

SYLLABUS FOR LAB ASSISTANT (FOOD & NUTRITION)**FOOD SCIENCE AND EXPERIMENTAL FOODS****Food Groups and Cooking Methods**

Foods, Classification, Functions, Food groups, Balanced Food, Food pyramid, My plate
Cooking- Objectives of Cooking, Preliminary preparation, cooking methods, Dry heat, Moist heat, Merits and Demerits.

Cereals, Pulses, Nuts and Oil Seeds, Fats and Oils

Structure, Composition and Nutritive Value, Changes in Nutritive Value during Cooking, Processing and storage, cooking quality

Cereals- Cereal cookery concepts, fermented products, non-fermented products, breakfast cereals

Pulses- Factors affecting cooking quality of pulses, storage and infestation, toxic constituents, pulse cookery.

Nuts and oil seeds- Nuts and oil seeds cookery, toxins in nuts and oil seeds

Fats & Oils - Processing and refining of fats, Specific fats, Role of fats/oil in cookery, Emulsion, smoking point, rancidity.

Vegetables and Fruits

Vegetables - Classification, Composition and Nutritive Value, Selection, Vegetable cookery- pigments, Changes in Nutritive Value, Ripening of Fruits, Storage of vegetables and Fruits, fungi and algae as foods

Fruits - Classification, Composition and Nutritive Value, post-harvest change, enzymatic and non-enzymatic browning, vegetables and fruits as functional foods, Ripening of Fruits, Pectic substances and gel formation, Storage of Fruits.

Meat, Poultry, Dairy and Fish

Milk – Composition and Properties of milk, Nutritive Value, effect of heat, acid, enzymes, phenolic compounds and salts. Microorganisms, Processing, Milk Products, Milk Substitutes, Role of milk and milk products in cookery

Egg- Structure, Composition and Nutritive Value, Quality of eggs, Egg cookery, Buying and Handling, preservation, Role of eggs in cookery.

Fleshy Foods- Structure, Composition and Nutritive value of meat, Selection and Storage – Effect of cooking on colour, Texture and flavour. Ageing of meat, Curing of Meat, Tendering Meat, Cuts and grades of meat, Meat cookery.

Poultry - Classification, Processing, Composition and Nutritive value, Preservation and storage

Fish - Classification, Composition, Selection, Fish cookery, Spoilage, Preservation and storage.

Sugars, Beverages, Spices and Condiments

Sugars - Nutritive value, Properties, Stages of sugar cookery, Sugar Related Products, Sugar Cookery and Artificial Sweetener.

Beverages - Classification, Nutritive value – Coffee, Tea, Cocoa, Chocolate, Fruit Beverages, Soups Vegetable Juices, Milk Based Beverages, Malted Beverages, Aerated and Non-Alcoholic Beverages, Miscellaneous Beverages, Alcoholic Beverages.

Spices and Condiments: Types, Functional properties, Role of spices in cookery.

PRINCIPLES OF NUTRITION**Energy**

Energy, Units of Energy, Measurement of Calorific Value, Physiological fuel values, Determination of energy requirements-Direct and Indirect calorimetry, Relation between Respiratory quotient and Energy output, Specific dynamic action of foods (Diet Induced Thermo genesis) definition, determination of basal metabolism-Benedicts Roth Apparatus, Factors Affecting BMR, determination of energy metabolism during work- Energy requirements for various age groups.

Carbohydrates and proteins

Carbohydrates - Classification, composition, sources, functions, digestion, absorption, glycaemic index and metabolism, Requirements (RDA) and deficiency. Dietary fibre – definition, sources, functions and types -Soluble and Insoluble Fiber.

Proteins - Classification, composition, sources, functions, digestion, absorption and metabolism, Requirements (RDA) and deficiency. Amino acid- classification and functions. Evaluation of protein quality-PER, NPU, NDBPER, BV and Chemical score.

Lipids and Water

Lipids and fats- Classification, composition, Sources, Essential fatty acids, functions, digestion, absorption, metabolism and Requirements

Water and electrolyte Balance - Distribution of water and electrolytes, Functions, Requirements, Sources, water balance.

Minerals

Macro minerals - Classification, Distribution in the body, Functions, Source's, absorption, storage, metabolism, storage, requirements, deficiency and toxicity- Calcium, Phosphorus, Magnesium.

