PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

ORGANIC CHEMISTRY II
CHEM 2020

Class Hours: 3.0 **Credit Hours: 4.0**

Laboratory Hours: 3.0 **Date Revised: Fall 2001**

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 Reference Materials Basic to the Course:

Solomon, T. W. Graham and Fryhle, Craig B. *Organic Chemistry.* 7th edition. John Wiley and Sons, Inc. 2000.
Pavia, D. L., Lampman, G. M., Kriz, G. S. and Engel, R. G. *Organic Laboratory Techniques, a small scale approach.* 1st edition. Saunders College Publishing, 1998.

I. Week/Unit/Topic Basis:

Week	Topic
1	Lecture: Conjugated Unsaturated Systems; Ch13.1-13.8,13.10-13.11 Lab: Check-in, Safety Rules and Laboratory Notebooks and Reports
2	Lecture: Aromatic Compounds; Ch.14.1-14.11 Lab: Steam Distillation of Essential Oils From Spices
3	Lecture: Reactions of Aromatic Compounds; Ch. 15..1-15.9 Lab: Preparation of Substituted Acetophenones Via Friedel-Crafts Acylation of Substituted Benzenes
4	Lecture: Reactions of Aromatic Compounds; Ch. 15.10-15.16 Lab: Preparation of Substituted Acetophenones Via Friedel-Crafts Acylation of Substituted Benzenes (cont) EXAM 1: Chapters 13-15

5	Lecture: Aldehydes and Ketones I: Nucleophilic Addition to the Carbonyl Group; Ch. 16.1-16.5 Lab: Preparation of 1,4-Diphenyl-1,4-butadiene Using a Wittig Reagent
6	Lecture: Aldehydes and Ketones I: Nucleophilic Addition to the Carbonyl Group; Ch. 16.6-16.14 Lab: Preparation of Tetraphenylcyclopentadienone
7	Lecture: Aldehydes and Ketones II: Aldol Reactions; Ch. 17.1-17.9 Lab: Problem Set: Aldehyde and Ketone Reactions
8	EXAM 2: Chapters 16-17 Lecture: Carboxylic Acids and Their Derivatives; Ch. 18.1-18.12 Lab: Preparation of an Unsaturated Ketone via Michael and Aldol Condensations
9	Lecture: Carboxylic Acids and Their Derivatives; Ch. 18.1-18.12 Lab: Preparation of an Unsaturated Ketone via Michael and Aldol Condensations
10	Lecture: Synthesis and Reactions of ?-Dicarbonyl Compounds; Ch. 19.1-19.11 Lab: Qualitative Analysis
11	Lecture: Amines; Ch.20.1-20.9 Lab: Qualitative Analysis (cont)
12	EXAM 3: Chapters 18-20 Lecture: Carbohydrates; Ch. 22.1-22.3 Lab: Isolation of Casein and Lactose From Milk
13	Lecture: Carbohydrates; Ch. 22.4-22.12 Lab: Isolation of Casein and Lactose From Milk (cont)
14	Lecture: Amino Acids and Proteins; Ch. 24.1-24.7 Lab: Acid-Base Titrations of Amino Acids
15	EXAM 4: Chapters 22 and 24 Lecture: Review Lab: Lab Final Exam and Check-Out
16	Final Exam

II. Course Objectives*:

A. Understand the concept of resonance stabilization and aromaticity. III.1, III.2

B. Acquire a 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. III.1, III.2

C. 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. I.5

D. Apply mechanistic approaches to determine and understand product distributions for the reactions studied. III.1, III.2

E. Apply retrosynthetic analysis in solving organic synthetic puzzles. III.1

F. Understand the properties and reactions of carbohydrates (including mono and discaccharides), amino acids, peptides and proteins and their importance in biological systems. VI.1

*Roman numerals after course objectives reference goals of the university parallel program.

