FOOD and NUTRITION

West Bengal State University

2023-24

Food and Nutrition

Programme Objectives:

The objective of the programme is to facilitate students acquire understanding of the concepts, principles of food and nutrition in relation to human health, well - being, management of diseases, and implications for the society.

Programme Outcome:

On successful completion of the programme, the students are expected to

- acquire theoretical knowledge, important values, hands on skills, ability to apply in real life situations, as the thrust of the programme seeks to strike a balance between theory and its applicability
- progress academically smoothly into higher levels being inculcated with a spirit to know continually in the field of food and nutrition, or opt for self - employment/jobs in different related sectors.

Semester wise Outline Structure: Major courses

Semester(s)	Course Codes	Course Title
Semester 1	FNTDSC101T	BASICS OF FOOD AND NUTRITION
	FNTDSC101P	
Semester 2	FNTDSC202T	CHEMISTRY OF NUTRIENTS
	FNTDSC202P	
Semester 3	FNTDSC303T	NUTRITION THROUGHLIFESPAN
	FNTDSC303P	
Semester 4	FNTDSC404T	FOUNDATION OF HUMAN HEALTH - 1
	FNTDSC404P	
	FNTDSC405T	METABOLISM OF NUTRIENTS
	FNTDSC405P	
	FNTDSC406T	COMMUNITY NUTRITION
	FNTDSC406P	
	FNTDSC407T	FOUNDATION OF DIETETICS -1
	FNTDSC407P	
Semester 5	FNTDSC508T	FOOD AND MICROBES
	FNTDSC508P	
	FNTDSC509T	FOUNDATION OF HUMAN HEALTH -2
	FNTDSC509P	
	FNTDSC510T	FOUNDATION OF DIETETICS -2
	FNTDSC510P	
	FNTDSC511T	VITAMINS IN NUTRITION
	FNTDSC511P	
Semester 6	FNTDSC612T	FUNDAMENTALS OF CELL AND MOLECULAR BIOLOGY, GENETICS, IMMUNOLOGY FOR NUTRITION
	FNTDSC612P	
	FNTDSC613T	FOOD BORNE DISASES
	FNTDSC613P	
	FNTDSC614T	PUBLIC HEALTH AND NUTRITION
	FNTDSC614P	
	FNTDSC615T	MINERALS AND WATER IN NUTRITION
	FNTDSC615P	
Semester 7	To be notified later	
Semester 8		

Note: A 5 credit Course will have 3 credit Theory and 2 credit Practical; 45 lecture hours may be allotted for a 3 credit Theory Course

SEMESTER 1

FNTDSC101T:BASICS OF FOOD AND NUTRITION

Course Objectives: To make basics of Food and Nutrition clearer and interesting

- **Introduction to Food and Nutrition**
- Foods: Energy giving, body building and protective. Nutrients: macro and micro nutrients, Diet andbalanceddiet, Menu.
- Healthandnutritionalstatus. Malnutrition,functionalfood,prebiotics,probiotics, phytochemicals, nutraceuticals. Fibre. Functions of foods: physiological, psychological, social. Foodgroups, foodpyramid, Relation betweenfoodandnutrition, healthand diseases.

- **Foods, Nutrients and Cooking of food**
  Foods and their nutrient contents: Nutrients present in cereals and millets, pulses, nuts and oil seeds,fruits and vegetables, milk and milk products, flesh food, eggs, Condiment and spices, salt.Non-nutrient components of foods: phytate, tannins, oxalate, trypsin inhibitor,goitrogens and other toxicagents in food.
  Cooking: Beneficial and adverse effects of cooking. Different methods of cooking-dry,moist, frying, and micro wave cooking- advantage, disadvantage and the effect of various methods ofcookingonfoods, Solarcooking.