Micro minerals - Classification, Distribution in the body, Functions, Sources absorption, metabolism, storage, requirements, deficiency and toxicity- Sodium, Potassium, Copper, Iron, Zinc, Iodine and Fluorine, selenium

Vitamins

Fat soluble vitamins - Chemistry, Functions, Sources, absorption, transport, metabolism, Requirements, Deficiency and toxicity.

Water Soluble Vitamins - Chemistry, Functions, Sources, absorption, transport and metabolism, Requirements, Deficiency and toxicity.

Antioxidants - Free radicals damage, Oxidant defense system, Antioxidants in diseases, Sources.

FOOD PROCESSING AND PRESERVATION TECHNOLOGY –I**Introduction to food processing**

Nature and properties of food, fluid and visco elastic behavior of foods, Principles of different food processing such as membrane filtration (ultra, osmosis and reverse osmosis, dialysis), pulsed electric, irradiation, high pressure processing and hurdle technology. Effect of food processing on the nutritional properties of food.

Processing of cereals and millets

Milling products and by products of wheat, rice, corn, barley, oats, sorghum and other millets, whole wheat atta, blended flour, fortified flour, flaked, puffed and popped cereals, malted cereals, processed foods – bakery products, pasta products and value-added products.

Processing of legumes and oil seeds

Milling, processing for anti-nutritional factors, processing for production of edible oil, meal, flour, protein concentrates and isolates, extrusion cooking technology, snack foods, development of low-cost protein foods.

Processing of Dairy and animal foods

Dairy – Manufacture of different types of milk, drying of whole and skim milk, cream separation, churning of butter, processing of different types of cheese, Probiotic milk products - yoghurt, dahi and ice-cream, indigenous milk products - khoa, burfi, kalakhand, gulab jamun, rasagola, srikhand, channa, paneer, ghee, lassi.

Animal Foods: Canning, cooking, drying, pickling, curing and smoking, salami, kebabs, sausages, sliced, minced, corned, whole egg powder, egg yolk powder, fish protein concentrate and fish oil

Processing of Fruits and Vegetables

Introduction to ripening of fruits and vegetables, processing and preservation of various fruits and vegetables, fruit juices concentrates and powders, purees, pastes, sugar and salt preserves, dehydrated fruits and vegetables.

NUTRITION THROUGH LIFESPAN

Introduction to RDA and Balanced Diet

Basics for Recommending the Dietary Allowances, Acceptable Dietary Intake, Purposes of RDA, Factors Affecting Recommended Dietary Allowances, Requirements and Recommended Dietary Allowances, Growth chart, Uses of ICMR RDA in planning balanced diet, Consumption Units. Reference Man and Woman, Food and Nutritional Requirements for Adults doing Different Activities.

Maternal Nutrition

Nutrition in Pregnancy: Maternal nutrition and outcome, Importance of pre and periconceptional nutrition during pregnancy; Pre pregnancy weight and fetal outcome. Fetal weight gain. Nutritional assessment and guidance in prenatal care. - Physiological changes during pregnancy, expansion in blood volume, hormonal profile in pregnancy, organ functions, placental transfer of nutrients and resulting complications in pregnancy. Other nutrition related conditions; pregnancy in obese women, gestational diabetes, preeclampsia, alcohol and caffeine abuse. - Maternal nutrient metabolism and recommended intakes in pregnancy. Maternal weight gain in pregnancy. Intrauterine growth retardation. High risk pregnancies and common concerns during pregnancy. Importance of antenatal care.

Nutrition in Lactation: Nutritional needs for lactation. Breast feeding biology, Psycho - physiological aspects of lactation. Factors affecting lactation capacity. Management of lactation, exclusive breast feeding, Breast support and counseling. Effect of breast feeding on maternal health.

Nutrition for Infant

Infant growth and physiological development. Norms/standards for growth. Growth monitoring and promotion. Failure to thrive. Infant nutritional needs and concerns. Nutrition and brain development. Infant feeding, volume and composition of breast milk, human milk Vs. artificial formula. -Development and nutritional quality of infant food: Modern infant formula, complementary and supplementary feeding. Dietary management issues in infant feeding. Food allergies in infancy. -Preterm and LBW infants: Consequences, implications for feeding and management. Neonatal infant mortality and child mortality, IMR. Government policies, schemes and entitlements.

