

ಡಾ. ಮನಮೋಹನ ಸಿಂಗ್
ಬೆಂಗಳೂರು ನಗರ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ



Dr. MANMOHAN SINGH
BENGALURU CITY UNIVERSITY

Office of the Registrar, Central College Campus, Dr. B.R. Ambedkar Veedhi, Bengaluru – 560 001.
PhNo.080-22131385, E-mail: registrar@bcu.ac.in/registrarbcu@gmail.com

No.MSBCU/BoS/Home Sci.-[UG & PG]/194 /2026-27

Date:05.09.2026

NOTIFICATION

Sub: M.Sc. III & IV Semesters Syllabus of Dr. Manmohan Singh
Bengaluru City University-reg.

Ref: 1. Recommendations of Board of Studies in the Home
Science [UG & PG]
2. Approval of the Vice-Chancellor dated.02.09.2026

In pursuance of the recommendation in the BoS in Home Science [UG & PG] and with the approval of the Vice-Chancellor, the Syllabus of following Courses are hereby notified for information of the concerned. This Syllabus will be effective from the academic year 2026-27.

Sl. No.	Programmes
1.	M.Sc. [Nutrition & Dietetics] – III & IV Semester
2.	M.Sc. [Food & Nutrition] – I to II Semester

The copy of the Syllabus is notified in the University Website: www.bcu.ac.in for information of the concerned.

REGISTRAR

To:

The Registrar [Evaluation], Dr. Manmohan Singh Bengaluru City University, Bengaluru.

Copy to;

1. The Dean, Faculty of Science, MSBCU.
2. The Chairman & Members of BoS in Home Science [UG & PG], MSBCU.
3. The P.S. to Vice-Chancellor/Registrar/Registrar [Evaluation], MSBCU.
4. Office copy / Guard file / University Website: www.bcu.ac.in

DR. MANMOHAN SINGH
BENGALURU CITY UNIVERSITY

Syllabus of I &II Semester
Post Graduate Programme in Home Science
M.Sc. Food and Nutrition

2026-27

M.Sc. FOOD AND NUTRITION
COURSE ELIGIBILITY

Name of the course	Post Graduate Programme in Home Science M.Sc. Food and Nutrition
Duration of the course	Two years (Four semesters)
Eligibility	A candidate must have secured: B.Sc. in Food Science and Nutrition, Nutrition and Dietetics, Clinical Nutrition and Dietetics, Home Science, Biochemistry, Microbiology, Biotechnology, Food Nutrition and Dietetics, Public Health Nutrition and Bachelor in Hotel Management.
Admission	As per University Regulations

SCHEME OF STUDY & EXAMINATION FOR MASTER OF HOMESCIENCE (FOOD & NUTRITION)

I semester of 1st yr Post Graduate Programme in Food and Nutrition

Part	Subjects	Paper	Instruction Hrs/week	Duration of Exams (Hrs)	Marks			Credits	Total Credits
					IA	Exam	Total		
Part-1	HSFN 101 Human Physiology	1T	1x4	1x3	1x30	1x70	1x100	1x4	04
		1P	1x4	1x4	1x15	1x35	1x50	1x2	02
	HSFN 102 Nutritional Biochemistry	1T	1x4	1x3	1x30	1x70	1x100	1x4	04
		1P	1x4	1x4	1x15	1x35	1x50	1x2	02
	HSFN 103 Human Nutrition	1T	1x4	1x3	1x30	1x70	1x100	1x4	04
		1P	1x4	1x4	1x15	1x35	1x50	1x2	02
	HSFN 104 Food Preservation	1T	1x4	1x3	1x30	1x70	1x100	1x4	04
		1P	1x4	1x4	1x15	1x35	1x50	1x2	02
Soft core	HSFN 105 Research Methodology	1T	1x3	1x3	1x30	1x70	1x100	1x2	02
Total credits per semester									26

II Semester of 1st yr Post Graduate Programme in Food & Nutrition

Part	Subjects	Paper	Instruction Hrs/week	Duration of Exams (Hrs)	Marks			Credits	Total Credits
					IA	Exam	Total		
Part-2	HSFN 201 Nutrition Through Life Span	1T	1x4	1x3	1x30	1x70	1x100	1x4	04
		1P	1x4	1x4	1x15	1x35	1x50	1x2	02
	HSFN 202 Food Science	1T	1x4	1x3	1x30	1x70	1x100	1x4	04
		1P	1x4	1x4	1x15	1x35	1x50	1x2	02
	HSFN 203 Food Sanitation and Hygiene	1T	1x4	1x3	1x30	1x70	1x100	1x4	04
	HSFN 204 Statistics	1T	1x4	1x3	3x30	3x70	3x100	1x4	04
	Soft Core HSFN 205 Food Microbiology	1T	1x3	1x3	1x30	1x70	1x100	1x2	02
	HSFN 206 Project Work	Project work	4	Report Evaluation	1x30	1x70	1x100	1x4	04
	Total Credits per semester								26

- **4 Weeks hospital internship is mandatory for the completion of the course to obtain the degree.**