III. Instructional Processes*:

Students will:

1. 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. *Communication Outcome, Problem Solving and Decision Making Outcome, Technological Literacy Outcome, Numerical Literacy Outcome, Information Literacy Outcome, Active Learning Strategy*

2. Use critical thinking to solve various problems in organic structure determination, mechanism of organic reactions and multistep syntheses of organic compounds. *Problem Solving and Decision Making Outcome, Information Literacy Outcome*

3. Encourage the development of teamwork, students will work in small groups both in performing laboratory experiments and problem solving in the classroom. *Communication Outcome, Personal De*velopment Outcome, Active Learning Strategies, Transitional Strategies

4. Be given examples of summaries of reaction pathways which will encourage and aid in the development of their own organizational skills. *Personal Development Outcome*

5. In learning the nomenclature and properties of different classes of organic compounds, 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. *Personal Development Outcome, Transitional Strategies*

*Strategies and outcomes listed after instructional processes reference Pellissippi State' s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should 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. A

2. Predict aromaticity for cyclic organic compounds based on the Huckel 4n + 2 Rule. A

3. Name organic structures using IUPAC rules including stereochemistry as well as draw structures for given names including appropriate stereochemistry. C

4. Predict the products of electrophilic aromatic substitution reactions of benzene and devise synthese for substituted benzenes. B

5. Determine the product of reactions of addition functional groups including aldehydes, ketones, carboxylic acids and carboxylic acid derivatives and amines. B

6. Using examples discussed in class, predict reaction mechanisms for similar reactions. D

7. Accomplish multistep synthesis of desired products use retosynthetic methods. E

8. Draw and name the stuctures of carbohydrates and carbohydrate derivatives. C

9. Elucidate the chemical and physical properties of carbohydrates and the importance these play in the essential biochemical role of carbohydrates. F

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. F

11. Determine the primary structure of a peptide from various experimental data. F

12. Use spectral data and reaction sequences to prdict products from reactions.

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 75% of grade

There will be four hour exams worth 125 points each and a comprehensive final exam worth 250 points. All of the exams will involve problem solving and short explanations (no multiple choice or true/false).
Missed exams may not be made up for any but the most serious problem. Valid excuses include but are not limited to the following: serious illness of the student or immediate family, military service and jury duty. 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 5 days 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

Evaluation of lab performance will be based on the following:

	Points
Reports (7 x 25 pts)	175
Pre-Lab Quizzes (5 x 5 pts)	25
Comp. Final	50
Total	250

Attendance is required for all scheduled lab meetings. There are NO MAKE-UP LABS. If you should have to miss a lab due to a serious problem, you must contact the instructor within 24 hours and provide a valid, document able excuse. However, students may be excused from one and only one lab meeting if the above conditions are met AND the individual will still be required to submitted a lab report using data supplied by the instructor. In all other cases missed laboratory meetings will result in a zero.
Pre-lab quizzes will be given at the beginning of each lab period. These quizzes will cover the previuous lab as well as the lab excercise to be performed that day. Students who arrive late will not be allowed to make up the quiz. Students arriving exceptionally late or with multiple

incidences of tardiness may lose additional points at the instructors discretion.
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. Notebooks will be checked periodically. Failure to complete these pre-lab preparations will result in points being taken off of the lab report grade. 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 stricken with a single line. Do not scratch out, erase or use "white-out".

Laboratory reports are due at the following lab meeting after completion of the laboratory assignment. (Note: Some experiments require two lab meetings for completion) Points will be deducted for laboratory reports turned in late.
No laboratory reports will be accepted after the laboratory final exam.
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.

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

The course grade will be based on the following:

Exams	500
Comprehensive Final	250
Laboratory	250
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

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled classes and laboratory meetings in order to receive credit for the course. (PSTCC Catalog & Handbook)

Individuals who violate the above policy will receive an F for the course. The instructor reserves the right to give an incomplete under extenuating circumstances to an individual who may not have completed 75% of the laboratory expectations but has completed 75% of the lecture portion of the course with a minimum of a C average. Students who have missed a significant number of lecture or laboratory meetings (>25%) are encouraged to withdraw from

the course or under extenuating circumstances to seek a late withdrawal.

B. Academic Dishonesty:

With any form of valid proof of dishonesty with regard to student work or testing, the instructor may elect from a range of actions. Academic dishonesty could lead to failure for the entire course or dismissal from the institution.

C. Other Policies:

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

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 and may lower the final grade.