



Master Syllabus  
Chemistry 212 Survey of Organic and Biochemistry

**1. Title, Number, and Classification**

Survey of Organic and Biochemistry  
073-0212

**2. Course Term**

16 week Semester or 8 week summer term

**3. Credit and Contact Hours**

Credit hours: 4

Contact hours: 3 hr lecture, 3 hr laboratory

**4. Prerequisites**

Grade of C or better in Chem 201 or consent of the department chairperson

**5. Catalog Description**

Survey of organic chemistry including: nomenclature and reactions of major functional groups essential to biochemistry, an introduction to the structure and function of biomolecules, and the metabolism of proteins, lipids, and carbohydrates. Writing assignments, as appropriate to the discipline, are part of the course.

**6. Students for whom the course is intended**

This course is intended for students preparing for nursing, physical therapy, occupational therapy, dietician, and other health fields that require only one semester of organic chemistry. It is not appropriate for pre-medical, pre-dental, pre-pharmacy, or programs that require two semesters of organic chemistry or the MCAT.

**7. Course objectives**

This course extends concepts learned in general chemistry into organic and biochemistry, introduces the language of organic chemistry, and fosters an appreciation of the 'poetry' of biochemistry. It provides the chemical basis for understanding biological structures including the lipid bilayer, carbohydrates, receptors, enzymes, and DNA, and biological processes including the mechanism of drug action.

**8. Learning outcomes**

1. Identify, classify, organize, analyze, and draw **structures** of organic molecules.
2. Apply the basic rules of organic **nomenclature** to convert between structures and names.
3. Recall reagents and predict products for a defined set of organic **reactions**.
4. Draw organic structures consistent with the results of specific **chemical tests**.
5. Predict the **physical properties** of organic chemicals based on their structures (e.g. relative boiling point, melting point, and solubility.)
6. Analyze the influence of structure and physical properties of organic molecules on their **biological properties** (e.g. drug action, membrane fluidity, energy storage, cell signaling.)
7. Recall details of specific **case studies** that apply the chemical principles learned in class to biology and medicine (e.g. goiter, thalidomide, AquaDots, Gleevec, vorinostat, etc.)
8. Demonstrate proficiency in organic chemical **laboratory** techniques. (Chemical tests, extraction, filtration, instrumental analysis, molecular model building)

**Specific Student Learning Outcomes and the General Education Goals They Satisfy:**

The course addresses three of the general education goals of the College:

Goal 2: Students demonstrate the ability to gather, interpret, and analyze data;

Goal 4: Students demonstrate the ability to perform effectively in the workplace; and

Goal 6: Students demonstrate the ability to learn independently.

## **9. Topical Course Outline (suggested)**

Bonding, Lewis Structures, VSEPR  
Functional Groups  
Alkanes  
Alkenes  
Aromatics  
Oxygen and Sulfur functional groups  
Chirality  
Acids and Bases  
Amines  
Aldehydes and Ketones  
Acids and Derivatives  
Carbohydrates  
Lipids  
Proteins  
Enzymes  
Nucleic Acids

## **10. Texts and Materials (suggested)**

Introduction to Organic and Biochemistry, 9<sup>th</sup> ed., Bettelheim et. al., ISBN 0-495-39116-6

Organic and Biochemistry, A Survey Course, a custom lab manual ISBN 0-495-47762-1

Colored pens or pencils for taking notes (three colors plus black)

Molecular modeling kit (will be discussed in class)

## **11. Method of Instruction:**

The course will consist of lectures, demonstrations, laboratory activities, in-class discussion, in-class worksheets, and molecular model building. The laboratory experiments require group work, data sharing, and immediate discussion of laboratory results, fostering a continuous cycle of observation, reasoning, and experimentation that is the hallmark of the scientific method.