- **Food energy and energy requirements:**
  The energy value of foods: Physical and physiological calories. Bomb calorimeter Energy requirement of an individual: Basal metabolic rate (BMR) BMR: Measurement (direct and indirect), factors affecting BMR, SDA offoods. Nutritional requirements and Recommended dietary allowances (RDA): factors affecting RDA, Application of RDA, Estimated Average Requirement (EAR), Reference man and woman.
- **Food adjuncts:** spices, condiments, herbs
- **Food Adulteration and colorants**: Definition, types

FNTDSC101P: BASICS OF FOOD AND NUTRITION (PRACTICAL)

- Generalconceptsofweightsandmeasures,Eye estimationofraw and cookedfoods.
- Process involved in cooking, microwave, steaming, grilling, deep fat frying.
- Preparationof foodfromdifferent food groupsandtheirsignificancein relationtohealth.
- Detection of common adulterants

Course Outcome: On successful completion of the particular course, the students are expected to appreciate well the basics Food and Nutrition.

SEMESTER 2

FNTDSC202T: CHEMISTRY OF NUTRIENTS (THEORY)

Course Objectives: To provide in depth knowledge of structure, properties, and basic functions of different types of nutrients and also select food groups.

- **Chemistry of Carbohydrates:** Carbohydrates:classification-mono-,di and polysaccharides;Stereoisomerismincarbohydrates.Physicalandchemicalpropertiesofmono-,di-andpolysaccharides**.**

- **Chemistry of Lipids:** Lipids: Classification – fattyacids, triglycerides, phospholipids, Glycolipids, sterols and steroids. Eiconoids. Edible fats and oils - physical and chemical properties, Hydrogenation and importanceoffatsin the diet. Physical and chemical properties of saturated, monounsaturated, polyunsaturated fattyacids,trans fattyacids,phospholipids,cholesterols and liposomes.Essential fattyacids**,** nuts

- **Chemistry of Amino Acids and Proteins:** Proteins: Classification. Protein structure and organization: primary, secondary, tertiary and quaternarystructure.Aminoacids-classification.Physicalandchemicalpropertiesofaminoacidandprotein.Biologicalvalueof proteins(BV), Netproteinutilization (NPU)and Proteinefficiencyratio (PER).

- **Dietary Fibers:** definition; types, composition, health benefits

- **Water:** Water in foods, water activity, phase transition of food containing water. Water activity and its influence on quality and stability of foods, methods for stabilization of food systems by control of wateractivity.

- **Select Food groups**: Cereals, millets and Pulses: Structure, composition, important properties including toxic constituents, and health benefits

  Dairy Products –types, composition, properties and health benefits

  Flesh foods: types, composition and health benefits

  Sugar and sugar products including artificial sweeteners: composition and properties

FNTDSC202P: CHEMISTRY OF NUTRIENTS (PRACTICAL)

- Qualitative tests for the identification of: Glucose, Galactose, Fructose, Sucrose, Lactose, Starch, Dextrin.
- Qualitativetestsfortheidentification of -Albumin,Gelatin, Peptone,urea,uricacid.
- Determinationofacidvalueofoils bytitrimetricmethod.
- Determinationofspecific gravityofliquid (fruitjuice,blood).

Course Outcome: On successful completion of the particular course, the students are expected to have clear concept regarding the structures, properties, and basic functions of the nutrients and select food groups.

SEMESTER 3

FNTDSC303T: NUTRITION THROUGH LIFE SPAN (THEORY)

Course Objectives: To understand therelevant principles of human nutrition in different stages of life.

