



SWAMI VIVEKANANDA UNIVERSITY

Telinipara, Barasat – Barrackpore Rd

Bara Kanthalia, West Bengal 700121

Syllabus

For

B.Sc. in Clinical Nutrition &

Dietetics

(As per NEP, 2020)

Programme Duration- 4 years (Semester I-VIII)**SEMESTER – I**

Course	Course Name	L-T-P	Credits
Major	Basic Nutrition	3-0-0	3
	Basic Nutrition Lab.	0-0-2	1
Minor	Microbes in Environment	3-0-0	3
	Microbes in Environment Lab.	0-0-2	1
Interdisciplinary	Science of Happiness	2-0-0	3
AEC	Communicative English I	2-0-0	2
SEC	Food Safety and Quality Control	3-0-0	3
VAC	Environmental Sciences I	2-0-0	2
	Understanding India	2-0-0	2
	Total		20

SEMESTER – II

Course	Course Name	L-T-P	Credits
Major	Basic Human Physiology	3-0-0	3
	Basic Human Physiology Lab.	0-0-2	1
Minor	Medical Microbiology & Immunology	3-0-0	3
	Medical Microbiology & Immunology Lab	0-0-2	1
Interdisciplinary	Basics of Life Skills Education	3-0-0	3
AEC	Bengali/Hindi	2-0-0	2
SEC	Food Preservation	3-0-0	3
VAC	Environmental Science II	2-0-0	2
	Digital Transformation	2-0-0	2
Internship	Internship at Hospital/ for 1 month	0-0-4	2
	Total		22

SEMESTER – III

Course	Course Name	L-T-P	Credits
Major	Advanced Human Physiology	3-0-0	3
	Advanced Human Physiology Lab.	0-0-2	1
Major	Nutritional Biochemistry	3-0-0	3
	Nutritional Biochemistry Lab.	0-0-2	1
Minor	Cell Biology	3-0-0	3
	Cell Biology Lab.	0-0-2	1
Interdisciplinary	Educational Research	3-0-0	3
AEC	Bengali/Hindi	2-0-0	2
SEC	Basic Dietetics	3-0-0	3
Internship	Internship at Hospital/ for 1 month	0-0-4	2
	Total		22

SEMESTER- IV

Course	Course Name	L-T-P	Credits
Major	Nutritional Biochemistry II	3-0-0	3
	Nutritional Biochemistry II Lab.	0-0-2	1
Major	Advanced Nutrition	3-0-0	3
	Advanced Nutrition Lab.	0-0-2	1
Major	Food Commodities	3-0-0	3
	Food Commodities Lab.	2-0-0	1
Minor	Bioethics and Biosafety	4-0-0	4
AEC	Communicative English II	2-0-0	2
	Total		18

SEMESTER V

Course	Course Name	L-T-P	Credits
Major	Food Microbiology	3-0-0	3
	Food Microbiology Lab.	0-0-2	1
Major	Dietetics	3-0-0	3
	Dietetics Lab.	0-0-2	1
Major	Family Meal Management	3-0-0	3
	Family Meal Management Lab.	2-0-0	1
Major	Food Sanitation and Hygiene	3-0-0	3
	Food Sanitation and Hygiene Lab.	0-0-2	1
Minor	Fundamentals of Personality	3-0-0	3
	Fundamentals of Personality Lab.	0-0-2	1
	Total		20

SEMESTER – VI

Course	Course Name	L-T-P	Credits
Major	Diet Counselling and Patient Care	3-0-0	3
	Diet Counselling and Patient Care Lab.	0-0-2	1
Major	Geriatric Nutrition	3-0-0	3
	Geriatric Nutrition lab.	0-0-2	1
Major	Community Nutrition	3-0-0	3
	Community Nutrition lab.	0-0-2	1
	Food Processing and Nutrition Science	4-0-0	4
Minor	Health Psychology	3-0-0	3
	Health Psychology Lab.	0-0-2	1
	Total		22

SEMESTER – VII

Course	Course Name	L-T-P	Credits
Major	Quantity Food Production and Service	3-0-0	3
	Quantity Food Production and Service Lab.	0-0-2	1
Major	Food Service Equipment and Layout	3-0-0	3
	Food Service Equipment and Layout Lab.	0-0-2	1
Major	Clinical Assessment and Counselling and Pateint Care	3-0-0	3
	Clinical Assessment and Counselling and Pateint Care Lab.	0-0-2	1
Major	Entrepreneuership Development	4-0-0	4
Minor	From Psychology Department	3-0-0	3
	From Psychology Department (Lab)	0-0-2	1
	Total		20

SEMESTER – VIII

Course	Course Name	L-T-P	Credits
Major	Research Methodology & Biostatistics	12-0-0	12
Major	Professional Ethics & Dietetic Practice Management	4-0-0	4
Minor	-	4-0-0	4
	Total		20

SEMESTER I

MAJOR

BASIC NUTRITION (Theory)

COURSE CODE: FN(Th.)1011

Learning Objectives

To know the foundational knowledge of macronutrients, micronutrients and digestion, absorption, assimilation and utilization of nutrients by the body.

COURSE OUTCOME	Students will be able to learn basic knowledge on Food and Nutrition. They will be aware of needs of macro & micro nutrients in our body and their digestion, absorption, assimilation and utilization in human body. Also, gather the proper knowledge about calorie requirements and calorific value for each individual person.
---------------------------	---

Module I: Introduction to nutrition-food as a source of nutrients, function of foods, definition of nutrition, nutrients, adequate, optimum and good nutrition, malnutrition. Inter-relationship between nutrition and health-visible symptoms of good health.

