NATIONAL EDUCATION POLICY- 2020

PROPOSED STRUCTURE

Of

B.Sc. FOOD NUTRITION & DIETITICS

syllabus

2023-24

Curriculum Design Committee, Uttarakhand

Sr.No.	Name & Designation	
1.	Prof. N.K. Joshi Vice-Chancellor , Sridev Suman Uttarakhand University, Tehri	Chairman
2	Dr. Manmohan Singh Chauhan, Vice -Chancellor, Kumaun University, Nainital	Member
3.	Prof. O.P.S. Negi Vice-Chancellor, Uttarakhand Open University, Haldwani	Member
4.	Prof. Jagat Singh Bisht Vice-Chancellor, Soban Singh Jeena University Almora	Member
5.	Prof. Surekha Dangwal Vice-Chancellor, Doon University, Dehradun	Member
6.	Prof. M.S.M. Rawat Advisor, Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand	Member
7.	Prof. K. D. Purohit Advisor, Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand	Member

SYLLABUS PREPARATION COMMITTEE

Name	Designation	Affiliation
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Program Outcomes (POs)

After successful completion of this program, graduates of Food Nutrition and Dietetics will have the following attributes:

1. Scientific Knowledge: Apply the knowledge of food science, chemistry, nutrition, physiology and dietetics in a competent manner to innovate in the field of nutrition and dietetics.
2. Design and Development of Solutions: Design nutrition and dietetics strategies as per the specified requirements of regulatory bodies related to food, health, environment, hospitals, families and communities.
3. Problem Analysis: Identify, formulate, rationalize, and analyses nutrition-related problems in the community and hospitals so as to reach substantiated diet-based conclusions using the principles of food nutrition and dietetics.
4. Modern Tool usage: Create, select, and apply modern nutrition and dietetics tools, techniques, and resources of relevance in nutrition and dietetics.
5. Environment and Sustainability: Evolve nutrition and dietetics approaches in the context of food security and environmentally sustainable development goals.
6. Teamwork: Function objectively as an individual and as a member in diverse teams.
7. Communication: Effectively document and communicate nutrition and dietetics approaches and plans with individuals, patients and communities.
8. Lifelong learning: Independently engage in continuous learning to adapt to newer concepts in nutrition and dietetics.

Program Specific Outcomes (PSOs):

After successful completion of this program, graduates of Food Nutrition and Dietetics will have the following specific attributes:

- Utilize the knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease processes
- Evaluate the food product and the application of necessary preservation techniques to increase the shelf life of the product and also be a part in the auditing industry
- Work in Research laboratories on the fortification and enrichment of existing product as well as the development of new product
- Apply the nutrition and dietetics-based knowledge and skills in the planning and assessment of suitable diets for individuals of every age, patients and the community in a sustainable manner.
- Provide nutrition counselling and education to individuals, groups, and communities throughout the lifespan using a variety of communication strategies
- Apply technical skills, knowledge of health behaviour, clinical judgment, and decision-making skills when assessing and evaluating the nutritional status of individuals and communities and their response to nutrition intervention.

- Implement strategies for food access, procurement, preparation, and security for individuals, families, and communities.
- Apply food science knowledge to describe functional properties of food ingredients.
- Apply the knowledge of principles and techniques of nutrition and dietetics for research-based approaches.
- Apply skills gained in nutrition and dietetics for research, development, and entrepreneurship.

Content of Courses for B.Sc. Degree in Food Nutrition and Dietetics

Year	Semester	Course Code	Theory/ Practical	Credits	Course/Paper Titles
1st Certificate Course in Food Nutrition and Deictics	I	B/FND001	Theory	4	Human Nutrition - I
		B/FND002	Practical	2	
		B/FND003	Theory	4	Human Physiology -I
		B/FND004	Practical	2	
		B/FND005	Theory	4	Food Science - I
			Vocational	3	As per University
	II	B/FND006	Theory	4	Dietetics - I
		B/FND007	Practical	2	
		B/FND008	Theory	4	Human Physiology- II
		B/FND009	Practical	2	
		B/FND/M010	Minor Theory	4	Food Chemistry
			Vocational	3	As per university
Diploma Course in Food Nutrition	III	B/FND011	Theory	4	Lifespan Nutrition - I
		B/FND012	Practical	2	
		B/FND013	Theory	4	Nutritional Biochemistry -I
		B/FND014	Practical	2	
		B/FND015	Theory	4	Human Nutrition - II

and Deictics			Vocational	3	As per university
	IV	B/FND016	Theory	4	Dietetics – II
		B/FND017	Practical	2	
		B/FND018	Theory	4	Lifespan Nutrition II
		B/FND019	Practical	2	
		B/FND/M020	Minor Theory	4	Quality Control
			Vocational	3	As per University
Degree in Food Nutrition and Deictics	V	B/FND021	Theory	4	Food Microbiology
		B/FND022	Practical	2	
		B/FND023	Theory	4	Food Science- II
		B/FND024	Practical	2	
		B/FND025	Theory	4	Sports Nutrition
		B/FND026	Theory	4	Community Nutrition
	VI	B/FND027	Theory	4	Nutritional Biochemistry -II
		B/FND028	Practical	2	
		B/FND029	Theory	4	Diet Counseling and Patient Care
		B/FND030	Practical	2	
		B/FND031	Theory	8	Internship

*Assessment – T- 80/20, P- 40/10

* TH – 60/ P

* Internship – 7 days/ 15 days

Year 1st Semester First Semester

Title Human Nutrition I (Theory)

Unit–1

Nutritional Status: The relation of good nutrition to normal physical development and sound health. Definitions of the terms – Nutrition, Health, Nutrients, Nutritional status, Malnutrition, RDA. Methods of assessing nutritional status – Population sampling, collection of data on the nutritional adequacy of diet consumes, anthropometric measurements, clinical examination, biochemical assessment. Diet surveys – methods.