- **Basics of Meal Planning:** Principles of meal planning, Food groups and Food exchange list, Factors affecting meal planning and food related behavior.
- **Nutritionin AdultsandElderly:** Physiological changes in elderly. RDA and nutritional guidelines, dietary management. Nutritional concerns and healthy foodchoicesfor: Adult men and women, Elderly.
- **NutritionduringPregnancy:** Basic idea about physiological aspects of pregnancyFactors(non-nutritional)affecting pregnancy outcome,importanceofadequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements duringpregnancy and modification of existing diet and supplementation, Deficiency of nutrients, especiallyenergy,iron, folicacid,protein,calcium,iodine.Common challengesofpregnancyandtheirmanagements, especially - nausea, vomiting, pica, foodaversions, pregnancy induced hypertension,obesity,GDM. Adolescent pregnancy.
- **NutritionduringLactation:** Basic idea about physiological aspects of lactation,Nutritionduring Lactation: Nutritionalrequirementsduringlactation,dietarymanagement, foodsupplements, galactagogues, preparation for lactation.
- **NutritionduringInfancy:** Infant physiology relevant to feeding and care, colostrum: itscomposition and importance, Breastfeeding: principles, procedure, advantages, initiations; exclusive breastfeeding. Weaning, Introductionofsupplementary foods. Bottle feeding – principles, requirements, hygiene issues. Preparation of formula. Mixed feeding.Artificialfeeding,Management ofpretermand lowbirth weightbabies.
- **NutritionforChildrenandAdolescents:** Growth and development in children, RDA, nutritional guidelines, nutritional concerns and healthy foodchoicesfor: Preschool children, Schoolchildren,Adolescents

FNTDSC303P:NUTRITION THROUGH LIFE SPAN (PRACTICAL)

Planning and preparation of suitable meal for different age groups - infants, children, adolescents, adults, elderlyand also in different physiological conditions – pregnancy andlactation.

Note: Emphasis should be given on principles and quantitative aspects.

Course Outcome: On successful completion of the particular course, the students are expected to have thorough idea regarding principles including specific requirements, sources of nutrients, and also relevant guidelines as applicable for different stages of life.

SEMESTER 4

FNTDSC404T: FOUNDATION OF HUMAN HEALTH -1 (THEORY)

Course Objectives: To provide basic knowledge about the role of different human systems with regard to overall human health

- **GI system:** Structure and function of different segments of GI tract and associated glands.
- **Blood and Body Fluids:** Blood and its composition, Morphology, formation and functions of formed elements, Blood groups andits importance in transfusion, hazards of mismatch blood transfusion. Mechanism of blood coagulation,Hemoglobin-structureand function. Extracellularfluid, lymph.
- **Cardiovascular System:** Structure of heart, artery, vein and capillary, Properties of cardiac muscle, Cardiac cycle, cardiac output,heart rate, heart sounds, ECG- normal and abnormal. Systemic and pulmonary circulation. Bloodpressure,pulsepressureRadial pulse, coronarycirculation
- **Respiratory System:** Structure of lungs: alveoli and airways. Respiratory volumes and capacities,Mechanics of breathing.Oxygenand carbondi oxidetransport, Neural andchemicalcontrol of breathing.
- **Renal Physiology, Skinand Body Temperature:** Anatomy of renal system: kidney, ureter, urethra and urinary bladder,Nephron: structure, Juxtaglomerular apparatus, GFR and GFI, Tubularfunctions, Urineformation: Countercurrentexchanger and multiplier. Role of kidney in water and electrolyte balance. phregulation by kidney.Structure of skin. Sweat and sweat glands. Sebum. Core body temperature, heat loss and heat gain, Regulation ofbodytemperature**.**

FNTDSC404P: BASICS OF HUMAN HEALTH -1 (PRACTICAL)

- Determination of pulse rate in resting condition and after exercise (30beats/10beats method).
- Determination of blood pressure by Sphygmomanometer (Auscultatorymethod).
- Determinationof BleedingTime (BT) andClottingTime (CT).
- DetectionofBlood group(Slidemethod).
- MeasurementofHemoglobinlevel (Sahli`sorDrabkin method).

Course Outcome: On successful completion of the particular course, the students are expected to appreciate the relevant portions of basics of Human Health as is relevant for Food and Nutrition thoroughly.

FNTDSC405T: METABOLISM OF NUTRIENTS (THEORY)

Course Objectives: To provide idea about the general concept of metabolism of different nutrients in human body

- **Enzymes:** Definition and structure. Enzyme substrate interaction. Enzyme kinetics, MichaelisMenten constant (K_m). Enzyme inhibition. Factors regulating enzyme activities, Isoenzymes, Pro-enzymes, Ribozymes, Abzymes, Concept of Rate limiting enzymes.