III Semester of 2nd yr Post Graduate Programme in Food & Nutrition

Part	Subjects	Paper	Instruction Hrs/week	Duration of Exam (Hours)	Marks			Credits
					IA	Exam	Total	
Food and Nutrition	HSFN 301 Clinical Nutrition and Dietetics I	1T 1P	1x4 1x4	1x3 1x4	1x30 1x15	1x70 1x35	1x100 1x50	4 2
	HSFN 302 Public Health Nutrition	1T 1P	1x4 1x4	1x3 1x4	1x30 1x15	1x70 1x35	1x100 1x50	4 2
	HSFN 303 Physical Fitness	1T	1x4	1x3	1x30	1x70	1x100	4
	HSFN 304 Food Adulteration and Food Additives	1T	1x4	1x3	1x30	1x70	1x100	4
Open elective	HSFN 305 Healthy Lifestyle and nutrition	1T	1x3	1x3	1x30	1x70	1x100	4 24 Credits

IV Semester of 2nd yr Post Graduate Programme in Food & Nutrition

Part	Subjects	Paper	Instruction Hrs/week	Duration of Exam (Hours)	Marks			Credits
					IA	Exam	Total	
Food and Nutrition	HSFN 401 Clinical Nutrition and Dietetics II	1T 1P	1x4 1x4	1x3 1x4	1x30 1x15	1x70 1x35	1x100 1x50	4 2
	HSFN 402 Nutrition in Critical Care	1T	1x4	1x3	1x30	1x70	1x100	4
	HSFN 403 Nutrition in Major Emergencies	1T	1x4	1x3	1x30	1x70	1x100	4
	HSFN404 Food Service Management	1T 1P	1x4 1x4	1x3 1x4	1x30 1x15	1x70 1x35	1x100 1x50	4 2
	HSFN 405	Dissertation	8	Report Evaluation Viva	1x30	1X 70 40 30 }	1x100	1x4 24 credits

4 WEEKS HOSPITAL INTERNSHIP IS MANDATORY FOR THE COMPLETION OF THE COURSE TO OBTAIN THE DEGREE

Semester-I
Food and Nutrition
HUMAN PHYSIOLOGY-Paper I

Code: HSFN 101

Hours: 52

Instruction hrs/week: 04

Total marks: 100

Theory: 70

IA: 30

Objectives:

This course will enable students to:

- Advance their understanding of some of the relevant issues and topics of human physiology
- Enable the students to understand the integrated function of all body systems
- To study the recent advances in human physiology

Unit 1

8 Hrs

Basic tissues -Classification, Structure & Functions

- Haematopoiesis
- Blood coagulation
- Blood groups
- Normal Blood Indices- Renal Functions Test, RF factor, Uric acid , FBS, PPBS, Lipid profile Liver function test , Hemogram Thyroid profile.

Unit 2

10 Hrs

Nervous system

- Structure of Brain and spinal cord and its functions
- Autonomous nervous system
- Reflex action
- Conduction of nerve impulse
- Neurotransmitters
- Afferent and efferent nerves
- Blood Brain Barriers
- Cerebrospinal fluid
- Structure and functions of skin; eye, ear, nose and tongue

Unit: 3

10 Hrs

Endocrine and immune system

A-Endocrine system

- Endocrine glands--structure and functions, Effect of hypo and hyper secretion

B -Immune system

- Cell mediated and humoral immunity
- Activation of WBC and production of Antibodies cells, B cells
- Role of Thymus

Unit: 4

20 Hrs

A-Digestive system

- Structure and functions of the digestive system
- Physiology of digestion of food.
- Motility of GIT.

B-Cardiovascular system

- Anatomical considerations of heart and cardiovascular system
- Cardiac cycle
- Types of circulation
- Cardiac output
- ECG
- Heart sounds
- Stroke volume
- Blood pressure and its regulation

C-Respiratory system

- Structure of respiratory tract
- Mechanism of respiration
- Respiratory control
- Vital capacity

D- Excretory system

- Structure and functions of excretory tract
- Physiology of urine formation
- Composition of urine
- Role of kidneys in maintaining water, electrolyte and acid –base Balance

Unit 5

4 Hrs

Reproductive system

- Structure and functions of male and female reproductive organs

Human Physiology
Practical

Code: HSFN 101P

No. of weeks: 13

Hours/week: 04

Total Marks: 50

Practical: 35

IA: 15

1. (a) Determination of blood group and Rh factor
(b) Enumeration of RBC and WBC count 4
2. Test of physical fitness: flexibility, endurance and muscular strength test 4
3. (a) Skin prick test: to diagnose food allergy 4
(b) Holter monitoring: which measures and records a person's heart activity (ECG)
4. (a) Pulmonary function test (spirometry test): to assess lung health 4
(To diagnose and monitor certain lung conditions)
(b) Uro flow test: to test the amount of urine voided during urination (to identify cause of certain urinary diseases)

References

1. Ganong, W.F [1985] Review of Medical physiology, 12th edition, Lange Medical Publication
2. Guyton A.C [1985]; Function of Human body, 4th edition, W.B, Sanders Company, Philadelphia
3. Guyton, A.C and Hall .J.B [1996] Text Book of Medical Physiology, 9th edition. W.B. Sanders company, Prism Books [Pvt] ltd Bangalore
4. Wilson K.J.W and Waugh A [1996]; Ross and Wilson Anatomy and Physiology in Health and illness, 8th edition, Churchill Livingstone
5. Jain A.K Text Book of Physiology, vol I and II. Avichal Publishing Co New Delhi

Semester-I
Food and Nutrition
NUTRITIONAL BIOCHEMISTRY

Paper II Code: HSFN 102

Hours: 52

Instruction hrs/week: 04

Total marks: 100

Theory: 70

IA: 30

Objectives:

To enable the students to:

- Further augment the biochemistry knowledge acquired at the undergraduate level
- Become proficient for specialization in nutrition and dietetics.
- Understand integration of cellular level metabolic events to nutritional disorders and imbalances.