Unit - 2

Energy - Definition of health and nutrition, Definition of calorie and joule, Measurement of calorific values of foods. Basal Metabolic Rate (BMR) - Factors affecting. Specific Dynamic Action (SDA) of foods. Energy needs of the body.

Unit -3

Measurement of energy balance of the body. Direct and indirect calorimetry Calculation of energy requirements. The ideal proportion of calories from protein, carbohydrates and fats Carbohydrates: Classification, Basic structure, chemistry, digestion, absorption, Transport, brief overview of metabolism, functions, sources and requirements

Unit -4

Proteins: Classification, Structure, chemistry, digestion, absorption, brief overview of metabolism functions, sources and requirements. Essential amino acids, evaluation of protein quality, Factors affecting bio-availability, supplementation and deficiency state.

Lipids / Fats: Classification, chemistry, digestion, absorption, brief overview of metabolism, functions sources and requirements. Saturated and unsaturated fatty acids and effects of deficiency. Nutritional significance of SFA, MUFA, PUFA, Omega-3

Title - Human Nutrition I (Practical)

Weights and Measures –Household measures

1. Weights and Standard measures used in food science laboratory.
2. Calculation of Mean nutritive value of food
3. Methods of Cooking

a. Water –boiling, steaming, pressure cooking

b. Oil- Shallow frying, deep frying

4. Qualitative tests for proteins
5. Quantitative estimation of glucose
6. Estimation of total lipid in egg yolk
7. Recommended Dietary Allowances/Nutritive values

References

- WTO Technical Reports Series for Different Nutrients.
- Roday S. (2018), Food Science and Nutrition, Oxford University Press
- Srilakshmi B (2015) Nutrition science - 4th Ed., New age international Publ., New Delhi
- Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros. Medical Publ., New Delhi
- Raheena Begum., (2009), A Text book of Food, Nutrition & Dietetics, Sterling Publications, New Delhi.
- Srilakshmi. B., (2009), Human Nutrition, New Age International Publishers

Title Human Physiology I - (Theory)

Unit–1

Introduction: Cell – structure and function of organelles, nucleus, chromosomes, genes, homoeostasis and body fluids. Blood: Red blood cells – Erythropoiesis, stages of differentiation, function, counts, physiological variation. Haemoglobin – structure, function, concentration, physiological variation. White blood cells – production, function, life span, counts, differential counts. Platelets – origin, normal count, morphology, functions. Plasma proteins – production, concentration, types, albumin, globulin, fibrinogen. Haemostasis and blood coagulation.

Unit -2

Cardiovascular system: Heart – physiological anatomy, nerve supply, properties of cardiac muscle, cardiac cycle – systole, diastole, conduction system. Cardiac output. Heart sounds: Normal heart sounds, areas of auscultation. Blood pressure – Definition, normal value, clinical measurement of blood pressure. Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension. Electrocardiogram (ECG) – significance, coronary, cerebral circulation and capillary circulation.

Unit -3

Digestive System: Physiological anatomy of gastro-intestinal tract, functions of digestive system. Salivary glands – structure and functions, deglutition, mastication – stages and regulation of saliva, functions of saliva. Stomach – structure and functions. Gastric secretion – composition, function, regulation of gastric juice secretion. Pancreas – structure, function, composition and regulation of pancreatic juice. Liver – functions of liver. Bile secretion - composition, function, regulation of bile secretion, bilirubin metabolism, types of bilirubin, jaundice – types, significance. Gall bladder – functions. Intestine – small intestine and large intestine. Small intestine - functions, digestion, absorption, movements. Large intestine – functions, digestion and absorption of carbohydrates, proteins, fats, lipids. Defecation

Unit- 4

Respiratory System: Function of respiratory system - physiological anatomy of respiratory system, respiratory tract, respiratory muscles, respiratory organs – lungs, alveoli, respiratory membrane, stages of respiration. Mechanism of normal and rigorous respiration, intra pulmonary pleural pressure, surface tension. Transportation of respiratory gases: Transportation of O2: direction, pressure gradient, forms of transportation, oxygenation of haemoglobin, quantity of O2 transported. Lung volumes and capacities. Regulation of respiration, mechanisms of regulation, nervous

Title - Human Physiology I- (Practical)

1. Record of blood pressure – Sphygmomanometer, palpatory method, auscultatory method, variation of BP
2. Haemoglobin estimation by Sahli's method
3. Blood grouping by agglutination method
4. Histology of Cartilage, bone, adipose tissue, skin, muscle
5. Microscope and its uses

References

- Jain NA (2022) CC Chatterjee's Human Physiology, 24th Ed., CBS Publishers, New Delhi
- Stuart IF, Rompolski K. (2018) Human Physiology, 15th Ed., McGraw Hill
- Marieb E, Hoehn K. (2018) Human Anatomy and Physiology, Pearson
- Chatterjee CC (2016), Human Physiology Volume I, Medical Allied Agency, Kolkata
- Jain A K (2012) Text Book of Physiology volume 1 and Vol.2, APC publications New Delhi

Title - Food Science -I (Theory)

Unit–1

Introduction to food science. Definition of food science. Food as a source of nutrients. Food groups: ICMR Five Food Group System. Eleven Food Group System. Nutritional Classification of foods. Cooking advantages of cooking. Methods of cooking: Moist heat methods – Water/steam as a media of cooking Boiling, simmering, poaching, stewing, steaming and pressure cooking – definition, advantages and disadvantages of each method. Dry heat method. Air as a media of cooking - grilling, roasting and baking Fat as media of cooking – stir frying, sautéing, shallow and deep fat frying. Definition, advantages and disadvantages of each method. Combination of cooking methods – braising. Microwave cooking – mechanism of microwave cooking, construction of a microwave oven, advantages and disadvantages

