CHEM 3042 BIOCHEMISTRY I(4 credit hours)

Elmira College

SPRING 2025

Required Text:
Biochemistry: A Short Course by John L. Tymoczko, Jeremy M. Berg, and Lubert Stryer.
Supplemental readings might be included to illustrate or expand on textbook readings.

Pre-requisites: CHEM 2035 Organic Chemistry

Course Description

An introductory course in biochemistry that explores the chemistry and biological properties of key biomolecules. The course focuses on the fundamental concepts and principles of biochemistry, with an emphasis on amino acids, proteins, nucleic acids, and carbohydrates. Students will gain an understanding of the structure, function, and metabolism of these biomolecules, as well as their significance in biological systems.

Course Objectives and Goals

- Understand the biological properties and functions of biomolecules in cellular processes.
- Understand the chemical properties and structures of amino acids, proteins, nucleic acids, and carbohydrates.
- Examine the metabolism and interplay of biomolecules in various biological pathways.
- Develop laboratory skills and techniques relevant to biochemistry experiments.
- Apply theoretical knowledge to analyze and interpret experimental data.
- Foster critical thinking and problem-solving abilities in the field of biochemistry.

Evaluation of Performance

Your grade will be based upon your performance on exams, assignments, and participation.

5 Quizzes	30%
6 Laboratory reports and practical assessments	30%
Exams	40%
Total	100%

Grades will be assigned as follows:

A	93% and above	B-	80 - 82%	D+	67 - 69%
A-	90 - 92%	C+	77 - 79%	D	63 - 66%
B+	87 - 89%	C	73 - 76%	D-	60 - 62%
B	83 - 86%	C-	70 - 72%	F	59% or below

Withdrawal Policy: Please see Elmira College Bulletin for information on this policy.

Academic Honesty: Please read the section on Academic Honesty in the **Code of Conduct**. Briefly, academic dishonesty includes: cheating, fabrication, facilitating academic dishonesty, and plagiarism. Ask if you have any questions on whether something constitutes as academic dishonesty. All work must be original and new. Past assignments from current or other courses will not be accepted. Academic dishonesty will not be tolerated. It will result in zero on the assignment, and a report will be filed with the school. Continued practice will result in failure of the class. Institutional penalties may also apply with repeated acts of academic honesty.

Student Responsibility:

- It is your responsibility to keep track of assignments and due dates.
- You should ask questions concerning assignments and lectures, if you need any clarifications.
- If you are struggling in class, have concerns, and/or unsure about expectations, please stop by during office hours or make an appointment for another time.

Tentative Schedule of Topics

Topic	Materials	Tasks & Evaluations
Biochemistry principles and their role in life	Chapters 1, 2, 3	Quiz 1
Water, weak bonds, and molecular interactions in biochemistry	Chapters 4, 5, 6	
Amino acids: structure, properties, and functions	Chapters 7, 8	*Lab 1 - Amino Acids*
Protein structure levels and their significance	Chapters 9, 10	Quiz 2
Techniques for protein purification and analysis	Chapters 11, 12	
Enzyme mechanisms and specificity in reactions	Chapters 13, 14	*Lab 2 - Enzyme Mechanisms*
Enzyme kinetics and regulatory mechanisms	Chapters 15, 16	Quiz 3
Strategies of enzyme catalysis and inhibition	Chapters 17, 18	
Hemoglobin structure and oxygen transport	Chapter 19	
Carbohydrates: types, structures, and functions	Chapter 20, 21	*Lab 3 - Carbohydrates*
Lipids in energy storage and membranes	Chapter 22, 23	*Lab 4 - Lipids*
Membrane composition, properties, and functions	Chapters 24, 25	
Signal transduction and cellular communication	Chapters 26, 27	Exam 1
Digestion and nutrient absorption processes	Chapters 28, 29	
Design and principles of metabolic pathways	Chapters 30, 31	
Glycolysis steps, regulation, and significance	Chapter 32	*Lab 5 - Glycolysis*
Gluconeogenesis pathway and its regulation	Chapter 33	
Pyruvate to acetyl-CoA conversion	Chapter 34	
Citric acid cycle steps and energy yield	Chapter 35	Quiz 4
Electron transport and oxidative phosphorylation	Chapter 36	*Lab 6 - Electron Transport*
Proton-motive force and ATP synthesis	Chapter 37	

Light reactions in photosynthesis	Chapter 38	Quiz 5
Calvin cycle and carbon fixation	Chapter 39	
Regulation of metabolic processes	Chapter 40	
Integration of metabolic pathways	Chapter 41	Exam 2