Nutrition in Childhood and Adolescence

Childhood: Growth and development, physiological development. Nutritional needs and feeding for preschool children. Micronutrient malnutrition among preschool children. Child health, morbidity, mortality and under five mortality rate (U5MR). -Nutritional requirements and RDA. Feeding school children, behavioral characteristics and feeding problems. Dietary patterns, planning a school lunch, factors to be considered. Implications of childhood obesity and other nutritional concerns. Healthy food choices during childhood.

Adolescence: Growth during adolescence, nutritional requirements, hormonal influences, age of menarche factors affecting, physiological problems and nutritional issues in adolescence. Government policies, schemes and entitlements

Nutrition for Adulthood and Old age

Nutritional requirements for adult man and woman. Nutritional concerns and diet. Nutrition and work efficiency. -Physiological changes in aging, effects of aging on nutritional health of elderly. RDA, nutritional guidelines. Modification in diet, feeding old people. Nutritional concerns in old age and their management. Government policies, schemes and entitlements

FOOD PROCESSING AND PRESERVATION TECHNOLOGY –II

Introduction to Food Preservation

Importance of Food Preservation, Types of Spoilage, Basic Principles of Food Preservation.

Preservation by the Use of Low and High Temperature

a) Preservation by the Use of Low temperature- Refrigeration, freezing

Refrigeration, Advantages, Factors to be Considered, Common Spoilages, Freezing, Difference between

Refrigeration and Freezing, Methods of Freezing, freeze drying and freeze concentration, Steps Involved in Freezing Common Foods, Spoilages, storage.

Preservation by Using Sugar

Sugar Concentrates – Principles of Gel Formation, Preparation of Jam, Jelly, Marmalades, sauce and squash, Preserves, Candied, Glazed and Crystallized Fruits

Preservation by Using Chemicals and Salts Fermentation

Definition, Types of Fermentation, Advantages, Preparation and Preservation of Fruit Juices, RTS

Pickling – Principles Involved and Types of Pickles- Indian Pickles, Vinegar, Salt Preservation

Chemical Preservatives – Definition, Role of Preservation, Permitted Preservatives, FPO Specification, Bio preservatives of microbial origin, FSSAI

Preservation by Fermentation

Common Fermented Foods, Wine and Cheese Making

FOOD CHEMISTRY

Sols, Gels and Solutions

Moisture in Foods, Hydrogen Bonding, Bound Water, Water and its interaction with food components and food stability, Water Activity in Foods, Determination of Moisture Content in Foods, True Solutions, Dispersions, Sols, Gels, Foams, Colloids and Emulsions.

Carbohydrates- Chemical properties for Food Applications

Carbohydrates- Starch - granule structure and properties, native and modified

Heteropolysaccharides - pectic substances and seed gums, Sweeteners, Effect of Sugar, Acid, Alkali, Fat and Surface Active Agents on Starch, Types of Candies, Chemistry of Milk Sugar, Non Enzymatic Browning, Swelling of Starch Granules, Gel Formation, Retrogradation, Syneresis.

Proteins- Chemical properties for Food Applications

Proteins - Amino acid chemistry, Protein structure, Components of Wheat Proteins, Structure, Gluten

Formation Effect of Soaking, Fermentation and Germination on Pulse Proteins. Properties of Egg Protein, Chemistry of Milk Protein, Changes in Milk, Egg and Meat Proteins during Heating, Action of Heat, Acid, Alkalis on vegetables Proteins and animal Proteins

Fats and Oils- Chemical properties for Food Applications

Lipids - Fatty acids and triglycerides, Phospholipids, Physical and Chemical Properties of Fats and Oils, Lipid oxidation -Rancidity, hydrolytic and oxidative Hydrogenation - mechanisms and catalysts, Winterization, Decomposition of Triglycerides, Shortening Power of Fats, Changes in Fats and Oils during Heating, Factors affecting fat absorption in foods

Chemistry of Pectic Substances, Plant Pigments, Spices and condiments

Pectins, Phenolic Components, Enzymatic Browning in Fruits and Vegetables, Volatile Compounds from Cooked Vegetables, Different Types of Plant Pigments – Water- and Fat-Soluble Pigments, Properties and Active Principles of Spices and Condiments, Colours and colorants, Food additives, Flavours, Acid -base chemistry of foods and common additives, Toxic substances.

NUTRITIONAL BIOCHEMISTRY

Biomolecules

Chemical constituents of life. Biomolecules and the cell. Types of biomolecules- Carbohydrates, lipids, amino acids, proteins and nucleic acids. Digestion and absorption of biomolecules. Biological oxidation.