Unit -2

Cereals: Structure of a cereal grain. Composition and nutritive value of cereal grain. Specific cereals – nutritive value, composition and milling of rice and wheat. Parboiling – processes for parboiling, its advantages and disadvantages. Cereal protein gluten – process of gluten formation, factors that affect gluten formation. Characteristics of cereal starch – Amylose and Amylopectin. Effect of moist heat Gelatinization of starch – process of gelatinisation, gelatinisation temperature, factors affecting gelatinisation. Changes in cooked

Unit -3

Processing of nuts and oil seeds. Specific nuts and oilseeds – groundnuts, coconut. Types of fats and oils Vegetable oil – coconut, groundnut, sunflower and soybean. Animal fats – lard, margarine and butter Processing of fats and oils – rendering, pressing, solvent extraction, hydrogenation and refining. Changes during cooking – effect of heating, changes in fat on heating. Storage, spoilage, rancidity. Role of fats and oils in cookery

Unit - 4

Fruits: Classification of fruits and nutritive value. Post harvest changes and storage. Pectin substances Ripening of fruits. Enzymatic and non-enzymatic browning, prevention of enzymatic browning. Vegetables Classification, nutritive value and composition. Pigments – water insoluble and soluble. Organic acids enzymes, flavour compounds, bitter compounds. Vegetable cookery: Preliminary preparation – washing peeling and blanching. Changes during cooking – oxidation, chemical composition, water content and

cellulose. Role of nutrients – mechanical losses, solvent action of water, oxidation and chemica composition. Enzymes and non-enzymatic browning, its prevention. Flavor compounds

References

• Apenten R, Vieira E. (2022) Elementary food science, Springer.

• Srilakshmi B. (2020) Food Science, New Age International Publishers.

• Sharma A. (2017) Food Science and Technology, CBS Publishers and Distributors

• Ward DJ. (2013) Principles of food science, Goodheart-Wilcox.

• Manay NS, Shadaksharaswamy M (2010) Foods - Facts and principles, New Age International Publ., New Delhi

Year 1st Semester - Second Semester

Title - Dietetics I - (Theory)

Unit–1

Definition of dietetics, clinical dietetics, objectives of dietetics, Growth and scope of dietetics, Characteristics and role of dietician in health care, classification of dietitian, characteristics of a dietitian, objectives of diet therapy. Hospital Dietary services- role and functions. Routine hospital diets: Liquid diet, semi-solid, regular and bland diet. Modification of normal diets. Types of feeding - oral feeding and tube feeding - enteral and parental

Unit -2

Diets in obesity and underweight: Obesity - Etiology, assessment, types. Regional distribution of fat in the body. Metabolic changes in obesity. Modification, dietary treatment. Nutritional requirements. Die management – objectives, macronutrients, micronutrients, general considerations, foods allowed/not allowed. Under weight - Aetiology, Symptoms and complications, Dietary management – objectives macronutrients, micronutrients, general considerations, foods allowed/not allowed

Unit -3

Diet in infections and febrile conditions: Fever: Development, types and metabolic changes. Acute and chronic fevers. Causes and dietary management of typhoid, influenza, malaria, tuberculosis. Dietary management of all fevers - objectives, macronutrients, micronutrients, general considerations, foods allowed/ not allowed.

Unit- 4

Chronic infection- HIV (Human Immunodeficiency Virus) infection and AIDS (Acquired Immune Deficiency Syndrome). Stages of HIV infection. Aetiology, diagnosis. Malnutrition and AIDS: Dietary management - objectives, macronutrients, micronutrients, general considerations

Title - Dietetics - I (Practical)

Planning, preparing and calculating the following diets (Four case studies)

1. Fluid diets

a. Clear fluid

b. Full fluid

c. Tube feeding

2. Obesity

a. Childhood obesity/overweight

b. Adulthood obesity/overweight

3. Underweight.

a. Childhood

b. Adulthood

4. Febrile conditions

a. General fevers

b. Typhoid

c. Tuberculosis

References

- Srilakshmi B (2011) Dietetics, 6th Ed., New Age International Publ., New Delhi
- Joshi SA, (1992) Nutrition and dietetics, Tata McGraw Hill Publications, New Delhi
- Raheen Begum (1989) A textbook of foods, nutrition and dietetics, Sterling Publ., Delhi
- Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982) Nutrition in health and disease, 17th Ed., JB Lippincott and Co., Philadelphia
- Antia FP (1973) Clinical dietetics and nutrition, 2nd Ed, Oxford Univ. Press, Delhi Williams SR (1989) Nutrition and diet therapy, 6th Ed, Time, Mirror, Mosby College Publ.

Title - Human Physiology – II (Theory)

Unit–1

Endocrine System: Definition, classification of endocrine glands and their hormones, properties of hormones. Thyroid gland hormones – regulation of secretion. Disorders – hypo and hypersecretion of hormone. Adrenal gland - physiological anatomy. Adrenal cortex, cortical hormones – functions and regulation. Adrenal medulla – hormones, regulation and secretion. Functions of adrenaline and nor- adrenalin. Pituitary hormones – anterior and posterior pituitary hormones, secretion, function. Pancreas – hormones of pancreas. Insulin – secretion, regulation, function and action.

