UNIVERSITY OF CALCUTTA

Notification No. CSR/80/2024

It is notified for information of all concerned that in terms of the provisions of Section 54 of the Calcutta University Act, 1979, (as amended), and, in the exercise of her powers under 9(6) of the said Act, the Vice-Chancellor has, by an order dated 20.092024 approved the new revised syllabus of the following:

1. Food & Nutrition: semester-1 to6 syllabus for 4-year Honours & Honours with Research and complete syllabus for 3-year MDC courses of studies.
2. Clinical Nutrition & Dietetics (Core- Vocational): Syllabus of Semester – 1 to 4.

The new CSR shall take effect from the Odd semester examination, 2024 and onwards.

26/9/2024

Prof.(Dr.) Debasis Das

Registrar

SENATE HOUSE

Kolkata-700073

26.09.2024

SYLLABUS FOR UNDERGRADUATE MAJOR COURSE IN

FOOD ANDNUTRITION UNDER NEP, 2022

Semester wise Course Structure									
Semester	**DSC/Core**	**Minor**	**IDC/MDC**	**AEC**	**SEC**	**CVAC**	**Internship (Either Sem 2/4/6)**	**Dissertation/ Research Work Or DSC – 1, 2, 3**	**Total Credit**
1	**1 x 4 = 4 3 Th 1P/TU**	**1 X 4 = 4 (M 1) 3 T 1 P/TU**	**1 X 3 = 3 2 Th 1 P/TU**	1 X 2 = 2 2 Th 0 P/TU	**1 X 4 = 4 3 Th 1 P/TU**	2 x 2 = 4			**21**
2	**1 x 4 = 4 3 Th 1P/TU**	**1 X 4 = 4 (M 1) 3 Th 1 P/TU**	**1 X 3 = 3 2 Th 1 P/TU**	1 X 2 = 2 2 Th 0 P/TU	**1 X 4 = 4 3 Th 1 P/TU**	2 x 2 = 4	**1 x 3 = 3**		**21/24**
3	**2 x 4 = 8 (2x) 3 Th 1 P/TU**	**1 X 4 = 4 (M 2) 3 Th 1 P/TU**	**1 X 3 = 3 2 Th 1 P/TU**	1 X 2 = 2 2 Th 0 P/TU	**1 X 4 = 4 2 Th 2 P/TU**				**21**
4	**4 x 4 = 16 (4x) 3 Th 1 P/TU**	**1 X 4 = 4 (M 2) 3 Th 1 P/TU**		1 X 2 = 2 2 Th 0 P/TU			**1 x 3 = 3**		**22/25**
5	**4 x 4 = 16 (4x) 3 Th 1 P/TU**	**2 X 4 = 8 (M 1 + M 2) (2 x) 3 Th 1 P/TU**							**24**
6	**3 x 4 = 12 (3x) 3 Th 1 P/TU**	**2 X 4 = 8 (M 1 + M 2) (2 x) 3 Th 1 P/TU**					**1 x 3 = 3**		**20/23**
7	**4 x 4 = 16 (4x) 3 Th 1 P/TU**							**1 x 4 = 4 (1Th +3P) for Dist. Or (3Th+1U)For DSC-1**	**20**
8	**3 x 4 = 12 (3x) 3 Th 1 P/TU**							**1 x 8 = 8 For Dissertation Or 3Th +1TU (DSC 2) 3Th +1TU (DSC 3)**	**20**
Credits	**22 x 4 = 88**	**8 x 4 = 32**	**3 x 3 = 9**	**4 x 2 = 8**	**3 x 4 = 12**	**4 x 2 = 8**	**1 x3 = 3**	**(1x4 + 1x8) = 12**	**169+3 =172**
Marks	**22 x 100 = 2200**	**8 x 100 = 800**	**3 x 75 = 225**	**4 x 50 = 200**	**3 x 100 = 300**	**4 x 50 = 200**	**1 x 75 = 75 (either Sem 2/4/6)**	**1x100+1x200 =300 (Dist/ RW)or 1x100 (DSC – 1) 1x100 (DSC – 2) 1x100 (DSC – 3)**	**4300**

Semester	Category of course	Course Title	Credits		
			Theory	practical	Total
I	DSC/Core (Major) (C-1)	Basic Food Science I	3	1	4
	SEC-1	Nutrition and Health Education	4	-	4
	Minor-1	Basic Food Science I	3	1	4
II	DSC/Core (Major) (C-2)	Basic Food Science II	3	1	4
	SEC-2	Nutritional Epidemiology & Public Health	4	-	4
	Minor-2	Basic Food Science-II	3	1	4
III	DSC/Core (Major) (C-3)	Human Nutrition I	3	1	4
	DSC/Core (Major) (C-4)	Human Physiology I	3	1	4
	SEC-3	Food Service Management	4	-	4
	Minor-1	Basic Food Science I	3	1	4
IV	DSC/Core (Major) (C-5)	Human Nutrition-II	3	1	4
	DSC/Core (Major) (C-6)	Human Physiology II	3	1	4
	DSC/Core (Major) (C-7)	Food commodities I	3	1	4
	DSC/Core (Major) (C-8)	Nutritional Biochemistry I	3	1	4
	Minor-2	Basic Food Science-II	3	1	4

V	**DSC/Core (Major) (C-9)**	**Community Nutrition**	**3**	**1**	**4**
	DSC/Core (Major) (C-10)	**Food Commodities II**	**3**	**1**	**4**
	DSC/Core (Major) (C-11)	**Nutritional Biochemistry II**	**3**	**1**	**4**
	DSC/Core (Major) (C-12)	**Diet Therapy I**	**3**	**1**	**4**
	Minor-3	**Human Nutrition -I**	**3**	**1**	**4**
VI	**DSC/Core (Major) (C-13)**	**Food Preservation**	**3**	**1**	**4**
	DSC/Core (Major) (C-14)	**Diet Therapy II**	**3**	**1**	**4**
	DSC/Core (Major) (C-15)	**Food Microbiology**	**3**	**1**	**4**
	Minor -4	**Human Nutrition II**	**3**	**1**	

FIRST SEMESTER

DSC/Core(Major)-C1-TH:BASIC FOOD SCIENCE-I 3 CREDITS

1. Basic concept of Food, Nutrition and Nutrients. Classification of Food, Classification of Nutrients.

2. Carbohydrates- Definition, Classification, Structure and properties.
   Monosaccharides - glucose, fructose, galactose.
   Disaccharides-Maltose, lactose, sucrose
   Polysaccharides-Dextrin, starch, glycogen, resistant starch.
   Carbohydrates- Sources, daily requirements, functions. Effects of too high and too low carbohydrates on health. Digestion and absorption of carbohydrate.

3. Lipids-Definition, Classification & Properties. Fatty acids- composition, properties, types. Lipids - sources, daily requirements, functions. Digestion & Absorption of nutrients. Role & nutritional significances of PUFA, MUFA, SFA, W-3fatty acid.

4. Proteins-Definition, Classification, Structure & properties. Amino acids Classification, types, functions. Proteins - Sources, daily requirements, functions. Effect of too high- too low proteins on health. Digestion & absorption. Assessment of Protein quality (BV, PER, NPU). Factors affecting protein bio-availability including anti-nutritional factors.

5. Dietary Fibre- Classification, sources, composition, properties & nutritional significance

DSC/Core(Major)C1-P: BASICFOODSCIENCE -I (PRACTICAL) 1 CREDIT

1. Identification of Mono, Di and polysaccharides

2. Identification of Proteins

3. Identification of glycerol

SEC 1- TH: NUTRITION AND HEALTH EDUCATION 4 CREDITS

1. Concept, objectives and importance of nutrition and health education.

2. Principles of health education.

3. Nutrition Educators' - criteria. Target groups for Nutrition and Health education: Infants, preschooler, school children, adults, and elderly.

4. Nutrition and health education communication process.

5. Steps in planning health and nutrition education.

6. Channels for nutrition education in the community

7. Methods involved in nutrition and health education

8. Evaluation of nutrition and health education programmes

SECOND SEMESTER

DSC/Core (Major) C-2- TH : BASIC FOOD SCIENCE-II 3 CREDITS

1.Minerals & Trace Elements, Bio-Chemical and Physiological Role, bio-availability & requirements, sources, deficiency & excess (Calcium, Sodium, Potassium Phosphorus, Iron, Fluoride, Zinc, Selenium, Iodine, Chromium)

2.Vitamins - Biochemical and Physiological role, Bio-availability and requirements, sources, deficiency & excess (Fat soluble and water-soluble vitamins), Provitamin, Antivitamin, Pseudo vitamin and Vitamers.

3.Water - Functions, daily requirements, Effect of excess and deficiency. Water balance.

DSC/Core (Major) C-2- P: BASIC FOOD SCIENCCE-II (PRACTICAL) 1CREDIT

1. Determination of Ash content in food
2. Determination of Moisture content in food
3. Determination of calcium, iron, and Vitamin C content in foods.