Enzymes and Hormones

Enzymes - Classification and functions. Mechanisms of enzyme action. Regulation of enzyme activity. Factors affecting enzyme activity. Enzyme inhibition. Coenzyme- types. Enzymes and metabolic pathways in cellular organelles. Hormones – Classification and mechanism of action. Biological functions of hormones.

Carbohydrates and Proteins and their Metabolism

Carbohydrates- Classification, structure and physico-chemical properties. Metabolisms of carbohydrates- Glycolysis, Citric acid cycle, Glycogenesis, Glycogenolysis, Gluconeogenesis. Abnormalities in carbohydrate metabolism.

Proteins and amino acids- Classification, structure and physico-chemical properties. Metabolism of proteins Urea cycle. Glutamine and Alanine cycle. Abnormalities in protein metabolism.

Metabolism of Lipids and Integration of Metabolic Pathways

Lipids- Classification and structure. Metabolic pathways of Triacylglycerol, fatty acids, cholesterol and lipoproteins. Biosynthesis of fatty acids and ketone bodies. Abnormalities in lipids metabolism.

Integration and regulation of metabolic pathways- Central role of the liver metabolism. Metabolic crossroads. Tissue-Specific Metabolism during the Fed-Fast Cycle System.

Nucleic acids, Nucleotides and their Metabolisms

Nucleic acids and nucleotides- Classification, structure and functions. Nucleosides vs nucleotides. Metabolism of nucleic acid components - Biosynthesis of nucleotides. Structure of DNA and RNA. Types of RNA. DNA replication, transcription and translation- Role of nucleic acids in protein synthesis.

CLINICAL NUTRITION AND DIETETICS – I

Introduction to Clinical Nutrition and Dietetics

Definition and history of dietetics- Concepts of a desirable diet for optimum health relationship between food, nutrition and health- Factors affecting food choices, Physiologic factors regulating food intake- role of neurotransmitters and nutrients in hunger and satiety.

Introduction to diet therapy- Glycaemic Index, dietary supplements, adjunct to diet therapy, food nutrition drug interaction

Role and Responsibilities of Dieticians

Dietician, classification, responsibilities, code of ethics, assessment and diet planning, diet counselling and nutrition education, dietician in India, Indian Dietetic Association (IDA)

Principles and Objectives of Medical Nutrition Therapy

Characteristics of a Regular diet, rationale for modifications in terms of energy and other nutrients, texture, consistency. Translation of diet orders into menu: defining nutrient needs, desirable dietary pattern, menu plan, use of exchange list, types of menu. Monitoring food intake.

Enteral and Parenteral feeding- Indications, types (oral supplements, tube feeding, parenteral feeding, TPN, pre and post-operative diets, immuno nutrition), methods of administration, monitoring and associated complications.

Dietary Principles and Management of Special Conditions

Protein and energy malnutrition (hospital and domiciliary treatment) - Febrile diseases-classification of fevers, metabolism, general dietary considerations- diet in acute and chronic fevers (typhoid and tuberculosis) -Surgical conditions, Burns and organ transplants, Infectious diseases (typhoid, malaria, tuberculosis, HIV), arthritis, gout, hypothyroidism

Nutrition in adverse reactions to food

Pathogenesis, food allergens, symptoms, tests for diagnosis, food allergies - pollen food allergy syndrome, latex –fruit syndrome, food dependent, exercise- induced anaphylaxis, food induced anaphylaxis, food –protein induced enterocolitis syndrome, cow’s milk protein allergy (CMPA). Management - restricted diets, elimination diets and hypo- sensitization.

FOOD MICROBIOLOGY

Introduction to Microbiology, Morphology and Growth factors of Microorganisms

Definition and History, Microscopy, Light and electron Microscopy, General Morphology of Microorganisms Bacteria, Fungi, Algae, Yeast and Virus-Bacteriophage, Microbial Biomass, Growth Curve, Definition of Batch and Continuous culture, Factors Affecting Growth - Intrinsic Factors, Nutrient Content, pH, Redox Potential, Antimicrobial, Barrier and Water Activity. , Extrinsic Factors: Relative Humidity, Temperature and Gaseous Atmosphere, Enumeration strategy of microorganisms, Simple microbial test-sampling, counting