Unit- 2

Reproductive system and puberty. Male reproductive system - functions of testis, spermatogenesis, spermiogenesis - stages, factors influencing semen, endocrine functions of testis. Androgens -

Testosterone - structure and functions. Female reproductive system - ovulation, menstrual cycle, physiological changes during pregnancy, pregnancy test. Lactation: Composition of milk factors controlling lactation. Contraception

Unit -3

Neuro-muscular system: Vision – function of different parts of eye, light reflex, refractive errors, colour blindness, night blindness, accommodation. Hearing –function of ear, deafness, vestibular apparatus. Taste buds – functions, smell physiology, receptors. Nervous system: Functions of nervous system, neuron structure, classification and properties, neuroglia. Nerve fibre, classification, conduction of impulses, factors affecting conduction. Synapse - structure, types, properties. Receptors - definition, classification, properties. Reflex action - reflex arc, properties of reflex action. Spinal cord nerve tracts - function. Functions of medulla, pons, hypothalamus. Cerebral cortex, lobes and functions, sensory cortex, motor cortex

Unit -4

Excretory system: Excretory organs - Kidney: function, structural and functional unit - nephrons, vasarecta, cortical and juxtamedullary nephrons - comparison, juxtaglomerular apparatus - structure and function. Renal circulation peculiarities. Mechanism of urine formation – ultrafiltration, criteria for filtration, GFR, plasma fraction, determination of GFR. Selective reabsorption - sites of reabsorption, substance reabsorbed, mechanisms of reabsorption. Tubular secretion, properties and composition of normal urine output. Abnormal constituents of urine. Counter-current mechanisms: micturition, innervations of bladder, cystourethrogram. Diuretics: water, diuretics, osmotic diuretics, artificial kidney, renal function tests

Title - Human Physiology - II (Practical)

1. Histology of epithelial, connective, muscular and nervous tissues.
2. Enumeration of RBC and WBC count by hemocytometry/Neubauer's counting chamber
3. Determination of Bleeding Time (BT) by Duke's method
4. Determination of Coagulation Time (CT) by Wright's method
5. Urine Analysis – Albumin
6. Urine Analysis - Glucose Test
7. Instruments used in haematology

References

- Jain NA (2022) CC Chatterjee's Human Physiology, 24th Ed., CBS Publishers, New Delhi
- Chatterjee CC (2016), Human Physiology Volume I, Medical Allied Agency, Kolkata

FOOD CHEMISTRY (Minor Theory)

Unit- 1

Cellular basis of foods; Water: properties, types, water activity and its effect on shelf life of food ;Carbohydrates: roles of in food structure, color, flavor and texture

Unit- 2

Lipids: roles in food structure, color, flavor and texture, rancidity, emulsifiers; Proteins: roles in food structure, color, flavor and texture

Unit- 3

Enzymes: enzymatic & non-enzymatic browning reactions, influences on color, flavor and texture; Technologies in minerals and vitamins fortification of foods, stability of vitamins; Food colors: natural & artificial colors, pigments

Unit- 4

Flavors: characteristics, taste, odor and astringency, off-flavor, aromatic compounds, Chemistry involved in ripening processes of fruits and vegetables; Food additives.

Suggested Readings:

1. Belitz, H.D, W. Groschm and P. Schieberle. 2009. Food Chemistry. Springer Verlag, Germany.

2. Coultate, T. 2009. Food: The Chemistry of Its Components. The Royal Society of Chemistry, Thomas Graham House, Science Park, UK.

3. Damodaran, S., K. Parkin and O.R. Fennema. 2007. Fennema's Food Chemistry, 4th ed. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA

Year 2nd Semester Third Semester

Title - Life Span Nutrition I (Theory)

Unit–1

Basic principles of meal planning: Explanation of terms: Health, RDA, Adequate intake, Balanced diet. Food exchange list, food guide pyramid. Vegetarian diets - classification of vegetarianism. Quality of various nutrients - proteins, fats, minerals, vitamins, fibres and antioxidants. Principles of planning meals. Factors affecting meal planning

Unit -2

Nutrition during infancy: Growth and development. Use of growth chart to monitor development Advantages of breast feeding. Nutrition factors of human milk. Difference between human and animal milk. Artificial feeding. Factors to be considered in bottle feeding. Feeding problems. Nutritional requirements. Weaning: Need and use. Points to be considered in introducing weaning foods. Problems in weaning. Types of supplementary foods

Unit -3

Nutritional needs for children: Pre School - Factors to be considered in planning meals for preschool children. Factors affecting nutritional status. Pica. Dietary guidelines. Nutritional requirements. Die planning

School children - Meal planning for school children. Feeding problems. School lunch programmes. Factors affecting feeding programmes. Nutritional requirements.

Unit - 4

Nutritional needs for adolescents: Special needs for girls during menarche - Food habits. Dietary guidelines Nutritional problems- obesity, eating disorder, osteoporosis, anaemia, under nutrition, premenstrual

syndrome, PCOD. Nutritional requirements.

Title Life Span Nutrition I (Practical)

Content of Practical

Planning, preparing and calculating the major nutrients of the following (Two planned diets with different age groups)

1. Nutritive Recipes for weaning
2. Diet planning for Infancy- 6-8 months and 9-12 months
3. Use and interpretation of Growth Charts- WHO Growth Charts
4. Diet planning for Toddlers- (1-3 years)
5. Diet planning for Preschool Child- (4-6 years)
6. Diet planning for School going Child-(7-9 years and 10-12 years)
7. Nutritive Recipes for snacks and packed lunches
8. Diet planning for Adolescents (13-15 years and 16-18 years)

References

• Elizabeth, K. E. (2022). Nutrition and child development,6th Ed., Paras Medical Publisher, Hyderabad.

