

Syllabus template M.Sc. FOOD SCIENCE & NUTRITION SEMESTER I

Semester: I				
Course : M.Sc. in Food Science and Nutrition				
Paper Title:Nutritional Biochemistry and Instrumentation				
Paper code: M2C4FN260121T			Credits:6	
Hours/week : 6 hours/week				
Category: Core/MDC/SEC/VAC : Core				
Theory / Practical / Composite : Theory				
No of Modules : 2				
Course Overview: Module I- It introduces students to development of nutrition biochemistry and contemporary interests in nutritional biochemistry. Complete detailed knowledgeof transport and metabolism of carbohydrates, proteins, lipids across various cellsare explained. In addition,disorders of metabolism andassessment of status, Interaction with other nutrients, Pharmacological and therapeutic effects will be dealt. The course also deals with basics of instrumentation and various types of techniques that help in assessment in food industries.				
Course Outcome:				
1. Understand and explain the biochemistry knowledge related to food and nutrition				
2. Evaluate the mechanisms adopted by the human body for regulation of metabolic pathways.				
3. Remember the principle and use of Instruments used for biochemical analysis.				
4. Analyse the different regulation of metabolism				
5. Apply the concepts of different types ofbiochemical pathways				
6. Analyse the basic ideas of bioinstrumentations				
Prerequisites: <i>Basic knowledge about any prior course</i>				
SYLLABUS				
UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL

Module 1- Nutritional Biochemistry	1. Introduction to Nutritional biochemistry – Meaning and importance, Development of nutrition biochemistry and contemporary interests in nutritional biochemistry. 2. Carbohydrates – Classification, Properties, digestion and absorption. Intestinal transport of carbohydrates, Transport of glucose across various cells, Cellular metabolism of carbohydrates Glycogen metabolism Regulation of carbohydrate metabolism at substrate level, enzyme level, hormonal level and organ level. Disorders of carbohydrate metabolism. Definition, classification, structure and properties of glycoproteins and proteoglycans. 3. Proteins – Structure, classification and properties. Metabolism of amino acids- biosynthesis and catabolism - energy, glucose and ketone bodies, protein amino acids, non-protein amino acids (including urea cycle, transamination, one-carbon metabolism), Creatine and creatinine, Plasma proteins – Nature, properties and functions, Biologically active peptides, polypeptides and transport proteins, Inborn errors of amino acid metabolism. 4. Lipid–Structure, Classification and properties: Digestion and absorption. Intestinal transport of lipids, Cellular uptake and metabolism of lipids (beta-oxidation, de novo synthesis of fatty acids, Synthesis and	2 4 4 4	CO1,CO2,CO3	K2,K5,K1,K4
---	---	-------------------------------------	--------------------	--------------------

	breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol). Lipoprotein metabolism, VLDL and LDL ('Forward' Cholesterol transport) VLDL and LDL (Endogenous TAG transport), HDL ('Reverse' Cholesterol transport), Regulation of lipid metabolism at substrate level, enzyme level, hormonal level and organ level, Disorders of lipid metabolism, Dyslipidaemias, Lipid storage diseases. 5. Vitamins and Minerals – Historical background, Structure and chemistry, Food sources, Metabolism (digestion, absorption, transport, storage, and elimination), Bioavailability and factors affecting bioavailability. Biochemical and physiological functions. Assessment of status, Interaction with other nutrients, Pharmacological and therapeutic effects, Requirements, methods for estimating requirements and recommended daily allowance. Deficiency, overload, and toxicity. 6. Enzymes – Classification, mechanisms of enzyme action, factors affecting enzyme activity and their role. Enzyme specificity, regulation of enzyme activity and synthesis. Enzymes in clinical diagnosis. Detoxification in the body metabolism of xenobiotics. 7. Antioxidants – Definition, free radicals, oxygen free radicals, natural and diet derived			
--	--	--	--	--

1/II Module 2- Instrumentation	antioxidants. 8. Nucleic acid – Diseases related to nucleic acid metabolism. 1. Basic principles of Absorption spectroscopy. Basics of UV-Vis spectroscopy, Colorimetry, Atomic absorption spectroscopy 2. Basic principle of chromatography. Basics principle of chromatography: Partition chromatography, Size-exclusion, Affinity chromatography, HPLC. 3. Basic principles of electrophoresis:Electrophoresis– Agarose, Polyacrylamide gel electrophoresis and application. 4. pH meter, Radioisotopes and their application.	8	CO1,CO2,CO4,CO5,CO6	K2,K4,K5,K6
Text Books				
1. Conn and Stumph, Outlines of Biochemistry. 2. Lehninger, Principles of Biochemistry, by 4th Ed. By Nelson D.L. and Cox. M.M. 3. Murray R.K., Grammer, D.K., Mayer P.A., Rodwell V.W., Harpers Biochemistry, Mc. Graw Hill. 4. West. E.S., Todal, W.R., Mason H.S. and Van Brygen J.T., Text Book of Biochemistry				

5. Biophysical Chemistry-Principles and Techniques by Upadhyay, Upadhyay and Nath
6. Principles and Techniques in Biophysics N. Arumugam, V. Kumaresan (Saras Publication)
7. Fundamentals of Bioanalytical techniques & Instrumentation by Sabari ghosal, Anupama Sharma Avasthi 2nd edition (PHI Learning Pvt Ltd)
8. Physical Biochemistry: Applications to Biochemistry and Molecular Biology by David Freifelder
9. Biochemistry by Jain and Jain.

Suggested readings

1.

2.

3.

Web Resources

1.

2.

Evaluation Theory CIA: 30 Semester Exam: 70

Paper Structure for Theory Semester Exam Module :

Full marks 70

Module 1: 35 marks

SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 1 MARK) = $5 \times 1 = 5$

LONG QUESTION: FROM 5 QTNS ANSWER 3 (EACH 10 MARKS) = $3 \times 10 = 30$

Module 2: 35 marks

SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 1 MARK) = $5 \times 1 = 5$

LONG QUESTION: FROM 5 QTNS ANSWER 3 (EACH 10 MARKS) = $3 \times 10 = 30$

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	Understand and explain the biochemistry knowledge related to food and nutrition	K2
CO2	Evaluate the mechanisms adopted by the human body for regulation of metabolic pathways.	K5
CO3	Remember the principle and use of Instruments used for biochemical analysis.	K1
CO4	Analyse the different regulation of metabolism	K4
CO5	Apply the concepts of different types of biochemical pathways	K3
CO6	Analyse the basic ideas of bioinstrumentations	K4
CO7	To study and demonstrate chromatography and other techniques	K4