SEC 2-TH: NUTRITIONAL EPIDEMIOLOGY & PUBLIC HEALTH 4 CREDITS

1. Definition of Health, Dimension of Health: Positive health versus Absence of disease, Determinants of Health, Indicators of health – Mortality, Morbidity, Disability, Nutritional Status, Health care Delivery, Environmental, Socioeconomics, Health care Policy

2. Epidemiology: Definition, Aims, Tools of Measurement – Rates, Ratios and Proportions. Study designs in epidemiology, Descriptive epidemiology, Analytical epidemiology, Data Collection and sources of data.

3. Secondary Sources of Community Health data: Sources of relevant vital statistics of infant, child & maternal mortality rates, Under- 5 mortality, Birth Rate, Crude death rate.

4. Immunization: Importance and National Immunization schedule for children and adults

5. Water and Waste Management: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents like Viral (Viral hepatitis, rotavirus diarrhea); Bacterial (Bacillary dysentery, Cholera); protozoal (Amoebiasis); Helminthic (Roundworm). Sources of water, safe drinking water, potable water, waste and waste disposal, sewage disposal and treatment, solid waste and disposal, liquid waste disposal.

6. Communicable and infective disease control: Nature of communicable and infectious diseases (Measles, Influenza, Tuberculosis, Dengue, SARS), infection, contamination,

disinfections, decontamination, transmission-direct & indirect, vector borne disease (Malaria, Typhoid, Hookworm infestation, Chikungunya fever) infecting organisms and positive agents, environmental agents and epidemiological principles of disease control.

7. Public health hazards due to contaminated foods: Food borne infections (Botulism, Salmonellosis, Shigellosis, Staphylococcal intoxication) and intoxications (Lathyrism, Aflatoxicosis, Mercury poisoning and pesticide residue DDT poisoning): symptoms, mode of transmission and methods of prevention.

THIRD SEMESTER

DSC/Core(Major)C-3-TH: HUMAN NUTRITION-I 3 CREDITS

1. Concept and definition of terms-Nutrition, Malnutrition and Health: Scope of Nutrition.

2. Minimum Nutritional Requirement and RDA: formulation of RDA and Dietary Guidelines Reference Man and Reference Woman, Adult consumption unit.

3. Energy in Human Nutrition: Idea of Energy and its unit, Energy Balance, Assessment of Energy Requirements—deficiency and excess, Determination of Energy in food, B.M.R. and its regulation, S.D.A.

4. Growth & Development from infancy to adulthood: Somatic, physical, brain and mental development, puberty, menarch, pre-pubertal and pubertal changes, Factors affecting growth and development. Importance of Nutrition for ensuring adequate development.

5. Growth monitoring and promotion: Use of growth charts and standards, Prevention of growth faltering

DSC/Core(Major)C-3-P: HUMAN NUTRITION-I (PRACTICAL) 1 CREDIT

1. Process involved in cooking: pressure cooking, microwave, steaming, grilling,deep fat frying.

2. General concepts of weights and measures. Eye estimation of raw and cooked foods.

3. Preparation of food from different food groups and their significance in relation to health.

4. Preparation of supplementary food for different age group and their nutritional significance.

5. Planning and preparation of low-cost diet for Grade I and Grade II malnourished child

DSC/Core (Major) C-4-TH: HUMAN PHYSIOLOGY-I 3 CREDITS

1. Overview of cell Biology • Structure and functions of animal cell with special reference to Plasma membrane (Fluid Mosaic Model), Mitochondria, Ribosome, Endoplasmic reticulum. • Nucleus (nuclear membrane, nuclear chromatin and nucleolus).

2. Digestive system: • Structure and functions of G.I. tract. • Structure and functions of Stomach, liver, gallbladder and pancreas. • Composition and function: Salivary juice, Gastric juice, Pancreatic juice, Bile juice and Intestinal juice. • Digestion and absorption of carbohydrates, Protein and fats • Gastrointestinal hormones

3. Circulatory and Cardiovascular system: • Blood components, Plasma Protein -Composition and Function, Blood groups • Erythropoiesis and factors controlling erythropoiesis, Mechanism of blood coagulation. • Structure and functions of heart. • Cardiac cycle, cardiac output, Blood pressure and its regulation, Hypertension.

4. Respiratory system: • Structure of Lungs and gaseous exchange (oxygen and carbon dioxide transport), Brief idea on Acclimatization.

5. Musculoskeletal System: • Types and functions of muscles, bones (osteoclasts and osteoblasts) and teeth (Brief idea).

6. Body composition: • Generalized structural makeup of human body

DSC/Core (Major) C-4-P: HUMAN PHYSIOLOGY-I (PRACTICAL)1 CREDIT

1. The Compound Microscope- parts, function

2. Peak Expiratory Flow Rate (PEFR) using Peak flow meter

3. Cardiac Efficiency test, Effect of Posture, Gravity and Muscular Exercise on Heart Rate

4. Squamous epithelial cells- preparation of film and staining

SEC -3-TH: FOOD SERVICE MANAGEMENT 4 CREDITS

1. Organization of food service management: Definition, Various types of Food Service institutions, their characteristics and functions.

2. Planning a food service unit, layout design, planning of different work areas – preparation, cleaning, storing, serving and dining areas. Lighting and ventilation, working heights in relation to equipment.

3. Institutional Menu Planning: Factors influencing menu planning, principles of menu planning, different kinds of menus.

4. Quality food Service – types-Centralized, de-centralized objectives. Styles of service.

5. Importance of sanitation and hygiene in food, kitchen hygiene, Hygienic handling of Food, employee's health, hygiene of food service unit.

6. Personnel Management- selection, training and supervision of personnel, criteria for selection of Dietitian and Food Service staff

FOURTH SEMESTER

DSC/Core(Major)C-5-TH: HUMAN NUTRITION-II 3 CREDITS

1. Nutrition During Pregnancy: Factors (non-nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, Deficiency of nutrients, specially energy, iron folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements, specially -nausea, vomiting, pica, food aversions, pregnancy induced hypertension, obesity, diabetes. Adolescent pregnancy.

2. Nutrition during Lactation: Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Care and preparation of nipples during breast feeding.

3. Nutrition during Infancy: Infant physiology relevant to feeding and care, Breast feeding colostrum, its composition and importance in feeding, Initiations of breast feeding. Advantages of exclusive breast feeding. Basic principles of breast feeding. Introduction of supplementary foods, initiation and management of weaning, Baby-led weaning. Bottle feeding-circumstances under which bottle feeding is to be given. Care & sterilization of bottles. Preparation of formula. Mixed feeding, breast feeding and artificial feeding.

4. Management of preterm and low birth weight babies.

5. Nutritional needs of toddlers, preschool, school going children-and adolescents- Dietary management

DSC/Core (Major)C-5-P: HUMAN NUTRITION-II (PRACTICAL) 1 CREDIT

Planning and preparation of adequate meal for different age groups with special reference to different physiological conditions: infants, pre-schooler, school children, adolescents, adults, pregnancy, lactation and old age.

DSC/Core (Major) C-6-TH: HUMAN PHYSIOLOGY-II 3 CREDITS

1. Nervous System: • Concept of sympathetic and parasympathetic nervous system. • Brief anatomy and functions of cerebrum, cerebellum, hypothalamus and neuron • Concept on synapse and synaptic transmission

2. Endocrine system: Types of hormones • Location, anatomy, functional morphology and hormones of pituitary, thyroid and adrenal gland. • Structure and functions of pancreas• Functions of parathyroid, hypothalamic hormones

3. Reproductive system: • Structure and functions of gonads, concept on menstrual cycle. • Brief idea of pregnancy, parturition, lactation and menopause. • Brief concept on spermatogenesis and Oogenesis process.

4. Excretory system: • Structure and functions of kidney- structure of nephron. endocrine function of kidney • Physiology of urine formation • Structure and function of skin. • Regulation of temperature of the body.

DSC/Core (Major) C-6-P: HUMAN PHYSIOLOGY-II (PRACTICAL) 1CREDIT

1.Preparing a Peripheral Blood Film- Staining with Leishman stain, Identification of different types of WBCs

2.Identification of tissues, with two characteristics of each – lungs, small intestine, pancreas, liver, kidney,

3.Recording of Systemic Arterial Blood Pressure

4. Effect of Posture, Gravity, and Muscular Exercise onBlood Pressure

DSC/Core (Major) C-7-TH: FOOD COMMODITIES-I 3 CREDITS

1.Cereals andMillets:Structure,processing,storage,useinvariouspreparation,variety, selection and cost. Cereal products, breakfast cereals, fast food.

2. Pulses and Legumes:Structures,Selectionandvariety.Storage,Processingandusein different preparations, Nutritional aspects and cost.

3.Milk and Milk products: Composition, Classification, Selection Quality and Cost, Processing, Storage and uses in different preparations, Nutritional aspects, shelf life and spoilage.

4.Eggs: Production, grade, quality selection, storage and spoilage, cost nutritional aspects and use in different preparations.

4. Meat, Fish and Poultry: Types, Selection, Purchase, Storage, Uses, preparations Cost, Spoilage of fish Poultry and meat.

5. Vegetables and Fruits: Variety, Selection, purchase, storage, availability causes and nutritional aspects of raw and processed products and use in different preparations.