• Joshi AS. (2021). Nutrition and Dietetics, 5th Ed. McGraw Hill, Noida

• Srilashmi B. (2019). Dietetics, 8th Ed., New Age International Publishers., New Delhi

• Mudambi SR, Rajgopal MV. (2020). Fundamentals Of Foods, Nutrition And Diet Therapy, 6th Ed.,New Age International Publishers., New Delhi

• Agarwal A, Udipi SA. (2013). Textbook Of Human Nutrition., 1st Ed., Jaypee Brothers Medical Publishers, New Delhi

• Mahan K L, Escott-Stump S (2012) Krause's Food and the Nutrition Care Process, 13th Ed., Elsevier,

Title - Nutritional Biochemistry I (Theory)

Unit–1

Carbohydrates: Nomenclature, Classification of carbohydrates – monosaccharides, oligosaccharides polysaccharides – examples and structure. Metabolism – Glycolysis, TCA cycle, HMP Shunt, Glycogenesis Glycogenolysis. Carbohydrate digestion and absorption. Importance of carbohydrates. Biological oxidation and enzymes: Compounds of ETC, mechanism, oxidative phosphorylation, high energy phosphate – ATP, ADP cycle and energy conservation.

Unit- 2

Proteins– classification based on amino acid, primary, secondary and tertiary structure of proteins, hydrolysis of proteins, denaturation, precipitation and coagulation, deamination, transamination, decarboxylation- urea cycle and metabolic disorders of urea cycle

Unit -3

Lipids: Nomenclature, Classification of simple lipids – fats, oils, waxes. Complex lipids – phospholipids glycolipids. Derived lipids – steroids, terpenes, carotenoids with examples, structure and function Digestion and absorption. Fatty acids – classification – essential and non-essential fatty acids, examples properties, functions. Metabolism – β-oxidation of saturated fatty acids. Biosynthesis and catabolism o cholesterol

Unit – 4

Enzymes: Definition, nomenclature, types and classification of enzymes. Active site. Definition, types o coenzymes, specificity of enzymes. Isoenzymes, enzyme kinetics, factors affecting velocity of enzymes catalysed reactions. Regulation of enzyme activity, enzyme inhibition

Title - Nutritional Biochemistry - I (Practical)

Content of Practical

1. Qualitative analysis for carbohydrates - Glucose, Fructose, Maltose, Lactose, Sucrose, Starch and Galactose
2. Quantitative analysis in blood and serum - Blood glucose
3. Quantitative analysis in blood and serum - Cholesterol
4. Quantitative analysis in blood and serum - Urea
5. Enzymes – effect of pH on human salivary α-amylase activity
6. Qualitative test for minerals
7. Quantitative estimation of Ascorbic acid using any two different samples
8. Preparation of ash solution

References

• Sathyanarayana U, Chakrapani U. (2021) Biochemistry, Elsevier, Gurgaon Jain JL (2012),

Fundamentals of Biochemistry, S. Chand and Company Ltd. Das, D (2005)

Title - Human Nutrition – II (Theory)

Unit–1

Macro minerals: Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and Sulphur-functions sources, requirements and effects of deficiency, Bioavailability

Unit -2

Micro minerals: Copper, Cobalt, Zinc, Iodine, Manganese, Fluorine, Molybdenum, Selenium, Chromium Iron-functions, sources, requirements and effects of deficiency, Bioavailability

Unit -3

Vitamins: Classification on the basis of solubility, Vitamin A, D, E, K, Ascorbic acid, Thiamine, Riboflavin Niacin, Folic acid, Vitamin B12, Pantothenic acid, Pyridoxine- functions, sources, absorption, requirements and deficiency

Unit - 4

Water: Importance, distribution in the body, functions, oedema, dehydration, sources, water balance and requirements. Fibre: Definition, classification, sources and role of fibre in human nutrition

References

• WTO Technical Reports Series for Different Nutrients.

• Srilakshmi B (2015) Nutrition science - 4th Ed., New Age International Publ., New Delhi

• Agarwal A, Udipi SA (2014) Text book of human nutrition, Jaypee Bros Medical Publ., New Delhi

• Bamji M, Rao NP, Reddy V. (2007) Text book of Human Nutrition, Oxford and IBH Publ. Co. Pvt Ltd, New Delhi

Year 2nd Semester- Fourth Semester

Title - Dietetics II (Theory)

Unit–1

Diet in burns injury and surgery conditions: Burns- definition, classification, complications: Dietary management - objectives, macronutrients, micronutrients, general considerations. Injury/ Trauma- definition. Metabolic, physiological and hormonal response to Injury: Dietary management - objectives, macronutrients, micronutrients, general considerations. Surgery- definition. Metabolic, physiological and hormonal response to surgery: Dietary management - objectives, preoperative and postoperative nutritional care, macronutrients, micronutrients, general considerations

Unit -2

Gastro-intestinal tract ailments: Diarrhoea- definition, classification, consequences. Treatment o diarrhoea- Fluid management- Oral Rehydration Therapy (ORT). Dietary management - objectives macronutrients, micronutrients, general considerations, low residue and low fiber foods. Definition symptoms, classification, complications and dietary management - objectives, macronutrients micronutrients, general considerations, foods allowed and not allowed for the following: Constipation Gastro Oesophageal Reflux Disease (GERD), Gastritis- acute and chronic, Peptic ulcer, Irritable bowe syndrome, Steatorrhoea, Ulcerative colitis, Diverticulosis.

Unit - 3

Food intolerance: Definition, causative factors, diagnosis, treatment – elimination diet. Lactose intolerance symptoms, causative foods and stages according to severity, foods included and excluded, nutrition treatment. Gluten intolerance – symptoms, dietary treatment, foods included and excluded, nutritiona treatment. Nutrient- drug interaction

Unit -4

Food Allergy: Definition, types of allergy, common food as allergens. Signs and Symptoms, tests for allergy. Dietetic treatment.

