Bring your laptop, tablets, clickers and smartphones); Vitamin C Determination
1/25: Classification according to molecular framework and functional groups	1/28: C2: Alkanes and Cycloalkanes occurrence, structure and nomenclature	1/30: Physical properties, conformations and isomerism	1/25-1/31 L2: Chemistry software; Melting point
2/1: Reactions of alkanes, free-radical chain reaction mechanism for halogenation	2/4: C5: Stereoisomerism Chirality and enantiomers, R-S convention	2/6: E-Z convention, <i>Cis-Trans</i> isomers, polarized light and optical activity	2/1-1/7: L3: Molecular modeling

<p>2/8:</p> <p>Properties of enantiomers, Fischer projections formulas, diastereomers and meso compounds</p>	<p>2/11:</p> <p>Stereochemistry and chemical reactions and resolution of racemic mixtures</p>	<p><b>2/13:</b></p> <p><b>Exam 1: Wednesday February 13</b></p>	<p>2/8-2/14</p> <p>L4: Dibenzalacetone</p>
<p>2/15:</p> <p>C12: Spectroscopy and Structure Determination: Principles of Spectroscopy</p>	<p>BREAK</p>		
<p>BREAK</p>	<p>2/25:</p> <p>NMR Spectroscopy</p> <p>1H NMR and 13C NMR</p>	<p>2/27:</p> <p>IR, UV-vis and Mass Spectrometry</p>	<p>2/22-2/28</p> <p>L5: Essential Oils</p>
<p>3/1:</p> <p>C3: Alkenes and Alkynes; Nomenclature, bonding, addition reactions</p>	<p>3/4: Addition reactions continued</p>	<p>3/6:</p> <p>C4: Aromatic Compounds; Benzene structure, orbital model of benzene nomenclature of aromatic compounds.</p>	<p>3/1-3/7</p> <p>L6: Spectroscopy</p>
<p>3/8:</p> <p>EAS reactions, Halogenation, nitration, sulfonation, alkylation and acylation</p>	<p>3/11:</p> <p>Ortho, Para-directing and Meta-directing groups, substituent effect on reactivity, importance of directing effect in synthesis</p>	<p>3/13:</p> <p>C6: Organic Halogen Compounds: SN1 and SN2 Reactions</p>	<p>3/8-3/14</p> <p>L7: Hydrocarbons</p>

<p>3/15: E1 &amp; E2 reactions</p>	<p>3/18: C7: Alcohols, Phenols, and Thiols; classification, nomenclature, properties</p>	<p>3/20: <b>Exam 2: Wednesday March 20</b></p>	<p>3/15-3/21 L8: Properties of Alcohols and Phenols</p>
<p>3/22: Acidity and basicity of alcohols and phenols, dehydration reactions, reactions with alkyl hydrogen halides, and oxidations</p>		<p>BREAK</p>	
<p>Break</p>	<p>4/1: No Class</p>	<p>4/3: C9: Aldehydes and Ketones  Nomenclature, synthesis and the carbonyl group  Nucleophilic additions to the carbonyl; Alcohols, (acetals and hemiacetal formation) Hydration, Grignard and Acetylide addition</p>	<p>3/22-4/4 L9: Properties of Carboxylic acids and Esters</p>
<p>4/5: Cyanohydrin formation, nitrogen nucleophiles, reduction and oxidation of carbonyl compounds</p>	<p>4/8: Keto-Enol tautomerism, the <math>\alpha</math>-hydrogen, Aldol Condensation</p>	<p>4/10: C16: Carbohydrates  Classification, Fischer projections and D, L-sugars. Cyclic hemiacetal structure, pyranose and furanose and anomeric carbons.</p>	<p>4/5-4/11 L10: Preparation of Aspirin</p>

<p>4/12:</p> <p>Reduction and oxidation of monosaccharides, glycosides, disaccharides and polysaccharides</p>	<p>4/15:</p> <p>C10: Carboxylic Acids and Their Derivatives</p> <p>Physical properties, the effect of structure on acidity</p>	<p>4/17:</p> <p>Preparation of carboxylic acids from; primary alcohols, aromatic side chains, Grignard reagents with CO<sub>2</sub> and hydrolysis of cyanides (nitriles)</p>	<p>4/12-4/18</p> <p>L11: Imine synthesis Part 1</p>
<p>4/19:</p> <p>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.</p>	<p>4/22:</p> <p>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</p>	<p>4/24:</p> <p>Basicity of Amines Chiral Amines Resolving agents and Reaction of Amines with Strong acids, Diazonium compounds</p>	<p>4/19-4/25</p> <p>L12: Imine synthesis Part 2</p>
<p>4/26:</p> <p>C17: Amino acids, peptides and proteins</p> <p>Naturally occurring amino acids, acid base properties, reactions, peptides and proteins</p>	<p>4/29:</p> <p>C15: Lipids and Detergents; Fats and Oils, hydrogenation of oils</p>	<p>5/1:</p> <p><b>Exam 3: Wednesday May 1</b></p>	<p>4/26-5/2</p> <p>L13: Check out and Surveys</p>



5/3: Saponification, how soap works and synthetic detergents Waxes, terpenes and steroids	5/6: C8: Ethers and Epoxides (Reading assign.)	Last Day of classes	Finals
Friday May 10, 2013 (8:00-10:30am) FINAL Exam			

### 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-** February 13, 2013 (Chapters 1,2 & 5)

**Exam 2-** March 20, 2013 (Chapters 3, 4, 6, 8 and 12)

**Exam 3-** May 1, 2013 (Chapters 7, 9, 10, 11 & 17)

**Final Exam-** May 10, 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.

3 Hour Exams, 100 points each = 300 points

Comprehensive Final Exam = 200 points

OWL Homework = 100 points

Laboratory = 100 points

Quizzes =50 points

Class Participation =50 points

**Total = 800 Points**

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

<b>A</b>	90.0 – 100%	<b>C</b>	70.0 – 73.9%
<b>A-</b>	87.0 – 89.9%	<b>C-</b>	67.0 – 69.9%
<b>B+</b>	84.0 – 86.9%	<b>D</b>	64.0 – 66.9%
<b>B</b>	80.0 – 83.9%	<b>E</b>	Below 64%
<b>B-</b>	77.0 – 79.9%		
<b>C+</b>	74.0 – 76.9%		

**ATTENDANCE POLICY**

Attendance in lectures is required. There are 41 class meetings throughout the semester. Each student is given 10 free misses, for any reason. Each miss beyond those 10 will deduct 2 points (out of 800) from the final point total. *Absences may be excused for distant sports events, medical issues or family emergencies if – and only if – appropriate documentation is offered.*

**ADA (AMERICAN WITH DISABILITIES ACT) STATEMENT**

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.

**EMERGENCY EVACUATION/SHELTER-IN-PLACE PROCEDURES**

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 <http://www.oneonta.edu/security>. All students are also encouraged to register for NY Alert for immediate notification of campus emergencies on or near the campus.