DSC/Core (Major) C-7-P: FOOD COMMODITIES-I (PRACTICAL) 1 CREDIT

1. Estimation of gluten content in cereal products.
2. Detection of urea in puffed rice.
3. Detection of Khesari flour in besan.
4. Detection of starch, sucrose, sucrose, formalin, boric acid, and urea in milk.
5. Effect of acid and alkali on milk proteins
6. Foaming properties of egg
7. Effects of Heat, acid, alkali and metals on pigments of fruits and vegetables
8. Methods to prevent enzymatic browning using salt, sugar, Ascorbic acid, lemon juice in fruits and vegetables

DSC/Core (Major) C-8-TH: NUTRITIONAL BIOCHEMISTRY-I 3 CREDITS

1. Biomolecules: Types of biomolecules- Carbohydrates, lipids, amino acids, proteins and nucleic acids. Digestion and absorption of biomolecules.

2. Enzymes : Definition, types and classification of enzymes, Types and functions of coenzymes and cofactors, Specificity of enzymes, Isozymes, Enzyme kinetics study including factors affecting enzyme action, Velocity of enzyme catalyzed reactions, Regulations of enzyme activity, Zymogen, Allosteric enzymes, Enzyme inhibition.

3. Carbohydrates and their Metabolism: Classification, structure and physico-chemical properties, Metabolisms of carbohydrates and Energy production: Glycolysis, Citric acid cycle, Glycogenesis, Glycogenolysis, Gluconeogenesis, Hexose monophosphate shunt pathway.

4. Lipids and their Metabolism : Classification, structure and physico-chemical properties, Metabolic Oxidation of fatty acids and Energy production, Biosynthesis of fatty acids and ketone bodies, Ketosis and fatty livers, Essential Fatty acids, Cholesterol and its clinical significance.

DSC/Core (Major) C-8-P: NUTRITIONAL BIOCHEMISTRY-I (PRACTICAL) 1 CREDIT

1. Determination of Enzyme activity and study on effect of pH, Temperature and Substrate concentration on Enzyme activity: Amylase

2. Quantitative estimation of Sugars: Glucose, Lactose, Starch
3. Estimation of Acid value, Iodine value, Saponification value of fats
4. Estimation of serum Glucose
5. Estimation of serum Triglyceride, Cholesterol

DSC/Core (Major) C-9-TH: COMMUNITY NUTRITION 3 CREDITS

1. Concept of Community, types of Community, Factors affecting health of the Community.

2. Nutritional Assessment and Surveillance: Meaning, need, objectives and importance

3. Nutritional assessment of human: Clinical findings, nutritional anthropometry, biochemical tests, biophysical methods.

4. 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.

5. Clinical Signs: Need & Importance's, identifying signs of PEM, vitamin A deficiency and iodine deficiency, Interpretation of descriptive list of clinical signs.

6. 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 chart.

7. International, national, regional agencies and organizations. Nutritional intervention programmes to combat malnutrition.

DSC/Core (Major) C-9-P: COMMUNITY NUTRITION (PRACTICAL) 1 CREDIT

1. Anthropometric Measurement of infant - Length, weight, circumference of chest, mid-upper arm circumference, precautions to be taken.

2. Comparison with norms and interpretation of the nutritional assessment data and its significance. Weight for age, height for age, weight for height, body Mass Index (BMI) Waist - Hip Ratio (WHR). Skin fold thickness.

3. Growth charts - plotting of growth charts, growth monitoring and promotion.

4. Clinical assessment and signs of nutrient deficiencies specially PEM (Kwashiorkor, marasmus) I vitamin A deficiencies, Anaemia, Rickets, B-Complex deficiencies.

5. 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. Interpretation of data.

DSC/Core (Major) C-10-TH: FOOD COMMODITIES-II 3 CREDITS

1.Sugar and sugar Products: Types of natural, sweeteners, manufacture, selection, storage and use as preserves, stages in sugar cookery.

2.Fats and Oils: Types and sources (animal and vegetable), Processing, uses in different preparations, storage, cost and nutritional aspects.

3.Food Adjuncts: Spices,condiments,herbs,extracts;concentratesessences,foodcolours, origin, classification, description, uses, specifications, procurements and storage.

4.Beverages: Tea; Coffee. Chocolate and Cocoa Powder-Processing, cost and nutritional aspects, other beverages-Aerated beverages, juices.

5.Raising and Leavening agents: Types, constituents, uses in cookery and bakery, storage.

6. Convenience Foods: Role, types, advantages, uses, cost and contribution to diet.

7.Salt: Types and uses.

DSC/Core (Major) C-10-P: FOOD COMMODITIES-II (PRACTICAL) 1 CREDIT

1. Estimation of sugars, TSS in Degree Brix
2. Estimation of Total solids in Jams and Jellies
3. Detection of Metanil yellow in coloured sweet products.
4. Detection of Argemone oil in edible oil.
5. Detection of Vanaspati in Ghee/Butter
6. Detection of artificially colour / foreign matter in tea (dust/leaves).
7. Detection of Metanil yellow in turmeric powder.
8. Detection of Adulterants in spices (Cumin seed powder, chilli powder)

DSC/Core (Major) C-11-TH: NUTRITIONAL BIOCHEMISTRY-II 3 CREDITS

1. Transport of Biomolecules:Brief introduction of biological membranes to understand molecular transport, Transport of large molecules, Receptor mediated endocytosis, exocytosis, Molecular aspects of transport; Passive diffusion, facilitated diffusion, active transport.

2. Nucleic acids, Nucleotides and their Metabolisms :Nucleic acids, nucleotides and nucleosides- Classification, structure and functions, Structure of DNA and RNA, Types of RNA and their functions, DNA: replication, transcription and translation, Role of nucleic acids in protein synthesis, elementary knowledge of genetic code.

3. Proteins and amino acids :Classification, structure and physico-chemical properties,General reaction of amino acid metabolism, Urea cycle, Lipoproteins: Types, composition, role and significance in diseases (in brief).

4. Vitamins and Minerals :Chemistry and biochemical role of fat-soluble vitamins (A, D, E, K) and Water-soluble vitamins (B1, B2, B3, B6 and C), Role of Vitamins as antioxidants and cofactors, Biochemical role of minerals in biological system and their importance – Sodium, Potassium, , Calcium, Phosphorus, Iron, Iodine, Copper, Zinc, Manganese.

DSC/Core (Major) C-11-P: NUTRITIONAL BIOCHEMISTRY-II (PRACTICAL) 1 CREDIT

1. Qualitative analysis of amino acids

2. Study on the properties of proteins

3. Quantitative estimation protein by Lowry and Biuret methods

4. Estimation of serum Creatinine and Urea

5. Estimation Vitamin C

6. Estimation of serum Calcium, Magnesium, Zinc, Copper

DSC/Core (Major) C-12-TH: DIET THERAPY-I 3 CREDITS

1. Basic concepts of diet therapy: Therapeutic adaptations of normal diet, principles and classification of the therapeutic diets.

2. Team approach to health care. Assessment of Patient's needs.

3. Routine Hospital Diets: Regular, light, soft, fluid, parenteral and enteral feeding.

4. Diets for different febrile conditions: influenza, malaria and typhoid.

5. Etiological factors, symptoms, and management of common diseases of stomach-Gastritis and Peptic ulcer.

6. Etiology, symptoms, and management of intestinal diseases: Diarrhoea, steatorrhoea, Diverticular disease, inflammatory bowel disease, Ulcerative Colitis, Flatulence, Constipation, Irritable Bowel Syndrome.

7. Diseases of the liver and Biliary System: Liver function tests. Etiology, symptoms, dietary care and general management of Viral Hepatitis and Cirrhosis of liver. Dietary care and management of Gall Bladder diseases –Cholecystitis and Cholelithiasis.

8. Anemia: General concept, aetiology, classification, and dietary management of Nutritional anemia.

DSC/Core (Major) C-12-P: DIET THERAPY-I (PRACTICAL) 1 CREDIT

1. Planning and preparation of normal diets.
2. Planning and preparation of fluid diets.
3. Planning and preparation of soft/semi solid diets.
4. Planning and preparation of Diets for the following diseases:
i) Peptic ulcer
ii) Viral hepatitis
iii) Anemia

SIXITH SEMESTER

DSC/Core (Major) C-13-TH: FOOD PRESERVATION 3 CREDITS

1. Food preservation: definition, objectives and principles of food preservation. Different methods of food preservation.

2. Preserved Products: Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups-types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.

3. Food Standards : ISI, Agmark, FPO, MPO, PFA, FSSAI

DSC/Core (Major) C-13-P: FOOD PRESERVATION (PRACTICAL) 1 CREDIT

1. Different methods of Food preservation – Drying, Freezing, Frying, canning, bottling etc.

2. Aseptic handling: Sources of contamination of foods.

3. Preparation of pickles, tomato sauce, chili sauce, jelly, tomato puree, squashes etc.

DSC/Core (Major) C-14-TH: DIET THERAPY-II 3 CREDITS

1. Energy modifications and nutritional care for weight management: Assessment, etiology, complications, prevention and treatment of obesity and underweight.

2. Diet in disease of the endocrine pancreas: Diabetes Mellitus: Classification, symptoms, diagnosis, management -insulin therapy, oral hypoglycemic agents, glucose monitoring at home, dietary care and nutrition therapy, meal plan (with and without insulin), special diabetic foods and artificial sweeteners.

