

## BIOL 270-INTRODUCTION TO BIOCHEMISTRY 4 CREDITS

### SYLLABUS

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#### CATALOG DESCRIPTION

This introductory course will explore the major themes of biochemistry including the structure and function of the major classes of molecules found in biological organisms, the basic strategies for biochemical pathway regulation, the chemistry and regulation of energy metabolism, and the molecular basis of genetic information transfer.

Prerequisites: BIOL 121 and CHEM 251

Semester Offered: On Demand

#### **Common Student Learning Outcomes**

*Upon successful completion of San Juan College programs and degrees, the student will demonstrate competency in...*

##### **BROAD AND SPECIALIZED LEARNING**

Students will actively and independently acquire, apply, and adapt skills and knowledge with an awareness of global contexts.

##### **CRITICAL THINKING**

Students will think analytically and creatively to explore ideas, make connections, draw conclusions and solve problems.

##### **CULTURAL AND CIVIC ENGAGEMENT**

Students will act purposefully, reflectively, and ethically in diverse and complex environments.

##### **EFFECTIVE COMMUNICATION**

Students will exchange ideas and information with clarity in multiple contexts.

##### **INFORMATION LITERACY**

Students will be able to recognize when information is needed and have the ability to locate, evaluate, and use it effectively.

##### **INTEGRATING TECHNOLOGIES**

Students will demonstrate fluency in the application and use of technologies in multiple contexts.

*Student work from this class may be randomly selected and used anonymously for assessment of course, program, and/or institutional learning outcomes. For more information, please refer to the Dean of the appropriate School.*

### Course Learning Outcomes

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

1. Describe the multiple levels of protein structure.
2. Describe the relationship between protein structure and function.
3. Explain how enzymes accelerate reactions by facilitating the formation of the transition state.

4. Use the Michaelis-Menten equation to describe the kinetic properties of many enzyme regulated processes.
5. Appreciate the various strategies enzymes use to facilitate and regulate biochemical reactions.
6. Describe several regulatory strategies enzymes use to efficiently control multi-step metabolic pathways.
7. Understand the basic structure of monosaccharides, polysaccharides and glycoproteins.
8. Describe the structure of fatty acids and lipids and their role in membrane formation and function.
9. How protein channels and pumps regulate the movement of molecules and ions across membranes through a variety of active and passive transport processes.
10. Describe how various G protein systems operate as signal-transduction processes to control the flow of information across cell membranes.
11. Explain how the 11 nonessential amino acids are synthesized from intermediates of metabolic pathways and ammonia obtained by nitrogen fixation.
12. Describe the biosynthesis of the nucleotides.
13. Understand the biosynthesis of phospholipids, triacylglycerols and cholesterol.
14. Explain the regulation of metabolic process by enzyme regulation and compartmentalization.
15. Identify and describe activated electron carriers used for fuel oxidation and reductive biosynthesis.
16. Identify and describe 6 key reactions central to metabolic pathways.
17. Illustrate glycolysis in terms of key reactions, structure and stereochemistry of chemical intermediates and allosteric regulation of the process by key enzyme systems.
18. Illustrate the citric acid cycle in terms of key reactions, structure and stereochemistry of chemical intermediates and regulation of the process by key enzyme systems.
19. Understand the role that the citric acid cycle plays in providing biosynthetic precursors.
20. Describe oxidative phosphorylation in terms of key reactions, structure and stereochemistry of chemical intermediates and regulation of the process by key enzyme systems.
21. Understand how a proton gradient powers the synthesis of ATP and the role that ATP synthase plays in the process.
22. Describe glycogen metabolism in terms of key regulatory enzymes.
23. Understand the role that certain hormones such as insulin play in glycogen metabolism.
24. Explain some of the oxidation, reduction and dehydration reactions involved in fatty acid metabolism.
25. Illustrate nucleotide, DNA and RNA structure and describe how these structures contribute to the properties and function of each.
26. Explain the process of replication including its phosphodiester bond formation, key enzymes, and regulation.
27. Recognize the different types of DNA damage, including how they are identified and repaired.
28. Describe the processes and important factors for transcription, mRNA processing and translation.

**Dean:** \_\_\_\_\_  
**Science, Math & Engineering**

**Date:** \_\_\_\_\_