Nutritional deficiency: Protein – energy malnutrition- aetiology, types, symptoms, dietary treatment and prevention, hospital treatment, domiciliary rehabilitation. Aetiology, clinical features, dietary treatment and prevention, prophylaxis programmes of the following: Iodine Deficiency disease and Vitamin A deficiency. Nutritional Anaemia - Aetiology, clinical features, types, dietary treatment and prevention of the following: Iron deficiency Anaemia / Disorder (IDD), Megaloblastic Anaemia, Folate Deficiency, Pernicious Anaemia

Title - Dietetics II (Practical)

Content of Practical

Planning, preparing and serving the following diets (two case studies)

1. Burns

2. Constipation

3. Peptic ulcer

4. Protein deficiency

5. Iron deficiency

6. Vitamin A deficiency

References

• Srilakshmi B (2011) Dietetics, 6th Ed, New Age International Publ., New Delhi

• Joshi SA,(1992) Nutrition and dietetics, Tata McGraw Hill Publications, New Delhi

• Mahan LK, Arlin MT (1992) Krause's Food, Nutrition and Diet Therapy, 8th Ed., W.B Saunders Company, London

• Williams SR (1989) Nutrition and diet therapy, 6th Ed., Time, Mirror, Mosby College Publ.St Louis

• Raheen Begun (1989) A textbook of foods, nutrition and dietetics, Sterling Publ., New Delhi

• Robinson CH, Lawler MR, Chenoweth WL, Garwick AE (1986) Normal and therapeutic nutrition, 17th Ed, Macmillan Publ and Co.

• Anderson L, Dibble MV, Turkki PR, Mitchall HS, Rynbergin HJ (1982): Nutrition in health and disease, 17th Ed., JB Lippincott and Co., Philadelphia

Title - Life Span Nutrition II (Theory)

Unit–1

Nutritional needs of adults: Reference man and reference woman in relation to occupation. Dietary guidelines to reduce the cost of a meal. Nutritional requirements.

Unit -2

Nutrition during pregnancy: Normal growth and weight gain. Physiological changes. Dietary modifications. General dietary problems. Complications during various stages of pregnancy. Nutritional requirements. Diet planning

Unit - 3

Nutritional needs during lactation: Physiology of lactation. Milk output and factors affecting it. Dietary guidelines. Nutritional requirements. Diet planning

Unit -4

Nutritional needs during old age: Physiological changes, RDA, Nutritional guidelines, nutritional, health concerns & complications and their management. Dietary modifications. Factors contributing to longevity

Title -Life Span Nutrition II (Practical)

Content of Practical

Planning, preparing and calculating the major nutrients of the following -

1. Nutritive Recipes during pregnancy
2. Diet planning for adult
4. Diet planning for Lactation mother
5. Diet planning for old person
6. Diet planning for Special occasion

References

• Elizabeth, K. E. (2022). Nutrition and child development,6th Ed., Paras Medical Publisher, Hyderabad.

• Joshi AS. (2021). Nutrition and Dietetics, 5th Ed. McGraw Hill, Noida

• Srilashmi B. (2019). Dietetics, 8th Ed., New Age International Publishers., New Delhi

• Mudambi SR, Rajgopal MV. (2020). Fundamentals Of Foods, Nutrition And Diet Therapy, 6th Ed.,New Age International Publishers., New Delhi

• Agarwal A, Udipi SA. (2013). Textbook Of Human Nutrition., 1st Ed., Jaypee Brothers Medical Publishers, New Delhi

• Mahan K L, Escott-Stump S (2012) Krause's Food and the Nutrition Care Process, 13th Ed., Elsevier,

Title - Quality Control I (Theory)

Unit–1

Food Laws: PFA - Mode of work and duties of food inspectors. Essential commodities act: fruit product order, milk and milk product order, meat product order, cold storage order, the vegetable oil product order, standard and weight measurement act, the infant milk substitute, feeding bottles and infant food act.

Unit -2

Food standards: ISI, AGMARK, Export inspection council, consumer protection act, CODEX Alimentarius, FSSAI. HACCP - Importance. Principles. Determination of CCP. Problems in implementing HACCP. Importance of TQM, GMP and GLP

Unit- 3

Adulteration of food: Definition. Types. Contamination of food by incidental adulteration by microorganisms, packing materials and other sources. Tests to detect common adulterants

Unit -4

Food technology: Biotechnology in food: Application, GM foods. Nutraceuticals. Organic foods. Packaging of foods: Classification, types of packaging materials – paper, plastics, glass, tins and metals, packaging of different food products – bakery, dairy, dehydrated, fresh fruits and vegetables, fats and oils, frozen food products

References-

1. Swaminathan, M., Food Science, Chemistry and Experimental Foods, Bappco Publishers, Bangalore, 2004.

2. Chandrasekhar, U, Food Science and Applications in Indian Cookery, Phoenix Publishing House Private Ltd., New Delhi, 2002.

3. Adams, M.R. and Moss, M.O., Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.

4. Fellow, P., Food Processing Technology – Principles and Practices, 2nd Edition, CRC Press Woodland Publishers, England, 2000.

5. Sommers, C.H. and Xveteng Fan, Food Irradiation Research and Technology, Blackwell Publishing, 2006.

Year 3rd SEMESTER FIFTH

Title- FOOD MICROBIOLOGY (Theory)

UNIT - I

General characteristics of microorganisms — bacteria, viruses, yeasts, Molds aid protozoa. A brief study of their morphology and diseases produced them.

UNIT - II

Primary sources of microbes in foods. Control of microbes: Sterilisation, Disinfection, pasteurization. Physical -

agents - light desiccation, electricity, irradiation and heat. Removal of microbes — filtration, sedimentation. Chemical agents - Preservatives & antibiotics.