Unit 1

12Hrs

- p^H , physiological relevance, buffers and their biological importance, Water as a solvent of life
- Polysaccharides: Definition, classification and functions of homo and hetero polysaccharides.
- Blood proteins: Classification nature and their functions.
- Enzymes: Classification, characteristics, Mechanism of the action of enzymes, Theories of enzyme catalysis.
- Vitamins : Definition, Classification and their deficiency manifestations, structures of vitamin- C and vitamin- B₁₂.

Unit 2

10Hrs

- Thermodynamics: laws, application of thermodynamic principles in living system.
- Bioenergetics: energy transfer, free energy concept, exergonic and endergonic reactions. High energy compounds
- Biological oxidation: stepwise process mitochondrial electron transport chain - compounds , schematic representation indicating sites of energy conservation ATP synthesis, oxidative phosphorylation

Unit 3

10Hrs

- Metabolism : Anabolism and Catabolism, types of metabolic reactions.
- Carbohydrate metabolism : Major pathways , glycolysis , TCA Cycle and their bio-energetics
- Lipid metabolism : beta oxidation of fatty acids and their bio-energetics.
- Amino acid metabolism : General reactions, Kreb's- Heinsleit cycle.

Unit 4

10Hrs

- Nucleic Acids: Composition, Classification, Nucleosides and Nucleotides and their structures, Chargoff's Rule of Base Equivalence, Watson Crick Model of DNA, DNA Replication , Difference between DNA & RNA, Genetic Code and their Characteristics, Central Dogma in Molecular Biology, Transcription and Translation.

Unit 5

10Hrs

- Detoxification (Xenobiotics) : Definition , Site of Detoxification , Mechanism of Detoxification.
- Genetic Engineering or Recombinant DNA Technology, Diagramatic representation of the production of Recombinant DNA molecule.
- Mutations : Principle , Types, Effects , Mutagens.
- Human Genome Project, Gene therapy and their types.

NUTRITIONAL BIOCHEMISTRY

Practicals

Code: HSFN 102P
No. of weeks: 13
Hours/week: 04

Total marks: 50
Practicals: 35
IA: 15

Unit 1 Estimations

- a) Determination of pKa of acetic acid.
- b) Estimation of amino acid (Sorenson's method).
- c) Estimation of glucose (Benedict's method).
- d) Estimation of ascorbic acid (Bessey's modified method).
- e) Estimation of serum calcium.

Unit 2 Oil analysis

- a) Determination of Iodine value.
- b) Determination of Saponification value.
- c) Determination of Acid value.
- d) Determination of Polenske and RM value of oil or a fat.

Unit 3 Colorimetric method

- a) Estimation of glucose by DNS method.
- b) Estimation of inorganic Phosphate by Fiske-Subbarow method.
- c) Estimation of creatinine by Jaffe's method.
- d) Estimation of reducing sugar by Somogy's method.

Unit 4 Preparations

- a) Preparation of biologically important buffers.
- b) Preparation of starch from potatoes.
- c) Preparation of casein & lactose from milk.

References

1. Nutritional Biochemistry II edition - By Tom B. Roddy Academic Press USA
2. Clinical chemistry, 6th edition, William J Marshall, Stephen K, Banger Mosby Elsevier. London
3. Biochemistry by U Satyanarayana, 2nd edition.
4. Biochemistry, 5th Edition .Jeremy.M Berg, John I Tymoczko, Luberty Stryer. Freeman and Company, New York. USA
5. Text book of Biochemistry with Clinical correlations, 6th edition Thomas Devlin Willeyliss. John Willey and sons publications N.J. USA

Semester-I
Food and Nutrition
HUMAN NUTRITION -Paper III

Code: HSFN 103
Hours: 52.
Instruction hrs/week: 04

Total marks 100
Theory: 70
IA: 30

Objectives:

This course is designed to:

- Provide in-depth knowledge of the physiological and metabolic role of macro and micronutrients and their importance in human nutrition.
- Familiarize with the recent advances in nutrition and apply this knowledge in planning for public health programme.
- To enable the students to translate the knowledge into practical guidelines for dietary needs of human nutrition at different stages of life.

Unit: 1

4Hrs.

Body Composition

- Significance of body composition and changes through the life cycle
- Methods used for measurement of body components.
- Body fat, Fat Free Mass (FFM), Factors affecting the two
- Influence of Energy Excess and Energy deficit in body composition

Unit: 2.

4Hr.

Energy

- Energy intake verses Energy Expenditure, Energy Balance.
- Components of energy expenditure: RMR, BMR, PAL, PAR, Thermic effect of food Control of food intake – Role of leptin and other hormones.
- Latest concepts in energy requirements and recommendation for different age groups.
- Methods of measuring energy expenditure
- Energy imbalance: An overview.

Unit 3

20Hrs

Carbohydrates

- Classification, Physiological functions
- Types of carbohydrates in Indian diets and their contribution to energy intake. Glycemic Index of food and its uses. Glycemic load.
- Dietary fibre – Components, Sources, Role of dietary fiber in human nutrition

- Resistant starch and fructo oligosaccharides-Physiological effects.
- Modification of carbohydrate intake for specific disorders –Lactose Intolerance,Diabetes mellitus and Dental caries

- Artificial sweeteners.

