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

Semester: I	
Course : Food Science & Nutrition	
Paper Title: Applied Physiology & Principles of Human health	
Paper code: MFSN4101	**Credits: 6**
Hours/week : 6	
Category: Core/MDC/SEC/VAC : CORE (Major)	
Theory / Practical / Composite : Theory	
No of Modules : 2 Modules	

Course Overview: This course provides a comprehensive overview of the normal functioning of various organ systems of the body and their interactions. It also comprehends the pathophysiology of commonly occurring human diseases. The role of various nutrients and their physiological contributions in human health will be enumerated in detailed.

Course Outcome:

1. Remember the current knowledge about the functional organization of the human body.

2. Understand the normal functioning of various organ systems of the body and their interactions.

3. Apply the knowledge to learn the pathophysiology of commonly occurring diseases.

4. Analyse the process of energy production of the nutrients to be supplied to the human body.

5. Evaluate the role of various nutrients and their role in human health.

6. Create and develop new approaches to diagnose human physiological disorders which are easier and less expensive.

Prerequisites: ***Basic knowledge about any prior course***

SYLLABUS

UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I. / I Module I- Basic Human Physiology	**Cell structure and function** General cell structure. Structure and functions of the organelles, cell membrane, review of structure and function of tissue, organs and systems.	**5**	**CO1,CO4,CO5**	**K1,K4,K5**
II. /I	**Gastrointestinal Physiology** i) Functions of Stomach, Liver, Pancreas and Gall Bladder ii) Composition, function and regulation of: a) Salivary juice b) Gastric juice	**6**	**CO1,CO3,CO4, CO5**	**K1,K3,K4,K5**

	c) Pancreatic juice d) Bile juice e) Intestinal juice f) GI hormones g) Pathophysiological overview of some common diseases in relation to Gastrointestinal Tract (Peptic ulcer/GERD, Cholelithiasis, Portal Hypertension, Fatty liver and Liver Cirrhosis.			
III. /I	**Excretory Physiology** a) Urine formation b) Renal function tests c) Acid Base balance d) Pathophysiology of Renal Stones, Urinary Tract Infection, Glomerulonephritis	7	**CO1,CO3,CO4, CO6**	**K1,K3,K4,K6**
IV. /I	**Reproductive Physiology** a) Physiology of b) Menstruation and Menopause c) Physiology of Ageing d) Physiology of Pregnancy, Lactation Pathophysiology of PCOD and Infertility	5	**CO2,CO3,CO4, CO5**	**K2,K3,K4,K5**
V. /II Module II- Principles of Physiology and Health	**Blood and Cardio-Thoracic Physiology** a) Blood and Plasma Protein - Composition and Function b) Blood formation and factors controlling Erythropoiesis. c) Pathophysiology of Anaemia and Jaundice d) Cardiac cycle, Cardiac output, Heart sounds e) Heart structure, Heart rate & regulation f) Blood pressure, Hypertension g) Coronary Artery Disease h) Haemorrhage; Compensatory changes after haemorrhage	**7**	**CO2,CO3,CO4, CO5,CO6**	**K2,K3,K4,K5, K6**
VI. /II	**Respiratory system** a) Structure and function of Lungs b) Pathophysiology c) Transport and exchange of gases d) Major Respiratory diseases	5	**CO1,CO2,CO3, CO5,CO6**	**K1,K2,K3,K5, K6**

VII. /II	**Neuro Physiology** a) Review of structure and function of neuron, nerve, conduction of nerve impulse, synapse, and neurotransmitters. b) General organization of the nervous system, protection structure and function of brain and spinal cord. c) Cerebrospinal fluid.	5	**CO1,CO3,CO5, CO6**	**K1,K3,K5,K6**
VIII. /II	**Endocrine Physiology** a) Structure, function and role of sensory organs (skin, eyes, ears, nose and tongue) in perception of stimuli. b) Effects of Pituitary, Thyroid, Parathyroid, Adrenal and Pancreatic hormones c) Pathophysiology of Diabetes Mellitus/Metabolic Syndrome, Hashimoto's disease. Tetany and Cushing Syndrome d) Basic/ General treatment overview.	6	**CO1,CO2,CO3, CO5**	**K1,K2,K3,K5**
IX. /II	**Current understanding and modern approaches to the human diseases like** 1. Metabolic syndrome 2. Developmental disorders 3. Inherited disorders 4. Cancer chemotherapy	4	**CO1,CO2,CO3, CO6**	**K1,K2,K3,K6**

Text Books

1. Visual Anatomy & Physiology by Martini, Ober &Nath (published by Pearson)
2. Griffins, M. Introduction to Human Physiology, Mac Millan and Co. 1974.
3. Green, J.H. An introduction to human physiology, Oxfords University Press 1972.

