



School of Biomedical Science and Technology (SBST)  
DEPARTMENT OF MEDICAL LABORATORY SCIENCES

2018/2019 Academic Year

**BBD 125: Organic Chemistry and Analysis for Biomedical Technology**

## COURSE OUTLINE

**Programme:** Diploma in Medical Laboratory Technology; Diploma in Medical Biotechnology

**Year of Study:** First Year; **Trimester:** Second Trimester

**BBD 125: Organic Chemistry and Analysis for Biomedical Technology**

### Course purpose

This is an introductory course to the cellular environment and the chemistry of organic molecules and biochemistry of cells, and it aims to provide students with an understanding of the relationship between structure and major classes of biopolymers by considering the interactions that stabilize biological macromolecules and the maintenance of constant pH within cells and organisms. The role of functional groups in biological molecules of biomedical importance and common reactions in metabolism is examined and also the concepts of ionization and pH is introduced and reinforced.

### Learning outcomes

- Describe functional groups of various classes of biomolecules and their significance for chemical properties.
- Describe the structure and properties of amino acids, proteins, carbohydrates and lipids
- Explain bond formation in biomolecules
- Explain the common reactions found in metabolic systems e.g. oxidation-reduction, bond formation and bond breaking events and knowledge of the role of water
- Explain the role of equilibrium and kinetic processes in biology and describe the process of catalysis
- Explain the importance of water as part of the cellular environment
- Describe how various molecules of life and how they interact to maintain constant the internal environment.
- Describe the chemicals test for the various biomolecules.
- Apply relevant knowledge and techniques in the chemical analysis/ assay of biomolecules of biomedical importance.

### COURSE CONTENT AND SCHEDULE

**WEEK1: Introduction:** Water, Cellular environment, pH concept, acids and bases, buffers and their physiological Physiologic importance.

**WEEK2: Amino acids:** Structure and reactions, Formation of peptides

**WEEK3: Proteins:** Peptide bonds, sequence determination, polypeptides, functions of proteins

**WEEK4: CONTINUOUS ASSESSMENT TEST (CAT) 1**

**WEEK5: Proteins c'nt:** CC- helix structure of fibrous and globular proteins, Categories of protein structure; primary, Secondary, tertiary, quaternary bonds.

**WEEK6: Carbohydrates:** Basic structure, classification, Monosaccharide, Disaccharides, Polysaccharides,

**WEEK7: Carbohydrates c'nt:** Glycosidic bonds, Stereoisomerism, Reducing sugars, Analysis of carbohydrates

**WEEK8: Lipids:** General structure, Classification: simple, compound, derived, fats and oils: physical and chemical Properties, quantitative tests

**WEEK9: CONTINUOUS ASSESSMENT TEST (CAT) 2**

**WEEK10: Basic Metabolism:** Basic concepts, Metabolic energy Equilibra, Keq for an isolated reaction, Dissociation pH & pKa with reference to carboxylic acids, PI, variation of charged species with pH.

**WEEK11: Buffering:** Bioenergetics, descriptive treatment of  $\Delta H$  and  $\Delta S$ ,  $\Delta G$ , 2<sup>nd</sup> law of thermodynamics.  
**WEEK12: Stereochemistry:** Chirality, enantiomers, Aromatic compounds-structure, nomenclature, reactivity.  
**WEEK13: END OF TRIMESTER 1 EXAMINATIONS (ETE1)**  
**WEEK14: END OF TRIMESTER 1 EXAMINATIONS (ETE1)**

### TEACHING AND LEARNING STRATEGIES

Lectures, discussions

### ASSESSMENT OF LEARNING

Continuous Assessment Tests (Practical and written)	40% of the total trimester mark
End of Trimester Examination (ETE)	60% of the total trimester mark
<b>Total Mark</b>	<b>100%</b>

### REFERENCES

#### *Main Reference*

1. Fundamental of General, Organic and Biological Chemistry (Fifth Edition) by J.R. Holum. Publisher : John Wiley & Sons
2. Biochemistry by Voet & Voet. Publisher : Wiley
3. Biochemistry (Second Edition) by D. Voet & J.G. Voet

#### **Other References**

4. Biological Molecules by L.A. Smith and G.J. Wood. Publisher: Chapman & Hall
5. Life Chemistry and Molecular Biology by Wood, Smith and Pickering. Publisher: Portland Press
6. Fundamentals of Biochemistry (5<sup>th</sup> Edition) by J. L. Jain. S. chand and company ltd

### APPROVAL

Prepared by	.....	.....	.....
	Lecturer	Sign	Date
Issued by	.....	.....	.....
	Programme Leader	Sign	Date
Approved	.....	.....	.....
	Chair of Department	Sign	Date