Protiens

- Classification, Physiological functions
- Methods of estimation of Dietary proteins.
- Therapeutic application of amino acids, Protein quality, Methods of evaluating protein quality
- Protein and amino acid requirements throughout life cycle
- Protein deficiency
- Kwashiorkor and Marasmus – clinical features and biochemical changes

Lipids

- Classification, Physiological functions
- Nutritional significance of fatty acids, SFA, MUFA, PUFA.
- Role of n3 and n6 fatty acids.
- Role of lipoprotein and cholesterol, triglycerides in Health and Disease
- Requirements of total fats and fatty acids requirements.
- Deficiency of Essential Fatty acids.

Unit: 4

4Hrs

Water

- Distribution and functions
- Water balance and its regulation- Role of hormones and electrolytes Requirements for water
- Disturbances in fluid balance – Dehydration, oedema and water toxicity

Unit: 5

20Hrs

Macro minerals,

Calcium, Phosphorous, Magnesium, Sodium, Potassium, Chloride, Sulphur

Micro minerals

Iron, Copper, calcium, Zinc, Magnesium, Manganese, Iodine, Fluoride, selenium, chromium, manganese, fluoride, lithium

For each mineral the following should be discussed:

- Physiological functions
- Food sources, daily requirement
- Bioavailability – calcium, iron, magnesium and factors affecting bioavailability
- Interaction with other nutrients
- Requirements and deficiency

Vitamins

- a) Fat soluble vitamins - Vitamin A, Vitamin D, Vitamin E, Vitamin K
- b) Water soluble vitamins - Thiamine, Riboflavin, Nicotinic acid, Pyridoxine folic acid, B 12, pantothenic acid, biotin, chorine, inositol, vitamin C

For each nutrient following should be discussed:

- Physiological functions, digestion, absorption, transportation, metabolism of minerals
- Food sources
- Interaction with other nutrients - Macro nutrients, vitamins, minerals.
- Requirements, deficiency and toxicity
- Assessment techniques (Invasive and Non Invasive - A Brief mention)
- Bioavailability- Vitamin A, Folic acid, biotin.

HUMAN NUTRITION Practicals

Code: HSFN 103P
No. of weeks: 13,
Hours/week: 04

Total marks: 50
Practicals: 35
IA: 15

Unit 1

- a) Planning and preparation of protein rich recipes and comparison with reference Protein (Egg white)
- b) Planning of recipes with low Glycaemic Index and calculate the glycaemic load.

Unit 2

Planning and preparation of recipes rich in soluble fiber and omega 3 fatty acids

Unit 3

- a) Planning of recipes to increase the bioavailability of calcium
- b) Planning of recipes to increase the bioavailability of Iron

Unit 4

- a) Analysis of Body composition using TANITA/BODY STAT apparatus
- b) Estimation of energy intake and expenditure to arrive at energy balance

References:

1. Mahan L.K. and Ecott – Stump, S.(2000): Krause's Food , Nutrition and Diet Therapy
2. Shils, M.B. Olson, J.A. Shike, N and Ross, A.C
3. (Ed). (1999): Modern Nutrition in Health and Disease, 9 th Edition, San Williams and Wilkins
4. WHO Technical Report Series
5. Indian Council of Medical Research, Recommended Dietary intake for Indians – Latest Recommendations
6. Advanced Nutrition and Human Metabolism. SareenS.Gropper, Jack. L. Smith, James, L. Groff. Fourth Edition
7. Williams Basic Nutrition and Diet Therapy. Staci Nix. Twelfth Edition (2005)

Journals:

- a. Nutrition Reviews
- b. International Journal of vitamin and Nutrition Research.

Semester-I
Food and Nutrition
Paper IV
FOOD PRESERVATION

Code: HSFN 104
Hours: 52
Instruction hrs/week: 04

Total marks: 100
Theory: 70
IA: 30

Objectives:

- To gain knowledge about principles and methods of food preservation
- To give an insight about the types of food preservation

Unit: 1

Factors Influencing Post-Harvest Losses and Deterioration Factors 14hrs

- Post-harvest losses
- Fruits and vegetables
- Deterioration factors and their control,
- Intrinsic and Extrinsic factors for food preservation and spoilage
- Enzymatic changes b) Chemical changes c) Physical Changes d) Biological Changes

Unit: 2 8hrs

Importance, Scope and Benefits of Processing.

- Principles and methods of value addition, value added products.
- Hurdle concept, intermediate processed foods, Minimally processed foods.

Unit: 3

Methods of Preservation and Processing 10hrs

- Dehydration, Concentration, canning, curing and smoking – flesh food preservation
- Preservation by use of low temperatures
- Food Irradiation, ultra violet light (UV), Microwaves, Ionizing Radiation
- Aseptic Processing
- Chemical Preservation

Unit: 4 12hrs

Thermal Processing of Foods

- Pasteurization, purpose of pasteurization, methods of pasteurization
- Sterilization process and equipment, commercial sterilization, calculation of heat processing time, Thermal death time (TDT curve) D-value decimal reduction time.

Unit 5 Food Packaging 8Hrs

- Functions, Types
- Protection of food by packaging materials, Recent Advances in Food Packaging - Films, foils, and plastics, glass containers, paper packaging, tin can /Tin plate

- FSSAI Labeling regulations
- Modified atmosphere packaging, Vacuum, nitrogen and tetra packaging.

