

Course Outline for: CHEM 2921 Biochemistry**A. Course Description**

1. Number of credits: 3
2. Lecture hours per week: 3
3. Prerequisites: CHEM 2061 and BIOL 1105
4. Corequisites: None
5. MnTC Goals: None

This is a one semester non-biochemistry major course designed for students who intend to complete a 4-year Biological Sciences major or enter a pre-professional program in Dentistry, Veterinary Medicine, or Pharmacology. The course is an introduction to the fundamentals of biochemistry, including structure and function of biological macromolecules, including the study of enzyme catalysis, metabolism and the regulation of metabolism (carbohydrates, lipids, amino acids and nucleotides), comprehensive, quantitative analysis of chemical equilibria, bioenergetics and the chemical foundation of genetic information.

B. Date last reviewed/updated: March 2023**C. Outline of Major Content Areas**

1. Introduction and Background
2. Amino acids
3. Enzymes
4. Carbohydrates
5. Lipids and membranes
6. Nucleic acids: DNA and RNA
7. Glycolysis
8. Krebs cycle
9. Electron transport and oxidative phosphorylation
10. Gluconeogenesis and glycogen metabolism
11. Pentose phosphate pathway
12. Lipid metabolism
13. Amino acid metabolism
14. Photosynthesis
15. Central dogma of molecular biology
16. Biosynthesis of pyrimidine and purine nucleotides
17. Formation of deoxyribonucleotides
18. Replication of DNA
19. Sequencing of DNA and recombinant DNA
20. Transcription
21. Translation

D. Course Learning Outcomes

Upon successful completion of the course, the student will be able to:

1. Draw the structures of the following classes of bio-molecules: amino acids, carbohydrates, lipids and nucleic acids.
2. Describe the concepts and techniques that are used to study biochemistry and molecular biology.
3. Describe the chemical basis of the flow of genetic information.
4. Write the reactions or describe the behaviors of the biomolecules under differing physiological conditions (2a).
5. Write the reactions in key metabolic pathways, including the drawing structures of the molecules involved, identifying the enzymes associated with the pathways and the points at which energy is released or consumed during the process (2a).
6. Solve problems related to pH, enzyme kinetics, and amino acid behavior under varied pH conditions (2a).

E. Methods for Assessing Student Learning

Methods for assessment may include, but are not limited to, the following:

1. Exams (commonly, three exams)
2. Quizzes, homework and case studies
3. Papers (commonly, 10+ pages) or posters
4. Comprehensive final exam

F. Special Information

None