



Chippewa Valley Technical College

806-186 Introduction to Biochemistry

Course Outcome Summary

Course Information

Description	Provides students with skills and knowledge of organic and biological chemistry necessary for application within Nursing and other Allied Health careers. Emphasis is placed on recognizing the structure, physical properties and chemical reactions of organic molecules, body fluids, and acids. Additional emphasis is placed on biological functions and their relationships to enzymes, proteins, lipids, carbohydrates and DNA.
Total Credits	4
Total Hours	90

Pre/Corequisites

Prerequisite High School or College Chemistry with a C or better

Textbooks

Any post-2006 'General, Organic and Biochemistry (GOB)' combined textbook
Biochemistry Handouts and Lab Manual, Shamus Funk

Learner Supplies

Three-ring loose-leaf or regular notebook for lecture notes, textbook problems, and handouts
Pencils and Pens
Lab Notebook

Core Abilities

Communicates Effectively
Models Integrity
Thinks Critically
Values Diversity

Course Competencies

Use appropriate scientific equipment, methods, and safety precautions

Assessment Strategies

1.1. in the laboratory

Criteria

Performance will be successful when:

- 1.1. you identify hazards and safety equipment in the chemistry lab
- 1.2. you wear personal protective equipment
- 1.3. you use appropriate pipetting devices
- 1.4. you never eat or drink in the laboratory
- 1.5. you routinely wash hands
- 1.6. you disinfects lab surfaces and work areas before and after use
- 1.7. you use approved techniques for cleaning up spills
- 1.8. you report or correct unsafe conditions observed in the classroom
- 1.9. you report or correct unsafe conditions observed in the lab
- 1.10. you use universal precautions with blood and other body fluids
- 1.11. you follow the requirements of the O.S.H.A. Bloodborne Pathogen Standard
- 1.12. you locate appropriate safety equipment
- 1.13. you properly dispose of waste
- 1.14. you report all injuries to instructor
- 1.15. you acknowledges or use proper steps for emergency steps
- 1.16. you follow good laboratory practice expectations of the college

Predict the effects of pH on biochemical reactions and its role in homeostasis

Assessment Strategies

- 2.1. through an analysis (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 2.1. analysis applies the Henderson Hasselbach equation
- 2.2. analysis describes the function of a bicarbonate buffer in the blood
- 2.3. analysis relates the pH to the hydronium and hydroxide ion concentration
- 2.4. analysis predicts effects of pH on chemical structure and solubility
- 2.5. analysis uses given written, graphic or oral format parameters

Summarize the structure, physical properties, and chemical reactions of hydrocarbons

Assessment Strategies

- 3.1. through a summary (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 3.1. summary determines structure from IUPAC name
- 3.2. summary determines structure from common name
- 3.3. summary classifies hydrocarbons by family
- 3.4. summary characterizes the physical properties of hydrocarbons
- 3.5. summary converts between condensed and expanded structural formulas
- 3.6. summary predicts the product of common reactions of hydrocarbons
- 3.7. summary recognizes geometric and structural isomers
- 3.8. summary relates hydrocarbons to biological significance
- 3.9. summary predicts the product of common reactions (including oxidation and reduction)
- 3.10. you use given written, graphic or oral format parameters

Summarize the structure, physical properties and chemical reactions of alcohols, ethers, and thiols

Assessment Strategies

- 4.1. through a summary (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 4.1. summary determines structure of alcohols from IUPAC name
- 4.2. summary determines structure from common name
- 4.3. summary classifies according to functional group

- 4.4. summary characterizes the physical properties of alcohols, ethers and thiols
- 4.5. summary converts between condensed and expanded structural formulas
- 4.6. summary predicts the product of common reactions of alcohols, ethers and thiols
- 4.7. summary relates alcohols, ethers and thiols to biological significance
- 4.8. you use given written, graphic or oral written, graphic or oral format parameters

Summarize the structure, physical properties and chemical reactions of amines

Assessment Strategies

- 5.1. through a summary (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 5.1. summary determines structure from common name
- 5.2. summary classifies according to functional group
- 5.3. summary characterizes the physical properties of amines
- 5.4. summary converts between condensed and expanded structural formulas
- 5.5. summary predicts the product of common reactions of amines
- 5.6. summary relates amines to biological significance
- 5.7. you use given written, graphic or oral format parameters

Summarize the structure, physical and chemical properties of aldehydes and ketones