Food Preservation Practicals

Code: HSFN 104P

No. of weeks: 13

Hours/week: 04

Total marks: 50

Practicals: 35

IA: 15

Unit: 1 Different methods of Food preservation – Class I & II Preservatives

Unit: 2 Preparation of pickles, tomato sauce, chilli sauce, tomato puree, squash

Unit: 3 Preparation of jams and jelly- Aseptic handling (house hold level canning)

Unit: 4 Preparation of Value added products

Unit: 5 Visits to NDRI/KMF

References

1. Potter, H. N, Food Science, AVI Pub, Co., Westport, 1978.
2. Srilakshmi, B, Food Science, 3rd Edition, New Age International Pub, New Delhi, 2003.
3. ShakuntalaManay and Shadaksharaswamy, Foods, Facts and Principles, Wiley EasternCo., New Delhi, 1995.
4. Charley, H, Food Science, (2nd edition), John Wiley & sons, New York, 1982.

Semester-I
Food and Nutrition
Paper V
RESEARCH METHODOLOGY
(SOFT CORE)

Code: HSFN 105

Hours: 40

Instruction hrs/week: 03

Total marks: 100

Theory: 70

IA: 30

Objectives:

- To develop a scientific approach and understand the process of research
- To develop the competence for selecting methods and tools appropriate for research topics
- To prepare the students to design and carry out research studies in the field of food and nutrition

Unit: 1

10Hrs

- Research-meaning , characteristics
- Need and scope of research in food and nutrition
- Types and methods of research-Basic, Applied and Action research, Exploratory, Descriptive, Diagnostic, Experimental, Analytical, Historical, Survey and Case study.
- Review of literature -Need, search procedure, sources of literature
- Steps in research process
- Research Problem-selection and formulation of research problem. Guiding principles in the choice of a research problem.
- Hypothesis - meaning, attributes of a sound hypothesis in research, stating the hypothesis and types of hypothesis.

Unit: 2

12Hrs

Research designs - Meaning, need, features of a good research design. Types, advantages and limitations of each design.

Descriptive studies.

- Correlational studies
- Case study
- Cross sectional study

Analytical studies

- Cohort study
- Case – control study

Experimental studies

- Interventional studies
- Clinical trial

Ethical considerations in research – ICMR ethical guidelines.

Unit: 3

06Hrs

Sampling-Meaning, concept of population , sample and sampling

- Basis of sampling, advantages and limitations.
- Types of Sampling-Probability and Non -Probability sampling.

- Probability sampling - simple random, systematic random, stratified random cluster sampling .
- Non probability sampling – Purposive , Quota and Judgement sampling, snow ball sampling.
- Meaning of Type I and Type II error.

Unit: 4

08Hrs

Tools and Techniques for data collection

- Primary and secondary data.
- Interview-Meaning, purpose, types. Techniques of interviewing, advantages and limitations. Observation-Meaning, types, stages in the process of Observation, uses and limitations
- Questionnaires and schedules-Meaning, types of Questionnaires steps in construction of Questionnaires and Schedules.
- Rating scales-Meaning, types , advantages and limitations
- Reliability and Validity of tool- Meaning

Unit: 5

04Hrs

- Report writing-Meaning, guidelines to be followed in scientific report writing, references in report writing
- Report publications- scopus index - citation index, impact factor, H factor
- Writing research proposals

References:

1. Kothari,C.R.(2008): Research Methodology: methods and techniques, 2nd edition,New Age International Pvt Ltd, New Delhi.
2. Kumar.R. (2005) Research Methodology :Step by step guide for beginners, Sage Publications, New Delhi.
3. A.K.P.C Swain (2010) A text book of Research Methodology, Kalyani Publishers, Ludhiana.
4. Kerlinger F.N. and Lee, H.B (2000) Foundations of Behavioural Research, 4th edition ,Harcourt College, Publishers

Semester II
Food and Nutrition
Paper I
NUTRITION THROUGH LIFE SPAN

Code: HSFN 201
Hours: 52
Instruction hrs/week: 04

Total marks: 100
Theory: 70
IA: 30

Objectives:

- To understand the role of nutrition in different stages of life span
- To provide the guidelines for Adequate Nutrition throughout life span
- To get acquainted with growth, development and physiological changes during pregnancy lactation and infancy
- Understand the interrelationship between nutrition and growth and development during these phases

Unit: 1

Nutrition in Pregnancy

10 hrs

- Maternal nutrition and fetal outcome
- Nutritional assessment and guidance in prenatal care
- Pregnancy in special conditions
- Nutritional deficiencies and complications of pregnancy and its management
 - Anaemia
 - IDD
 - Preeclampsia
 - Eclampsia
 - Intra Uterine Growth Retardation [IUGR]
 - Congenital malformation
 - Foetal alcohol syndrome
 - Gestational Diabetes mellitus
 - Pregnancy and AIDS
- Adolescent pregnancy

Unit 2 Nutrition in Lactation

10 hrs

- Physiology and endocrinology of lactation
- Synthesis of milk components
- Let down reflux
- Role of hormones
- Lactational amenorrhoea
- Nutritional requirements during lactation
- Human milk composition
- Colostrum & Exclusive breast feeding
- Factors affecting breast feeding
- Effect of breast feeding on maternal health

- Lactogogues

Lactation Complications

- Malnutrition
- Engorged breast, Sore nipples
- Breast feeding during AIDS
- Management of lactation failure
- Breast feeding by Surrogate