3. Hypertension: classification, etiology, symptoms and dietary management. Diseases of the cardiovascular system: Definition of infarct, ischemia, angina pectoris, myocardial infarction, heart attack and stroke. Atherosclerosis and hyperlipidemia – classification, symptoms, dietary and lifestyle management. Prevention of cardiovascular diseases.

4 Renal Diseases: Etiology, symptoms and dietary management of acute and chronic Glomerulonephritis. Nephrotic syndrome - dietary management. Uremia – dietary Nephrolithiasis - dietary management. Use of sodium and potassium exchange list.

DSC/Core (Major) C-14-P: DIET THERAPY-II (PRACTICAL) 1 CREDIT

Planning and preparation of Diets for the following diseases:
i) Obesity and Underweight
ii) Diabetes mellitus
iii) Hypertension and Atherosclerosis
iv) Acute and chronic glomerulonephritis

DSC/Core (Major) C-15-TH: FOOD MICROBIOLOGY 3 CREDITS

1. Food and Microorganisms: Brief history and scope of food microbiology, Important microorganisms in foods – Bacteria, Yeast, Mold, Factors affecting the growth of microorganisms in food : Extrinsic and intrinsic parameters.

2. Cultivation of microorganisms : Nutritional requirements of microbial growth, Types of media, Methods of isolation, Bacterial growth curve.

3. Control of growth of microorganism : Physical methods for removal of microbes - heat, irradiation, filtration, Chemical methods for removal of microbes - alcohol, aldehydes, dyes, halogens, phenols, gases, Primary sources of microorganisms in foods, Fundamental methods for control of microorganism in foods – Pasteurization, dehydration, freezing, freeze-drying, irradiation and preservatives.

4. Spoilage and contamination of different foods : Cereal and cereal products, vegetable and fruits, fish and sea foods, meat and meat products, eggs and poultry, milk and milk products, canned foods.

DSC/Core (Major) C-15-P: FOOD MICROBIOLOGY (PRACTICAL) 1 CREDIT

1. Study of apparatus used in microbiology lab: Compound Microscope. Autoclave, Inoculation Chamber, Incubator
2. Microscopic identification of microbes: Fungi, Bacteria, Yeast
3. Preparation of liquid and solid media for culture of microorganisms
4. Pure culture isolation techniques: Spread plate, Pour plate and Streak plate
5. Staining Techniques to study of Morphology of microbial cells: Simple staining of bacteria, yeast and fungi, Differential staining with Gram stain technique

Minor Course Syllabus

Minor -1- Basic Food Science I (Either in semester I /semester III)

MINOR -1-TH: BASIC FOOD SCIENCE-I 3 CREDITS

1 Basic concept of Food, Nutrition and Nutrients. Classification of Food, Classification of Nutrients.

2. Carbohydrates- Definition, Classification, Structure and properties.
Monosaccharides -glucose, fructose, galactose.
Disaccharides-Maltose, lactose, sucrose
Polysaccharides-Dextrin, starch, glycogen, resistant starch.
Carbohydrates-Sources, daily requirements, functions. Effects of too high and too low carbohydrates on health. Digestion and absorption of carbohydrate.

3. Lipids-Definition, Classification & Properties.Fatty acids-composition, properties, types. Lipids - sources, daily requirements, functions. Digestion & Absorption ofnutrients.Role&nutritionalsignificancesofPUFA,MUFA,SFA,W-3fattyacid.

4. Proteins- Definition, Classification, Structure & properties. Amino acids Classification, types, functions. Proteins - Sources, daily requirements, functions. Effect of too high- too low proteins on health. Digestion & absorption. Assessment of Protein quality (BV, PER, NPU). Factors affecting protein bio-availability including anti- nutritional factors.

5. DietaryFibre-Classification,sources,composition,properties&nutritionalsignificance

MINOR 1-P: BASICFOODSCIENCE -I (PRACTICAL) 1CREDIT

1. Identification of Mono, Di and polysaccharides
2. Identification of Proteins
3. Identification of glycerol

Minor -2- Basic Food Science II (Either in semester II /semester IV)

MINOR 2- TH : BASIC FOOD SCIENCE-II 3 CREDITS

1.Minerals & Trace Elements, Bio-Chemical and Physiological Role, bio-availability & requirements, sources, deficiency & excess (Calcium, Sodium, Potassium Phosphorus, Iron, Fluoride, Zinc, Selenium, Iodine, Chromium)

2.Vitamins - Biochemical and Physiological role, Bio-availability and requirements, sources, deficiency & excess (Fat soluble and water-soluble vitamins), Provitamin, Antivitamin, Pseudo vitamin and Vitamers.

3.Water - Functions, daily requirements, Effect of excess and deficiency. Water balance.

MINOR 2- P: BASIC FOOD SCIENCCE-II (PRACTICAL) 1 CREDIT

1. Determination of Ash content in food
2. Determination of Moisture content in food
3. Determination of calcium, iron, and Vitamin C content in foods.

Minor -3- Human Nutrition I (Semester -V)

Minor-3-TH: HUMAN NUTRITION-I 3 CREDITS

1. Concept and definition of terms-Nutrition, Malnutrition and Health: Scope of Nutrition.

2. Minimum Nutritional Requirement and RDA: formulation of RDA and Dietary Guidelines Reference Man and Reference Woman, Adult consumption unit.

3. Energy in Human Nutrition: Idea of Energy and its unit, Energy Balance, Assessment of Energy Requirements—deficiency and excess, Determination of Energy in food, B.M.R. and its regulation, S.D.A.

4. Growth & Development from infancy to adulthood: Somatic, physical, brain and mental development, puberty, menarche, pre-pubertal and pubertal changes, Factors affecting growth and development. Importance of Nutrition for ensuring adequate development.

5. Growth monitoring and promotion: Use of growth charts and standards, Prevention of growth faltering

Minor-3-P: HUMAN NUTRITION-I (PRACTICAL) 1 CREDIT

1. Process involved in cooking: pressure cooking, microwave, steaming, grilling, deep fat frying.

2. General concepts of weights and measures. Eye estimation of raw and cooked foods.

3. Preparation of food from different food groups and their significance in relation to health.

4. Preparation of supplementary food for different age group and their nutritional significance.

5. Planning and preparation of low-cost diet for Grade I and Grade II malnourished child

Minor -4- Human Nutrition II (Semester -VI)

Minor -4-TH: HUMAN NUTRITION-II 3 CREDITS

1. Nutrition During Pregnancy:Factors (non-nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, Deficiency of nutrients, specially energy, iron folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements, specially -nausea, vomiting, pica, food aversions, pregnancy induced hypertension, obesity, diabetes. Adolescent pregnancy.

2. Nutrition during Lactation:Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Care and preparation of nipples during breast feeding.

3. Nutrition during Infancy:Infant physiology relevant to feeding and care, Breast feedingcolostrum, its composition and importance in feeding, Initiations of breast feeding. Advantages of exclusive breast feeding.Basic principles of breast feeding. Introductionof supplementary foods, initiation and management of weaning, Baby-led weaning. Bottle feeding-circumstances under which bottle feeding is to be given. Care & sterilization of bottles.Preparation of formula. Mixed feeding, breast feeding and artificial feeding.

4. Management of preterm and low birth weight babies.

5. Nutritional needs of toddlers, preschool, school going children-and adolescents- Dietary management

Minor-4 -P: HUMAN NUTRITION-II (PRACTICAL) 1 CREDIT

Planning and preparation of adequate meal for different age groups with special reference to different physiological conditions: infants, pre-schooler, school children, adolescents, adults, pregnancy, lactation and old age.

SYLLABUS for IDC OFFERED by FOOD AND NUTRITION Under CCF 2022

BASIC NUTRITION AND FOOD SCIENCE (THEORY) (2 CREDITS)

1. Definition of Food, Nutrition, Nutrient, Nutritional status, Dietetics, Balanced diet, Malnutrition, Energy (Units of energy – Joule, Kilocalorie).

2. Carbohydrate, Protein, Fat, Vitamins and Minerals (calcium, phosphorus, sodium, potassium, iron, iodine, fluorine) - sources, classification, functions, deficiencies of these nutrients. Functions of water and dietary fiber.

3. B.M.R: Definition, factors affecting B.M.R. and Total Energy Requirement (Calculation of energy of individuals).

4. Basic five food groups: Nutritional significance of cereals, pulses, milk, meat, fish, vegetable, egg, nuts, oils, sugar.

5. Principles and objectives of meal planning and balanced diet.

6. Diet for a pregnant woman and Lactating mother

7. Diet for an infant, preschool child, school child, Normal male and female of different occupation.

BASIC NUTRITION AND FOOD SCIENCE (PRACTICAL) (1 CREDIT)

1. Elementary idea of weight and measure.

2. Planning and preparation of Balanced diet for an adult.

3.Preparation of different types of nutritious tiffin for pre-schooler and school going Children.