- **CarbohydrateMetabolism:** Glycolysis. Glycogen metabolism. Metabolism of pyruvate. Outline of pentose phosphatepathway.Anapleroticreactions. Gluconeogenesis and its importance.

- **Lipid Metabolism:** Fatty acid synthesis and *de novo* biosynthesis of fatty acid; regulation and mechanismofchainelongation. Metabolism of cholesterol, its control and pathophysiological importance. β-oxidation of fattyacids.

- **Amino acid Metabolism:** Essentialaminoacids. Transamination.Deamination.Trans-methylation.Decarboxylation.Glucogenic and ketogenic aminoacids. Outline of ureacycle.
- **Biologicaloxidation**:Mitochondrial electrontransport chain. High energyphosphatebond. Formation ofATP.

FNTDSC405P: METABOLISM OF NUTRIENTS (PRACTICAL)

- Estimation of Glucose in blood.
- Estimation of Protein by Biuret and Lowry methods.
- Estimation of urea and uric acid in blood.

Course Outcome: On successful completion of the particular course, the students are expected to have in depth understanding about metabolism of different nutrients in human system.

FNTDSC406T: COMMUNITY NUTRITION(THEORY)

Course Objectives: To provide basic knowledgeabout community health with special emphasis on nutritional aspects

- Introduction to Community: Factors affecting health of the Community.
- Assessment methods: Nutritionalassessmentofhuman:Clinicalfindings,nutritionalanthropometry, biochemical tests, biophysical methods.
- Nutritional anthropometry: Need and importance, standard for reference, techniques of measuring height, weight, head, chest and arm circumference, interpretation of these measurements. Growth & Development, factors affecting growth and development. Use of growth charts.
- Diet survey: Concept 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 familyfood security.
- **Clinical Signs:** Clinical Signs: Need and importance, identifying signs of PEM, vitamin A deficiency and iodine deficiency, Interpretation of descriptive list of clinical signs. Nutritional anaemia.
- **Nutritional Monitoring and Surveillance**: Concept, objectives, procedure, and importance.
- **Agencies and Programmes:** International, national, regional agencies and organizations. National nutritionalinterventionprogrammes to combat malnutrition: ICDS, Midday meal, Special nutrition program, National programsforprevention of anemia, Vitamin A deficiencyandIodinedeficiencydisorders.

FNTDSC406P: COMMUNITY NUTRITION (PRACTICAL)

- Anthropometric Measurements- Body height, body weight, circumference of chest, mid –upperarmcircumference, precautions to betaken.
- Comparison with norms and interpretation of the nutritional assessment data and its significance.Weight for age, height for age, weight for height, Z scores, body Mass Index (BMI), Waist –HipRatio (WHR).
- Growth charts– plotting and interpretation.
- Clinical assessment and signs of nutrient deficiencies especially PEM(Kwashiorkor, marasmus)
- Estimation of food and nutrient intake: Household food consumption data, adult consumption unit, 24 hours dietary recall 24 hours record, Weighment method, food diaries, food frequency data, use of each of the above, information available through each individual, collection of data, estimation of intakes.

Course Outcome: students should be able to conduct nutritional assessments and also know about the interventions thoroughly after completing the particular course.

FNTDSC407T: FOUNDATION OF DIETETICS -1 (THEORY)

Course Objectives: To provide elaborate knowledge about the fundamentals of diet and dietetics