Module II: Food guide-basic five food groups-how to use food guide.

Module III: Use of food in body digestion, absorption, transport, utilization of nutrients in the body.

Module IV: Water-as a nutrient, function, sources, requirement, water balance-effect of deficiency.

Module V: Carbohydrates-composition, classification, food sources, functions, storage in body. Fat and oils-composition, saturated and unsaturated fatty acids, classification of the sources of fats, functions of fats. Proteins-composition, sources, essential, non-essential amino acids, source of proteins, functions, protein deficiency.

Module VI: Food as a source of energy, energy value of food. The body's need for energy B.M.R activities, for utilization of food to fat energy requirement. Acid-base balance.

Basic Nutrition Lab.**Learning Objectives:**

To understand the presence of carbohydrate, protein, fat in specific samples.

COURSE OUTCOME	Students will be able to learn the identification of macronutrients present in food samples.
---------------------------	--

Module I: Identification of Mono, Di and polysaccharides

Module II: Identification of Proteins

Module II: Identification of glycerol

REFERENCE BOOKS/ JOURNALS:

- Guthrie, Hele, Andrews, Introductory Nutrition, 6 thed. St. Louis, TimesMirror/MosbyCollege, 1988.
- Mudambi S.R, M.V Rajgopal Fundamentals of Foods and Nutrition(2nded) Wiley EasternLtd,1990.
- Swaminathan S.: Advanced text book on Foods Nutrition Vol. I, II (2nded revisedandenlarged) B.app C.1985.
- Willson, EVAD Principles of Nutrition,
- thed. New York John Willey and Sons, 1979.
- Textbook of Nutrition-Ravinder Chadha & Pulkit Mathur, Orient Blackswan Pvt.Ltd.Telangana.
- B. Srilakshmi(2018).Nutrition Science. New Delhi: New Age International.
- Clinical Nutrition & Dietetics- F. P. Antia and Philip Abraham, Oxford University Pres

SEC**Food Safety and Quality Control**

COURSE CODE: FN1051

Learning Objectives:

Enable students for grooming into various industry-specific activities e.g. production, packaging, quality control, auditing, product development, sales, and marketing.

COURSE OUTCOME	The course is pro-industry and students coming out of the course would be placed in food processing industries, herbal extraction in various roles such as production, packaging, quality control, auditing, product development, sales, and marketing. The course is also designed to groom the students into entrepreneurs.
---------------------------	---

Module I: Concept meaning and exposure, estimation, toxicological requirements and risk assessment

- Food quality, food safety, food adulteration, food hazards. Natural toxins.

Module II: Food laws and regulations

- National and international food laws
- Governing bodies: Bureau of Indian Standards (BIS) , Food Standards and Safety Authority of India (FSSAI)

Module III: Food Adulteration

- Definition, reasons and types.
- Adulterants in common food items

Module IV: Safety aspects

- Water and beverages such as soft drinks, tea, coffee, cocoa.

Module V: Safety assessment and Safety evaluation

- Food contaminants and pesticide residues.
- heat treatments and related processing techniques

Module VI: Concept of quality attributes

- Physical, chemical, nutritional, microbial, and sensory.
- Concepts of quality management.
- Principles of quality control.
- Quality management systems in India; Sampling procedures and plans.
- Food Safety organizations dealing with inspection, traceability and Labeling issues, International food standards.

Module VII: HACCP

- Define,
- Principles
- Uses
- How HACCP assists the food industry.

Module VIII: Quality assurance, Total Quality Management

- GMP/GHP
- GLP, GAP
- Sanitary and hygienic practices
- Quality manuals, documentation and audits
- Indian & International quality systems and standards like ISO and Food Codex
- Export-import policy and export documentation

REFERENCE BOOKS/ JOURNALS

- Bhatti, S. 1995. Fruit and vegetable processing. CBS Publishers, Distributors, New Delhi.
- Coles, R., McDowell, D., Kiiwan, M. J. 2003. Food Packaging Technology. Blackwell Publishing Co.
- Dauthy, M. E. 1995. Fruits and Vegetables Processing- FAO Bulletin 119. International Book Distributing Co., Lucknow.
- Devendia, K. B. and Piiyanka, P. 2006. An Introduction to Food Science and technology and Quality Management. Kalyani Publishers 81-272-2521-5.
- FAO - Training Manual No.17/2. 2007. Prevention of post-harvest food losses: Fruits, Vegetables and Root crops. Daya Publish

MAJOR:**BASIC HUMAN PHYSIOLOGY****COURSE CODE: FN(Th.)2011****Learning Objectives:**

To know the basic physiological aspects of human body in relation with several chronic and acute ailments

COURSE OUTCOME	Students will be able to learn general physiological terminologies, cell structure & function, histology and gross anatomy of muscular system, cardiovascular system, respiratory system, reproductive system and digestive System with relation to various diseases and their diagnosis associated with.
-----------------------	---

Module I: Cellular Organization

Cell structure, plasma membrane (fluid mosaic model), and cell organelles and their functions- Mitochondria, Centrioles, Endoplasmic Reticulum, Ribosome, Peroxisome, Golgi Apparatus, Cytoskeletons, Cytoplasm. Brief idea about cells, tissues, organs, systems. Cell theory, Cell principle. Tissues- brief description of major types and disorders.

Module II: Cardiovascular System

Functional anatomy of heart and blood vessels.

