BARTON COMMUNITY COLLEGE
COURSE SYLLABUS

I. GENERAL COURSE INFORMATION

Course Number: CHEM 1804
Course Title: Elementary Organic Chemistry
Credit Hours: 5 Credit Hours
Prerequisites: CHEM 1802 Fundamentals of General Chemistry with a grade of C or better OR CHEM 1806 with a grade of C or better.
Division/Discipline: Academic Division/Chemistry
Course Description: A brief course in organic chemistry with emphasis given to the practical aspects of organic chemistry. This course is designed for those persons who need organic chemistry as a one-semester course, such as pre-agriculture, pre-baccalaureate nursing, nutrition, and similar majors.

II. INSTRUCTOR INFORMATION

III. COLLEGE POLICIES

Students and faculty of Barton Community College constitute a special community engaged in the process of education. The College assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom.

Plagiarism on any academic endeavors at Barton Community College will not be tolerated. The student is responsible for learning the rules of, and avoiding instances of, intentional or unintentional plagiarism. Information about academic integrity is located in the Student Handbook.

The College reserves the right to suspend a student for conduct that is determined to be detrimental to the College educational endeavors as outlined in the College Catalog, Student Handbook, and College Policy & Procedure Manual. (Most up-to-date documents are available on the College webpage.)

Any student seeking an accommodation under the provisions of the Americans with Disability Act (ADA) is to notify Student Support Services via email at disabilityservices@bartonccc.edu.

IV. COURSE AS VIEWED IN THE TOTAL CURRICULUM

Elementary Organic Chemistry is a 5 credit hour course for Allied Health majors. This course is the second semester of the Allied Health chemistry course series (1802 & 1804). It is an approved general education course at Barton Community College which can be used to fulfill the college-level degree requirements as a breadth laboratory science course in the natural/physical science requirement for all associate in applied science degrees offered at Barton Community College.

The transferability of this course varies among 4-year college and university programs. These requirements may change from time to time and without notification. Therefore it shall be the student's responsibility to obtain relevant information from intended transfer institution during his/her tenure at BCC to ensure that he/she enrolls in the most appropriate set of courses for the transfer program.

V. ASSESSMENT OF STUDENT LEARNING

Barton Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton, as a learning college, in finding ways to improve student learning.

Course Outcomes, Competencies, and Supplemental Competencies:

A. Identify trends in the naming, properties, and reactions of hydrocarbons.
   1. Name straight chain and substituted alkanes, alkenes, and alkynes using International Union of Pure and Applied Chemistry (IUPAC) and common nomenclature.
   2. Use the cis-trans isomer designation to separate isomers of unsaturated hydrocarbons.
      a. Identify cis-trans isomers of pheromones.
      b. Relate cis-trans isomerism to vitamins and pharmaceuticals.
   3. Predict the products of addition reactions of alkenes.
   4. Identify aromatic compounds using Huckel's Rule.
      a. Describe the stability of compounds based on aromatic substituents.

B. Identify trends in the naming, properties, and reactions of alcohols, phenols, thiols, and ethers.
   1. Name alcohols, phenols, and ethers using IUPAC and common nomenclature.
   2. Describe the classification of alcohols.
   3. Rank the relative boiling points of alcohols, phenols, and ethers.
   4. Write out the characteristic reactions of alcohols, phenols, and ethers.
   5. Predict the products of the characteristic reactions of alcohols, phenols, and ethers.

C. Identify trends in the naming, properties, and reactions of ketones and aldehydes.
   1. Name ketones and aldehydes using IUPAC and common nomenclature.

2. Rank the relative boiling points and solubilities of ketones and aldehydes.
3. Write out the oxidation and reduction reactions of ketones and aldehydes.
4. Predict the products of the oxidation and reduction reactions of ketones and aldehydes.
    a. Identify hemiacetals and acetals.
5. Identify chiral and achiral carbon atoms in an organic molecule.

