

PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

ORGANIC CHEMISTRY II
CHEM 2020

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 3.0

Revised: Spring 2011

Catalog Course Description:

Continuation of CHEM 2010. Course includes 3 hours of lecture and 3 hours of laboratory applications each week.

Entry Level Standards:

The student should have a good understanding of Organic Chemistry I. Reading and writing on a college level is also expected. Basic mathematical skills (algebra, logarithms and ratios) are also needed.

Prerequisite:

CHEM 2010

Textbook(s) and Other Course Materials:

Solomon, T. W. Graham and Fryhle, Craig B. *Organic Chemistry*. 9th edition. John Wiley and Sons, Inc. 2008.

Zubrick, James W. *The Organic Chem Lab Survival Manual*. 8th edition. John Wiley and Sons, Inc. 2011.

Laboratory Notebook

CHEMSKETCH: free download at <http://www.acdlabs.com/download/chemsk.html>

ACS Organic Chemistry Study Guide:
http://www4.uwm.edu/chemexams/order/2009_SG_form.pdf

Additional Aids (optional):

Solomon, T. W. Graham, Fryhle, Craig B. and Johnson, Robert G. *Study Guide and Solutions Manual to Accompany Organic Chemistry*. 9th edition. John Wiley and Sons, Inc. 2007.

HGS Molecular Models: Organic Chemistry

Chemist Triangle, Aldrich Chemical Company

I. Week/Unit/Topic Basis:

Week	Topic
1	Nuclear Magnetic Resonance
2	Conjugated Unsaturated Systems
3	Aromatic Compounds
4	Reactions of Aromatic Compounds
5	continued
6	Aldehydes and Ketones I: Nucleophilic Addition to the Carbonyl Group
7	continued
8	Aldehydes and Ketones II: Aldol Reactions
9	Carboxylic Acids and Their Derivatives
10	continued
11	Synthesis and Reactions of α,β -Dicarbonyl Compounds
12	Amines
13	Amino Acids and Proteins
14	Carbohydrates
15	Final Exam

II. Course Goals*:

The course will:

- A. Acquire knowledge of modern spectroscopic techniques used in the determination the molecular structures of carbon containing compounds. V.1, V.2, V.4
- B. Understand the concept of resonance stabilization and aromaticity. V.4
- C. Acquire knowledge of the reactivity of additional functional groups including benzene, conjugated dienes, aldehydes, ketones, carboxylic acids and amines as well as methods for preparation of these functional groups. V.4
- D. Develop a working knowledge of IUPAC as well as common nomenclature for organic compounds containing the functional groups above as well as carbohydrates and peptides. V.4
- E. Apply mechanistic approaches to determine and understand product distributions for the reactions studied. V.4
- F. Apply retro synthetic analysis in solving organic synthetic puzzles. V.1, V.4
- G. Understand the properties and reactions of carbohydrates (including mono and disaccharides), amino acids, peptides and proteins and their importance in biological systems.

- H. Exhibit critical thinking skills. V
- I. Learn skills related to observing, measuring, analyzing, evaluating and communicating scientific data. I, V, VI

*Roman Numerals after Course Goals reference TBR General Education Goals.

III. Expected Student Learning Outcomes*:

The student will be able to:

1. Draw resonance structures for the reaction intermediates involved in the addition reactions of conjugated dienes and thus determine the thermodynamic and kinetic products from these reactions. B
2. Predict aromaticity for cyclic organic compounds based on the Huckel $4n + 2$ Rule. B
3. Name organic structures using IUPAC rules including stereochemistry as well as draw structures for given names including appropriate stereochemistry. D
4. Predict the products of electrophilic aromatic substitution reactions of benzene and devise syntheses for substituted benzenes. C
5. Determine the product of reactions of addition functional groups including aldehydes, ketones, carboxylic acids and carboxylic acid derivatives and amines. C
6. Using examples discussed in class, predict reaction mechanisms for similar reactions. E
7. Accomplish multistep synthesis of desired products use retro synthetic methods. F
8. Draw and name the structures of carbohydrates and carbohydrate derivatives. G
9. Elucidate the chemical and physical properties of carbohydrates and the importance these play in the essential biochemical role of carbohydrates. G
10. Draw the structures of amino acids and peptides as a function of pH and the importance of the acid-base chemistry of proteins in biological systems. G
11. Determine the primary structure of a peptide from various experimental data. G
12. Use spectral data and reaction sequences to predict products from reactions. A, C
13. Collect, tabulate, graph and analyze from laboratory experiments and prepare written lab reports using scientific journal format. This will require the use of word-processing and data base software and a variety of information resources. H, I
14. Use critical thinking to solve various problems in organic structure determination, mechanism of organic reactions and multistep syntheses of organic compounds. F, G, H
15. To encourage the development of teamwork, students will work in small groups both in performing laboratory experiments and problem solving in the classroom. H, I
16. Students will be given examples of summaries of reaction pathways which will encourage and aid in the development of their own organizational skills. H
17. In learning the nomenclature and properties of different classes of organic compounds, students will have a better understanding of the chemistry involved in producing the