SUGGESTED BOOKS AND JOURNALS

BASIC FOOD SCIENCE

1. SrilakshmiB(2017): Nutrition Science,6th Multicolour Ed. New Age International (P) Ltd.

2. RodayS(2012): Food Science and Nutrition, 2nd Ed. Oxford University Press.

3. Mann J and TruswellS(2017) : Essentials of Human Nutrition, 5th Ed. Oxford University Press.

4. Wilson K and Walker J(2000): Principles and Techniques of Practical Biochemistry, 5th Ed. Oxford University Press.

5. Sadasivan S and ManikamK(2007): Biochemical Methods, 3rd Ed. New Age International (P) Ltd.

6. Oser B L(1965). Hawk's Physiological Chemistry, 14th Ed. McGraw-Hill Book

7. Nath RL and NathRK(1990). Practical biochemistry in clinical medicine, 2nd Ed. Academic Publishers.

8. Sen AR, Pramanik NK and Roy SK(2001): A treatise on analysis of food fat and oil, Oil Technologists Association of India (EZ), Kolkata, 76, 119.

9.Plummer D(2017): An introduction of Practical Biochemistry, 3rd Ed. McGraw Hill Education.

10.SwaminathanM(2007): Essentials of Food and Nutrition(Vol. I & II), 2nd Ed. Bappco.

11.Meyer LH (2004): Food Chemistry, CBS Publishers & Distributors

NUTRITION AND HEALTH EDUCATION

1.Park K(2017): Textbook of Preventive and Social Medicine,24th Ed. BanarsidasBhanot Publishers

2.Mahajan BK, Roy RN , Saha I, Gupta, MC (2013):Text book of Preventive and Social Medicine, 4th Ed. Japee Brothers

3. Pandya R(2010):Community Health Education, Rawat Publications.

NUTRITIONAL EPIDEMIOLOGY & PUBLIC HEALTH

1.Smith, G.W.: Preventive Medicine and public health. 2nd edition. McMillan Co. New York.

2.Park: Park's Textbook of preventive and Social Medicine. 23rdedition.M/s. BanarasidasBhanot.

Jabalpur.

3.SeshubabuVVR(2011): Review in Community Medicine, 2nd Ed, Paras Medical Books Pvt

Ltd.

4.Mahajan BK, Roy RN , Saha I, Gupta, MC (2013):Text book of Preventive and Social

Medicine, 4th Ed. Japee Brothers.

5.Vir SC(2011): Public Health Nutrition in Developing Countries, Woodhead Publishing India.

6.Willett W(2012): Nutritional Epidemiology, 3rd Ed. Oxford University Press,USA

HUMAN NUTRITION

1. SrilakshmiB(2014): Dietetics, 7th Multicolour Ed. New Age International (P) Ltd.

2. Guthrie AH(1986):Introductory Nutrition, 6th Revised Ed., McGraw-Hill Inc., US.

3. Robinson CH and Lawler M(1990): Normal and Therapeutic Nutrition. 17th Revised Ed.

Macmillan USA.

4. SwaminathanM(2007): Essentials of Food and Nutrition(Vol. I & II), 2nd Ed. Bappco

5. GopalanC , Rama Sastri BV and Balasubramanian SC(2016): Nutritive value of Indian

Foods, Indian Council of Medical Research.

6. Nutrient Requirements and Recommended Dietary Allowance for Indians, Indian Council of

Medical Research: New Delhi.

7. FAO/WHO/UNO: Technical Report Series, 724 (1985). Energy and Protein Requirement,

Geneva.

8. GhoshS(2007):Nutrition and Child Care, 2nd Ed. Jaypee Brothers Medical Publishers Private

Limited.

9. WHO : A growth chart for International use In Maternal and Children Health Care, Geneva.

10.Mann J and TruswellS(2017) : Essentials of Human Nutrition, 5th Ed. Oxford University

Press.

11.Worthington- Roberts B and Williams SR(1999): Nutrition Throughout the Life Cycle , 4th

Ed. McGraw-Hill Higher Education.

12.Elizabeth KE(2015); Nutrition and Child Development , 5th Ed. Paras Medical Publishers.

13.Geissler C and Powers H (2005):Human Nutrition, 11th Ed. Churchill Livingston.

14.Zimmermann M(2001):Burgerstein's Handbook of Nutrition: Micronutients in the Prevention

and Therapy of Disease Thieme Stuttgart.

15.Samour PQ and King K(2010): Pediatric Nutrition, 4t Ed. Jones & Bartlett Learning.

16.Insel P, Ross D, McMahon K and Bernstein M(2016): Nutrition, 6th Ed. Jones & Bartlett

Learning.

17.MudambiSR(2018): Fundamentals of Foods, Nutrition and Diet Therapy, 6th Ed. New Age

International (P) Ltd.

18.Williams SR(2001): Basic Nutrition and Diet Therapy, 11th Ed. Elsevier.

19.Proudfit FT and Robinson CH(1967):Normal and Therapeutic Nutrition, 13th Ed. Mamillan.

20.Guthrie H and Picciano MF (1994): Human Nutrition , WCB McGraw-Hill,

21. Smith A and ColleneA(2015); Wardlaw's Contemporary Nutrition, 10th Ed. McGraw-Hill

Education.

22.Sharlin J and Edelstein S(2010): Essentials of Life Cycle Nutrition, 1st Ed. Jones & Bartlett

Learning.

23.Indian National Code for Protection of Breast Feeding: Govt. of India. Ministry of Social

Welfare, New Delhi.

HUMAN PHYSIOLOGY

1. Chatterjee CC (1988). Text Book of Physiology – Vol I& II.
2. Chaudhuri SK (2000). Concise Medical Physiology. New Central Book Agency (P) Ltd.
3. GanongW.F.(2003)-Review of Medical Physiology.21st ed. McGraw Hill.
4. Guyton AC, Hall JE (2000). Text book of Medical Physiology. 9th Ed. Prism Books (Pvt.) Ltd. Bangalore.
5. Hadley ME (2000). Endocrinology. 5th ed. Pearson Education.
6. Harrison's Endocrinology (2010) J. Larry Jamesonsecond edition, Mc Graw-Hill

FOOD SERVICE MANAGEMENT

1. Khan MA (1987):Food Service Operations, Avi Publication Co.
2. Tompkins D(1969):Table Layout and Decoration, Ward Lock Co. Ltd.
3. Kinton R and CaseraniV(1989): The Theory of Catering, 6th Ed. ELBS.
4. Edward K(1997): Food Service Facilities Planning 3rd Ed, John Wiley & Sons.
5. Sethi M (2015):Catering Management: An Integrated Approach,3rd Ed. New Age International(P) Ltd.
6. RodayS(2017): Food Hygiene and Sanitation with Case Studies, 2nd Ed. McGraw Hill Education.

FOOD COMMODITIES

1.Swaminathan MS Food Science, Chemistry and Experimental Foods, Bangalore Print

&Publishing Company.

2.SrilakshmiB(2018): Food Science, 7th Colour Ed. New Age International (P) Ltd.

3.Lavies, S (1998): Food Commodities Ltd. London.

4. Hughes O and Bennion, M (1970): Introductory Foods, 5th Ed. Macrnillan& Co., New York.

5.Parker R and Pace M(2016):Introduction to Food Science and Food Systems, 2nd Ed. Delmar

Cengage Learning.

6.Meyer LH(2004): Food Chemistry, 1st Ed. CBS Publishers and Distributors, New Delhi.

7.Mudambi SR, Rao SM and Rajagopal MV(2006): Food Science, 2nd Ed. New Age

International (P) Ltd.

8.Manay SN and ShadaksharaswamyM(2008): Foods: facts and principles , 3rd Ed. New Age

International (P) Ltd.

9. Potter NN and Hotchkiss JH(1999): Food science,5th Ed , Spinger.

10.PruthiJS(2011):Spices and Condiments, National Book trust, New Delhi.

11.Pyke M and Murrey J (1974): Catering Service and Technology, John MurreyPube, London

NUTRITIONAL BIOCHEMISTRY

1.Murray RK, Bender DA, Botham KA, Mayes PA and RodwellVW(2015):Harper's

Biochemistry, 30th Ed. Lange Medical Book.

2.Handler P, Smith EI, Stelten DW: Principles of Biochemistry, McGraw Hill Book Co.

3.Nelson DL and Cox MM (2017): Lehninger Principles of Biochemistry. 7th Ed. WH Freeman.

4.Devlin TM (2010): Text Book of Biochemistry with Clinical Correlations. John Wiley and

Sons.

5.Berg JM,Tymoczko JL, Gatto GJ and Stryer L(2015): Biochemistry, 8th Ed WH Freeman and Co

COMMUNITY NUTRITION

1.Jelliffe DB. Assessment of the Nutritional Status of the Community; World Health

Organisation.

2.Sahn DE, Lockwood R,Scrimshaw NS(1988): Methods the Evaluation of the Impact of Food

and Nutrition Programmes, 2nd Printing, United Nations University.

3.Ritchie, JAS(1979): Learning Better Nutrition , Nutritional Studies number 20, FAO, Rome.

4.Gopaldas T and Seshadri S(1988): Nutrition Monitoring and Assessment, Oxford University

Press.

5.Mason JB, Habicht, JP, Tabatabai H and Valverde V(1984): Nutritional Surveillance, World

Health Organisation.

6.Park K(2017): Textbook of Preventive and Social Medicine,24th Ed. BanarsidasBhanot Publishers.