Properties of cardiac muscle.

Origin & spread of cardiac impulse, heart block, cardiac arrhythmias.

ECG: leads, principles of normal recording, normal waves & internal & their interpretations, electrical axis of the heart including left and right axis deviation, clinical uses of ECG.

Cardiac cycle: Mechanical events, pressure changes in atria, ventricles, aorta, pulmonary artery and jugular vein. End diastolic volume, end systolic volume, ejection fraction.

Heart sounds: normal character, physiological basis of splitting, murmur. Cardiac output: definition, determination, factors regulating, venous return.

Arterial pulse: normal & abnormal

Physical principles governing flow of blood in heart & blood vessels, laminar flow, turbulent flow, Reynolds number, peripheral resistance, Poiseuille-Hagen formulae.

Arterial pressure: total pressure, lateral pressure, Bernoulli's principle, importance of different pressure, measurement, factors controlling B. P. effects of gravity, posture and exercise on B.P Hypertension & hypotension

Module III: Gastrointestinal System

Characteristics of G.I wall

Brief about G.I. Tract Enzymes and Hormones

Saliva: Composition, Functions, control of secretion.

Gastric juice: Composition, mechanism of secretion, functions, regulation of secretion, mucosal barrier, peptic ulcer, gastrectomy.

Pancreatic juice: Composition, functions, regulation, applied importance

Liver & Gall Bladder: Composition & functions of bile, control of secretion, functions of gall bladder, gall stones, enterohepatic circulation, jaundice, functions of liver & L.F.T.

Small intestine: Composition & regulation of secretion and functions of intestinal juice.

Large intestine: Functions

Movements of GI tract: Mastication deglutition, gastric motility and emptying, intestinal motility with reference to BER, small bowel wave, peristalsis, paralytic ileus defecation.

Module IV: Respiratory System

Functional Anatomy and functions of respiratory system. Mechanics of respiration.

Lung volumes and capacities: definition, normal values, their measurement and clinical importance

Pulmonary ventilation, alveolar ventilation, dead space.

Diffusion of gases across alveoli-capillary membrane, diffusing capacity. Pulmonary circulation.

Oxygen & carbon dioxide transporting blood.

Pressure changes during ventilation, pressure volume relationship including surfactant and compliance, airway resistance, work of breathing

Control of respiration: response to exercise, periodic breathing

Hypoxia including high altitude physiology and acclimatization, asphyxia, cyanosis, oxygen therapy and toxicity.

Lung function tests

Module V: Reproductive System

Sex differentiation and development of Reproductive system. Puberty, precocious and delayed puberty

Male reproductive system: Spermatogenesis, endocrine functions of testis, abnormalities of testicular function, cryptorchidism, male hypogonadism, sterility.

Female reproductive system: ovary, oogenesis, ovulation, corpus luteum, ovarian hormones –oestrogen, progesterone, relaxin, control of ovarian functions by hypothalamic and pituitary hormones.

Menstrual cycle: ovarian cycle, uterine cycle, hormonal basis, abnormalities of menstruation, infertility

Pregnancy: Fertilization, implantation, placental hormones, pregnancy tests, parturition. Lactation and Contraception.

BASIC HUMAN PHYSIOLOGY LAB

Learning Objectives:

To understand the microscopic examination of physiological tissue samples, basic tools & techniques of Blood pressure measurements, bleeding time, Clotting time analysis and documentations.

COURSE OUTCOME	Students will be able to learn different practical exposure of physiological Aspect in laboratory.
---------------------------	--

- Microscope and its use
- Determination of blood pressure- systolic and diastolic
- Recording of pulse (Supine, lying and walking).
- Harvard Step Test
- Determination of bleeding time and coagulation time.
- Detection of blood group and Rhesus factor
- Identification of the prepared slides- blood cells, renal, nervous muscle, Stomach, Intestine-small and large, Liver and Pancreas
- Staining blood cells

REFERENCEBOOKS/JOURNALS:

- Keele, C.A and Neil. E(1978), Samson Wright’s Applied Physiology, Oxford University Press.
- Tortora G.J and N.P Anagnostakos (1984), Principles of Anatomy and Physiology, Harper and Row

Publisher, New York.

- Pearce Evelyn(2010): Anatomy and Physiology for Nurse, London: Faber & Faber Ltd.
- Wilson (1989): Anatomy and Physiology in Health and Illness, Edinburgh, Churchill Livingstone.
- Hoar W S (1984): General and comparative Physiology. 3rd ed. Prentice-HallofIndia
- Win Word(1988): Sear's Anatomy and Physiology for Nurses. London

SEC

FOOD PRESERVATION COURSE CODE: FN2052

- **Food preservation:** definition, objectives and principles of food preservation. Different methods of food preservation.
- **Preserved Products:** Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups-types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.

- **Use of Various Preserving Agents**

Sugar and sugar products: Different forms of sugar (sugar, jaggery, honey, syrup), selection, storage and use, preserves.

Fats and Oils: Types and sources of fats and oils (animal and vegetable), processing, uses.

Food adjuncts: Spices, condiments, herbs, extracts, concentrates- origin, classification, description, uses, specifications, procurement and storage.

Salts: Types, uses in the diet.

