Course – M.Sc. in Food Science and Nutrition

Semester	1
Paper Number	MFSN 4101
Paper Title	Applied Physiology & Principles of Human health
No. of Credits	6
Non composite/ composite	Non-Composite Full Theory
No. of periods assigned	6
Course description/ Objective	1. To understand the normal functioning of various organ systems of the body and their interactions. 2. Able to comprehend the pathophysiology of commonly occurring diseases. 3. Enumerating the role of various nutrients and their physiological contributions.
Reference List	1.Kale, C.A. and Nail, E Samson Wright's Applied Physiology, Oxford University press, 1994. 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. 4.Visual Anatomy & Physiology by Martini, Ober &Nath (published by Pearson)
Evaluation	**Theory:** 100 Marks (80 End Sem + 20 CIA) **Question Paper format: Theory end semester** **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

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Paper code - MFSN 4101 – Applied Physiology & Principles of Human health

Course Outcome:

- To know the current knowledge about the functional organization of the human body.
- To understand the normal functioning of various organ systems of the body and their interactions.
- Able to comprehend the pathophysiology of commonly occurring diseases.
- Enumerating the role of various nutrients and their physiological contributions.
- Understand the process of energy production from the nutrients.

Module 1 [Basic Human Physiology] **F.M - 50**

1. 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.

2. Gastrointestinal Physiology

i) Functions of Stomach, Liver, Pancreas and Gall Bladder
ii) Composition, function and regulation of:
a) Salivary juice
b) Gastric juice
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.

3. Excretory Physiology

a) Urine formation
b) Renal function tests
c) Acid Base balance
d) Pathophysiology of Renal Stones, Urinary Tract Infection, Glomerulonephritis

4. Reproductive Physiology

a) Physiology of Menstruation and Menopause
b) Physiology of Ageing
c) Physiology of Pregnancy, Lactation
d) Pathophysiology of PCOD and Infertility

Module 2 [Principles of Physiology and Health] **F.M - 50**

5. 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

6. Respiratory system

a) Structure and function of Lungs
b) Pathophysiology
c) Transport and exchange of gases
d) Major Respiratory diseases

7. 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.

8. 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.

9. Current understanding and modern approaches to the human diseases like

1. Metabolic syndrome
2. Developmental disorders
3. Inherited disorders
4. Cancer chemotherapy

Course – M.Sc. in Food Science and Nutrition

Semester	1
Paper Number	MFSN 4102
Paper Title	Nutritional Biochemistry and Instrumentation
No. of Credits	6
Non composite/ composite	Non-Composite Full Theory
No. of periods assigned	6
Course description/ Objective	1. To augment the biochemistry knowledge acquired. 2. To understand the mechanisms adopted by the human body for regulation of metabolic pathways. 3. To understand the principle and use of Instruments used for biochemical analysis.
Reference List	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.
Evaluation	**Theory:** 100 Marks (80 End sem + 20 CIA) **Question Paper format: Theory end semester** **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

Paper Code MFSN 4102 - Nutritional Biochemistry & Instrumentation

Course Outcome:

- To understand the mechanisms adopted by the human body for regulation of metabolic pathways and an insight into interrelationships between various metabolic pathways.
- To understand the principle and use of Instruments used for biochemical analysis.

Module 1 [Nutritional Biochemistry] F.M- 50

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. [JG]

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. [SSC]

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 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. [KS]

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.[SSC]

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. [JG + SSC]

7. Antioxidants – Definition, free radicals, oxygen free radicals, natural and diet derived antioxidants. [SSC]

8. **Nucleic acid** – Diseases related to nucleic acid metabolism.[KS]

Module 2 [Instrumentation] [RM] **F.M-50**

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.

Course – M.Sc. in Food Science and Nutrition

Semester	1
Paper Number	MFSN 4103
Paper Title	Human Nutrition & Community Nutrition
No. of Credits	6
Non composite/ composite	Non-Composite Full Theory
No. of periods assigned	6
Course description/ Objective	➢ To understand the historical perspective of nutrient requirements. ➢ To critically evaluate the methodology and derivation of requirements for specific macronutrients. ➢ To learn various measures for enhancing nutritional quality of diets. ➢ To stay updated with emerging concepts in nutrition.
Reference List	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. Exercise physiology, fitness and sports physiology by B. Srilakshmi, V. Suganthi, C. kalaivani Ashok, 2016 4. Textbook of Food Science and Nutrition by Sunita Roy Chowdhury and BaniTamberAeri, 5. A Laboratory Manual of Food Analysis by Shalini Sehgal, Year – 2016 ISBN NO - 9789384588847
Evaluation	**Theory:** 100 Marks (80 End sem + 20 CIA) **Question Paper format: Theory end semester** **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

Paper Code MFSN 4103 - Human Nutrition & Community Nutrition

Course Outcome:

- To understand the historical perspective of nutrient requirements.
- To critically evaluate the methodology and derivation of requirements for specific macronutrients.
- To appreciate importance of nutrition immunity interactions and their implications.
- To learn various measures for enhancing nutritional quality of diets.
- To stay updated with emerging concepts in nutrition.