Microbiology of Plant-based Foods

Outline of Contamination, Spoilage and Preservation of Vegetables and Fruits, Cereals and Cereal Products, Pulses, Nuts and oilseeds, Sugar and Sugar Products

Microbiology of Animal-based Foods

Outline of Contamination, Spoilage and Preservation of Milk and Milk Products, Canned Foods, Meat and Meat Products, Egg and Poultry

Beneficial Effects of Microorganisms

Fermented Foods – Curd, Cheese, Sauerkraut, Meat, Soy Based Foods, Alcoholic Beverages and Vinegar

Unit V: Food Intoxication and Food Infection

Food Borne Diseases – Classification- Intoxication – Botulism and Staphylococcal intoxication- Infection –Salmonellosis, Clostridium Perfringens illness, Bacillus cereus, Ecoli, Shigellosis, Yersinia and Streptococcus faecalis – Foods involved, Disease’s outbreak, Preventive and control measures.

CLINICAL NUTRITION AND DIETETICS – II

Dietetics in Clinical Nutrition

Therapeutic diets- an overview. Principle involved in planning menu of therapeutic diets. Techniques of writing menus, Food service management in hospitals- Types (centralized and decentralized systems of service), management of delivery and service of food in different systems.

Dietary management of metabolic syndrome and associated disorders

Metabolic syndrome: Concept; Pathophysiology of insulin resistance.

Obesity- introduction, aetiology, clinical assessment, treatment approaches, consequences of obesity and its prevention. Diabetes mellitus – types, aetiology, symptoms and diagnosis, aims of dietary treatments, special dietary consideration for type I and II diabetics, complications of diabetes

Diseases of the heart and blood vessels- etiology, symptoms and diagnosis; atherosclerosis, lipids and other dietary factors and coronary heart diseases (CHD). Diet in CHD, hypertension, congestive heart failure and hyperlipidaemia.

Dietary management of gastrointestinal tract disorders

Structure and function of the gastrointestinal tract, dietary treatment for constipation, diarrhoea, peptic ulcer, celiac disease, tropical enteropathy, tropical sprue, inflammatory bowel disease, irritable bowel syndrome and diverticular disease.

Nutritional management in liver and kidney diseases

Diseases of the liver - functions of liver, clinical assessment of liver function. Pathogenesis, signs and symptoms of hepatitis, acute liver failure, cirrhosis and encephalopathy. Nutritional management in liver diseases. Dietary management in gallbladder diseases.

Diseases of the kidney - functions of kidney, clinical assessment of kidney function. Pathogenesis, signs and symptoms of acute and chronic renal failure, nephrotic syndrome and renal calculi. Nutritional management in kidney diseases and during renal replacement therapy.

Unit V - Nutritional therapy in neoplastic diseases

Cancer- Types, stages and markers. Nutrition in the etiology of cancer. Nutritional effects of cancer and cancer therapy, nutritional care of cancer patient. Complementary and alternative nutrition therapies.

FOOD PRODUCT DEVELOPMENT AND MARKETING

Food consumption pattern

Trends in Food Consumption pattern. Economical, Psychological and Sociological Dimensions of Food

Consumption patterns. Trends in Social Change as a Base for New Product Development

Introduction to Food Processing and Product Development

Food Components, Types of Food Processing, Status of Food Processing Industry in India and Scope of Growth in Future, Principles and Purpose of New Product Development, Product Design and Specifications.

Development of Convenience Foods

Traditional Foods, Weaning Foods, Convenience Foods, RTE, RTS, Extruded foods, IMF Foods, Speciality Products, Health foods, Nutritional Supplements, Functional Foods, Nutraceuticals and Designer Foods, Sports Foods, Foods for Defence Services, Space foods, flight foods.

Testing, Evaluation and Packaging of Products

Standardization, Portion size, Portion Control, Quantity Cooking, Shelf Life Evaluation- Sensory and Microbial Testing of Processed Foods, Nutrient Analysis. Suitable Packaging Materials for Different Foods, SWOT Analysis, labelling information and designing, misbranded foods and loss.

Financial Management and Marketing of Food Products

Institutional Support (Training and Finance) for Entrepreneurship Development. Financial Institutions (Central and State Government) banks/Funding Agencies, Financial Accounting Procedures, Book Keeping, Market Research, Marketing Strategies, digital marketing, Cost Calculation, Advertising Methods, Product sales, Product License, Legal specifications, Consumer Behaviour and Food Acceptance, data sciences.

