

DISCIPLINE SPECIFIC CORE COURSE -8 – :
Biochemistry: Metabolic Processes
Zoo-DSC-8

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Biochemistry: Metabolic Processes Zoo-DSC-8	04	02	Nil	02	Passed 12 th Class	NIL

Learning Objectives

The learning objectives of this course are as follows:

- To provide fundamental and precise knowledge of the metabolic processes that play a crucial role in all processes of life and the development of diseases.
- To apprise the students of the various functions of the molecules like providing structural integrity to the tissue-engineered constructs.
- Through this course, the students would be able to understand myriads of health, potential treatments of diseases and solve several industrial problems
- The enzymatic study would enable them to understand the various metabolic pathways and physiological reactions.

Learning Outcomes

By studying this course, students will be able to

- Interpret the structure-functional relationships of carbohydrates, proteins, lipids and nucleic acids.
- Understand the clinical knowledge and importance of antioxidants.
- Understand the process of biological oxidation crucial to generation of energy for a living cell.
- Appreciate the action of various types of enzymes under variety of conditions.

Syllabus of DSC-8

UNIT- 1: Carbohydrate Metabolism

9 hrs

Glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis.

UNIT- 2: Lipid Metabolism

7 hrs

β -oxidation and omega-oxidation of saturated fatty acids with even number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis.

UNIT- 3: Protein Metabolism

4 hrs

Catabolism of amino acids: Transamination, Deamination, Urea cycle.

UNIT- 4: Oxidative Phosphorylation

7 hrs

Redox systems; review of mitochondrial respiratory chain: electron carriers, sites of ATP production, Oxidative phosphorylation; Chemiosmotic hypothesis, mitochondrial shuttle system.

UNIT- 5: Liver as a Major Metabolic Hub

3 hrs

Inter-connection of glucose-6-phosphate, pyruvate and acetyl-CoA; fates of amino acids, fatty acids and glucose in liver cells; cascade of metabolic events in fasting and starvation.

Practical

60 hrs

(Laboratory periods: 15 classes of 4 hours each)

1. Estimation of total protein in given solutions by Lowry's method.
2. Detection of SGOT and SGPT in serum/ tissue.
3. Estimation of GST and GSH in serum/ tissue.
4. To study the enzymatic activity of Lipase.
5. Study of biological oxidation (SDH) [goat liver].
6. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.
7. Dry Lab: To trace the labelled 'C' atoms of Acetyl-CoA till they evolve as CO₂ in the TCA cycle through models.

Essential/recommended readings

3. Nelson, D.L., Cox, M.M. (2017). Lehninger: Principles of Biochemistry (7th ed.). New York, WH: Freeman Company.
4. Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009). Harper's Illustrated Biochemistry. XXVIII Edition, International Edition, The McGraw- Hill Companies Inc.

Suggestive readings

1. Stryer, L., Berg, J., Tymoczko, J., Gatto, G. (2019). Biochemistry (9th ed.), New York, WH: Freeman.
2. Voet, D., Voet, J. G. (2013). Biochemistry (4th ed.). New Jersey, John Wiley & Sons Asia Pvt. Ltd.