- **Dietetics and Dietician:** Definition and objective of dietetics, Dieticians-Definition, Classification and Responsibility.
- **Food groups:** Four food groups (Caribbean Food Guide; Canadian Food Guide; USA Food Pyramid; British Food Guide; Recommended Nutrient Intake (RNI); Dietary Value Intake; Dietary Reference Value, food group sys**tem.**
- **Dietary guidelines:** Nutritive values as a basis for classification of food, Recommended Daily Allowances (RDA), Dietary guidelines for Indians and food pyramids.
- **Menu Planning:** Rationale for menu planning, Factors affecting food choice, Nutritional factors, otherfactors; Exchange list and food composition tables for menu planning, Steps in the development ofexchange list, Factors to be considered when planning the regular balanced diet: adequacy, balance caloric control, moderation, varietyand aesthetics.
- **Basics of diet therapy:** Basic Basic concepts of diet therapy: Therapeutic adaptations of normal diet, principles and classification ofthetherapeuticdiets, Nutrient modifications.
- **Diet for healthcare:** Team approach to healthcare. Assessment of Patients' needs. Intersectoral coordination
- **Routine Hospital Diet:** Routine Hospital Diets: Regular, light, soft, fluid, parenteral and enteral feeding.

FNTDSC407P: FOUNDATION OF DIETETICS -1 (PRACTICAL)

Planning and preparationof normal diet, fluid diets, soft, semi solid diets, and nutrient modified diets.

Note: Emphasis should be given on principles and quantitative aspects.

Course Outcome: On successful completion of the particular course, the students are expected to have thorough idea regarding principles of routine as well as different types of diets for patients.

SEMESTER 5

FNTDSC508T: FOOD AND MICROBES (THEORY)

Course Objectives: To provide basic knowledge about the role of different microbes in relation to food.

- **Microorganisms and food materials**
- **Factors affecting growth of Microorganisms**
- **Spoilage:** Factors responsible, chemical changes taking place
- **Microbiology of Primary Food commodities**: Milk, meat, fish, plant products
- **Fermented and Microbial Foods**: Fermented milk: yoghurt , cheese, vinegar, fermented vegetables- sauerkraut and kimchi, mould fermentations-tempeh, soy sauce

FNTDSC508P: FOOD AND MICROBES (PRACTICAL)

- Microscopy
- Autoclave, Incubator, Inoculation chamber: Use
- Preparation of different types of media (complex, differential and selective)
- Preparation of slant, stab and plates using nutrient agar
- Morphological study of bacteria and fungi using permanent slides
- Gram staining

Course Outcome: On successful completion of the particular course, the students are expected to appreciate the basics of food microbiology as is relevant for Food and Nutrition.

FNTDSC509T: FOUNDATION OF HUMAN HEALTH -2(THEORY)

Course Objectives: To provide basic knowledge about the role of different human systems with regard to overall human health and well being.

- **Physiology of excitable cells:** Different types of muscles and their structures Mechanism of skeletal muscle contraction and relaxation, Muscle energetic, Isometric and isotonic muscle contraction. Structure of nerves. Nerve impulse and its conduction. Synapse and Neuromuscular junctions. Synaptic transmission. Neutrotrophins.

- **Nervous System:** Brief anatomy of Brain and spinal cord. Central and Peripheral nervous system. Reflexaction and Reflex arc. Outline of functions of cerebrum, cerebellum, hypothalamus. Autonomic nervous system: Sympathetic and parasympathetic nervous system. Sensory physiology: Sensory Receptors as biotransducers. Brief outline of the special senses. Structure and functions of photoreceptors in eye and hair cells in cochlea.

- **Reproductive system:** Structure of ovary, fallopian tubule and uterus. Oogenesis and ovulation. Changes during menstrual cycle, Hormonal regulation of menstrual cycle and menopause Fertilisation and implantation of blastocysts ,Placenta.Hormonal control of pregnancy, parturition, lactation, Structure of testis, prostrateandseminal vesicle. spermatogenesis and its hormonal regulation.