- **Preservation of various foods**

Cereals and pulses

Fruit and vegetables

Flesh foods

Milk and milk products

SEMESTER III

Major:

ADVANCED HUMAN PHYSIOLOGY

COURSE CODE: (FN(Th.)3011

Learning Objectives:

To know the basic physiological aspects of human body in relation with several chronic and acute ailments

COURSE OUTCOM E	Students will be able to learn general physiological terminologies, cell structure & function, histology and gross anatomy of muscular system, cardiovascular system, respiratory system, reproductive system and digestive System with relation to
--------------------------------	---

Module 1

Endocrine System: Structure and functions of various glands: pituitary, thyroid, parathyroid, adrenal gland and pancreas, hypothalamus. Hormonal functions and disorders. Gastrointestinal hormones and growth factors.

Module 2

Excretory System: Structure of Kidney, Nephron- structure and function; Renal circulation- formation of urine. Renal regulation- osmolarity and volume of blood fluids. Diabetes insipidus. Formation of hypertonic urine.

MODULE 3

Musculoskeletal System: Types of muscles, their structure and function. Skeletal muscle contraction and relaxation; Isotonic and isometric muscle contraction. Structure and function of nerves.

MODULE 4

Nervous System: Brain and spinal cord- anatomy. Functions of cerebrum, cerebellum, and hypothalamus. Central and peripheral nervous system. Reflex action. Autonomous nervous system- sympathetic and parasympathetic. Sensory receptors

Nutritional Biochemistry**COURSE CODE: FN(Th.)3012**

Learning Objectives:

To understand basic ideas regarding biomolecules, the basic building block of living organisms, focusing on their structural underpinnings, unique properties, biological roles and functions and interrelations.

COURSE OUTCOME	Students will come to know about 1. chemical & molecular foundationsof life 2. association between structure and function of various biomolecules with a biological nerspective.
-----------------------	---

The foundations of Biochemistry:

Cellular and chemical foundations of life, Water- unique properties, ionization of water, Bufferingaction in biological system, water as a reactant and fitness of the aqueous environment.

Amino Acids:

Structural features and classifications, Physical properties, optical properties (Stereoisomerism),Chemical properties (acid base properties, titration curve) of amino acids

Carbohydrates:

Monosaccharides- structure of aldose and ketose, Ring structure of sugars, conformations of sugars, mutarotations, anomers, epimers and enantiomers, structure of biologically important sugar derivatives, oxidation and reduction of sugars, Formation of disaccharides, reducing and non-reducingdisaccharides, , Polysaccharides- homo & heteropolysaccharides, structural & storage polysaccharides, glycoproteins & glycolipids.

Lipids:

Building blocks of lipids- Fatty acids, glycerol, ceramide; storage lipids- triacyl glycerol and waxes,structural lipids in membranes- glycerophospholipids, galactolipids and sulpholipids , etherlipids, sphingolipids and sterols.

Nucleic Acids:

Nucleotides- structure and properties of bases, Nucleosides- Nucleic acid structure, Watson-Crick model of DNA, Forms of DNA, Structure of major species of RNA-mRNA , tRNA , rRNA , functions of Nucleotides, Components of Coenzyme.

Vitamins:

Classification of vitamins- fat-soluble, water-soluble vitamins, Deficiency diseases and symptoms. Hypervitaminosis.

Nutritional Biochemistry Lab.

COURSE CODE: FN(Pr.)3012

Learning Objectives:

To know about the safe handling of equipment in laboratory and basic biochemical tests with carbohydrates, lipids and amino acids.

COURSE OUTCOME	Students will be able to learn qualitative tests of macronutrients, amino acids and chromatography.
---------------------------	--

Safety measures in laboratories.

Preparation of buffers, phosphate and acetate buffers.

Qualitative tests for Carbohydrates.

Qualitative tests for lipids.

Qualitative tests for amino acids, protein.

Qualitative tests for nucleic acids.

Separation of amino acids/ sugars/ bases by thin layer chromatography.

SEC:**Basic Dietetics****COURSE CODE:** FN3051

COURSE OUTCOME	Understand the fundamental principles of dietetics. To demonstrate knowledge of the different physiological systems and nutrient metabolism. Identify major food groups and their nutritional contributions. Recognize dietary requirements for different
---------------------------	---

Module 1: Introduction to Dietetics

- Definition and scope of dietetics
- Importance of nutrition and diet in health
- Basic nutrients: carbohydrates, proteins, fats, vitamins, and minerals
- Digestion and absorption of nutrients

Module 2: Recommended Dietary Allowance (RDA) Across Life Stages

- Nutritional needs during infancy, childhood, adolescence
- Nutrition in adulthood and the elderly
- Nutrition for pregnancy and lactation
- Factors affecting nutritional requirements

Module 3: Food Groups and Balanced Diet

- Classification of food groups
- Concept of a balanced diet
- Food pyramid and dietary guidelines
- Planning balanced meals for individuals and families

Module 4: Common Nutritional Disorders

- Deficiency diseases (e.g., anemia, scurvy, rickets)
- Overnutrition and obesity
- Malnutrition: causes and consequences
- Prevention and management of nutritional disorders

Module 5: Therapeutic Diets

- Principles of therapeutic diet planning
- Types of therapeutic Diet
- Basics of Diet modifications for common diseases: diabetes, hypertension, cardiovascular diseases, gastrointestinal disorders

REFERENCE BOOKS:

B. Srilakshmi – Dietetics

Nutritive Value of Indian Food - C Gopalan

SEMESTER IV

NUTRITIONAL BIOCHEMISTRY II

COURSE CODE: FN(Th.)4011

Introduction:

Importance and development of nutritional biochemistry

Carbohydrate: Digestion, absorption, glucose transport, glycolysis, citric acid cycle, gluconeogenesis, glycogenolysis, glycogenesis, pentose phosphate pathway

Lipid: Digestion, absorption, oxidation of fatty acids, biosynthesis of fatty acids, lipoprotein-classification, composition, transport, hyperlipoproteinemias, and ketosis

Protein: Digestion, absorption, amino acid metabolism, transamination reaction, deamination reaction, urea cycle

Vitamins: Chemistry and biochemical role of fat soluble vitamins. A, D, E and K. Water soluble vitamins-B1, B2, B6 and C.

