

20FT002 - FOOD CHEMISTRY AND NUTRITION

L	T	P	C
3	-	2	4

L	T	P
45	15	-

WA/RA	SSH/HSB	CS	SA	S	BS
15	30	-	5	5	-

Course Description and Objectives:

This course offers the students' knowledge on chemistry of food components and their nutrition aspects, metabolic pathways, enzyme activity and mechanisms by which diet can influence health. The objective of this course is to empower the students with methods and techniques for molecular weight estimation of proteins, qualitative analysis of edible fats and oils and make nutrient profiles for balanced diet and health.

Course Outcomes:

Upon successful completion of this course student should be able to:

- Describe the major metabolic pathways involved in the metabolism of nutrients in the human body
- Analyze the roles of biomolecules in metabolic reactions and relate metabolism with human nutrition
- Understand the basis of reactivity of biologically relevant molecules and their interactions.

SKILLS:

- Separation and molecular weight estimation of proteins
- Quality analysis of edible fats and oils
- Identify and recommend micro and macro nutrient profile for balanced diet and health
- Enzyme activity measurement and determining the mechanism of the reaction

UNIT – I

Basic Concepts of Carbohydrates: Structure and properties of Mono, Di, Oligo & polysaccharides, complex carbohydrates, Confirmation of pyranose & furanose ring, glycosidic bond, Glycogen, starch & dextran; as mobilizable stores of glucose. Cellulose, glycoproteins, glycosaminoglycans & lectins; structure and function. Bioenergetics & Metabolism of Carbohydrate: Respiratory chain, Aerobic and anaerobic respiration. Glycolysis, Glucogenesis, Glycogenolysis, Gluconeogenesis, ED Pathway, Pentoses phosphate shunt & TCA cycle.

UNIT – II

Amino Acids: Amino acids - Classifications, Physico – Chemical Properties, Protein structure, folding & function, Nitrogen Cycle, Nitrogen Balance, reductive amination & transamination & Urea cycle. Synthesis of amino acids -Glutamate pathway; Serine pathway; shikimate pathway for the production of aromatic amino acids.

UNIT – III

Lipids and their Metabolism: Classifications, Structures and roles of fatty acids; fatty acid breakdown; fatty acid synthesis. Triglyceride; synthesis and metabolism and function. Lipoproteins – classification & function. Oxidative stress and antioxidants – Free radicals – definition, formation in biological systems, defense against free radicals Role of free radicals and antioxidants in health and disease.

UNIT-IV

Regulation of metabolism – Interrelationship of carbohydrate, protein and lipid metabolism, Role of Vitamins and Minerals in Metabolism, metabolic adaptation during starvation, exercise, stress and diabetes mellitus

UNIT – V

Nutrition: Functions and energy of foods, basal energy metabolism, dietary allowances and standards for different age groups. Assessment of nutritional quality of foods, mineral and vitamins as functional constituents in human metabolism and deficiency diseases associated. Effect of processing on nutritive value of food. Vitamins and minerals: Classification, structure and role of vitamins in food. Aroma substances.

TEXTBOOKS:

1. Lehninger A.L, Nelson O.'L, M.M. Cox, "Principles of Biochemistry" 3rd ed., CBS Publications, 2005.
2. J.L. Jain, "Fundamentals of Biochemistry ", 7th ed., S.Chand Publishers, 2009.
3. Food: Facts and Principles-N. Shakuntala Manay, Shadksharawamis.

REFERENC EBOOKS:

1. Voet D, Voet J. G, "Biochemistry", 3rd ed., John C Wiley and Sons, 1994.
2. L. Stryer, J.M. Berg, JLTymockzo, "Biochemistry" 5th ed., WH Freeman & Co., 2002.
3. K. Mathews, K.E. Van Holde, Kevin G Ahern, "Biochemistry", 3rd ed., Pearson education, 2005.

Food Chemistry and Nutrition Lab

1. Determination of boiling point and freezing point of water
2. Estimation of polyphenols
3. Determination of natural pigments in foods
4. Determination of refractive index of fats
5. Fat acidity in foods-flour
6. Antioxidant Assay
7. Mineral Profiling
8. Fatty acid Profiling
9. Phenolic acid profiling
10. Estimation of Phytic Acid