Unit 3 Nutrition in Infancy and preschool age

10 Hrs

Infancy

Effect on mother's nutritional status and well being Infant Preterm, small for date and low birth weight infants

- Implications for feeding and management
- Growth and development during infancy-Growth Chart
- Failure to thrive
- Nutrient needs during infancy
- Breast feeding v/s Bottle feeding
- Feeding practices in special conditions
 - Cleft palate
 - Lactose intolerance
 - Infant formulae

Preschool Nutrition

- Growth & Development of preschool children
- Growth monitoring
- Brain development in preschool age -Effect of nutrition
- Nutritional needs of preschool children
- Dietary guidelines
- Nutritional concerns in preschool children-Under nutrition & Obesity
- Formulation of good food habits

Unit 4 Nutrition during school age and Adolescence

12 hrs

School age

- Growth and development
- Nutritional needs
- Dietary guidelines
- Factors influencing food intake
- Breakfast practices
- Packed lunch
- School lunch programme.

Nutritional problems

- Obesity and under nutrition
- Iron deficiency
- Dental caries

Adolescence

- Growth and development
- Body composition
- Sexual maturity
- Social and Psychological changes
- Nutritional needs
- Nutritional Requirements and Dietary guidelines
- Food habits
- Fast foods & its impact

Nutritional problems:

- Anaemia
- Eating disorders, Anorexia nervosa & Bulimia
- Malnutrition - under nutrition and obesity
- Teen age pregnancy

Unit: 5

10 Hrs

Nutrition during Adulthood and Geriatric Nutrition

Adulthood

- Physiological ,social and psychological changes
- Pre and Post-Menopausal changes in women
- Nutritional needs
- Dietary guidelines
- Importance of weight management.

Geriatrics

- Theories of ageing and delayed ageing
- Physiological, socio economical and psychological factors and its effect on dietary intake
- Nutritional requirements
- Dietary modifications
- Age related Nutritional problems management
 - Malnutrition – obesity and under nutrition
 - Diabetes mellitus
 - Hypertension
 - Osteoporosis
 - Osteoarthritis
 - Anaemia

NUTRITION THROUGH LIFE SPAN PRACTICALS

Code: HSFN 201P

No. of weeks: 13

Hours/week: 04

Total marks: 50

Practicals: 35

IA: 15

Unit 1

Planning and preparation of diet plan for Pregnant and Lactating mothers (low income group and high income group)

Unit 2

Planning and preparation of foods for Children - Breakfast/ nutritious packed lunch.

Unit 3

- a) Planning and preparation of Nutrient Dense recipes for preschoolers.
- b) Healthy snacks for school children and adolescents.

Unit 4

- a) Assessment of Growth of children
 - Use of anthropometric measurements
 - Use of weight chart to measure growth
 - Interpretation of somatic data
- b) Diet plan for geriatric population

Unit 5

Visit to a baby friendly hospital and observation of expression of milk and breast milk bank.

References:

1. Krause M.V and Hunser M.A-Food, nutrition and diet therapy, 11th edition .W .B Saunders company, Philadelphia, London
2. Michael J Gibney, Barrie M Margetts, John M Kearney and Lenore (2005), Public health nutrition NSI Textbook series, Blackwell publishing
3. Gibney, M. J., Macdonald, I. A., & Roche, H. M. (Eds.). (2003). Nutrition and metabolism. Blackwell Publishing.

Semester-II
Food and Nutrition
FOOD SCIENCE
Paper –II

Code: HSFN 202
Hours: 52
Instruction hrs/week: 04

Total marks: 100
Theory: 70
IA: 30

Objectives:

This course is designed to

- Provide an understanding of composition of various food stuffs
- Familiarize students with changes occurring in various foodstuffs as a result of processing and cooking
- Enable students to use their theoretical knowledge in various applications and food preparations
- To familiarize the students with the recent trends in food science

Unit 1

Introduction to Food Science

10Hrs

- Bound and free water
- Colloidal system- sols, gels, Emulsions, Types and factors affecting stability, Foam—factors affecting foam volume and stability, suspension
- Ph
- Osmosis
- Freezing point, boiling point, melting point

Sensory Evaluation

- Factors affecting the acceptability of food
- Selection of taste panel
- Subjective and objective tests
- Score card, Sensory Evaluation of Food,
- Basic requirement for sensory lab

Unit 2

8Hrs

Study of Cereals and Pulses

- Structure, composition, cooking and processing methods
- Starch cookery- Role of ingredients in baking, dough formation, factors affecting dough formation and gluten formation
- Gelatinization of starch and factors affecting
- Structure and composition of cereals
- Flour and flour quality and tests for flour quality
- Leavening agents- Methods of leavening, Classification

Pulses and legumes

- Structure, composition, processing
- Toxic constituents

Unit 3

08Hrs

Fats and oils, nuts and oilseeds

Fats and oils

- Structure, sources
- Physical and chemical properties
- Effect of composition on fat properties
- Functional properties of fat
- Rancidity
- Changes during frying
- Interesterification of fats
- Factors affecting fat absorption

Nuts and oilseeds

- Composition of nuts and oilseeds
- Oil extraction and by-products

Unit 4

20Hrs

Milk and milk products

- Composition
- Physical properties and chemical properties
- Milk processing and Types of processed milk
- Fermented[cheese and yogurt] and unfermented [khoa and ice cream]
- Milk products---composition, classification, processing
- Factors affecting coagulation of casein[study of paneer]
- Milk Substitutes

Meat, poultry, eggs and fish

Meat and poultry

- Structure and composition
- Changes during cooking
- Rigormortis
- Meat tenderisers
- Storage

Eggs

- Structure
- Composition
- Quality testing
- Changes during storage
- Grading
- Processing
- Changes during cooking
- Storage

- Designer eggs

Fish

- Classification
- Methods of cooking and changes during cooking
- Storage
- Quality buying

Sugar cookery

- Sugar cookery
- Solubility of solution
- Stages of sugar cookery
- Crystallization and factors affecting it
- Non-enzymatic browning
- HFCS(High fructose corn syrup)- method of manufacture and uses.

