CLUSTER UNIVERSITY SRINAGAR

SYLLABUS (FYUP UNDER NEP 2020)

Offered By Department Of BIO-TECHNOLOGY

Semester 2nd (Major Course)

Course Title: Cellular Metabolism

Course Code: UGBTC22J201 **Max. Marks 100**
Credits: 4 (Theory: 3, Practical: 1) **Theory External: 60; Min Marks: 24**
Contact Hrs: 75 (Theory 45, Practical 30) **Theory Internal (Continuous Assessment): 15 Marks, Min Marks: 06**
Practical Experimental Basis= 15, Min. Marks: 06
Practical Experimental (Continuous assessment) = 10, Min. Marks: 04

Learning Objective:
To make students understand how coordinated cellular activity involving different metabolic pathways cooperate to obtain chemical energy.

Learning Outcomes:
On completion of the course the students will be able to understand:

- Metabolism and metabolic pathways of carbohydrates fats proteins and nucleotides.
- Interaction between various metabolic pathways and their regulation.
- Importance of metabolic pathways in health and disease
- Quantitative determination of biomolecules by different methods.

Unit-I **(15 Hrs)**

Carbohydrate Metabolism

Introduction to metabolism, 'ATP as universal energy transducer', reducing power of the cell (NADH/NADPH/FADH2)

- 'Glycolysis, Fate of pyruvate under aerobic and anaerobic conditions'
- TCA cycle,
- Glycogenesis and Glycogenolysis,
- Gluconeogenesis,
- Regulation of carbohydrate metabolism,
- ETC & oxidative phosphorylation,
- Inhibitors & uncouplers of oxidative phosphorylation & ETC.

Unit –II **(15 Hrs)**

Lipid Metabolism

- Transport of cholesterol and Triacylglycerols.
- Transport of Fatty Acids across the Mitochondrial Membrane.
- 'Beta Oxidation of Saturated and Unsaturated Fatty Acids.
- Biosynthesis of Fatty Acids and Triglycerides.
- Regulation of fatty acid metabolism

Unit-III **(15 Hrs)**

Amino Acid &Nucleotide Metabolism

- Amino Acid Degradation- Transamination and Oxidative Deamination.
- Fate of the Carbon Skeleton, 'Glucogenic and Ketogenic amino acids.
- Metabolic precursors of amino acids' and 'Essential and non-essential amino acids.
- Inborn errors of amino acid metabolism.
- Urea cycle and its regulation,
- Metabolism of Nucleotides.
- Inborn errors of nucleotide metabolism

Unit- IV

PRACTICALS **(30 Hrs)**

1. Estimation of blood glucose.
2. Isolation of cholesterol from egg yolk and its estimation.
3. Estimation of proteins by different methods
4. Isolation of lecithin and its estimation.
5. Estimation of DNA by DPA method.
6. Estimation of RNA by orcinol method.

Literature Recommended:

1. Nelson David L. and Cox Michael M. (2017).
2. Lehninger Principles of Biochemistry (7th Edn). W.H.Freeman & Co Ltd, Macmillan Publishers, United States of America.
3. Victor Rodwell, David Bender, et al. (2018). Harper's Illustrated Biochemistry (31st Edn). McGraw-Hill Education, Ahmedabad.
4. Jeremy Berg, John L. Tymoczko and Gregory J. Gatto Jr and Lubert Stryer (9th Ed.) (2019). Biochemistry. Macmillan Publishers, United States.
5. Voet, D.J., Voet, J.G., Pratt, C.W., Principles of Biochemistry, John Wiley, (2008).
6. Biochemistry 6th Edition 2021 by U Satyanarayana
7. Experimental Biochemistry by B A Ganai et al.
8. On-line Resources
9. Related review articles and research papers