PACKAGING AND LABELLING OF FOOD PRODUCTS

Packaging design and chemistry of food products

Food Packaging- Definition, Principles of packaging, Importance, relationship between Packaging and food, functional requirements for food packaging- preservation and protection, transport and storage, operational, communication, appellative function, persuasive function, informative function, environmental requirements. Integrated food packaging systems- Types, Food packaging and environmental ethics, sustainability in food packaging, packaging design.

Oxygen scavenging Packaging

Active Packaging, oxygen scavengers, moisture control, gas permeability control, ethylene scavengers, odour removers, antimicrobial packaging, carbon dioxide absorbers.

COMMUNITY NUTRITION

Unit I –Community Nutrition- An Overview

Community nutrition- Definition. Role of nutrition in community development. Methods of improving nutritional quality. Nutritional and infection interrelationship. Present trends and focus on community nutrition.

Nutritional Problems of the Community

Nutritional Problems- PEM, obesity, vitamin A deficiency diseases, anaemia, iodine deficiency disorders, fluorosis and lifestyle disorders. Malnutrition- Definition, prevalence, causes, consequences. Ecological factors leading to malnutrition. Vicious cycle of malnutrition. Strategies to overcome malnutrition. Nutritional recommendations during nutritional deficiencies, disorders and pandemic. Principles of planning diets during malnourishment.

Complementary Nutrition. Role of functional foods in health promotion and disease prevention.

Assessment of Nutritional Status

Different methods for assessing nutritional status. Direct methods- Anthropometric assessments, biochemical assessments, clinical observations, dietary assessments. Indirect methods- economic factors, cultural and social factors, ecological variables, vital health statistics and other records.

Strategies to Combat Nutritional Problems

Strategies to mitigate nutritional problems. Food Security and Nutritional security- concept and measurement. Factors affecting food security and nutritional security. Management of food insecurity-Food Fortification and enrichment. Governmental Policies and Programmes - Food

Assistance and Food Supplementation Programmes-Public Distribution System (PDS), Food For Work (FFW), Special Nutrition Programme (SNP), School Lunch Programme (SLP), Mid Day Meal Programme (MMP), Balawadi Nutrition Programme (BNP), Integrated Child Development Services (ICDS). Nutrition Education - Importance - Approaches Media and Methods.

ANALYTICAL INSTRUMENTATION

Introduction to Food Analysis

Need for food analysis, need for Instrumentation in Food Analysis, Criteria for Selecting a Technique, Instrumental Techniques in Food Analysis, Transition of Food Analysis.

Chromatographic Techniques

Gas chromatography, Liquid chromatography, Thin Layer Chromatography, High-Performance Thin Layer Chromatography – Principles and applications

Hyphenated Techniques

Gas Chromatography-Mass Spectrometry (GC-MS), Liquid Chromatography-Mass Spectrometry (LC-MS) – Principles and applications- Principles and applications.

spectroscopic Techniques

Visible Spectroscopy, Atomic-Absorption Spectroscopy (AAS), Inductively Coupled Plasma – Optical Emission Spectrophotometry (ICP- OES/MS), Nuclear Magnetic Resonance Spectroscopy (NMR), Fourier Transform Infrared Spectroscopy (FT-IR) –Principles and applications.

Unit V Thermal Methods of Analysis

Thermogravimetry, Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC) – principles and applications

FOOD PRODUCT EVALUATION

Unit I - Introduction to Food Evaluation Quality

Definition, Objectives and Need for Evaluation of Food Quality

Factors Affecting the Evaluation of Food Quality – Psychological and Physiological

Methods of Evaluation of Food Quality – Subjective Methods

Sensory Characteristics of Food - Appearance, Colour, Flavour, Taste, Texture and Consistency, Conducting Sensory Tests – Training Panel Members, Testing Laboratory – Preparation of Samples, Techniques of Smelling and Tasting, Testing time, Design of Experiment, Reasons for Testing Food Quality Tasting procedures- Chewing, nibbling, slurping, mouth rinsing Organoleptic Evaluation- Flavour, Colour, Clarity, Viscosity, texture, smelling procedures

Sensory Tests used for Food Evaluation

Types of Tests, Difference Tests, Rating Tests, Sensitivity Tests, Descriptive Tests, Interpretation of scores, Application of software in interpreting scores Threshold tests- Absolute, Recognition, Differential, Terminal Discrimination tests- paired comparison, duo trio difference, triangular difference, single sample test, two alternative forced choice test Descriptive tests- Simple descriptive, Descriptive with rating, Flavour profile, Dilution profile technique

Methods of Evaluation of Food Quality – Objective Methods

Basic Guidelines, Advantages and Disadvantages, Tests Used, Chemical, Physio-chemical, Microscopic, Physical Method- grading, Instruments used for Evaluation.