D. Classify carbohydrates and describe their chemical properties.
1. Identify an organic molecule as a carbohydrate.
2. Classify a carbohydrate as an aldose or ketose.
3. Classify a carbohydrate as a monosaccharide, disaccharide, or polysaccharide.
4. Draw Fisher projections of carbohydrates.
5. Draw Haworth projections of carbohydrates.
    a. Convert between Fisher, Haworth, and standard stereoformulas.
6. Describe the linkage features in di- and polysaccharides.

E. Identify trends in the naming, properties, and reactions of carboxylic acids and esters.
1. Name carboxylic acids and esters using IUPAC and common nomenclature.
2. Rank the relative boiling points of carboxylic acids and esters.
3. Rank the relative solubility, dissociation, and neutralization of carboxylic acids and esters.
4. Write out the characteristic reactions of carboxylic acids and esters.
5. Predict the products of the characteristic reactions of carboxylic acids and esters.

F. Classify lipids and describe their chemical properties.
1. Identify a lipid as a wax, triacylglycerol, glycerophospholipid, sphingolipid, or steroid.
2. Identify a lipid as saturated or unsaturated.
    a. Relate cis-trans isomerism to lipids.
3. Predict and draw the condensed or line-angle structural formula for the products of a fatty acid and an alcohol or glycerol.
4. Identify if a lipid will undergo the characteristic reactions of lipids.
    a. Write the equation for hydrogenation.
    b. Write the equation for hydrolysis.
    c. Write the equation for saponification.
5. Draw the fused ring, backbone structure of all steroids.
    a. Identify common steroids.

G. Identify trends in the naming, properties, and reactions of amines and amides.
1. Name amines and amides using IUPAC and common nomenclature.
2. Rank the relative boiling points of amines and amides.
3. Rank the relative solubility, dissociation, and neutralization of amines and amides.
    a. Describe the role of amines as neurotransmitters.

4. Write out the characteristic reactions of amines and amides.
5. Predict the products of the characteristic reactions of amines and amides.
6. Identify amino acids as amines.
    a. Define zwitterion.
    b. Identify which ionic form an amino acid will be in below, at, or above the isoelectric point.
    c. Identify peptide bonds and give the name, three letter, and one letter abbreviations for the peptide formed.

H. Optional or supplemental topics to support further learning.
1. Design multiple step reactions to synthesize all of the common functional groups.
    a. Assess starting material and desired product for appropriate reaction conditions in a multistep analysis.
    b. Apply a retrosynthetic and systematic approach to design an experiment.

I. Work in the laboratory in accordance with good laboratory practices.
1. Dress in an appropriate manner as to promote safety in the laboratory, wearing a lab coat and goggles when anyone is working with chemicals in the laboratory.
2. Follow written directions accurately.
3. Work safely and effectively, using equipment and chemical carefully and correctly.
4. Demonstrate use of required safety and common laboratory techniques.
5. Dispose of waste products in a proper manner.

J. Gather and record qualitative and quantitative data accurately.
1. Acquire data using standard laboratory techniques.
2. Make and record visual observations.
3. Use computers, as appropriate, as data acquisition and interpretation tools.
4. List or describe experimental assumptions made and any deviations from the written experimental procedures.

K. Handle and evaluate data in logical, productive, and meaningful ways.
1. Create a notebook and laboratory reports that are clear, understandable, and accurately represent the data collected.
2. Display computer data graphically or in a spreadsheet, as appropriate.
3. Correlate observations with chemical or physical processes.
4. Carry out suitable calculations with quantitative data, recognizing when data and calculations are within a reasonable range.
5. Use observations of experimental data to present relevant conclusions pertinent to experimental the procedure.

6. Correlate laboratory work with principal topics in Elementary Organic Chemistry lecture by discussing the results obtained in the context of the competencies identified above in outcomes A-H.

VI. INSTRUCTOR'S EXPECTATIONS OF STUDENTS IN CLASS

VII. TEXTBOOKS AND OTHER REQUIRED MATERIALS

VIII. REFERENCES

IX. METHODS OF INSTRUCTION AND EVALUATION

Since laboratory activities are integral to the learning outcomes of this lab science course, students must pass the laboratory portion of the class in order to successfully complete ("pass") the course.

X. ATTENDANCE REQUIREMENTS

XI. COURSE OUTLINE