Unit: 5

06Hrs

Fruits and vegetables

- Structure
- Flavouring constituents
- Pigments---classification and factors affecting it
- Post harvest changes
- Artificial ripening of fruits
- Factors affecting turgor
- Methods of storage
- Enzymatic browning and prevention

Beverages and spices

- Classification of beverages, composition and processing(tea, coffee, cocoa,wine)
Spices and condiments

FOOD SCIENCE

Practicals

Code:HSFN 202P

No.of hours weeks: 13

Hours/week: 04

Total marks:50

Practicals: 35

IA: 15

Objectives:

1. To study the characteristics of different food commodities, changes during cooking and storage
2. To study techniques of improving cooking quality of food

Unit 1

Sensory evaluation of a given recipe

Unit 2

Starch cookery

- a) Gelatinization of starch –factors affecting gelatinization of starch
- b) Retro gradation /syneresis
- c) Factors affecting Gluten formation-Gluten test, effect of kneading and added substances on chapattis
- d) Preparation of different types of rice to study the effect on cooking time and volume of water absorbed
- e) Microscopic observation of different types of starch

Pulse cookery

- a) Effect of various methods of cooking and processing methods on
- b) Characteristics of pulses
- c) Preparation of Soya-milk and Tofu.

Unit 3

Fats and oils

- a) Smoke point
- b) Factors affecting fat absorption.

Milk and milk products

- a) Factors affecting coagulation of casein [preparation of cream of tomato soup]
- b) Preparation of paneer

Egg cookery

- a) Assessing egg quality
- b) Formation of Emulsion [Temporary and permanent emulsion]
- c) Prevention of ferrous sulphide formation
- d) Preparation of baked and stirred custard

Unit 4

Fruits and vegetables

- a) Enzymatic browning in fruits [factors affecting and prevention]
- b) Study of factors affecting texture and pigments of vegetables

Leavened products

- a) Use of different leavening agents in food preparation
- b) Air - preparation of foam
- c) Steam and Biological leavening agents—preparation of idlis
- d) Chemical leavening agents-preparation of cakes using
 - Egg white and whole egg
 - Slow and fast acting baking powder.

Sugar cookery

- a) Stages of sugar cookery[cold water test]
- b) Crystallization of sugar—Factors affecting crystallization of sugar[sugar moulds]
- c) Relative sweetness of sugar

References

1. Bowers J [1992] Food theory and Applications, 2nd edition, Mac Millan publishing co New York.
2. Janaki Rao, P. 2006. Nutrition and Food Science, Avishkar Publishers.
3. MohiniSethi ,Eram S.Rao.,2005.,Food Science-Experiments and Applications.CBS Publishers.
4. Srilakshmi B., 2006. Food Science, 3rd Edition. New Age International (P) Ltd, Publishers.
5. ShakunthalaManay and ShadaksharaSwamy N., 2006, Foods Facts and Principles, New Age International Publication.

Semester-II
Food and Nutrition
Paper III
FOOD SANITATION AND HYGIENE

Code: HSFN 203
Hours: 52.
Instruction hrs/week: 04

Total marks: 100
Theory: 70
IA: 30

Objectives:

1. To enable the students to inculcate the sanitary aspects of safe of handling food
2. To help the students gain knowledge of personal and environmental hygiene

Unit: 1 **06 hrs**

- Food sanitation: Introduction, definition, importance, health hazards due to contaminated foods, Food borne diseases -Food poisoning and infections

Unit: 2 **15 hrs**

- Environmental hygiene of premises, Safe Drinking Water, Lighting, Temperature & Humidity. Disinfectants, sanitizers, antiseptic and germicide.
- Common disinfectants used on working surfaces, kitchen equipment, dish washing, hand washing etc. Care of premises and equipment, cleaning of equipment and personal tools immediately after use, use of hot water in the washing process. Waste disposal, collection, storage and proper disposal from the premises.
- Personal hygiene - care of skin, hair, hands, feet, teeth, Use of cosmetics and jewellery, Grooming, Uniform, Evaluation of personal hygiene, Training staff. Safe handling of food - Control measures to prevent food borne diseases and precautions to be taken by food handlers

Unit: 3 **15 hrs**

- Microbiological criteria and indices of water, milk and processed foods
- Water – sources, microbial standards for portable water, Purification and disinfection of potable water supply
- Milk – kinds of microorganisms, control of microorganisms, quality and methods of study, microbial standards for milk and milk products
- Processed foods - kinds of microorganisms, control of microorganisms, quality and methods of study, microbial standards for processed foods

Unit: 4 **06 hrs**

- Rodents and Insects as carriers of food-borne diseases- Types, Prevention and Control techniques.