7.King MH, King PMA, Morley D and AP Burgess(2015):Nutrition for Developing Countries, ELBS Oxford University Press.

8.Passmore R and Eastwood MA (1986): Davidson and Passmore's Human Nutrition &Dietetics , 8th Revised Ed. Churchill Livingstone.

9.SeshubabuVVR(2011): Review in Community Medicine, 2nd Ed, Paras Medical Books Pvt

Ltd.

10.Mahajan BK, Roy RN , Saha I, Gupta, MC (2013):Text book of Preventive and Social Medicine, 4th Ed. Japee Brothers.

11.Vir SC(2011): Public Health Nutrition in Developing Countries, Woodhead Publishing India.

12.Bamji MS, Krishnaswamy K and BrahmamGNV(2017): Textbook of Human Nutrition , 4th Ed. Oxford & IBH Publishing Co. Pvt. Ltd.

DIET THERAPY

1.Anderson L, Dibble MV, Turkki PR, Mitchall HS, and RynberginHJ(1983): Nutrition in

Health and Disease, 17th Ed. J. B. Lipincott& Co. Philadelphia.

2.Anita FP and Abraham P: Clinical Dietetics and Nutrition, 4th Ed. Oxford University Press,

Delhi.

3.Mahan LK and Escott-Stump S(2007): Krause's Food and Nutrition Therapy. 12th Ed. WB

Saunders Company, London.

4.Robinson. CH, Lawler MR, Chenoweth WL and Garwick, AE(1986): Normal and Therapeutic

Nutrition. 17th Ed.,Macmilian Publishing Co.

5.Williams SR (1989): Nutrition & Diet Therapy, 6th Ed. Times Mirror/Mosby College

Publishing, St. Louis.

6.Begum RM (2009): A textbook of Food, Nutrition and Dietetics, 3rd Ed. Sterling Publishers,

New Delhi.

7.Joshi SA(2017): Nutrition and Dietetics, 4th Ed. Tata McGraw Hill Publications, New Delhi.

8.Hutchison, R(2010)Food And The Principles Of Dietetics , Kessinger Publishing, LLC

FOOD PRESERVATION

1.Subalakshmi, G and Udipi, SA(2006):Food processing and preservation, 1st Ed. New Age

International (P)Ltd.

2.SrilakshmiB(2018): Food Science, 7th Colour Ed. New Age International (P) Lt

3. Potter NN and Hotchkiss JH(1999): Food science,5th Ed , Spinger.

4.Srivastava RPO and Kumar S (2014): Fruit and Vegetable Preservation Principles and

Practices, 3rd Ed. International Book distribution Company.

5.McWilliamsM and Paine H(1984): Modern Food preservation. Surjeet Publications,.

6.CruessWV(2004):Commercial Fruits and Vegetable Products, Agrobios India.

7.Desrosier NW and Desrosier JN(2006):The Technology Of Food Preservation, 4th Ed. CBS

Publishers and Distributors, New Delhi.

8.Adams M and NoutMJR(2001): Fermentation and Food Safety, Spinger

FOOD MICROBIOLOGY

1.Frazier WC and Westhoff D C and Vanitha NM (2017): Food Microbiology, 5th Ed. MaGraw

Hill Education..

2. Jay JM (2005): Modern Food Microbiology, 3rd Ed. CBS Publishers & Distributors.

3.Pelczar M, Chan ECS, Krieg N(2009): Microbiology : Application Based Approach, Tata

McGraw Hill Education.

4.Benson HJ(2001): Microbiological Applications: Complete Version: A Laboratory Manual in General Microbiology, 8th Ed. McGraw-Hill Publishing Co.

5.Colling CE and Lyne PM (1976): Microbiological Methods, Butterworth. London.

6.Bamrart G(2012): Basic food Microbiology, 2nd Ed. (Reprint), Spinger.

7.Wood BJ(1998):Microbiology of Fermented Foods, Vol I & II, 2nd Ed. Spinger.

8.Joshi VK(2009): Biotechnology: Food Fermentation Microbiology, Biochemistry & Technology, Vol I &Vol II , Educational Publishers & Distributors.

9.Tortora GJ, FunkeBR and Case CL(2016): Mocrobiology, 11th Ed. Pearson Education India.

10.Black JG (2008): Microbiology: Principles and Explorations, 7th Ed. John Wiley & Sons.

IDC paper: BASIC NUTRITION AND FOOD SCIENCE

1. Guthrie, Hele, Andrews, Introductory Nutrition, 6thed. St. Louis, Times Mirror/Mosby College, 1988.

2. Mudambi S.R, M.V Rajgopal Fundamentals of Foods and Nutrition(2nded) Wiley Eastern Ltd,1990.

3. Swaminathan S.: Advanced text book on Foods Nutrition Vol. I, II (2nded revised and enlarged) B.app C.1985.

4. Willson, EVAD Principles of Nutrition, 4thed. New York John Willey and Sons, 1979.

5. Textbook of Nutrition-Ravinder Chadha & Pulkit Mathur, Orient Blackswan Pvt. Ltd. Telangana.

6. Srilakshmi B. (2018). Nutrition Science. New Delhi: New Age International.

7. Clinical Nutrition & Dietetics- F. P. Antia and Philip Abraham, Oxford University Press

8. Nutrition Science by B. Srilakshmi, latest ed.

COURSE STRUCTURE-MDC

	CC1	CC2	Minor	IDC	AEC	SEC	CVAC	Summer Internship	Total Credit
Semester	8x4= 32	8x4= 32	6x4= 24	3x3=9	4x2= 8	3x4=12	4x2=8	1x3= 3	124
1	1x4= 4 3TH+1P/TU	1x4= 4 3TH+1P/TU		1x3=3 2TH+1P/TU	1x2= 2 2TH+0P/TU	1x4= 4	2x2=4		21
2	1x4= 4 3TH+1P/TU	1x4= 4 3TH+1P/TU		1x3=3 2TH+1P/TU	1x2= 2 2TH+0P/TU	1x4= 4	2x2=4		21
3	1x4= 4 (3TH+ P/TU)	1x4= 4 3TH+1P/TU	1x4= 4 3TH+1P/TU	1x3=3 2TH+1P/TU	1x2= 2 2TH+0P/TU	1x4= 4			21
4	2x4=8 4x(3TH+1P/TU)	2x4= 8 2x(3TH+1P/TU	1x4= 4 (3TH+1P/TU)		1x2= 2 2TH+0P/TU				22
5	2x4= 8 2x(3TH+1P/TU)	1x4= 4 3TH+1P/TU	2x4= 8 2x(3TH+1P/TU						20
6	1x4= 4 (3TH+1P/TU)	2x4= 8 2x(3TH+1P/TU)	2x4= 8 2x(3TH+1P/TU)						20
Credits	**8x4= 32**	**8x4= 32**	**6x4= 24**	**3x3= 9**	**4x2= 8**	**3x4= 12**	**4x2=8**		**125+3 =128**
Marks	**8x100=800**	**8x100=800**	**6x100=600**	**3x75=225**	**4x50=200**	**3x100=300**	**4x50=200**		**Total Marks =3200**

Marks= 25 marks per credit.

Total credit=125+3 (for summer internship) = 128
Summer Internship: As mentioned in clause no. 8 (G)

SYLLABUS FOR THREE YEAR B.A/B.Sc MULTI DISCIPLINARY COURSE (MDC) OF STUDIES in FOOD and NUTRITION UNDER CCF, 2022

Semester	Category of Course	Course Title	Credits		
			Theory	Practical/OP/TU	Total
I	DSC/Core (CC1-1)	Basic Food Science I	3	1	4
II	DSC/Core (CC1-2)	Basic Food Science II	3	1	4
III	DSC/Core (CC1-3)	Human Nutrition I	3	1	4
IV	DSC/Core (CC1-4)	Human Nutrition-II	3	1	4
	DSC/Core (CC-1-5)	Advanced Food Science	3	1	4
V	DSC/Core (CC1-6)	Fundamentals of Community Nutrition	3	1	4
	DSC/Core (CC1-7)	Clinical Nutrition and Dietetics	3	1	4

VI	**DSC/Core** **(CC1-8)**	**Food Preservation**	**3**	**1**	**4**
	SEC offered*	**Food Safety and Quality Control**	**3**	**1**	**4**

***Students can opt SEC in First/Second/Third Semester**

Notes: Students those who wants to opt Food and Nutrition as **CC2** -

- The syllabus of Food and Nutrition from Semester I to Semester IV will be same as CC1 .
- In semester V the CC2 students will opt only one paper i.e., CC1 -6
- In semester VI the CC2 students will opt two papers of CC1 that is CC1-7 and CC1-8
- Those who opt Food and Nutrition as **Minor** in MDC will read total six papers of CC1from Semester III to Semester VI as given below
    - Semester III : CC1-1
    - Semester IV : CC1-2
    - Semester V : CC1-3 & CC1-4
    - Semester VI : CC1-5 & CC1-6

FIRST SEMESTER

CC1- 1-TH: BASIC FOOD SCIENCE - I 3 CREDITS

1. Basic concept on Food, Nutrition and Nutrients. Classification of Food, Classification of Nutrients.

2. Carbohydrates-Definition, Classification, Structure and properties.
   Monosaccharaides -glucose, fructose, galactose.
   Disaccharides-Maltose, lactose, sucrose
   Polysaccharides-Dextrin, starch, glycogen, resistant starch.
   Carbohydrates-Sources, daily requirements, functions. Effects of too high and too Low carbohydrates on health. Digestion and absorption of carbohydrate.

