



KASKASKIA COLLEGE
COURSE SYLLABUS
CHEM 210

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TEXT: Biochemistry
Author: Campbell/Farrell
(6th edn)

Grading policy:	
QUIZES	150
Discussions	100
Exams	750
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TOTAL	1000

<u>Scores</u>	<u>Letter grade</u>
900-1000	A
800-899	B
700-799	C
600-699	D
<600	F

Exams: There will be total **5** exams including the Final Exam. The Final Exam is comprehensive

Discussion will be held every week and questions will be asked during discussion

Assignments: The assignments will be assigned every week.

CATALOG DESCRIPTION OF COURSE

Topics include basic structure, stereochemistry, synthesis, regulation, and metabolism of carbohydrates, proteins, lipids, and nucleic acids. Physical biochemistry of pH and buffers. Structure and function of enzymes including enzyme kinetics and glycogen synthesis and degradation, and insulin and glycogenesis. DNA replication, transcription, translation, protein synthesis by RNA molecules and regulation of gene expression. Cell membrane structure and function, transport receptors and signal transduction. Laboratory not required.

OBJECTIVES OF THE COURSE

- A. To introduce the classification of the biological molecules including their nomenclature, basic structure, stereochemistry, and functions
- B. To provide knowledge of the metabolism of the important biomolecules, e.g., carbohydrates, proteins, lipids, and nucleic acids
- C. To introduce the structure and function of different types of hormones.
- D. To introduce the knowledge of enzyme kinetics, bioenergetics, and biochemistry of vitamins and minerals
- E. To introduce the genetic functions of DNA and RNA molecules.
- F. To provide knowledge of synthetic and analytical biochemistry

COURSE OUTLINE

Chapter 1: Structure and Function of Biomolecules. Difference between Prokaryotes and Eukaryotes Structure and Function of Eukaryotic and Prokaryotic cells: Description of organelles with their biochemical functions in both Eukaryotic and Prokaryotic cells. **Hybridization of atoms and the formation of carbon compounds with various functional groups with nomenclature. Variation of bond angles and geometry depending on the electronic and orbital structure of the compounds(Informations will be provided).**

Chapter 2: Polarity of molecules. Non-covalent interactions. Acids, Bases and Buffers.

EXAM 1: Feb 10(Fri)

Chapters 3,4,5,and 6 :Amino acids and Proteins: Classification and nomenclature of amino acids. Structures and stereochemistry of amino acids and proteins. Structures and function of various kinds of proteins or polypeptides. Hemoglobin and mechanism of oxygen transport. Metabolism of amino acids. Purification and Characterization of proteins.

Chapter 7: Enzymes and Catalysis: Nomenclature and classification. Kinetics and mechanism of enzyme-catalyzed reactions. Enzyme-substrate complex and specificity. Mechanism of action of some common enzymes. Enzyme cofactors. Allosteric enzymes and regulation of enzymatic reactions.

EXAM II: March 2(Fri)

Chapter 8: Lipids and Lipid Metabolism: Classification and nomenclature. Lipid storage, Fatty acid degradation, β -oxidation, ketone bodies, ketogenesis. Fatty acids synthesis. Cholesterol and health hazards. The Mosaic Model and Structure and Function of Biological Membranes.

Chapter 9: Nucleic Acids: Chemical composition of DNA and RNA. Nucleosides and Nucleotides. Double-helical structure of DNA. Replication and functional DNA. Classification and structure of RNA molecules, Eukaryotic genes, transcription, translation, the genetic code, and protein synthesis, and regulation of gene expression.

Chapters 11 and 12: Transcription and Protein Synthesis.

EXAM III: April 6(Fri)

Chapters 16,17,19 and 20: Carbohydrates: Definition, types of carbohydrates, nomenclature, structure and stereochemistry of carbohydrates. Plane polarized light and stereochemistry. D-L notations. Monosaccharides, mutarotation, reducing sugars, oligosaccharide, polysaccharides and bacterial cell wall.

Energy storage and ATP molecules. Hydrolysis of dietary macromolecules. Glycolysis, gluconogenesis, glycogen synthesis and degradation, insulin and glyogenesis. Mitochondria and Citric Acid Cycle, oxidative phosphorylation, urea cycle.

EXAM IV: May 2(Wed)

Chapter 13:Biotechnology and Gene Therapy: Gene cloning and its applications in medical science. Modern progress in Gene Therapy: a biochemical perspectives.

FINAL EXAM:Comprehensive(May 7)

Learning Outcomes of CHEM 210 (biochemistry)

The Students will be able to understand and learn

1. about bonding and structures of both organic and biological molecules
2. about the structures and functions of biological cells and organs
3. about the structure and functions of biomolecules e.g., proteins, nucleic acids, carbohydrates and lipids
4. the mechanism and stereochemistry of biological molecules
5. how the biological molecules are synthesized in our body and how they work
6. how the genetic message is transferred from parents to offspring
7. how our food is converted to energy and what kind of food we need to eat everyday.
8. About the biochemical differences between the Eukaryotic and prokaryotic cells.
9. About how enzymes work in our body and how mechanism of enzymes is related to their kinetics