Module 1 [Human Nutrition] **F.M – 50**

1. Human Nutrient Requirements–Macronutrients

- Historical perspective of nutrient requirements.
- 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,
  -Lipids,
  -Water
- Critical evaluation of national and international nutrient allowances; factors affecting the requirements.

2. Human Nutrient Requirements- Micronutrients[AB]

- 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
- Critical evaluation of national and international nutrient allowances; factors affecting the requirements, dietary guidelines for Indians.

3. Nutrition in Special Conditions

- Extreme temperatures- low and high
- High altitude -
- Space nutrition and food systems -
- Sports nutrition –

4. **Interactions of Nutrition, Immunity and Infection and emerging concepts**
   - Host defense mechanisms and nutrients essential in the development of immune system.
   - Effect of Infections on the nutritional status of an individual.

- Nutrient deficiencies and excesses affecting the immuno-competence and susceptibility to infections.
- Ongoing nutrition transition and its implications.
- Changing trends in life style patterns in population groups and their implications.
- Nutrigenomics, nutraceuticals, bioactive compounds.

5. Improving Nutritional Quality of Diets

- Ways of enhancing nutritional quality of diets.
- Assessment of protein quality- By various indices and their interpretation
- Dietary diversification.
- Bioavailability of nutrients.
- Nutrient losses during cooking and processing

Module 2 [Community Nutrition] **F.M – 50**

1. Introduction to concept of community, rural and urban communities, community health, healthcare, community nutritional and its future projections.

2. Protein Energy malnutrition – etiology, prevalence, causes, prevention and control.

3. Other Major nutritional problems – Macro nutrient deficiencies and micronutrient deficiencies, etiology, symptoms, prevention and control.

4. 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.

5. Secondary Methods: Vital statistics, Mortality rates, survival rate, morbidity rate, fertility rate.

6. Nutrition Monitoring and Nutrition surveillance objectives and components of nutrition monitoring and current programmes. Nutrition Surveillance – Objectives, Uses, infrastructure and computerization

7. Nutrition Education – Need and scope, importance, theories, Nutrition education programmes – formulations, Implementation and Evaluation.

8. Nutrition Programmes in developing and developed countries – Role of various agencies – National, International and voluntary.

9. National & International Agencies: Introduction, mission, vision, objectives, functions, policies of **CFTRI ,NIN, FAO, NIPCCD, CARE, WHO,UNICEF,ICMR,ICAR,CSIR.**

Course – M.Sc. in Food Science and Nutrition

Semester	1
Paper Number	MFSN 4151 **PRACTICAL**
Paper Title	Human Health & Nutritional Biochemistry
No. of Credits	2+2+2 = 6
Non composite/ composite	Non-Composite
No. of periods assigned	12
Course description/ Objective	➢ To understand the biochemical compositions of food. ➢ To critically analyse the biochemical tests of food samples. ➢ To learn the preparation of various kinds of buffer. ➢ To stay updated with the tests for health checkup.
Reference List	1. A Laboratory Manual of Food Analysis by Shalini Sehgal, Year – 2016 2. Nutritional Biochemistry by Homer Wells.
Evaluation	**Practical :** 100 Marks (20 End Sem + 80 CIA) **Question Paper format: Practical end semester** **Viva voce – 20 marks (End Sem)**

Paper Code MFSN 4151 - Human Health and Nutritional Biochemistry

[Practical Paper]

F.M -100

1. Buffers and pH measurement
   - Preparation of acidic buffers.
   - Preparation of basic buffer
2. Spectrophotometry
   - Estimation of Phosphorous
   - Estimation of Proteins.
   - Estimation of Iron.
   - Estimation of Cholesterol.
   - Determination of blood glucose– oxidase method.
   - Estimation of Vitamin-C.
   - 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 -
   - Introduction to energy expenditure.
   - Physical activity level.
   - Use of wearable devices
   - Total energy expenditure
   - Measurement of Oxygen saturation levels
   - Pulse rate measurements
   - Energy balance & Weight management: Body height, skin fold thickness, height, body composition.
8. Assessment of Protein Quality - Calculation of Net Dietary protein Cal% of diets and dishes.
9. Planning nutritive recipies.
10. Assessment of Nutritional status
11. Identification of nutritional problems among vulnerable groups.
12. Visit to Aganwadi, primary health center and ICDS** centre.

Prerana Tripathi

22/8/25