Unit: 5 **10 hrs**

- Legal administration and quality control, laws relating to food hygiene. . Food standards, PFA, FPO, BIS, MPO, Agmark, Codex Alimentarius, FSSAI, HACCP.

REFERENCES:

1. Roday, S. (2011). Food hygiene and sanitation (2nd ed.). Tata McGraw Hill Education.
2. Frazier, W.C, Food Microbiology, MC Graw Hill Inc 4th edition, 1988.
3. Pelczar, M.I and Reid, R.D, Microbiology, MC Graw Hill Book Company, New York, 5th edition, 1993

Semester-II
Food and Nutrition
STATISTICS
Paper IV

Code: HSFN 204
Hours: 52.
Instruction hrs/week: 04

Total marks: 100
Theory: 70
IA: 30

Objectives:

This course will enable students to:-

1. To apply statistical techniques to research data for analysing and for interpretation of data.
2. To summarize data and present it using tables and graphs.
3. To be able to understand the components of research proposals.
4. To develop skills for preparation of research proposals and writing reports

Unit 1

08Hrs

- Meaning and Scope of Statistics.
- Classification and Tabulation
- Graphic and Diagrammatic representation of data (frequency, histogram, graphs, bar-Diagram and pie-charts).

Unit 2

12Hrs

- Measures of Central tendency and Dispersion (Mean, Median, Mode, Quartiles, Range and Standard Deviation).
- Correlation and Regression: Correlation and its interpretation. Product Moment and Rank order Correlation Coefficient Regression Equations (without derivation) and its interpretations, use for prediction.

Unit 3

6Hrs

- Elementary ideas on probability (Simple Probability) Skewness and Kurtosis definition).
- Normal Distribution and its properties.

Unit 4

16Hrs

- Testing a Statistical Hypothesis.
- Procedures and applications.
 - Parametric and non- Parametric tests.
 - Parametric tests:
 - Application of students 't'test for Independence of attributes, paired 't'test for single mean, Equality of means and 'f'test for small samples.
 - Application of 'z'test for large samples.
 - Analysis of variance – one way and two way.
 - Non-parametric tests: χ^2 test and its significance

Unit 5

10Hrs

Software packages for statistical analysis

- Coding of data , Editing and cleaning of data
- Data interpretation, presentation of results

References:

1. Gupta, S. (2001) “ Research Methodology and statistical Techniques”, Deep and Deep, New Delhi,
2. Marcello pagano(2008) “ Principles of Biostatistics” second edition, brooks/cole,
3. Sarma, K.V.S. (2001) “statistical made simple: Do it yourself on PC”, Prentice-Hall, New Delhi,
4. Journals and websites related to application statistics in food and nutrition

Semester-II
Food and Nutrition
Paper V
FOOD MICROBIOLOGY
SOFT CORE

Code: HSFN 205
Hours: 48.
Instruction hrs/week: 03

Total marks: 100
Theory: 70
IA: 30

Objectives:

To familiarize the students with recent advances in food microbiology including fermented foods, dairy, food preservation, detection of food-borne diseases, their control measures.

Unit 1

6Hrs

Introduction

- Classification of microorganisms
- Morphology – Bacteria, yeast, mold and algae.
- Microbial growth, intrinsic and extrinsic parameters of food affecting the microbial growth.

Unit 2

14 Hrs

Principles and types of food spoilage

- Major Microorganisms Involved in Food Spoilage, spore formers, toxin
- producers: *Bacillus Cereus*, *Clostridium botulinum*, *C Perfringens*, *Staphylococcus aureus*, *E-coli*, *listeria monocytogenes*, *shigella*, *salmonella* Species, *Campylobacter jejuni*, *Aspergillus species*, *Pencillium* Detection and Quantification of Food-Spoilage
- Food borne Diseases

Unit 3

Kinds of microorganisms

- Sources of contamination and control of- cereals, pulses, vegetables, fruits, milk, yogurt, cheese, fish, meat, egg, poultry.

Unit 4

4 Hrs

Uses of Microorganisms in Food

- Food produced by Microbes: Microbial cells as food (single cell proteins)-mushroom cultivation.
- Beneficial Role of Microorganisms in Food Industry. Bioconversions- cheese production, sauerkraut, production of alcohol-fermented beverages- beer and wine.

Unit 5

8 Hrs

Microbial indicators of food safety and quality control

- Principles of quality control and microbiological criteria, Indicators of product quality and microbiological safety of foods, Hazard analysis, critical control points (HACCP),
- Good manufacturing process (GMP)
- Microbiological standards Codex Alimentarius

References:

1. Pelczar, M.I and Reid, R.D, Microbiology, MC Graw Hill Book Company, New York, 5th edition, 1993.
2. Atlas M.Ronalds ,Principles of microbiology, 1st edition, Mosby – year book Inc, Missouri, U.S.A, 1995.
3. Frazier, W.C, Food Microbiology, MC Graw Hill Inc 4th edition, 1988.
4. Banwart , Basic food Microbiology, 2nd edition CBS Publisher, 1989.
5. Bensaon, H.J, Microbiological applications, C. Brown publishers, U.S.A, 1990.
6. Adams, M. R., & Moss, M. O. (2000). *Food microbiology* (2nd ed.). Royal Society of Chemistry
7. Jay, J. M., Loessner, M. J., & Golden, D. A. (2005). *Modern food microbiology* (7th ed.), Springer.
8. Ray, B., & Bhunia, A. (2025). *Fundamental food microbiology* (6th ed.). CRC Press.