Unit V Evaluation of Microbial Quality of Foods

Methods, Assays used to assess the Microbial Loads of different foods, Permitted levels of Microbial Load in different foods, Microbes responsible for Food Quality, Microbiological evaluation standards.

RESEARCH METHODOLOGY AND BIO STATISTICS

Research Types, Designs and Hypothesis

Research – Types, objectives, approaches and significance. Research process, Criteria of good research, Research design- Types, characteristics and significance. Basic principles of experimental designs. Nutrition Intervention studies – pilot study, randomized controlled trial , nutritional biomarkers. Research hypothesis- Null Hypothesis and Alternative Hypothesis, Type I and Type II Errors. Testing of hypothesis. Characteristics of good hypothesis.

Methods of Data Collection and Sampling designs

Methods of data collection- Primary and secondary data, Selection of appropriate method for data collection. Sampling designs - Probability sampling *and* Non-probability sampling. Sampling and Non-sampling Errors. Measurement and Scaling techniques- Quantitative and Qualitative Data, Goodness of Measurement Scales.

Bio Statistics and Descriptive Methods

Bio Statistics- Concept and its scope in public health research. Descriptive methods, Measures of central tendency- Arithmetic mean, median and mode. Measures of dispersion- Range, Mean Deviation and Standard Deviation. Measures of Skewness and Kurtosis. Measures of Relationship- Covariance, Karl Pearson's Coefficient of Correlation and Rank Correlation.

Unit IV- Processing and Analysis of Data

Processing Operations. Problems in Processing data. Analysis of data- Elements of data analysis, statistical measures in Research- Student's t- test, Analysis of variance- One way ANOVA and two way ANOVA. Duncan's test. Multivariate analysis of variance (MANOVA), Chi-square test and Regression Analysis. Biostatistics with statistical software- MS-Excel, SPSS, Graph pad prism software and other statistical calculators available in web.

Unit V- Interpretation and Scientific Research Writing

Interpretation- Techniques and Precautions. Preparation of a Research Proposal. Report Writing- steps, types and significance. Mechanics and Precautions for Writing a Research Report. Presentation of research report-Tabulation and organization of data, Graphical presentation of data.

PUBLIC HEALTH NUTRITION

Public Health Nutrition- An Overview

Public health nutrition -Concept and importance. Concept of health and disease. Dimensions, determinants and indicators of health. Public health and nutritional issues- Global and Indian perspectives. Health care system in India. Role of public nutritionist in health care delivery.

Nutritional Epidemiology

Epidemiology –Concept, approaches, types and significance. Principles of Nutritional Epidemiology. Measurement issues. Epidemiology of communicable and non-communicable diseases. Design and planning of nutritional epidemiological studies- Assessing and evaluating epidemiological studies.

Public Health Nutrition - Strategies and Approaches

Global and national public health nutrition approaches. Theories of behaviour change and their application to public health nutrition. Developing public health nutrition strategies in the community. Evaluation of public health interventions and policies. Formative research approaches to develop malnutrition interventions. Nutrition education- principle, methods and significance in maintaining public health nutrition.

National and International Organizations to Combat Malnutrition

National organizations- ICMR-NIN, ICAR, CHEB, CSWB, SSWB, NNMB, CFTRI, DFRL, NFI and NIPCCD. International organizations- FAO, WHO, UNICEF, WFP, CARE, GAIN, AFPRO, CWS, CRS, and World Bank. Economics of Nutrition. Malnutrition and its economic consequences. Food security. Food production and food pricing.

NUTRACEUTICALS AND FUNCTIONAL FOODS

Nutraceuticals and Functional Foods

Nutraceuticals- definition and classification. Functional foods: Types- Cereal and cereal products; Milk and milk products; Meat, poultry and sea foods; nuts and oilseeds, Functional fruits and vegetables; Herbs and spices; Beverages. Designer foods. Market demand for nutraceuticals and functional foods. Role of Nutraceuticals in Maternal Nutrition, Medical Foods and Infant Formulas.

