

PELLISSIPPI STATE COMMUNITY COLLEGE  
MASTER SYLLABUS

**ORGANIC CHEMISTRY II**  
**CHEM 2020**

Class Hours: 3.0  
Laboratory Hours: 3.0

Credit Hours: 4.0  
Date Revised: Fall 2017

**Catalog Course Description:**

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

**Prerequisites:**

CHEM 2010

**Textbook(s) and Other Course Materials (required):**

Klein, David, *Organic Chemistry*. 2<sup>nd</sup> edition, John Wiley and Sons, Inc. 2015

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

Carbonless Copy Laboratory Notebook

CHEMSKETCH: free download for Windows at

[Chems sketch Download](#)

OR

MARVIN SKETCH: free download for Windows, Linux, and iOS at

[Marvin Sketch Download](#)

ACS Organic Chemistry Study Guide:

[Study Guide Link](#)

**Additional Aids (optional):**

Klein, David Study Guide and Solutions Manual to Accompany Organic Chemistry. 2<sup>nd</sup> edition. John Wiley and Sons, Inc. 2015.

HGS Molecular Models: Organic Chemistry (sold in PSCC Bookstore or maybe ordered from Sigma-Aldrich Z277703-1EA)

**D2L:**

Important course materials will be posted on D2L or may be sent by email. Check these **daily**. Note outlines, supplemental material and practice problems will be posted on D2L. It is the student's responsibility to print these assignments and bring them to class. Laboratory procedures will also be posted on D2L. Make sure that you can access both D2L and webmail through the PSCC homepage before you leave campus today. If you have difficulty please call the helpdesk (694-6537) or go to the open computer lab located on the third floor of the ERC.

**Week/Unit/Topic Basis:**

Week	Chapter	Topic
1	14	Ethers and Epoxides
2	15	Infrared Spectroscopy
3	16	Nuclear Magnetic Resonance Spectroscopy
4	17	Conjugated Pi Systems

5	18	Aromatic Compounds
6	19	Aromatic Substitution Reactions
7	20	Aldehydes and Ketones
8	21	Carboxylic Acids and Their Derivatives
9	22	Alpha Carbon Chemistry
10	23	Amines
11	24	Carbohydrates
12	25	Amino Acids, Peptides and Proteins
13	25	continued
14		Review
15		Final Exam

### Course Goals\*:

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

- 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 ethers, 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

### Expected Student Learning Outcomes\*:

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

Upon successful completion of this course, the student should be able to:

1. Determine structures for organic compounds based on molecular formula, and Infrared and Nuclear Magnetic Resonance spectral data. B
2. 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
3. Predict aromaticity for cyclic organic compounds based on the Huckel  $4n + 2$  Rule. B

4. Name organic structures using IUPAC rules including stereochemistry as well as draw structures for given names including appropriate stereochemistry. D
5. Predict the products of electrophilic aromatic substitution reactions of benzene and devise syntheses for substituted benzenes. C
6. Determine the product of reactions of addition functional groups including aldehydes, ketones, carboxylic acids and carboxylic acid derivatives and amines. C
7. Using examples discussed in class, predict reaction mechanisms for similar reactions. E
8. Accomplish multistep synthesis of desired products use retro synthetic methods. F
9. Draw and name the structures of carbohydrates and carbohydrate derivatives. G
10. Elucidate the chemical and physical properties of carbohydrates and the importance these play in the essential biochemical role of carbohydrates. G
11. 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
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

**Evaluation:****A. Testing Procedures: 75% of grade**

Exams, quizzes, in-class assignments and/or homework will be worth a total of 750 points. The final exam is MANDATORY. If the final exam is not completed a grade of an "F" will be assigned in the course.

Molecular models are allowed on all exams. Other applicable materials will be provided during the exam. All cell phones and other devices should be turned OFF before the exam begins.

Missed exams may not be made up for any but the most serious personal or family crisis. The instructor must be notified within 24 hours of the scheduled exam time. Documentation is required. In all other cases missed exams will be recorded as a zero. Students arriving late for an exam will not be given extra time.

In addition the instructor may at their discretion give weekly graded homework assignments and/or quizzes. Quizzes and/or homework assignments may not be made up.

B. Laboratory Expectations: 25% of grade

Laboratory Reports, Problem Sets, Laboratory Notebook and laboratory final will be worth a total of 250 points.

Attendance is required for all scheduled lab meetings. Students arriving late will not be permitted to perform the lab. If there are multiple incidences of tardiness students may lose points at the instructor's discretion. Any missed labs due to unexcused absences will be counted as a zero. Any lab experiments or problem sets missed due to an excused absence may only be made up with permission from the instructor.

Students should dress appropriately for the laboratory. Shoes covering the entire foot are required (no clogs/sandals/ballet flats). Legs must be fully covered (no tights/leggings/yoga pants). Safety eye wear must be Additional dress requirements as well as 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.

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 carbonless copy 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. Lab reports must be turned into the drop box on D2L before coming to lab. A hard copy will also be given to the lab instructor. Points will be deducted for laboratory reports turned in late.

C. Grading Scale:

The course grade will be based on the following:

	<u>Points</u>
Lecture	750
<u>Laboratory</u>	<u>250</u>
Total	1000

The grading scale will be as follows:

<u>Points</u>	<u>Grade</u>
900-1000	A
875-899	B+
800-874	B
775-799	C+
700-774	C
600-699	D
Below 600	F

**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.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

C. Accommodations for disabilities:

Students that 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 Disability Services (DS) in order to receive accommodations in this course. [Disability Services](http://www.pstcc.edu/sswd/) (<http://www.pstcc.edu/sswd/>) may be contacted via [email](#) or by visiting Alexander 130

D. Classroom Disruptions

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.