Minerals: Biochemical role of inorganic elements. Inborn errors of metabolism

NUTRITIONAL BIOCHEMISTRY -II LAB COURSE CODE: FN(Pr.)4011

Learning objective: To understand and analyze macronutrients, their basic chemistry, identification, reactions, and to develop the knowledge on the importance of nutritional biochemistry in the field of nutrition science.

COURSE OUTCOME	Students will be able to learn the practical aspects of nutritional biochemistry, applications of qualitative analysis various macronutrients.
-----------------------	--

- Analysis of amino acids
- Qualitative analysis for proteins
- Estimation of serum lipoproteins
- Estimation of serum creatinine
- Estimation of serum urea
- Estimation of serum iron, phosphorus, calcium, and vitamin D

REFERENCE BOOKS:

- 1.) Nutritional Biochemistry. (1998). Tom Brody. Elsevier publication. 2nd Edition
- 2.) Swaminathan, M. Food Science, (2005) Chemistry and Experimental Foods, Bappco Publishers, Bangalore.
- 3.) Meyer, L.H, Food Chemistry, (2004) CBS Publishers and Distributors, 4th edition.
- 4.) Paul, P.C. and Palmer, H.H. Food Theory and Applications (2000) JohnWiley and Sons, New York, (Revised Edition).
- 5.) Chopra H.K, Panesar, P.S, Food Chemistry (2010) Narosa Publishing House, New Delhi.

ADVANCED NUTRITION

COURSE CODE: FN(Th.)4012

Learning Objectives:

To know about the physiological and metabolic roles of various nutrients and their interactions inhuman nutrition.

COURSE OUTCOME	Enable students to understand the basis of human nutritional requirements and recommendation through the life cycle, to familiarize students about the recent advancement in nutrition.
-----------------------	--

Minerals-functions, sources, bio-availability, requirement, deficiency & toxicity of the followingminerals-calcium, iron, iodine, fluorine, sodium, and potassium

Vitamins-classification, units of measurement, sources, functions, deficiency and toxicity of following vitamins:

- a) Fat soluble vitamins: Vitamin A, Vitamin D, Vitamin E, Vitamin K
- b) Water soluble vitamins: Ascorbic acid, Thiamine, Riboflavin, Niacin, Other members of B complexsuch as B6, Folic acid and B12

ADVANCED NUTRITION LAB

COURSE CODE:

FN(Pr.)4012

Learning Objectives:

To know the determination of micronutrients from foods.

COURSE OUTCOME	Students will come to know about determination of Ash content, moisture content and other micronutrients content in food.
-----------------------	--

Determination of Ash content in food,

Determination of Moisture content in food

Determination of calcium, iron, and Vitamin C content in foods

REFERENCE BOOKS/JOURNALS:

1. Michael Zimmerman, Handbook of Nutrition, Micronutrients in Prevention and Therapy of Disease, Theme Medical and Scientific Publishers Ltd, U.P.
2. Clinical Nutrition & Dietetics- F. P. Antia and Philip Abraham, Oxford University Press
3. Indian Council of Medical Research Nutrient Requirements and Recommended Dietary Allowances for India, A Report of the Expert Group of the Indian Council of Medical Research, New Delhi; ICMR.
4. Matab S. Bamji, N. Prahlad Rao, Vinodini Reddy (1996): Text Book of Human Nutrition, Oxford & IBM Publishing Co. Pvt. Ltd., New Delhi.
5. Swaminathan M. (1991): Advanced Text Book on Food & Nutrition, Vol. I & II (2nd Edition, Revised), Bangalore printing & Publishing Ltd

SEMESTER V**FOOD MICROBIOLOGY****COURSE CODE: FN(Th.)5011**

COURSE OUTCOM	Students will come to know the interactions between food, microorganisms and their environment to ensure food safety, quality
----------------------	--

Learning Outcome:

To impart knowledge of the basic principles of bacteriology, virology, mycology, immunology and parasitology.

Introduction to microbiology and its relevance to everyday life-general morphology of microorganism's general characteristics of bacteria, fungi, virus, protozoa, algae.

Control of microorganisms-growth curve-effect of environmental factors on growth of microorganisms-pH, water activity-oxygen availability, temperature and others.

Microbiology of different foods-spoilage and contamination-sources, types, effects on the following:

- a) Cereals and cereal products. b) Sugar and sugar products. c) Vegetables and fruits. d) Meat and meat products. e) Fish and other sea foods. f) Eggs and poultry. g) Milk and milk products. h) Canned foods.

Environmental microbiology-water, air, soil and sewage.

Microbial intoxications and infections-sources of contamination of foods, toxin production and physiological action. Sources of infection of foods by pathogenic organisms-symptoms and method of control.

Beneficial effect of microorganisms.

Relevance of microbiological standards for food safety.

FOOD MICROBIOLOGY LAB**COURSE CODE: FN(Pr.)5011**

Learning Objective:

Enable students to understand the methods of isolating and characterizing various microbes associated with foods and food groups.

