**BIOCHEMISTRY-II CREDIT HOURS 2+1**

**LEARNING OUTCOMES:**

**The students will be able to**:

Demonstrate advanced knowledge and understanding about the bioenergetics, biochemical thermodynamics and integration of metabolic pathways.

**COURSE CONTENTS:**

Introduction to metabolism and basic aspects of bioenergetics and biochemical thermodynamics (endergonic and exergonic reactions); phosphoryl group transfer and ATP production; metabolism, oxidation-reduction; carbohydrate metabolism and regulation (glycolysis, glycogenolysis; gluconeogenesis; pentose phosphate pathway); citric acid cycle (reactions, energetics and control), electron transport chain, oxidative phosphorylation, shuttle mechanisms (glycerol-phosphate shunt), lipid metabolism (energy yield from fatty acid oxidation, ketone bodies, acylglycerol, compound lipids, cholesterol); photosynthesis; Calvin Cycle; metabolism of nitrogenous compounds (amino acid synthesis, catabolism, purine and pyrimidine synthesis); nucleic acid metabolism and control; urea cycle; integration of metabolism.

**PRACTICALS:**

1. Preparation of calibration curve for glucose
2. Estimation of serum glucose by using calibration curve
3. Extraction of glycogen from liver; acid and enzymatic hydrolysis of glycogen
4. Extraction and estimation of lipids from plant tissue/seed and lipid separation from different tissues; fractionation by thin layer chromatography (TLC).
5. Extraction and salting out of proteins.
6. Quantitative analysis of proteins and nucleic acids by UV spectrophotometry
7. Extraction and quantitative analysis of amino acids

**RECOMMENDED BOOKS:**

1. Voet, D., Voet, J. G. and Pratt, C. W., 2002. Fundamentals of Biochemistry; John Wiley and Sons. Inc., New York.
2. Berg, J. M., Tymoczko, J. L. and Stryer, L., 2002. Biochemistry 5th Edition. W.H. Freeman and Company, New York.
3. Devlin, T. M., 2002. Textbook of Biochemistry with Clinical Correlations 5thEdition. John Wiley and Sons. Inc., New York.
4. Zubay, G., 1995. Biochemistry 4th Edition. W. C. Brown Publishers, Inc., Oxford England.
5. Plummer, D. T., 1990. An Introduction to Practical Biochemistry 4th Edition. McGraw-Hill Book Company, London,
6. Wilson, K. and Walker, J., 1994. Practical Biochemistry: Principles and Techniques, 4thEdition. Cambridge Univ. Press, London
7. Berg, J. M., Tymoczko, J. L., Stryer, L., 2006. Biochemistry: International 6th Edition. W.H. Freeman & Co Ltd.
8. Cox, M. and Nelson, D.L., 2005. Lehninger Principles of Biochemistry 4th Edition, Palgrave MacMillan.
9. Murray, R., Granner, D., Mayes, P., and Rodwell, V., 2006. Harper's Illustrated Biochemistry 27thEdition. McGraw-Hill Education.

Denniston, S. 2006. General, Organic and Biochemistry, 5thEdition. McGraw-Hill.