UNIT — III

Food spoilage: Contamination of foods and microbes in the spoilage of foods and their prevention. Spoilage of cereals & cereal products, vegetables & fruits, sea foods, meat, egg, poultry & canned foods, milk & milk products.

UNIT — IV

Public health hazards due to food contamination. Food borne infections &intoxications - symptoms, mode & sources of transmission, methods of prevention: detection of food borne disease outbreak. Importance of sanitation and hygiene in foods. Milk and water sanitary quality. HACCP — concept & application in food safety.

Importance of microbes in foods. Fermented foods & fermenting age Cereal — pulse mixtures, wheat products, milk products, soy products. alcoholic. beverages.

Title- FOOD MICROBIOLOGY (Practical)

1) Examination of yeasts. moulds. protozoa and pathogenic bacteria under the

microscope.

2) Examination of stained organisms — Hanging drop preparation method

3) Examination of stained organisms — Simple staining and Gram's method 01

4) Demonstration of serial dilution technique & pure culture technique.

5) Visit to a milk processing plant. Demonstration of phosphatase test.

6) Demonstration of certain types of food fermentation.

REFERENCES

- Joshua. A.K. (1988) — Microbiology : III Edition, Popular Book Depot. Madras.
- Frazier. W.c. and Westhoff D.0 (1988) Food Microbiology, 4th ed. John Wiley & Sons, Inc., New York.
- Jay, J.M., (1986) Modern Food Microbiology, 3'd ed. Van NostrandReinhold Co. Inc.
- Roday, S. (1999) Hygiene & Sanitation in food Industry. Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Harold. B. (1990) Microbiological applications. C Brown Publishers. USA Text Book.
- Foster (2016) Textbook of Food Microbiology;CBS Publications

Title- Food Science II (Theory)

Unit–1

Milk and milk products: Composition and nutritive value. Physical properties of milk. Effect of heat on milk constituents – nutrients, colour, flavour, digestibility, microorganisms, scum formation, scorching of milk. Processing of milk – clarification, pasteurization and homogenization. Preparation of cheese, butter, curd and ice cream. Problems encountered in cooking milk. Milk products – Vitamin D milk, skim milk, concentrated milk and cream

Unit -2

Egg: Structure and nutritive value. Composition – egg white and egg yolk proteins. Pigments in egg shell, white and yolk. Vegetarian egg. Egg quality – evaluation of egg quality, egg grading and deterioration of egg quality. Egg beating and factors affecting foaming. Egg cookery – Effects of heat and coagulation of egg proteins, microorganisms, effect of ingredients on egg protein. Egg prepared in the shell – boiled eggs – hard and soft. Egg prepared out of the shell – poached egg, fried egg, scrambled egg and omelette. Products based on egg as thickening agent – Custard. Products based on egg as emulsifying agent – Meringues. Preservation – freezing, cold storage, drying. Storage of egg

Unit -3

Meat: Structure, composition and nutritive value of meat. Classes of meat. Gelatin. Cuts and grades of meat and their selection. Post mortem changes, storage and changes during cooking. Ageing of meat and curing of meat. Factors affecting tenderness of meat. Meat cookery and changes during cooking, methods of cooking – dry heat and moist heat.

Unit -4

Poultry, fish and spices: Classification and nutritive value. Processing and preservation. Selection and storage. Methods of cooking poultry and fish cookery. Spoilage of fish.

Spices and condiments – Composition, flavouring extracts, adulteration and medicinal values. Processing and uses of major spices – Pepper (white and green), cardamom, ginger and turmeric

Title – Food Science II (Practical)

1. Milk : Methods of cooking fine and coarse cereals, Preparation of selected Indian cereal recipes,

2. Meat : Browning reaction, Effect of acid and alkali, Preparation of selected common recipe

3. Fats and oils - Smoking point, Preparation of common recipes

4. Milk cookery - Experimental cookery on milk, Common preparations with milk, cheese and curds

5. Egg cookery - Evaluation of fresh egg.

6. Experimental cookery – boiled egg, poached egg, omelette and custard. Preparation of selected common recipes with milk

REFERENCES

1. Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.

2. Shakunthala Manay. N; Shadakshara Swamy.M; Foods Facts and Principles, 3rd edition, New Age International (P) Limited Publishers, 2014.

3. Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.

4. Arindam Ramaswamy, Elements of Food Science, Oxford Book Company, 2010.

5. Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.

6. Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.

Title - SPORTS NUTRITION (Theory)

Unit- 1

The principles of fitness, motivation and conditioning; Nutrition for the athletes, stress management, preventing accidents, stretching, posture and aerobics

Unit -2

Vitamins and minerals supplementation for fitness; High and low intensity exercise, cross training, walking for weight control and case studies; Introduction to muscle contraction, fast and slow fibres, energy storage, fuels used for exercise

Unit -3

Energy balance, fluid balance, fuelling cycle: Pre-exercise, during exercise and during recovery; Athletes eating plan, calorie goals, calorie values, carbohydrate goals, protein goals, fat, vitamins and mineral goals; Competition nutrition; Loosing, gaining and making weight for athletes.

Unit- 4

Eating disorder and athletes; Sports drink and supplementation; National and international regulations for supplements; Risks associated with performance enhancing drugs; Metabolic Equivalent Task; My pyramid for sportsman.

Suggested Readings:

1. Antonio, J., D. Kalman, J.R. Stout, M. Greenwood, D.S. Willoughby and G.G. Haff. 2008. Essentials of Sports Nutrition and Supplements. Humana Press, New York, USA.