COURSE OUTCOME	Students will come to know the use of 1. various microbiological techniques for the study of food 2. The methods used to detect pathogens in foods.
-----------------------	--

1. Introduction, Laboratory Safety, Use of equipment, Sterilization Techniques, Culture Media: Types and Uses, Preparation of Nutrient Broth and Agar Slant
2. Inoculation and growth of microorganisms.
3. Staining of organism and study of morphology of bacteria and fungi under light microscope.
4. Test for proper pasteurization of milk and milk products.
5. Identification of bacteria in foods (e.g., bread, vegetables, cheese).
6. Identification of water borne organism like coli form, Salmonella etc by simple biochemical

DIETETICS

COURSE CODE: FN(Th.)5012

Learning Objective:

To understand the medical nutritional therapy for different disease conditions according to their body compositions, anthropometric measurements, food allergies, ethnicity, cultural backgrounds, food habits and level of physical activities.

COURSE OUTCOME	Students able to understand 1. principles of diet therapy 2. modification of normal diet for therapeutic purposes in different disease conditions 3. the role of dietitian.
-----------------------	---

Diet in surgical conditions, burns, cancer, infection and fever.

Diet in influenza, typhoid fever, recurrent malaria and tuberculosis.

Diet in diseases of the liver and gall bladder: Etiology, symptoms and dietary treatment in jaundice, hepatitis, cirrhosis of the liver and hepatic coma.

Dietary treatment in cholecystitis and cholelithiasis and pancreatitis.

Diet in diabetes mellitus: incidence predisposing factors, symptoms, types, tests for detection, metabolism and meal management. Complications of diabetes, hypoglycemic drugs, insulin and its type.

Diet in cardiovascular diseases: role of nutrition in cardiac efficiency. Incidence of atherosclerosis, dietary principles, dietary treatment of hyperlipidaemia and chronic diseases of the heart, dietary management of hypertension, sodium-restricted diet, source of sodium and dangers of sodium restriction.

Diet in renal diseases: symptoms and dietary treatment in acute and chronic glomerulonephritis, nephrosis, renal failure, kidney stone and dialysis. Causes and dietary treatment of urinary calculi. Acid and alkaline-producing and neutral foods.

Gout: causes, symptoms and diet

DIETETICS LAB

COURSE CODE: FN(Pr.)5012

Learning Objectives:

To understand the modification of a normal diet to fit the nutritional needs of a specific subject with nutrients, consistency, texture and food allergies/food tolerances.

COURSE OUTCOME	Students able to understand modification of normal diet for therapeutic purposes in different disease conditions.
-----------------------	---

Nutrition in fever and infections- tuberculosis, AIDS

MNT for diseases of hepato- biliary tract- Hepatitis, Cirrhosis, Hepatic comaMNT

for Kidney diseases –Nephritis, Nephrosclerosis, Diet for dialysis

MNT for life style diseases – Diabetes- IDDM, NIDDM, Atherosclerosis, Cancer, PCOD

Special diets for Obesity- Low carb diet, Keto Diet, Intermittent Diet

REFERENCE BOOKS/ JOURNALS:

- a. BSrilakshmi- Dietetics
- b. Krause's Food & the Nutrition Care Process by L. Kathleen Mahan, Janice L Raymond, 14th ed.
- c. Sue Rodwell Williams, (1993): Nutrition, Diet Therapy, (7th Ed): W.B. Saunders Company London.
- d. Antia F.P. And Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford Publishing Company.
- e. Gopalan C., Ram Sastri B.V. And Bal Subramaniam S.C., (2006) Nutritive Value of Indian Foods, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research.

FAMILY MEAL MANAGEMENT

COURSE CODE: FN(Th.)5013

Learning Objectives:

To understand the principles of meal planning, and nutritional requirements in different age groupsand nutritional requirements in different physiological conditions.

COURSE OUTCOM E	Students will come to know about 1. Principles of meal planning 2. Nutritional requirements during pregnancy, lactation, infancy, schoolgoing age, adolescence, adulthood and
------------------------	--

Introduction to meal management - balanced diet – food guide – basic five food groups.Basic principles of meal planning objectives – steps in meal planning, food cost.

Nutrition in pregnancy – physiological changes of pregnancy – nutritional requirements – foodselection – complications of pregnancy.

Nutrition during lactation – physiology of lactation – nutritional requirements.

Nutrition during infancy – growth and development – nutritional requirements –breast feeding – infant formulae – introduction of supplementary foods.

Nutrition during early childhood (toddler/preschool) – growth & nutrient needs –nutrition relatedproblems – feeding patterns.

Nutrition of school children – nutritional requirement – importance of snacks – schoollunch. 8.Nutrition during adolescence growth & nutrient needs – food choices – eating habits –factors influencing.