- **Endocrine system:** Structure,hormones and functions of pituitary,thyroid,parathyroid,adrenal gland and pancreas. Hypothalamus as an endocrine gland. Gastrointestinal hormones. Growth factors. Diabetes Mellitus Definition, Etiology, Classification, long and short term complications, Diagnosis,

FNTDSC509P: FOUNDATION OF HUMAN HEALTH -2 (PRACTICAL)

- Test for Visual acuity, Colour vision.
- Identification with reasons of histological slides (Lung, Liver, Kidney, Small intestine, Stomach, Thyroid, Adrenal, Pancreas, Testis, Ovary and Muscle of mammals).
- Quantitative estimation of glucose in blood
- Detection of glucose in urine.
- Total count(TC)and Differential count(DC)

Course Outcome: On successful completion of the particular course, the students are expected to appreciate the relevant portions of basics of Human Health thoroughly as is relevant for Food and Nutrition.

FNTDSC510T: FOUNDATION OF DIETETICS -2 (THEORY)

Course Objectives: To provide in depth knowledge about the significance of dietary management of select lifestyle challenges.

- **Life style disorder:** Introduction, types, etiology, management**.**
- **Diabetes Mellitus** Management (Insulin Therapy, Dietary Management with food exchange list, Exercise, Pharmacological), Role of artificial sweeteners. Overview of special conditions: Diabetes in Childhood, Pregnancy, Role of Nutrition Education, Role of Nutrition in Prevention
- **Cardiovascular diseases** Prevalence, incidence, mortality with special reference to Indian situation. Patho- physiology and Management of Atherosclerosis, Endothelial dysfunction, Thrombosis, Angina Pectoris, Congestive cardiac failure, stroke, MI. Hyper-lipidemia classification, diagnosis and nutritional management, Hypertension: Oetiology, Risk factors, Patho-physiology, Management
- Obesity and Overweight: Body weight components, Classification of obesity,(gynoid/android and Regulation hypertrophy/hypersplasia, Etiology and assessment of obesity and prevalence in Indian situation, Complications of obesity. Management: Medical (Pharmacological), Nutrition and lifestyle, Surgical, Behavioural Juvenile Obesity. Underweight: Etiology, Diet management, Eating disorders:(Anorexia Nervosa and Bulimia), Management (Medical, Nutritional care), Psychological support and Prevention.
- **Nutritional management of metabolic disease:** Gout: Role of proteins and purine, Etiology, Symptoms and complications,Dietary management,
- **Nutrition and respiratory health:** Physiology and functions of the respiratory system, Nutritional management of Asthma
- **Nutritional management in cancer (Oral and colon):** Cancer: Pathogenesis and progression of cancer, Role of Nutrients and food additives in cancer therapies and their nutritional implications, Symptoms, Diagnosis, Cancer therapies: Nutritional implications, Dietary management.
- **Arthritis and Osteoporosis:** Etiology dietary treatment in arthritis and osteoporosis**.**

FNTDSC510P: FOUNDATION OF DIETETICS -2 (PRACTICAL)

Planning and preparation of Diets for the following diseases:

i) Obesity, overweight and Underweight ii) Diabetes mellitus iii) Hypertension and Atherosclerosis iv) Gout v) Osteoporosis

Note: Emphasis should be given on principles and quantitative aspects.

Course Outcome: On successful completion of the particular course, the students are expected to have in depth knowledge about dietary management of several life style challenges.

FNTDSC511T: VITAMINS IN NUTRITION (THEORY)

Course Objectives: To provide basic knowledge about the role of different vitamins in human systems for overall health and wellbeing

VITAMINS

- Chemistry
- Properties
- food sources of plant and animal origins,
- daily requirements in humans including variations with sex, age, special conditions, as applicable,
- absorption(factors affecting and bioavailability)
- functions (including mechanism of actions) in human system,
- deficiency symptoms,
- conditions arising out of excess or inadequate consumption

for fat (A, D, E. K)and water soluble(C, Thiamin, riboflavin, niacin, pyridoxine, biotin, folic acid, pantothenic acid, cobalamine) vitamins

FNTDSC511P: VITAMINS IN NUTRITION (PRACTICAL)

- Estimation of Vitamin C in citrus fruits.
- Clinical assessment of vitamin deficient conditions
- Planning and formulation of cost effective nutritious/supplementary recipe for individuals with diagnosed vitamin deficiencies

Note: Emphasis should be given on principles and quantitative aspects.