3. Lipids-Definition, Classification & Properties. Fatty acids -composition, properties, types. Lipids - sources, daily requirements, functions. Digestion & Absorption of nutrients. Role & nutritional significances of PUFA, MUFA,SFA,W-3fattyacid.

4. Proteins -Definition, Classification, Structure & properties. Amino acids Classification, types, functions. Proteins - Sources, daily requirements, functions. Effect of too high- too low proteins on health. Digestion & absorption. Assessment of Protein quality (BV, PER, NPU). Factors affecting protein bio-availability including anti-nutritional factors.

5. DietaryFibre-Classification,sources,composition,properties&nutritionalsignificance

CC1-1-P: BASIC FOOD SCIENCE- I (PRACTICAL) 1 CREDIT

1. Identification of Mono, Di and polysaccharides

2. Identification of Proteins

3. Identification of glycerol

SECOND SEMESTER

CC1-2- TH : BASIC FOOD SCIENCE-II 3 CREDITS

1. Minerals & Trace Elements, Bio-Chemical and Physiological Role, bio-availability & requirements, sources, deficiency & excess (Calcium, Sodium, Potassium Phosphorus, Iron, Fluoride, Zinc, Selenium, Iodine, Chromium)

2. Vitamins - Biochemical and Physiological role, Bio-availability and requirements, sources, deficiency & excess (Fat soluble and water-soluble vitamins), Provitamin, Antivitamin, Pseudo vitamin and Vitamers.

3. Water - Functions, daily requirements, Effect of excess and deficiency. Water balance.

CC1-2- P: BASIC FOOD SCIENCE-II (PRACTICAL) 1CREDIT

1. Determination of Ash content in food
2. Determination of Moisture content in food
3. Determination of calcium, iron, and Vitamin C content in foods.

THIRD SEMESTER

CC1-3-TH: HUMAN NUTRITION-I 3 CREDITS

1. Concept and definition of terms-Nutrition, Malnutrition and Health: Scope of Nutrition.

2. Minimum Nutritional Requirement and RDA: formulation of RDA and Dietary Guidelines Reference Man and Reference Woman, Adult consumption unit.

3. Energy in Human Nutrition: Idea of Energy and its unit, Energy Balance, Assessment of Energy Requirements—deficiency and excess, Determination of Energy in food, B.M.R. and its regulation, S.D.A.

4. Growth & Development from infancy to adulthood: Somatic, physical, brain and mental development, puberty, menarche, pre-pubertal and pubertal changes, Factors affecting growth and development. Importance of Nutrition for ensuring adequate development.

5. Growth monitoring and promotion: Use of growth charts and standards, Prevention of growth faltering

CC1-3-P: HUMAN NUTRITION-I (PRACTICAL) 1 CREDIT

1. Process involved in cooking: pressure cooking, microwave, steaming, grilling, deep fat frying.

2. General concepts of weights and measures. Eye estimation of raw and cooked foods.

3. Preparation of food from different food groups and their significance in relation to health.

4. Preparation of supplementary food for different age group and their nutritional significance.

5. Planning and preparation of low-cost diet for Grade I and Grade II malnourished child

FOURTH SEMESTER

CC1- 4-TH: HUMAN NUTRITION-II 3 CREDITS

1. Nutrition During Pregnancy: Factors (non-nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy, antenatal care and its schedule, Nutritional requirements during pregnancy and modification of existing diet and supplementation, Deficiency of nutrients, specially energy, iron folic acid, protein, calcium, iodine. Common problems of pregnancy and their managements, specially -nausea, vomiting, pica, food aversions, pregnancy induced hypertension, obesity, diabetes. Adolescent pregnancy.

2. Nutrition during Lactation: Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation. Care and preparation of nipples during breast feeding.

3. Nutrition during Infancy: Infant physiology relevant to feeding and care, Breast feeding colostrum, its composition and importance in feeding, Initiations of breast feeding. Advantages of exclusive breast feeding. Basic principles of breast feeding. Introduction of supplementary foods, initiation and management of weaning, Baby-led weaning. Bottle feeding-circumstances under which bottle feeding is to be given. Care & sterilization of bottles. Preparation of formula. Mixed feeding, breast feeding and artificial feeding.

4. Management of preterm and low birth weight babies.

5. Nutritional needs of toddlers, preschool, school going children-and adolescents- Dietary management

CC1-4-P: HUMAN NUTRITION-II (PRACTICAL) 1 CREDIT

Planning and preparation of adequate meal for different age groups with special reference to different physiological conditions: infants, pre-schoolers, school children, adolescents, adults, pregnancy, lactation and old age

CC1- 5-TH: ADVANCED FOOD SCIENCE 3 CREDITS

1. Basic five food groups: Nutritional significance, composition and different products of cereal, millets, pulses, fruits and vegetables

2. Milk and milk products: Composition, types, processing (clarification, pasteurization, homogenization), storage, spoilage, uses, nutritional aspects of milk, curds, butter milk, paneer, khoa, cheese, ice-cream, kulfi and various kinds of processed milk.

3. Eggs: Composition, grade, quality, nutritional aspects.

4. Fish, Poultry and Meat: composition and nutritional importance of fish, poultry and meat.

5. Food additives and adulterants: Definition, purpose and types. Basic concept of different types of additives and adulterants present in food.

6. Nutritional significance of spices and herbs.

CC1-5-P: ADVANCED FOOD SCIENCE (PRACTICAL) 1 CREDIT

1. Preparation of Milk based products like Flavoured Yoghurt, Flavoured curd, Butter milk, Custard, Pudding, etc.
2. Preparation of dehydrated Cereals, Millets and Pulses products like Chips, Papads etc.
3. Detection of adulterants in Milk and milk products (Starch, Sugar, Detergent), Spices like Turmeric powder (Metanil yellow, Starch), Chilli powder (Metanil yellow, Brick powder), etc.

FIFTH SEMESTER

CC1- 6-TH: Fundamentals of Community Nutrition 3 CREDITS

1. Concept and types of Community. Concept of community nutrition.

2. Nutritional Assessment: Meaning, need, objectives and importance. A brief idea on methods of nutritional assessment. Concept of ABCD method

3. Malnutrition: Definition, causes, classification, sign and symptoms of kwashiorkor, marasmus and marasmic kwashiorkor and their preventive measures.

3. Elementary idea of health agencies - FAO, WHO, ICMR, ICAR, NIN and CFTRI.

4. Nutritional Intervention programmes to combat malnutrition: ICDS, Mid- Day Meal Programme, SNP, ANP, NNAPP, National Prophylaxis programme for prevention of blindness due to Vitamin A deficiency , IDD control programme

5. Nutrition Education: Definition, objectives of nutrition education. Methods of imparting nutrition education**.**

CC1- 6-P: Fundamentals of Community Nutrition 1 CREDIT

1. Preparation of homemade ORS.

2. Preparation of weaning foods for infants.

3. Preparation of low cost and medium cost school tiffin

4. Growth charts - plotting of growth charts, growth monitoring and promotion.

5. Diet survey by 24 hours recall method.

CC1-7-TH: CLINICAL NUTRITION AND DIETETICS 3 CREDITS

1. Definition of Dietetics, dietitian, Goals of Diet Therapy.

2. Basic concepts of Diet Therapy: Therapeutic adaptations of the normal diet. Routine hospital diets –Regular, soft, full fluid, clear fluid diet. Specially modified therapeutic diets.

3. Obesity and underweight: Causes, risk factors, dietary and general management of overweight and underweight.

4. Diarrhoea, Constipation and Hepatitis: Causes, symptoms and dietary management.

5. Anaemia: Definition, causes, classification, and dietary management of Nutritional anaemia.

6. Hypertension, Atherosclerosis and Diabetes Mellitus: Definition, Causes, Types, risk factors, signs, symptoms and dietary Management.

7. Fever: Definition, causes, types, symptoms and dietary management.

CC1-7-P: CLINICAL NUTRITION AND DIETETICS (PRACTICAL) 1 CREDIT

1. Preparation of soft, full fluid and clear fluid diet

2. Planning and preparation of Therapeutic Diets for the following diseases:

i) Diabetes mellitus

ii) Hepatitis

iii) Hypertension

iv) Obesity

v) Fever

SIXTH SEMESTER

CC1- 8-TH: FOOD PRESERVATION 3 CREDITS

1. Food preservation: definition, objectives and principles of food preservation. Different methods of food preservation.

2. Preserved Products: Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups-types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.

