



LEAD CITY UNIVERSITY, IBADAN

Faculty of Sciences
Department of Biochemistry

COURSE PARTICULARS

Course code: General Biochemistry II
Course title: BCH 211
No. of Units: 2
Status: Compulsory

LECTURER DETAILS

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Area of Specialization: Drug metabolism and Toxicology

COURSE DESCRIPTION

- Proteins: level of structures, methods of isolation, determination of structures
- Acid- Base chemistry of biological molecules
- Nucleic acids (RNA and DNA), functions and structures, nucleosides and nucleotides,
- Nucleic acid hydrolysis

COURSE OBJECTIVES

To have a general overview of biochemistry and understand the common biological macro molecules- Proteins and Nucleic acids in terms of classes, functions, structures and chemistry.

ASSESSMENT

Class Attendance	5marks
Test(s) and Assignments	25marks
Final Examination	70marks

LECTURE PLAN

WEEK	TOPIC
1st week	Polypeptides and levels of protein structures
2nd- 4th week	Methods of isolation of proteins and determination of protein structures
5th- 7th week	Acid base chemistry in biological systems
8th week	Mid – Semester test
9th – 10th week	Nucleic acids: functions, primary structure, nucleosides and nucleotides
11th- 12th week:	DNA replication, transcription and translation, double helical structure of DNA
13th week:	RNA: Structure, types and functions in protein synthesis

READING LIST

1. Biochemistry (Garrett and Grisham, 2nd edition) .
2. principle of biochemistry (Lehninger, 2nd edition)

TUTORIAL QUESTIONS

SECTION A

- Q1 Given the octapeptide $\text{NH}_2\text{-Lys-Ile-Met-Thr-Arg-Tyr-Ala-Iso-COOH}$,
- Write the full chemical structure
 - What will be the resulting peptides if sample of the peptide are treated separately with the following: (a) Cyanogen bromide (b) clostripain (c) Trypsin (d) chymotrypsin
- Q2 (A) Give the general structures of α -, β - and γ - amino acids, name one example in each case.
- (B) Define the term chirality? How many chiral centres are there in the following amino acids?
- Leucine, (ii) Proline, (iii) Glycine, (iv) Threonine, (v) Methionine, and (vi) Histidine and (vii) Asparagine.
- Q3 (a) What are endopeptidases? (b) List two uses of Edman's reagent
- Q4 Discuss the roles of the following in the fragmentation of polypeptide chain:
- Trypsin (ii) Chymotrypsin (iii) Cyanogen bromide
- Q5 With specific example in each case, describe the classification of proteins on the following basis:
- Composition, Solubility and physical properties
 - Shape and size
- Q6 (a) What are proteins?
- (b) Explain the unique properties of proteins that account for their wide range of functions in living Cells
- (c) Enumerate any six biological functions of proteins in living tissues
- Q7 (a) Briefly explain the secondary structure of proteins
- (b) Describe the following elements/ types of secondary structures (i) Alpha- helix (ii) Beta-pleated Sheet
- (c) Highlight and discuss other levels of structural organization observed in proteins
- Q 8. With specific examples write briefly on the following classes of proteins based on functional properties
- Regulatory proteins

- (ii) Storage proteins
- (iii) Contractile proteins
- (iv) Transport proteins
- (v) Structural proteins

SECTION B

- Q9.** Describe with a labeled diagram, the double helical structure of the DNA. (b) What are the possible mechanisms by which DNA replicates in the cell? (c) Briefly describe each mechanism.
- Q10.** (a) What are nucleic acids? (ii) Describe the primary structure of nucleic acids (iii) What functions does DNA perform in eukaryotes? (b) Differentiate between the following (i) Nucleosides and Nucleotides (ii) DNA and RNA (c) Write out the base sequence of a complementary RNA strand obtained from a DNA strand with the sequence 5'-AATGCCTTACGA-3'
- Q11.** (a) Describe the process of DNA replication in the cell. (ii) Why is it important for it to occur prior to cell division? (b) Explain the terms (i) Transcription (ii) Translation.
- Q12.** Discuss the different types of ribonucleic acids (RNA) and their functions in the cell. (b) What is the nucleotide sequence of the complementary strand of a DNA template with 3'-GGT AAC CTA TCG-5' sequence (c) Differentiate between DNA replication and DNA transcription.
- Q13.** What is a buffer? (ii) Mention 3 blood buffer systems in the body. (iii) Given that the pH of the plasma is 7.4, what is the hydrogen ion concentration in the extracellular fluid? (b) Derive Henderson-Hasselbalch equation (bii) The normal plasma levels of bicarbonate (HCO_3^-) and carbonic acid (H_2CO_3) are 24mmol/L and 1.2mmol/L respectively. What is the pH of the blood, when the pKa of the carbonic acid decreases to 5.0? (biii) What is acidosis?
- Q14.** Draw the structure of the following compounds (i) guanine (ii) Cytosine (iii) Adenosine triphosphate (iv) Thiamine (v) Ribose-5-phosphate