Course Outcome: On successful completion of the particular course, the students are expected to possess in depth knowledge about the roles of different vitamins in ensuring human health and well being.

SEMESTER 6

FNTDSC612T: FUNDAMENTALS OF CELL AND MOLECULAR BIOLOGY, GENETICS, IMMUNOLOGY FOR NUTRITION (THEORY)

Course Objectives: To provide basic knowledge about the role of Cell Biology, Molecular Biology, Genetics and Immunology for understanding principles of nutrition in human system

- **Basics of Cell Biology** Structure and basicfunctions of animal cell organelles, Structure and functions of plasma membrane, Role of membrane in transport and communications, Importance of cell junction- tight, gap and desmosome, Types of humantissue-location, structure and functions.Structure of muscles, bones, teeth and joints.

- **Basics of Molecular Biology:** Nucleotides and Nucleic Acids, Genes and Chromosomes, Metabolism of DNA and RNA (basics only)

- **Genetics including Nutrigenomics:**
  Inborn errors of metabolism: PKU, MSUD, Glycogen storage disorders, Galactosemia

- **Basics of Immunology: Immune system** Cells and Organs of the immune system, Innate and Acquired, Primary and secondary immune response, Active and Passive, Antigen, Antibody, Haptens, Adjuvants, Immunoglobulin- classification,

- Antibody production -processing and presentation of antigen, MHC, Humoral immune response. Cell mediated immunity, Formation, maturation and activation of B and T cells, Immune effectors system- cytokines complement system, K cells and NK cells, Cell mediated effectors response, Interferons, Immuno pathology - basic principles of auto immune disease , Vaccine,

- **Immunization:** definition. Host defences and immunity, immunizing agents: its types, national immunization schedule - its importance, immunization in adults and travellers,

FNTDSC612P: FUNDAMENTALS OF CELL AND MOLECULAR BIOLOGY, GENETICS, IMMUNOLOGY FOR NUTRITION (PRACTICAL)

Planning and formulation of cost effective nutritious/supplementary recipe/ dietary guideline for patients with genetic disorders: thalessemia, PKU

Note: Emphasis should be given on principles and quantitative aspects.

Course Outcome: On successful completion of the particular course, the students are expected to possess basic working knowledge in Cellular, Molecular Biology, Genetics and Immunology in order to better appreciate principles of nutrition in human system.

FNTDSC613T: FOOD BORNE DISASES (THEORY)

Course Objectives: To provide basic knowledge about the microbial diseases caused due to consumption

- **Food borne diseases**
- **Food Hazards and Significance of Food borne diseases**
- **Bacterial Agents of Food borne Illness**
- *Bacillus cereus, Clostridium botulinum, Clostridium perfringens, Listeria monocytogenes, E coli, salmonella, shigella, Yersinia enterocolitica,*
- **Non bacterial agents of food borne diseases**
    - *Helminths, nematodes, Protozoa, Toxigenic algae and fungi,*
- **Food borne disease due to naturally occurring toxicants -** Lathyrism, dropsy
- **Food borne viruses-** Hepatitis A and E,

FNTDSC613P: FOOD BORNE DISASES (PRACTICAL)

- Assessment of surface sanitation by swab and rinse method.
- Isolation and enumeration of bacteria from rotten food, bread and vegetables.
- Planning and formulation of cost effective nutritious/supplementary recipe for patients suffering from food borne diseases (Note: Emphasis should be given on principles and quantitative aspects)
- Testing of sanitizers and disinfectants; Study of phenol coefficient of sanitizers.

Course Outcome: On successful completion of the particular course, the students are expected to possess detailed knowledge about the food borne diseases, their causative agents, including mechanism of actions.