3. Food Standards : ISI, Agmark, FPO, MPO, PFA, FSSAI

CC1 8-P: FOOD PRESERVATION (PRACTICAL) 1 CREDIT

1. Different methods of Food preservation – Drying, Freezing, Frying, Canning, Bottling etc.

2. Aseptic handling: Sources of contamination of foods.

3. Preparation of pickles, tomato sauce, tomato puree, jam, jelly, squashes etc.

SEC Offered

SEC : FOOD SAFETY AND QUALITY CONTROL 3 CREDITS

1. Food Quality: Meaning and definition of food quality, Quality factors in foods, indicators of food quality, importance and ways of Food Quality Assessment
2. Introduction to Food Hazards: Definition, types of hazard-physical, chemical (naturally occurring, environmental and intentionally added) and biological, factors affecting (food borne pathogensbacteria, viruses and eukaryotes; sea food and shellfish poisoning and mycotoxins)
3. Hygiene and Sanitation : Principles of food hygiene, personal hygiene, kitchen hygiene and sanitation. water quality assessment, insect and pest control, waste treatment and disposal, food vending and packaging standards, employees' health
4. Food Safety Management Tools: Basic concept, prerequisites-GHPs, GMPs. HACCP, ISO series. National Food Standards (BIS, AGMARK) and Food Laws (PFA and FSSAI).

SEC : FOOD SAFETY AND QUALITY CONTROL (PRACTICAL) 1 CREDIT

Detection of adulterants in the following Foods- Milk, Edible Oil, Sugar, Spices, honey, Flours, Ghee, Beverages (one method of detection for each food item).

1. To detect the adulterants like dyes and argemone in the fats, oils and ghee.

2. To detect the presence of adulterants like water, urea, formalin, detergent, sugar and starch in the milk.

3. To detect the adulteration of insoluble substance, chalk powder and washing soda in sugar.

4. To detect the adulteration of brick powder in chilli powder, Metanil yellow in turmeric.

5. To detect colouring agents in fruit juices and sweets.

SUGGESTED BOOKS AND JOURNALS

BASIC FOOD SCIENCE

1. SrilakshmiB(2017): Nutrition Science,6th Multicolour Ed. New Age International (P) Ltd.

2. RodayS(2012): Food Science and Nutrition, 2nd Ed. Oxford University Press.

3. Mann J and TruswellS(2017) : Essentials of Human Nutrition, 5th Ed. Oxford University Press.

4. Wilson K and Walker J(2000): Principles and Techniques of Practical Biochemistry, 5th Ed. Oxford University Press.

5. Sadasivan S and ManikamK(2007): Biochemical Methods, 3rd Ed. New Age International (P) Ltd.

6. Oser B L(1965). Hawk's Physiological Chemistry, 14th Ed. McGraw-Hill Book

7. Nath RL and NathRK(1990). Practical biochemistry in clinical medicine, 2nd Ed. Academic Publishers.

8. Sen AR, Pramanik NK and Roy SK(2001): A treatise on analysis of food fat and oil, Oil Technologists Association of India (EZ), Kolkata, 76, 119.

9.Plummer D(2017): An introduction of Practical Biochemistry, 3rd Ed. McGraw Hill Education.

10.SwaminathanM(2007): Essentials of Food and Nutrition(Vol. I & II), 2nd Ed. Bappco.

11.Meyer LH (2004): Food Chemistry, CBS Publishers & Distributors

HUMAN NUTRITION

1. SrilakshmiB(2014): Dietetics, 7th Multicolour Ed. New Age International (P) Ltd.

2. Guthrie AH(1986):Introductory Nutrition, 6th Revised Ed., McGraw-Hill Inc., US.

3. Robinson CH and Lawler M(1990): Normal and Therapeutic Nutrition. 17th Revised Ed.

Macmillan USA.

4. SwaminathanM(2007): Essentials of Food and Nutrition(Vol. I & II), 2nd Ed. Bappco

5. GopalanC , Rama Sastri BV and Balasubramanian SC(2016): Nutritive value of Indian

Foods, Indian Council of Medical Research.

6. Nutrient Requirements and Recommended Dietary Allowance for Indians, Indian Council of

Medical Research: New Delhi.

7. FAO/WHO/UNO: Technical Report Series, 724 (1985). Energy and Protein Requirement,

Geneva.

8. GhoshS(2007):Nutrition and Child Care, 2nd Ed. Jaypee Brothers Medical Publishers Private

Limited.

9. WHO : A growth chart for International use In Maternal and Children Health Care, Geneva.

10.Mann J and TruswellS(2017) : Essentials of Human Nutrition, 5th Ed. Oxford University

Press.

11.Worthington- Roberts B and Williams SR(1999): Nutrition Throughout the Life Cycle , 4th

Ed. McGraw-Hill Higher Education.

12.Elizabeth KE(2015); Nutrition and Child Development , 5th Ed. Paras Medical Publishers.

13.Geissler C and Powers H (2005):Human Nutrition, 11th Ed. Churchill Livingston.

14.Zimmermann M(2001):Burgerstein's Handbook of Nutrition: Micronutients in the Prevention

and Therapy of Disease Thieme Stuttgart.

15.Samour PQ and King K(2010): Pediatric Nutrition, 4t Ed. Jones & Bartlett Learning.

16.Insel P, Ross D, McMahon K and Bernstein M(2016): Nutrition, 6th Ed. Jones & Bartlett

Learning.

17.MudambiSR(2018): Fundamentals of Foods, Nutrition and Diet Therapy, 6th Ed. New Age

International (P) Ltd.

18.Williams SR(2001): Basic Nutrition and Diet Therapy, 11th Ed. Elsevier.

19.Proudfit FT and Robinson CH(1967):Normal and Therapeutic Nutrition, 13th Ed. Mamillan.

20.Guthrie H and Picciano MF (1994): Human Nutrition , WCB McGraw-Hill,

21. Smith A and ColleneA(2015); Wardlaw's Contemporary Nutrition, 10th Ed. McGraw-Hill

Education.

22.Sharlin J and Edelstein S(2010): Essentials of Life Cycle Nutrition, 1st Ed. Jones & Bartlett

Learning.

23.Indian National Code for Protection of Breast Feeding: Govt. of India. Ministry of Social

Welfare, New Delhi.

COMMUNITY NUTRITION

1.Jelliffe DB. Assessment of the Nutritional Status of the Community; World Health

Organisation.

2.Sahn DE, Lockwood R,Scrimshaw NS(1988): Methods the Evaluation of the Impact of Food

and Nutrition Programmes, 2nd Printing, United Nations University.

3.Ritchie, JAS(1979): Learning Better Nutrition , Nutritional Studies number 20, FAO, Rome.

4.Gopaldas T and Seshadri S(1988): Nutrition Monitoring and Assessment, Oxford University

Press.

5.Mason JB, Habicht, JP, Tabatabai H and Valverde V(1984): Nutritional Surveillance, World

Health Organisation.

6.Park K(2017): Textbook of Preventive and Social Medicine,24th Ed. BanarsidasBhanot Publishers.

7.King MH, King PMA, Morley D and AP Burgess(2015):Nutrition for Developing Countries, ELBS Oxford University Press.

8.Passmore R and Eastwood MA (1986): Davidson and Passmore's Human Nutrition &Dietetics , 8th Revised Ed. Churchill Livingstone.

9.SeshubabuVVR(2011): Review in Community Medicine, 2nd Ed, Paras Medical Books Pvt

Ltd.

10.Mahajan BK, Roy RN , Saha I, Gupta, MC (2013):Text book of Preventive and Social Medicine, 4th Ed. Japee Brothers.

11.Vir SC(2011): Public Health Nutrition in Developing Countries, Woodhead Publishing India.

12.Bamji MS, Krishnaswamy K and BrahmamGNV(2017): Textbook of Human Nutrition , 4th Ed. Oxford & IBH Publishing Co. Pvt. Ltd.

FOOD PRESERVATION

1.Subalakshmi, G and Udipi, SA(2006):Food processing and preservation, 1st Ed. New Age

International (P)Ltd.

2.SrilakshmiB(2018): Food Science, 7th Colour Ed. New Age International (P) Lt

3. Potter NN and Hotchkiss JH(1999): Food science,5th Ed , Spinger.

4.Srivastava RPO and Kumar S (2014): Fruit and Vegetable Preservation Principles and

Practices, 3rd Ed. International Book distribution Company.

5.McWilliamsM and Paine H(1984): Modern Food preservation. Surjeet Publications,.

6.CruessWV(2004):Commercial Fruits and Vegetable Products, Agrobios India.

7.Desrosier NW and Desrosier JN(2006):The Technology Of Food Preservation, 4th Ed. CBS

Publishers and Distributors, New Delhi.

8.Adams M and NoutMJR(2001): Fermentation and Food Safety, Spinger

9.Tortora GJ, FunkeBR and Case CL(2016): Mocrobiology, 11th Ed. Pearson Education India.

10.Black JG (2008): Microbiology: Principles and Explorations, 7th Ed. John Wiley & Sons.

FOOD SAFETY & QUALITY CONTROL

1. Food Hygiene and Sanitation by S. Roday

2. Singhal, R. S. (1997) Handbook of indices of food quality and authenticity. Cambridge Woodhead Publishing, New York.

3. Essentials of food safety and sanitation by David Ms Swane, Nancy Rue and Richard

Linton

4. Text Book of Food Safety and Quality Control by Pulkit Mathur

5. Essentials of Food Sanitation by Marriott, Norman

6. Food Safety, Sanitation and Personal Hygiene by BC Cook Articulation Committee

and The BC Cook Articulation Committee