Suggested readings

1. Kale, C.A. and Nail, E Samson Wright's Applied Physiology, Oxford University press, 1994.
Web Resources
1.
2.
Evaluation Theory CIA: 20 Semester Exam: 80
Paper Structure for Theory Semester Exam Module : Full marks 80 **Module 1: 40 marks** SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5x2=10 LONG QUESTION: FROM 8 QTNS ANSWER 6 (EACH 5 MARKS)= 6x5=30 **Module 2: 40 marks** SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5x2=10 LONG QUESTION: FROM 8 QTNS ANSWER 6 (EACH 5 MARKS)= 6x5=30

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	**Remember** the cell structure, function, human anatomy and physiology.	K1
CO2	**Understand** the basis of physiology for maintenance of good human health.	K2
CO3	**Apply** the knowledge of human body, physiology and metabolism.	K3
CO4	**Analyse** the role of various anatomical structures in healthy human body.	K4
CO5	**Evaluate** the role of all biological systems and their interactions.	K5
CO6	**Create** and develop modern approaches to study the Metabolic syndrome, Developmental disorders & Inherited disorders.	K6

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: MFSN 4102	**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 knowledge of transport and metabolism of carbohydrates, proteins, lipids across various cells are explained. In addition, disorders of metabolism and assessment 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 of biochemical pathways
6. **Analyse** the basic ideas of bioinstrumentations

Prerequisites: ***Basic knowledge about any prior course***

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 breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol). Lipoprotein	**2** **4** **4** **4**	**CO1,CO2,CO3**	**K2,K5,K1,K4**

	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 antioxidants. 8. **Nucleic acid** – Diseases related to nucleic acid metabolism.	**4** **4** **3**		

1/II **Module 2-** **Instrumentation**	**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, AnupamaSharma Avasthi 2nd edition (PHI Learning Pvt Ltd) 8. Physical Biochemistry:Applications to Biochemistry and Molecular Biologyby David Freifelder 9. Biochemistry by Jain and Jain. .
Suggested readings
1.
2.
3.
Web Resources
1.
2.
Evaluation Theory: 100 Marks (80 End sem + 20 CIA)
Paper Structure for Theory Semester Exam Module : **Module 1: 40 marks** SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5x2=10 LONG QUESTION: FROM 8 QTNS ANSWER 6 (EACH 5 MARKS)= 6x5=30 **Module 2: 40 marks** SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5x2=10 LONG QUESTION: FROM 8 QTNS ANSWER 6 (EACH 5 MARKS)= 6x5=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

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

Semester: I	
Course : Food Science & Nutrition	
Paper Title: Human Nutrition & Community Nutrition	
Paper code: MFSN4103	**Credits: 6**
Hours/week : 6	
Category: Core/MDC/SEC/VAC : CORE (Major)	
Theory / Practical / Composite : Theory	
No of Modules : 2 Modules	

Course Overview: This course tries to equip students with the knowledge and skills to assess nutritional status, prevent diet-related illnesses, and promote healthy eating habits at both individual and population levels. This course emphasizes to bridge the gap between scientific nutritional knowledge and practical application within communities.

Course Outcome:

1. Remember the concept of nutrients for the functional organization of the human body.

2. Understand the historical perspective of nutrient requirements.

3. Apply the knowledge of nutrients for balanced and nutrient rich healthy diet for different population groups.

4. Analyse the importance of nutrition immunity interactions and their implications.

5. Evaluate critically the methodology and derivation of requirements for specific micro and macronutrients.

6. Create and develop new approaches & various measures for enhancing nutritional quality of diets.

Prerequisites: ***Basic knowledge about any prior course***

SYLLABUS

UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I. / I **Module I – Human Nutrition**	**Human Nutrient Requirements–Macronutrients** a) Historical perspective of nutrient requirements. b) Critical evaluation of sensitive methods and derivations of requirements and recommended dietary allowances of macronutrients for all age groups: -Energy, -Carbohydrates and dietary fibre, -Proteins and amino acids,	**6**	**CO1,CO2,CO4**	**K1,K2,K4**