FNTDSC614T: PUBLIC HEALTH AND NUTRITION (THEORY)

Course Objectives: To provide basic knowledge about the role of different human systems with regard to overall human health

- **Public health:** Definition of public health; current challenges; Concepts of Epidemic, pandemic, endemic.
- **Community health care** Health care of the community, health care delivery, health care system, Primary health care in India, Indian public health standards for subcenters, PHCs, community health centers.
- **Sanitation and Hygiene:** Hygiene and sanitation: Contamination, control methods using physical and chemical agents, use of preservatives, pest control management, personal hygiene.
- **Community water management:** Community water management: importance of water to the community, sources of water. Concept of water pollution. Purification of water in small land largescale. Drinking water handling and safe drinking water. Potable water.
- **Community waste management** Community waste management: types and methods of disposal of wastes, sewage disposal and treatment. Management of hazardous including bio medical waste.
- **Air pollution** Air pollution: source of air pollution, factors of air pollution. Indoor air pollution. Monitoring of air pollution. Effects, prevention and control of air pollution

FNTDSC614P: PUBLIC HEALTH AND NUTRITION (PRACTICAL)

- Preparation of 3 audio visual aids like charts, posters, models related to health and nutrition for education.
- Assessment of personal hygiene
- Bacteriological Analysis of Water by MPN method
- Assessment of physicochemical properties of wastewater; Estimation of BOD
- Planning and formulation of cost effective nutritious/supplementary recipe/dietary guidelines for public health challenged conditions. (Note: Emphasis should be given on principles and quantitative aspects).
- Field visit (health centre, immunization centre, ICDS, MCH centre, NGOs etc.

Course Outcome: On successful completion of the particular course, the students are expected to appreciate the basics of Public Health and its implications for Nutrition.

FNTDSC615T: MINERALS AND WATER IN NUTRITION (THEORY)

Course Objectives: To provide in depth knowledge about the role of different minerals and water in human systems for health and wellbeing

Minerals and Water

Minerals

- Chemistry,
- food sources of plant and animal origins,
- daily requirements in humans including variations with sex, age, special conditions, as applicable,
- absorption
- functions (including mechanism of actions) in human system,
- deficiency symptoms,
- conditions arising out of excess or inadequate consumption

for iron, calcium, phosphorous, sodium, potassium, chlorine, copper, zinc, magnesium, selenium, iodine, sulphur,

Water: significance in human system; significance of minerals in drinking water, implications of dehydration and its management

Toxicity of arsenic, fluorine, lead, mercury, cadmium.

FNTDSC615P: MINERALS AND WATER IN NUTRITION (PRACTICAL)

- Estimation of calcium in blood (using kit)
- Estimation of sodium and potassium in blood (using kit).
- Planning and formulation of cost effective nutritious/supplementary recipe for patients with challenges in mineral metabolism(Note: Emphasis should be given on principles and quantitative aspects.)
- Planning and formulation of cost effective nutritious/supplementary recipe for patients suffering from dehydration

Course Outcome: On successful completion of the particular course, the students are expected to possess in depth knowledge about the roles of different minerals in ensuring human health and well being.

SEC

Fundamental Skills of Computer and Instrumentation

Course Objective: To facilitate students acquire hands on skill in use of computer and instrumentation as required for students of Food and Nutrition.

- use of commonly available widely used packages related word processing, presentation, email and working knowledge in spreadsheet packages
- Preparation of reports, creation of tables, graphs as especially appropriate for food and nutrition
- Preparation of suitable aids for the purpose of communication and demonstration of food and nutrition related issues especially focussing the common people
- Preparation of self-profile
- Use of microscopy

Course Outcome: The theoretical working principles as essentially required should be briefly explained, but emphasis should be given on students acquiring hands on skills

Fundamental Skills of Fruit and Vegetable Processing

Course Objective: To facilitate students acquire hands on skill in fruits and vegetables processing as required for students of Food and Nutrition.

- Preparation of Fruit preserves (Jam, Jelly).
- Preparation of vegetable preserves (Pickles)
- Tomato Processing.
- Fruit Pulping/Juice/Beverages production.

Course Outcome: The theoretical food processing principles as essentially required should be briefly explained, but emphasis should be given on students acquiring hands on skills