2. Driskell, J.A. 2007. Sports Nutrition Fats and Proteins. CRC Press, Taylor and Francis Group, Boca Raton, FL, USA.

3. Fink, H.H., A.E. Mikesky and L.A. Burgoon 2011. Practical Applications in Sports Nutrition, 3rd ed. Jones & Bartlett Learning Burlington, MA, USA.

4. Lanham-New, S.A., S.J. Stear, S.M. Shirreffs and A.L. Collins. 2011. Sports and Exercise Nutrition. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK.

5. Maughan, R.J. 2000. Nutrition in Sport: The Encyclopedia of Sports Medicine. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK.

Title - COMMUNITY NUTRITION (Theory)

UNIT I

Assessment of Nutritional Status of the Community

 Diet or nutritional survey method.

 Clinical Method.

 Anthropometric measurement.

 Bio-chemical methods

 Bio-physical and Radiological

 A Vital Statistics

UNIT II

Definition of malnutrition Etiology of malnutrition. Strategies to prevent malnutrition, consequences of malnutrition.

UNIT III

Nutrition Education: Definition, importance, principles is planning, programme execution and evaluation, integration with other national programmes. Mass media, types, preparation of educational material.

UNIT - IV

Nutrition Intervention Programmes

 Genesis, objectives and operation of nutrition intervention programmes in India —School lunch programme, CMNMP, ICDS, TINP organized by government for vulnerable sections of the population.

National, International and voluntary organizations to combat Malnutrition

 International Organisation: FAO, WHO, UNICEF Bank,

 National Organisation: ICMR, SSWB, NIN, NNMB, NIPCCD.

REFERENCES

 ShanthiGhosh, The feeding and care of infants and young_ children, Voluntary Health Association of India. New Delhi — 1992.

 ShanthiGhosh, Nutrition and Child Care, A Practical Guide. Jay Pee Brothers, Medical Publishers (P) Ltd., New Delhi, 1997.

 Government of India Integrated Child Development Services Scheme, Ministry of Education and Social Welfare, New Delhi, 1979.

 Rajammal P. Devadas, Nutrition and Nutritional Development. SaradalayaPress, Coimbatore, Tamilnadu, 1980.

Year 3rd SEMESTER - SIX SEMESTER

Title- NUTRITIONAL BIOCHEMISTRY-II (Theory)

Unit- 1

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.

Unit- 2

Introduction to Nucleic acids: Structure, replication, transcription, genetic code (in brief) elementary knowledge of biosynthesis of proteins.

Unit- 3

Proteins: General reaction of amino acid metabolism, urea cycle. Lipoproteins: Types, composition, role and significance in disease (in brief).

Unit- 4

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

Minerals: Biochemical role of inorganic elements.

Title- NUTRITIONAL BIOCHEMISTRY-II (PRACTICAL)

1. Qualitative analysis of amino acids

2. Qualitative analysis of proteins

3. Estimation of serum Protein

4. Estimation of serum creatinine

5. Estimation of serum Urea

6. Estimation of serum Iron, phosphorus, calcium

REFERENCES

1. Lehninger, A.L, Biochemistry, worth publishers INC, New York, 2000.

2. Ambiga Shanmugam, Fundamentals of biochemistry for Medical students, Karthik printers, 2002.

3. Nutritional Biochemistry, 2nd edition Tom Bridt, Academic press 2006.

4. Powar and Chatwal, Biochemistry, Himalaya publishing house, 2000.

5. Ranganatha Rao, K, Text book of Biochemistry, Prentice Hall of India, New Delhi, (2000). .

6. Sathyanarayanan, U.,Chakrapani, U., textbook of biochemistry, 3rd edition, books and allied (p) ltd kolkata, 2010.

7. Lehinger's principle of Biochemistry (2000), Nelson and Cox.

8. Harper's Biochemistry - Rober K. Murray, Daryl K.Grammer, McGrawHill, Lange Medical Books

9. Biochemistry - Dr. Ambica shanmugam, published by author 2006.

10.Illustrated biochemistry-lippincott's,5th edition

Title - DIET COUNSELING AND PATIENT CARE (Theory)

Unit-1

Introduction to term Dietician: Definition of Dietician, Difference between registered dietician & Nutrition; Role of dietician in hospital: work area of hospital dietician, role of dietician in hospital

Unit- 2

Role of dietician in community: - work area of community dietician, role of community dietician

Introduction to Nutrition Care Process: Definition of Nutrition Care Process. Steps of Nutrition Care Process

Nutrition Assessment: -Definition , Nutrition assessment component, Critical thinking

Unit- 3

Nutrition Diagnosis: nutrition diagnosis domain:- intake, clinical, behavioral – environmental Nutrition diagnosis component• nutrition vs. medical diagnosis

Unit- 4

Nutrition Interventions: Definition and objectives

Nutrition Monitoring & Evaluation : Definition, Nutrition monitoring & evaluation components, nutrition goals & objectives. Evaluation of nutrition care

Title- DIET COUNSELING AND PATIENT CARE (PRACTICAL)

1 Taking Case history and study any five Patient

2 Routine Hospital diet (one or two days visit any One Hospital)

3 Dietary management of patient in different diseases (any four types) and diet chart for the particular patient.

4. Role of dietitian /nutritionist in diet counselling

Title- DIETETIC INTERNSHIP

CONTENT

Internship one week or fifteen days

 Observation and Study of organisation and management of the dietary department.

 Understanding the medical history of the patients, study of case sheets, and diagnostic tests used, Nutritional Assessment of patients.

 Planning therapeutic diets and computation of nutritive value. Diet setting.

 Observation and study of

a) Purchase storage and issue

b) Production

c) Service

d) Evaluation and follow up

 Participation in diet counselling units. Experience in imparting diet counselling and understanding the records maintained in diet counselling units.