Assessment Strategies

- 6.1. through a summary (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 6.1. summary determines structure from common name
- 6.2. summary classifies according to functional group
- 6.3. summary characterizes the physical properties of aldehydes and ketones
- 6.4. summary converts between condensed and expanded structural formulas
- 6.5. summary predicts the product of common reactions of aldehydes and ketones
- 6.6. summary relates aldehydes and ketones to biological significance
- 6.7. you use given written, graphic or oral format parameters

Summarize the structure, physical, and chemical properties of carboxylic acids and their derivatives

Assessment Strategies

- 7.1. through a summary (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 7.1. summary classifies according to functional group
- 7.2. summary characterizes the physical properties of carboxylic acids and their derivatives
- 7.3. summary converts between condensed and expanded structural formulas
- 7.4. summary predicts the product of common reactions of carboxylic acids and their derivatives
- 7.5. summary relates carboxylic acids and their derivatives to biological significance
- 7.6. you use given written, graphic or oral format parameters

Correlate the molecular structure and function of proteins to their roles in biological systems

Assessment Strategies

- 8.1. through an analysis (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 8.1. analysis illustrates the structure of a given written, graphic or oral peptide
- 8.2. analysis explains the four levels of protein structure and the types of interactions responsible for each level
- 8.3. analysis explains the causes and mechanisms of protein denaturation
- 8.4. analysis relates the structure of a protein to its function

- 8.5. analysis identifies the roles of selected proteins
- 8.6. analysis identifies a chiral carbons in a given written, graphic or oral structure
- 8.7. analysis recognizes the biological significance of chirality
- 8.8. analysis illustrates the common reactions of proteins
- 8.9. you use given written, graphic or oral format parameters

Correlate the structure of enzymes to their biological function

Assessment Strategies

- 9.1. through an analysis (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 9.1. analysis contrasts the characteristics of enzymes versus inorganic catalysts
- 9.2. analysis recognizes factors that affect enzyme activity
- 9.3. analysis describes the role of cofactors, vitamins and coenzymes in enzyme function
- 9.4. analysis explains mechanisms of enzyme regulation
- 9.5. analysis gives examples of how selected enzymes can be used in medical diagnosis
- 9.6. you use given written, graphic or oral format parameters

Correlate the structure to the functions of key carbohydrates

Assessment Strategies

- 10.1. through an analysis (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 10.1. analysis discriminates among common carbohydrates
- 10.2. analysis relates the structural differences to the biological significance of glycogen, starch, and cellulose
- 10.3. analysis illustrates the common reactions of carbohydrates
- 10.4. you use given written, graphic or oral format parameters

Correlate the structure to the functions of key lipids

Assessment Strategies

- 11.1. through an analysis (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 11.1. analysis discriminates among common lipids
- 11.2. analysis relates the structural differences to the biological significance of triglycerides, steroids, phospholipids and prostaglandins
- 11.3. analysis illustrates the common reactions of lipids
- 11.4. analysis diagrams the structure of a cellular membrane
- 11.5. you use given written, graphic or oral written, graphic or oral format parameters

Diagram the basic metabolic processes

Assessment Strategies

- 12.1. through a diagram

Criteria

Your performance will be successful when:

- 12.1. diagram identifies the major incoming and outgoing metabolites of aerobic and anaerobic glycolysis, Krebs Cycle (citric acid), and electron transport and oxidative phosphorylation
- 12.2. diagram identifies major incoming and outgoing metabolites of fatty acid oxidation
- 12.3. diagram identifies major incoming and outgoing metabolites of the urea cycle
- 12.4. diagram explains the relationships among diabetes, mellitus, glucose metabolism and ketosis
- 12.5. diagram compares energy yield of various metabolic pathways
- 12.6. diagram explains how oxidation and reduction are involved in metabolism
- 12.7. diagram identifies key precursors of carbohydrates, proteins and lipids
- 12.8. diagram contrasts the general characteristics of catabolism and anabolism

12.9. you use given written, graphic or oral written, graphic or oral format parameters

Correlate the molecular structure and function of DNA and RNA to their roles in biological systems

Assessment Strategies

13.1. through a summary (Format may be written, graphic or oral)

Criteria

Your performance will be successful when:

- 13.1. summary shows correlation between structure of DNA and RNA
- 13.2. summary describes the roles of the various RNA molecules in protein synthesis
- 13.3. summary explains the process of basic DNA replication
- 13.4. summary explains the role of RNA and DNA in heredity and genetic expression
- 13.5. you use given written, graphic or oral format parameters