1. Elementary idea of weight and measure.
2. Planning and preparation of diet for adult man and woman during different physical activities and different cost.
3. Planning and preparation of a balanced diet for a pregnant and lactating woman. Modification of dietary pattern during various complications of pregnancy.
4. Preparation of weaning food. Planning and preparation of diet for a toddler.
5. Preparation of diet for a preschool and school child

REFERENCE BOOKS/ JOURNALS

2. Textbook of Nutrition-Ravinder Chadha & Pulkit Mathur, Orient Blackswan Pvt. Ltd.Telangana.
 3. B. Srilakshmi- Dietetics, 7 th ed
 4. Sohi D. A Comprehensive Textbook of Nutrition & Therapeutic Diets, New Delhi:Jaypee Brothers Medical Publishers.
 5. Arora K (2008). Theory Of Cookery, Frank Brothers
 6. Mann and Truswell: Essentials of Human Nutrition, Oxford University Press.
 7. Gopalan, C. et. al : Nutritive value of Indian Foods, Indian Council of Medical Research.
 8. Indian Council of Medical Research : Nutrient Requirements and Recommended Dietary Allowance for Indians, New Delhi.
 9. 8. FAO/WHO/UNO: Technical Report Series, 724 (1985). Energy and Protein Requirement,Geneva.
 10. WHO Technical Reports Series for different Nutrients.
 11. Ghosh, S.: The Feeding and Care of Infants arid Young Children, VHAI. 6th Ed.Delhi.
- Clinical Nutrition & Dietetics- F. P. Antia and Philip Abraham, Oxford University Press

Food Sanitation and Hygiene
COURSE CODE: FN(Th.)5014

Learning Objectives:

To understand the methods of contamination, safety measures and hygiene maintenance for foodproducts in Industries, hospitals and institutions.

COURSE OUTCOME	Students will come to know about the safety measures and hygiene maintenance for food products in Industries, hospitals and institutions.
-----------------------	--

General introduction to cleanliness, hygiene, sanitation, the importance of hygiene and sanitation in food sector

Food safety contamination sterilization disinfection

Foodborne diseases rope disease moodiness food poisoning symptoms

Sources of food contamination

Hygiene and sanitation practices in food operating hygiene and sanitation before production precautions to be taken during the production precautions to be taken after the production

Pest control of food industry

Insects-rodents' birds, domestic animals and wild animals

Operating structure and design properties

Water hygiene

Important microorganisms transmitted by water

Causes of water contamination

Water cleaning: physical methods chemical methods

Chemicals used for water disinfection: ozone , iodine, Potassium permanganate , Chlorinated lime (limestone, javelin, calcium hypochlorite)

Correction of water chemical deficiencies Good

manufacturing practices for food sectorFood

safety management systems

HACCP (Hazard Analysis Critical Control Point)

STANDARD SANITATION OPERATION PROCEDURES (SSOP)

FOOD SANITATION AND HYGIENE LAB

COURSE CODE: FN(Pr.)5014

Learning Objective

To understand the safety measures, sanitary practices, control of food contaminations in food industries.

COURSE OUTCOM E	Students will understand about the hands-on experience regarding personal hygiene; sanitary practices in food preparation causes investigation, control of illness caused by food contamination (Hazard Analysis Critical Control Points):
--------------------------------	---

Keeping Food Safe

Contamination, Food Allergens, and Foodborne IllnessFood

Safety Management Systems

Safe Facilities and Equipment

Cleaning and Sanitizing

Integrated Pest Management

Food Safety Regulation and Standards HACCP

Principles and Application GuidelinesStaff Food

Safety Training

SEMESTER VI

Major:

Diet Counselling and Patient Care

COURSE CODE: FN(Th.)6011

Learning Objectives:

To understand the methods, communication tool and techniques of patient handling, patient counselling and while

COURSE OUTLINE	Students will understand methods communication tool and techniques of patient handling, patient counselling and while giving dietary therapy with modifications of normal diet.
-----------------------	--

giving dietary therapy with modifications of the normal diet.

- Introduction: Normal Diet, Modified Diet, Hospital Diet, and their classifications
- Balanced Diet and the Importance of a Balanced Diet
- Therapeutic diet and its classification
- Diet Counselling and Diet chart Preparation guidelines for diet counselling
- Communication techniques: Interviewing, Teaching, Counselling, Motivating
- Diet counselling room set up
- The Diet interview questionnaires
- Patient care and education about Diet on Oral Health: Diet & Dental Caries, Effect of fat, Protein, Vitamins, Trace elements on Dental Caries

Diet Counselling and Patient Care Lab

COURSE CODE: FN(Pr.)6011

Learning Objectives:

To understand the hands-on training exposure methods, communication tool and techniques of patient handling, patient counselling.

COURSE OUTCOME	Students will understand methods communication tool and techniques of patient handling, patient counselling and giving dietary therapy for specific nutritional needs.
-----------------------	---

- Practical exposure to the Preparation of the diet chart
- Practical exposure to Nutritional Assessment
- Methods and Techniques of Diet Counselling: Communication with patients, Interviews, Teaching, Counselling and Motivation
- Real Case Assessment
- Case Study
- Case Study Report Submission

GERIATRIC NUTRITION
COURSE CODE: FN(Th.)6012

Learning Objectives:

To understand the Nutritional & Health assessments and planning for a modified diet for elderly people

COURSE OUTCOME	Students will come to know about the different methods of nutritional assessment applied in elderly people and their modified, special dietary planning and artificial feeding practices
-----------------------	---

- Introduction to Physiology of Ageing
- The ageing process - physiological, metabolic, body composition changes and impact on health and nutritional status.
- Socio-psychological aspects of ageing- special problems of elderly women, Nutritional and health status of elderly people
- Factors influencing food and nutrient intake, health status, including lifestyle patterns, medication, psychosocial aspect etc.
- Chronic degenerative disease, neurological and nutritional problems of the elderly:
 - Weight Disorders: Obesity
 - Metabolic Syndromes
 - Osteoporosis
 - Anemia
 - Gastroenteritis
 - Dementia and Parkinson’s Disease
 - Nutritional Dementia
- Enteral and parenteral nutrition support. Artificial Feeding. Role of immune enhancer, conditionally essential nutrients, Immune suppressants, and special diets in critical care
- Policies and programs of the government and NGO sector pertaining to the elderly

GERIATRIC NUTRITION LAB
COURSE CODE: FN(Pr.)6012

Learning Objective:

To understand the Nutritional & Health assessments and planning for modified diet or special diet for different degenerative conditions of elderly people.

