**BARTON COMMUNITY COLLEGE**

##### **COURSE SYLLABUS**

## **GENERAL COURSE INFORMATION**

Course Number: CHEM 1814

Course Title: Organic Chemistry I

Credit Hours: 5 Credit Hours

Prerequisites: 1808 College Chemistry II or equivalent with a C or better.

Division/Discipline: Academic Division/Chemistry

Course Description: This course is the first half of a two-semester course in organic chemistry and provides students with the knowledge of the physical and chemical properties of carbon compounds with emphasis on the mechanisms of organic reactions, the nomenclature of the compounds and methods of organic synthesis. This course is designed for those students who need a good understanding of organic chemistry.

1. **INSTRUCTOR INFORMATION**

## **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 detrimental to the College's 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.)

Anyone seeking an accommodation under provisions of the Americans with Disabilities Act should notify Student Support Services via email at disabilityservices@bartonccc.edu.

## **COURSE AS VIEWED IN THE TOTAL CURRICULUM**

Organic Chemistry I is an approved general education course at BCC, which can be used to fulfill degree requirements as a breadth laboratory science course in the natural/physical science. In addition, it is required (or recommended) to be taken by students enrolled in Chemistry, Physical Science, Biological Sciences, Medical Lab Technician, and pre-professional programs (e.g. Pre Dentistry, Pre-Forestry, Pre-Medicine, Pre-Pharmacy, Pre-Wildlife, Pre-Chiropractic, Pre-Veterinarian, Pre-Engineering, etc.)

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 insure that he/she enrolls in the most appropriate set of courses for the transfer program.**

## **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:

1. Apply standard concepts of General Chemistry to Organic Chemistry.
   1. Apply Lewis structures to organic molecules.
   2. Apply bonding and valence rules to the atoms of organic chemistry.
   3. Define acids and bases using both Bronsted Lowry and Lewis definitions.
   4. Demonstrate an understanding of relative acidities of organic molecules.
   5. Relate the words nucleophile and electrophile to Lewis acids and bases.
   6. Identify the intermolecular forces of organic molecules based on structure.
2. Demonstrate an understanding of common organic functional groups.
   1. Identify common functional groups such as alkanes, alkenes, alkynes, halides, ketones, aldehydes, alcohols, ethers, esters, carboxylic acids, and amines.
   2. Relate the properties of organic molecules to the functional groups present.
   3. Name a variety of organic molecules using standard IUPAC nomenclature.
   4. Understand when to use common naming conventions.
3. Develop an understanding of the stereochemistry and relationship of organic isomers.
   1. Define and provide examples of enantiomers, diastereomers, and constitutional isomers.
   2. Determine the isomer relationship of a pair or set of compounds.
   3. Identify stereogenic centers.
   4. Identify chiral and achiral molecules.
   5. Name isomers based on the Cahn-Ingold-Prelog system of assigning priorities to determine the R or S prefix.
   6. Name compounds with more than one stereogenic center.
   7. Convert between Fischer and standard stereoformulas.
4. Demonstrate an understanding of general organic mechanisms.
   1. Identify nucleophiles and electrophiles.
   2. Demonstrate an understanding of organic mechanisms by showing curved arrow notation to change reactants to products.
5. Demonstrate an understanding of Nucleophilic Substitution reactions and their conditions.
   1. Determine the electrophilic site of an alkyl halide starting material.
   2. Predict the substitution reaction mechanism for a reaction based on the starting materials and reaction conditions.
   3. Explain why Sn2 reactions result in an inversion of stereochemistry.
   4. Identify relative carbocation stability.
6. Demonstrate an understanding of Elimination reactions and their conditions.
   1. Predict the elimination reaction mechanism for a reaction based on the starting materials and reaction conditions.
   2. Explain why substitution or elimination products are favored given specific conditions.
   3. Define and use Zaitsev’s Rule.
   4. Determine which mechanism would be favored with given reaction conditions; Sn1, Sn2, E1, E2.
7. Describe the properties and expected reaction mechanisms for organic molecules that contain alcohol, ether, or epoxide functional groups.
   1. Name the organic molecules that contain alcohol, ether, or epoxide functional groups.
   2. Demonstrate an understanding of the reaction mechanisms for the characteristic reactions of alcohols, ethers, and epoxides.
      1. Describe and utilize Grignard reagents in chemical reactions.
   3. Define and apply the relative strength of a leaving group in product prediction.
8. Describe the properties and reactivity of the pi bonds in unsaturated molecules.
   1. Name alkenes and alkynes using the appropriate IUPAC naming conventions including E & Z prefixes where necessary.
   2. Demonstrate the electrophilic addition reaction mechanism to synthesize alkyl halides.
   3. Define and use Markovnikov’s Rule.
   4. Identify when products of reactions follow an anti-Markovnikov addition.
   5. Calculate the degree of unsaturation of a molecule.
      1. Predict the products or reactants of a Diels Alder reaction.
      2. Explain the structure and characteristics of conjugated dienes and the reactions they undergo
9. Work in the laboratory in accordance with good laboratory practices
   * 1. Dress in an appropriate manner as to promote safety in the laboratory, wearing appropriate laboratory attire 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 techniques.
     5. Dispose of waste products in a proper manner.
     6. Find and interpret the safety information on MSDS's for the chemicals used in a particular laboratory.
10. Gather and record qualitative and quantitative data accurately
    * 1. Acquire data using appropriate lab ware.
      2. Make and record visual observations.
      3. Use computers, when appropriate, as data acquisition tools.
      4. List or describe experimental assumptions made and any deviations from the written experimental procedures.
11. Handle and evaluate data in logical, productive, and meaningful ways.
    * 1. Create notebooks and laboratory reports that are clear, understandable, and accurately represent the data collected.
      2. Correlate observations with chemical or physical processes.
      3. Carry out suitable calculations with quantitative data, recognizing when data and calculations are within a reasonable range.
      4. Use observations of experimental data to present relevant conclusions pertaining to the experimental procedure.
      5. Correlate laboratory work with principal topics in Organic Chemistry I lecture by discussing the results obtained in the context of the competencies identified above in outcomes A-H.

1. **INSTRUCTOR'S EXPECTATIONS OF STUDENTS IN CLASS**

1. **TEXTBOOKS AND OTHER REQUIRED MATERIALS**

## **REFERENCES**

### **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.

### **ATTENDANCE REQUIREMENTS**

## **COURSE OUTLINE**