		-Lipids, -Water c) Critical evaluation of national and international nutrient allowances; factors affecting the requirements.			
II.	**/I**	**Human Nutrient Requirements-Micronutrients** a) Critical evaluation of sensitive methods and derivations of requirements and recommended dietary allowances of micronutrients for all age groups: - Water soluble vitamins - Fat soluble vitamins - Minerals and trace elements b) Critical evaluation of national and international nutrient allowances; factors affecting the requirements, dietary guidelines for Indians.	**6**	**CO1,CO3,CO5,**	**K1,K3,K5**
III.	**/I**	**Nutrition in Special Conditions** a) Extreme temperatures- low and high b) High altitude - c) Space nutrition and food systems - d) Sports nutrition –	**5**	**CO1,CO3,CO5**	**K1,K3,K5**
IV.	**/I**	**Interactions of Nutrition, Immunity and Infection and emerging concepts** a) Host defense mechanisms and nutrients essential in the development of immune system. b) Effect of Infections on the nutritional status of an individual. c) Nutrient deficiencies and excesses affecting the immuno-competence and susceptibility to infections. d) Ongoing nutrition transition and its implications. e) Changing trends in life style patterns in population groups and their implications. f) Nutrigenomics, nutraceuticals, bioactive compounds.	6	**CO2,CO3,CO4**	**K2,K3,K4**
V.	**/I**	**Improving Nutritional Quality of Diets** a) Ways of enhancing nutritional quality of diets.	**7**	**CO2,CO5,CO6**	**K2,K5,K6**

	b) Assessment of protein quality- By various indices and their interpretation c) Dietary diversification. d) Bioavailability of nutrients. e) Nutrient losses during cooking and processing			
VI. /II **Module II- Community Nutrition**	**Introduction** to concept of community, rural and urban communities, community health, healthcare, community nutritional and its future projections.	5	**CO1,CO2,CO3, CO4**	**K1,K2,K3 ,K4**
VII. /II	**Protein Energy malnutrition** – etiology, prevalence, causes, prevention and control. **Other Major nutritional problems** – Macro nutrient deficiencies and micronutrient deficiencies, etiology, symptoms, prevention and control.	6	**CO3,CO4,CO6**	**K3,K4,K6**
VIII. /II	**Assessment of nutritional status** – meaning need, objectives, and techniques. Primary Methods: Anthropometric measurement, Weight, Height skin fold, Head circumference MUAC. Chest circumference, use of growth chart, Biochemical assessment, clinical assessment, Diet surveys. **Secondary Methods**: Vital statistics, Mortality rates, survival rate, morbidity rate, fertility rate.	6	**CO1,CO2,CO3, CO5**	**K1,K2,K3 ,K5**
IX. /II	**Nutrition Monitoring** and Nutrition surveillance objectives and components of nutrition monitoring and current programmes. Nutrition Surveillance – Objectives, Uses, infrastructure and computerization	5	**CO2,CO5,CO6**	**K2,K5,K6**

	Nutrition Education – Need and scope, importance, theories, Nutrition education programmes – formulations, Implementation and Evaluation. **Nutrition Programmes** in developing and developed countries – Role of various agencies – National, International and voluntary. **National & International Agencies**: Introduction, mission, vision, objectives, functions, policies of CFTRI,NIN,FAO, NIPCCD, CARE,WHO, UNICEF,ICMR, ICAR, CSIR.			

Text Books

1. Mayer, J., Human Nutrition, Charles, C. Thomas, spring field.
2. Michael, J. Gibney, Barrie, M. Margetis, John, M. Kearney. Lenore Arab. Public Health Nutrition. Blackwell science, Blackwell Publishing Company (2004).
3. Textbook of Food Science and Nutrition by Sunita Roy Chowdhury and BaniTamberAeri,

Suggested readings

1. Exercise physiology, fitness and sports physiology by B. Srilakshmi, V. Suganthi, C. kalaivani Ashok, 2016
2. A Laboratory Manual of Food Analysis by Shalini Sehgal, Year – 2016

Web Resources

1.

2.

