



MASTER COURSE OUTLINE

Prepared By:

Date: Sep 2017

COURSE TITLE

Intro Organic/Biochem

GENERAL COURSE INFORMATION

Dept.: CHEM&

Course Num: 131

(Formerly:)

CIP Code: 40.0501

Intent Code: 11

Program Code: N/A

Credits: 5

Total Contact Hrs Per Qtr.: 71.5

Lecture Hrs: 38.5

Lab Hrs: 33

Other Hrs: 0

Distribution Designation: Lab Science LS

COURSE DESCRIPTION (as it will appear in the catalog)

This course is designed for Allied Health transfer students and for students wanting an introductory organic chemistry course in preparation for a complete organic chemistry sequence at a baccalaureate institution. Topics include an introduction to alkanes, alkenes and alkynes, an exploration of common functional groups, and organic nomenclature. The course also explores the relationship of organic compounds such as carbohydrates, lipids, proteins, and enzymes with the human body. CHEM& 131 includes 25-30 hours of laboratory. Laboratory exercises are designed to reinforce classroom learning as well as providing hands on experience with chemical reactions.

PREREQUISITES

A grade of 2.0 or above in CHEM& 121 or instructor's permission.

TEXTBOOK GUIDELINES

A current Organic/Biochemistry text with an allied health focus. A good example would be *Organic and Biochemistry for Today* by Seager and Slaubaugh. The text used must have departmental approval.

COURSE LEARNING OUTCOMES

Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:

1. Name organic compounds from a structural formula according to standard rules of organic nomenclature.
2. Predict reaction products of some standard organic reactions.
3. Distinguish between aromatic and non-aromatic compounds.
4. Recognize the major functional groups in organic compounds and identify characteristic reactions and physical properties associated with those functional groups.
5. Explain the function of enzymes in biological systems with emphasis on human biochemistry.
6. Describe human metabolism of carbohydrates, lipids and proteins.

INSTITUTIONAL OUTCOMES

None

COURSE CONTENT OUTLINE

1. **ORGANIC COMPOUNDS: ALKANES**
 - Carbon: The Element of Organic Compounds
 - Bonding and Isomers
 - Functional groups: the organization of organic chemistry
 - Alkane structures and conformations
 - Alkane nomenclature
 - Physical properties of alkanes
 - Reactions of alkanes
2. **UNSATURATED HYDROCARBONS**
 - Nomenclature of alkenes
 - Geometry of alkenes
 - Properties of alkenes
 - Additions polymers
 - Alkynes
 - Aromatic compounds and the benzene structure
 - Nomenclature of benzene derivatives
 - Properties of aromatic compounds
3. **ALCOHOLS, PHENOLS, AND ETHERS**
 - Nomenclature of alcohols and phenols
 - Classification
 - Physical properties of alcohols
 - Reactions of alcohols
 - Important alcohols
 - Characteristics and uses of phenols
 - Properties of ethers
 - Thiols
 - Polyfunctional compounds
4. **ALDEHYDES AND KETONES**
 - Nomenclature of aldehydes and ketones
 - Physical properties of aldehydes and ketones
 - Chemical properties of aldehydes and ketones
 - Important aldehydes and ketones
5. **CARBOXYLIC ACIDS AND ESTERS**
 - Nomenclature of carboxylic acids
 - Physical properties of carboxylic acids
 - The acidity of carboxylic acids
 - Salts and esters of carboxylic acids
 - Nomenclature of esters
 - Reactions of esters
 - Esters of inorganic acids
6. **AMINES AND AMIDES**
 - Classification of amines
 - Nomenclature of amines
 - Physical properties of amines
 - Chemical properties of amines
 - Amines as neurotransmitters
 - Biologically important amines
 - Nomenclatures of amides

- Physical properties of amides
- Chemical properties of amides
- 7. CARBOHYDRATES
 - Classes of carbohydrates
 - Stereochemistry of carbohydrates
 - Fischer projections
 - Monosaccharides
 - Properties of monosaccharides
 - Important monosaccharides
 - Disaccharides
 - Polysaccharides
- 8. LIPIDS
 - Classification of lipids
 - Fatty acids
 - Structure of fats and oils
 - Chemical properties of fats and oils
 - Waxes
 - Phosphoglycerides
 - Sphingolipids
 - Biological membranes
 - Steroids
 - Steroid Hormones
 - Prostaglandins
- 9. PROTEINS
 - The amino acids
 - Zwitterions
 - Reactions of amino acids
 - Important peptides
 - Characteristics of proteins
 - Primary structure of proteins
 - Secondary structure of proteins
 - Tertiary structure of proteins
 - Quaternary structure of proteins
 - Protein hydrolysis and denaturation
- 10. ENZYMES
 - General Characteristics of enzymes
 - Enzyme nomenclature and classification
 - Enzyme cofactors
 - Mechanism of enzyme actions
 - Enzyme activity
 - Factors affecting enzyme activity
 - Enzyme inhibition
 - Regulation of enzyme activity
 - Medical application of enzymes
- 11. CARBOHYDRATE METABOLISM
 - Digestion of carbohydrates
 - Blood glucose
 - Glycolysis
 - Fates of pyruvate

The citric acid cycle
The electron transport chain
Oxidative phosphorylation
The complete oxidation of glucose
Glycogen metabolism
Gluconeogenesis
Hormonal control of carbohydrate metabolism

12. LIPID AND AMINO ACID METABOLISM

Blood lipids
Fat mobilization
Glycerol metabolism
Oxidation of fatty acids
Ketone bodies
Fatty acid synthesis
Amino acid metabolism
Amino acid catabolism: The fate of the nitrogen atoms
Amino acid biosynthesis

DEPARTMENTAL GUIDELINES (*optional*)

Evaluation will be accomplished by a combination of graded homework, examination, quizzes and laboratory performance and write up.

The final grade will be based on a percentage of the total points possible:

A typical breakdown of the points is: Three unit exams comprise approximately 50% of the total score, the final exam approximately 25%, laboratories approximately 15%, quizzes and homework provide the balance of the points.

PO5 should be assessed: Students will be able to solve problems by gathering, interpreting, combining and/or applying information from multiple sources.

DIVISION CHAIR APPROVAL

DATE