products, both natural and man-made, that they use on a daily basis. These products include soaps and detergents, cosmetics, plastics, pesticides, fabrics, pharmaceuticals and many others. I

* Capital letters after Expected Student Learning Outcomes reference the course goals listed above.

IV. Evaluation:

A. Testing Procedures: 75% of grade

There will be four hour exams worth 150 points each. An American Chemical Society (ACS) comprehensive final exam will be administered at the end of the semester worth 150 points. Missed exams may not be made up for any but the most serious problem. Missed exams may be made up only if the instructor is notified within 24 hours of the scheduled exam time and is provided a valid, document able excuse. However, missed exams must be made up within one week of the scheduled exam time. In all other cases missed exams will be recorded as a zero. Students may not make up more than one missed exam except under the direst of circumstances. Students arriving late for an exam will not be given extra time.

B. Laboratory Expectations: 25% of grade

Attendance is required for all scheduled lab meetings. Students arriving exceptionally late or with multiple incidences of tardiness may lose points at the instructor's discretion.

Students should dress appropriately for the laboratory. Dress requirements as well as other safety rules will be discussed during the first lab meeting. Students who are not appropriately attired for subsequent lab meetings will not be allowed to complete the lab assignment and will receive a zero.

Evaluation of lab performance will be based on the following:

	<u>Points</u>
Lab Reports, Problem Sets & Lab Notebook	200
<u>Comprehensive Final</u>	<u>50</u>
Total	250

Students must read the assignments prior to the laboratory meeting. An outline of the experiment, as well as other information necessary for the completion of the assigned lab, should be recorded in a bound lab notebook using permanent ink prior to the lab meeting. During lab, data should be recorded in the lab notebook using permanent ink. If corrections to the information in the lab notebook are necessary, the erroneous data should be stricken with a single line. Do not scratch out, erase or use "white-out".

Laboratory reports are due at the lab meeting following completion of the laboratory assignment. Points will be deducted for laboratory reports turned in late.

DO NOT WEAR SANDALS TO LAB! KEEP A PAIR OF TENNIS SHOES IN YOUR CAR IN CASE YOU FORGET!

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

The course grade will be based on the following:

Exams	600
Comprehensive Final	150
Laboratory	<u>250</u>
Total	1000

The grading scale will be as follows:

900 - 1000	A
875 - 899	B+
800 - 874	B
775 - 799	C+
700 - 774	C
600 - 699	D
below 600	F

V. Policies:

A. Attendance Policy:

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

C. Accommodations for disabilities:

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Services for Students with

Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at <http://www.pstcc.edu/sswd/>.

D. Other Policies:

Students should prepare for class by reading assignments prior to the lecture. Please bring textbooks and other pertinent materials to class.

Important course materials will be posted on D2L or may be sent by email. It is the student's responsibility to make sure that they can access both through the PSCC homepage. If you have difficulty please call the helpdesk (694-6537) or go to the open computer lab located in the ERC.

Lecture attendance is extremely important for those wishing to complete organic chemistry successfully. It is the student's responsibility to obtain notes and/or handouts if they must be absent or if they are late for a lecture.

Classroom disruptions during lecture or laboratory, any form of communication during testing, or any other form of behavior that may prove distracting to others will not be tolerated.

Unacceptable behavior for the classroom includes but is not limited to: (1) use of a cell phone for either conversation or texting, (2) talking during lecture for any purpose other than asking or answering a question from the instructor, (3) eating during lecture or lab, (4) inappropriate use of a laptop, and/or (5) arriving late or leaving early.