COURSE OUTCOME	Students will come to know about the different methods of nutritional assessment applied in elderly people and their modified, special dietary planning and artificial feeding practices.
-----------------------	--

- Measuring and recording Nutritional Status of Elderly people
- Nutrition Problems of elderly-Report
- Diet Chart preparation for –
 - Elderly Degenerative Disorders: Osteoporosis
 - Anemia
 - Gastroenteritis
 - Dementia and Parkinson’s Disease
 - Nutritional Dementia

COMMUNITY NUTRITION

COURSE CODE: FN(Th.)6013

Learning Objectives:

To understand the nutritional deficiencies, the food consumption pattern in a specific geographical location or community.

COURSE OUTCOME	Students will come to know the 1. basic understanding of common methods of nutritional assessment, using dietary, biochemical and anthropometric approaches. 2. To gain an understanding of the rationales, advantages, and disadvantages of these various approaches to nutritional assessment. 3. To gain an understanding of the appropriate applications of the various methods and the
-----------------------	--

- Concept of Community, types of Community
- Factors affecting the health of the Community
- Nutritional Assessment and Surveillance: Meaning, need, objectives and importance
- Nutritional assessment of humans: Clinical findings, nutritional anthropometry, biochemical tests, and biophysical methods.
- Diet survey: Need and importance, methods of dietary survey, Interpretation - concept of consumption unit, individual and total distribution of food in family, adequacy of diet in respect to RDA
- Concept of Family Food Security
- Clinical Signs: Need & Importance's, identifying signs of PEM, vitamin A deficiency and iodine deficiency, Interpretation of descriptive list of clinical signs.
- Nutritional anthropometry: Need and importance, standard for reference, techniques of measuring height, weight, head, chest and arm circumference, interpretation of these measurements. Use of growth charts.
- International, national, regional agencies and organisations. Nutritional intervention programmes to combat malnutrition.

COMMUNITY NUTRITION LAB

COURSE CODE: FN(Pr.)6013

Learning Objectives:

To understand the practical knowledge in field works related to nutritional deficiencies, food consumption pattern in a specific geographical location or community

COURSE OUTCOME	Students will gain knowledge on hands-on training of the 1. basic understanding of common methods of nutritional assessment, using dietary, biochemical and anthropometric approaches. 2. To gain an understanding of the rationales, advantages, and disadvantages of these various approaches to nutritional assessment. 3. To gain an understanding of the appropriate applications of the various methods and the
-----------------------	--

- Nutrition surveillance at Community: Nutrition screening
- Assessment of the nutritional status: Components of nutritional assessment

- Assessment of the nutritional status by Anthropometric measurements
- Case Studies of nutritional assessment in a community
- Preparation of Field Report

Food Processing and Nutrition Science

COURSE CODE: FN(Th.)6014

Learning Objectives:

To understand the fundamentals of food processing and its application in the commercial field.

COURSE OUTCOM E	Students will come to know the 1. fundamental food shorting and grading 2. Students will become familiar with milling techniques and product development related to it 3. Students will become familiar with the Pasteurization technologies and its advancement 3. Students will be able to analyze the different technological challenges in food canning and its subsequent storage 4. Students will become understand the extrusion
--------------------------------	--

- Basic preparation techniques for fruit & vegetable products; Concept of aseptic processing, hygiene, plant sanitation, Material of construction for equipment and machinery; Plant layout concept; Inspection of raw materials; Sorting and grading; Handling and storage concept
- Processing of cereals and pulses: Milling of wheat – product and by-products; Flour improvers and bleaching; Rice milling system; Product and by-products of rice milling and their utilisation; Parboiling of rice, RTE foods made from rice; Fermented food made from rice flour. Corn: Dry and wet milling of corn; uses of corn flour; Corn starch and its uses; Milling of Pulses
- Oilseeds: Mechanical and solvent oil extraction of oilseeds; Products and by-products from oil extraction plants, Margarine, mayonnaise
- Homogenization, pasteurisation and sterilisation of milk; Preparation methods for condensed, and evaporated milk; Milk products processing – cream, butter, cheese, ice-cream, fermented milk (curd, yoghurt)
- Processing of meat, fish and eggs, post mortem and antemortem inspection of meat, deboning, tenderization, ageing, pickling, curing and smoking of meat; Canning of meat; sausage, dehydrated meat; Meat analogues, smoking, freezing and dehydration of fishes; Fish sausage, minced fish; Surimi; Fish protein concentrate; Fish oil; Structure, composition, spoilage of egg; dehydrated egg powder
- Cold storage of fruits and vegetables; Canning of fruits and vegetables. Preparation of syrup, cordial and nectar, juice concentrate, fruit leather, jam, jellies, marmalades, pickle, chutney, puree, sauces, paste; Production of non-alcoholic and alcoholic beverages
- Tea, coffee and cocoa: Manufacturing processes for making green, oolong and black tea; CTC process; Coffee powder, Instant coffee; Cocoa powder; cocoa liquor; cocoa butter; Chocolates; Chemistry of spices; Spice powder and spice soluble; Oleoresins and essential oils
- Extrusion cooking of foods; Structured food/Designer food; Production of RTE snacks and cereals; Roasting, baking, frying techniques.