Evaluation Theory CIA: 20 Semester Exam: 80

Paper Structure for Theory Semester Exam Module :
Full marks 80
Module 1: 40 marks
SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5x2=10
LONG QUESTION: FROM 8 QTNS ANSWER 6 (EACH 5 MARKS)= 6x5=30

Module 2: 40 marks
SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5x2=10
LONG QUESTION: FROM 8 QTNS ANSWER 6 (EACH 5 MARKS)= 6x5=30

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	**Remember** the nutrient requirements of the human body.	K1

CO2	**Understand** the historical perspective of nutrient requirements.	K2
CO3	**Apply** the knowledge of nutrients to stay updated with emerging concepts in nutrition.	K3
CO4	**Analyse** and learn various measures for enhancing nutritional quality of diets.	K4
CO5	**Evaluate** the methodology and derivation of requirements for specific micro & macronutrients.	K5
CO6	**Create** and develop Nutrition Monitoring and Nutrition surveillance methods.	K6

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

Semester: I	
Course : Food Science & Nutrition	
Paper Title: Human Health & Nutritional Biochemistry	
Paper code: MFSN4151	**Credits: 6**
Hours/week : 12	
Category: Core/MDC/SEC/VAC : CORE (Major)	
Theory / Practical / Composite : Practical	
No of Modules : No	

Course Overview: This course make the students learn how to analyse the biochemical components of the different food items. Here they learn to perform various qualitative and quantitative analysis with knowledge of different techniques like chromatography, spectrophotometry etc. Also different human body composition tests are also included as part of human physiology. Survey of Nutritional status in different communities is also done as part of the course.

Course Outcome:

1. Remember the composition of nutrients required for the human body.

2. Understand and learn preparation of different kinds of buffers.

3. Apply the knowledge of composition of nutrients for balanced and nutrient rich healthy diet for population groups.

4. Analyse the micro and macronutrients in various food items and their implications.

5. Evaluate critically the tests required for proper health check ups.

6. Create new approaches & various measures for enhancing and analysing nutritional quality of diets.

Prerequisites: ***Basic knowledge about any prior course***

SYLLABUS

UNIT/Module	CONTENT	HOURS or NUMBER OF CLASSES	CO Mapping	COGNITIVE LEVEL
I.	1. Buffers and pH measurement i. Preparation of acidic buffers. ii. Preparation of basic buffer 2. Spectrophotometry i. Estimation of Phosphorous ii. Estimation of Proteins. iii. Estimation of Iron. iv. Estimation of Cholesterol. v. Determination of blood glucose–oxidase method.	**12 /week**	**CO1,CO2,CO3, CO4,CO5,CO6**	**K1,K2,K3 K4,K5,K6**

	vi. Estimation of Vitamin-C. vii. Estimation of calcium. 3. Qualitative tests for carbohydrates. 4. Determination of the saponification number and Iodine number of fats. 5. Chromatographic Techniques - Separation of amino acids, sugars and lipids. 6. Energy expenditure – i. Introduction to energy expenditure. ii. Physical activity level. iii. Use of wearable devices iv. Total energy expenditure v. Measurement of Oxygen saturation levels vi. Pulse rate measurements vii. Energy balance & Weight management: Body height, skin fold thickness, height, body composition. 7. Assessment of Protein Quality - Calculation of Net Dietary protein Cal% of diets and dishes. 8. Planning nutritive recipies.. 9. Assessment of Nutritional status 10. Identification of nutritional problems among vulnerable groups. 11. Visit to Aganwadi, primary health center and ICDS** centre.			

Text Books
1. A Laboratory Manual of Food Analysis by Shalini Sehgal, Year – 2016
2. Nutritional Biochemistry by Homer Wells.
3. Food Science: The Biochemistry of Food & Nutrition, Lab Manual (Glencoe/McGraw-Hill)
4.
Suggested readings
1. A Laboratory Manual of Food Analysis by Shalini Sehgal, Year – 2016
Web Resources

1.
2.
Evaluation Theory CIA: 20 Semester Exam: 80
Paper Structure for Practical Semester Exam Module : **Practical : 100 Marks (20 End Sem + 80 CIA)** **Question Paper format: Practical end semester** **Viva voce – 20 marks (End Sem)**

Course outcomes (COs) and Cognitive Level Mapping

COs	CO Description	Cognitive levels
CO1	**Remember** the general biochemical tests for analysis of food stuffs.	K1
CO2	**Understand** the preparation of buffers.	K2
CO3	**Apply** the knowledge of chemistry on biochemical analysis.	K3
CO4	**Analyse** the role of techniques like chromatography and spectrophotometry in analysis.	K4
CO5	**Evaluate** the role of micro and macronutrients present in food items in community.	K5
CO6	**Create** and develop analytical methods to analyse the biochemical parameters of food.	K6