SEMESTER-IV

Category I

(SRI VENKATESWARA COLLEGE)

(BSc Honors in Biological Science in three years)

DISCIPLINE SPECIFIC CORE COURSE – 10:

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		
Metabolism and Integration (BS-DSC-401)	4	2		2	Class XII Pass with Biology and chemistry	Should have a background in chemistry of biomolecules and enzymes

Learning Objectives

The Learning Objectives of this course are as follows:

- To introduce the students to the basic concepts of metabolism occurring within a living organism.
- to provide the students an understanding of the major metabolic pathway and their regulation.
- To provide knowledge about the possible integration between various metabolic pathways.
- To enable them to corelate adaptations in metabolic pathways and physiological as well as pathophysiological states.

Learning outcomes

On successful completion of the course, students will be able to:

- Outline the pathways involved in catabolism and biosynthesis of glucose.
- Understand the biosynthesis and degradation of glycogen
- Comprehend the catabolism and biosynthesis of fatty acids
- Understand the biosynthesis and degradation of amino acids and nucleotides
- Understand the integration of metabolism

SYLLABUS FOR DSC-10

CREDITS:2 **TOTAL HOURS: 30 hrs**

UNIT I: Carbohydrate metabolism **No. of hours: 14**

Principles of metabolism, anabolism, catabolism, standard free energy change, metabolic roles of ATP, phosphoryl group transfer, nucleotidyl group transfer. Glycolysis as a universal pathway, anaerobic glycolysis, fermentation, gluconeogenesis, reciprocal regulation of glycolysis and gluconeogenesis, Glycogenesis and glycogenolysis and overview of regulation, Pentose phosphate pathway, Pyruvate dehydrogenase complex, oxidation of acetyl CoA. TCA cycle, amphibolic role, ATP calculation, Glycerol-3-phosphate and malate-aspartate shuttle.

UNIT II: Lipid metabolism **No. of hours: 8**

Lipid metabolism - Mobilization of triglycerides, metabolism of glycerol, β-oxidation of saturated, monounsaturated and poly-unsaturated fatty acids, even and odd chain fatty acids. Ketogenesis and significance, Biosynthesis of C-16 palmitic acid, brief overview of cholesterol metabolism and lipoprotein cycle.

UNIT III: Amino acid and nucleotide metabolism **No. of hours: 5**

Transamination and deamination, Urea cycle, glucogenic and ketogenic amino acids, secondary metabolites from amino acids. Nucleotide Metabolism- De novo and Salvage pathways and degradation. Inborn errors of metabolism - Phenylketonuria, Alkaptonuria, Maple syrup, Lesch Nyhan syndrome.

UNIT IV: Integration of metabolism **No. of hours: 3**

Starve feed cycle: Metabolic shifts in absorptive, post absorptive, fasting and starvation states

PRACTICALS

CREDITS: 2 **TOTAL HOURS: 60**

1. Estimation of Random Blood Glucose – Glucose Oxidase- Peroxidase method
2. Estimation of Oral Glucose tolerance test (O-GTT).
3. Determination of Lipid Profile: Total Cholesterol (TC), High Density Lipoproteins (HDL) and Triglycerides (TAG).
4. Estimation of SGPT and SGOT in serum/plasma sample.
5. Estimation of creatinine in serum/plasma sample.
6. Estimation of Blood Urea.
7. Estimation of serum uric acid

Essential Readings

1. Nelson, D.L. and Cox, M.M. (2017). Lehninger: Principles of Biochemistry (7th ed.). W.H. Freeman & Company (New York), ISBN:13: 9781464126116 / ISBN:10-1464126119.
2. Berg, J.M., Tymoczko, J.L., Stryer L., (2012) Biochemistry 7th ed., W.H. Freeman and Company (New York); ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4.
3. Campbell, M.K., Farrel, S.O. (2012) Biochemistry7th ed, S.O. Brooks/Cole, Cengage Learning (Boston); ISBN: 13:978-1-111-42564-7 ISBN:10:1-4292-2936-5.
4. An Introduction to Practical Biochemistry (1998) 3rd ed., Plummer D. T., Tata McGraw Hill Education Pvt. Ltd. (New Delhi), ISBN:13: 978-0-07-099487-4 / ISBN:10:0-07-099487-0

Suggested Readings

1. Principles of Biochemistry (2013) 4th ed., Voet, Donald,Voet, Judith &Pratt, charlotte. Wiley & Sons, Inc. (New Jersey), ISBN:978-1-11809244-6.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, Universityof Delhi, from time to time.