Bioactive carbohydrates, peptides, lipids

Sources and biological activities of bioactive carbohydrates, peptides, lipids. Bioactive carbohydrates from plants, animal products, microorganisms. Biological roles of bioactive carbohydrates- antioxidant, immunomodulatory, antitumor, anti-diabetic, antimicrobial. Sources of bioactive peptides- from meat, dairy, collagen, egg, plant, marine and fungi. Fats and Oils as sources of bioactive molecules.

Prebiotics, Probiotics, Symbiotic and Postbiotics

Prebiotics, probiotics, synbiotics and postbiotics- concept, functions, mechanism of action. Clinical applications of prebiotics, probiotics and symbiotic: gastrointestinal system, respiratory system, cardiovascular system, urinary system, reproductive system, immune system.

Role of Nutraceuticals in Health and Disease

Concept of dietary supplements, FOSHU foods – concepts, regulatory aspects Food component – approved health claims, labelling considerations for functional ingredients, Permissible and impermissible functional claims, role of biotechnology in the development of functional foods.

Good Manufacturing Practices and Safety Issues in Functional Food Industries

HACCP in functional food industries. Product specifications and conformance. Equipment's and maintenance. Safety assessment: nutritional and toxicological. Market of functional foods- Challenges for Functional food delivery, Customer and manufacturer issues- product information and customer awareness. Factors affecting consumer interest.

FOOD AND NUTRITION RESEARCH TECHNIQUES

Food and Nutritional Research and Ethical Issues

Trends in food and nutrition research- Global and Indian perspective, Thrust areas in food and nutritional research. Food and Nutritional research- In vitro and in vivo studies. Nutrition intervention studies- principles, merits and demerits. Ethical issues in nutritional research- Rights of the research participant, Physical and psychological risks, Ethical issues regarding copyright. Human and animal ethical committees.

Research in Novel Food Product Development

Food products- the basis of innovation- 3D food printing, cultured meats, food nano materials, nano tooled buy boosters. Measures of food products success and failure. Product development process- the basis for success. Prototype. Developing an innovative strategy. Managing and improving product development process. Case studies product development in food systems. Patent in food sectors. Significance of research in food products development in health promotion and disease prevention.

Growth Studies in Animal Models

Animal models in nutrition research, Need for extrapolation research in animal models. Maintenance of animal laboratory, maintenance of records. Growth and development of rats- role of different protein levels in diet formulation, feeding techniques, Biological assays with animal models- metabolic and nitrogen balance studies.

Biological Assays in Human Trials

Research studies among humans-Principles and objectives. Growth studies among infants, children and adolescents-Effect of supplementation of different protein sources in managing nutritional status. Metabolic and nitrogen balance studies among children, adolescents and adults and interpretation of results. Nutritional research in vulnerable sector of society and innovation in dietary supplement delivery.

Unit V Manuscript Writing and Publication Ethics

Manuscript writing-tools and techniques. Manuscript preparation- steps. Guidelines for preparing for publication- Scientific papers writing. Indexed journals-types and its significance. Publication ethics. Perspectives of plagiarism- techniques to avoid plagiarism. Internet plagiarism and Plagiarism detection software- Turnitin, Copy leaks, Plagiarism Checker, Dupli Checker, Plag Scan, Pro Writing Aid and White Smoke.

NUTRITION IN HEALTH AND FITNESS

Health, Physical Activity and Physical Fitness

Health- definition and dimensions. Spectrum of health. Physical activity- Concept, types, health benefits and recommendations. Exercise- concept and types, Physical Fitness- Components, principles and evaluation of physical fitness, FITT Principles. Energy Systems and fuels to support physical activity.

Energy Metabolism in Physical Activity and Weight Management

Energy homeostasis in the cell. Integration of carbohydrate, protein and fat metabolism. Muscle ATP production during exercise- Aerobic and Anaerobic metabolic pathways. Energy requirements based on physical activity. Components and assessment of energy expenditure. The Fed-Fast cycle. Regulation of energy balance and bodyweight. Health implications of altering body weight. Interrelation between Physical activity and weight management.

Nutritional Recommendation and Physical Fitness

Nutritional requirements during exercises- Carbohydrate, protein, fat, vitamins and minerals recommendations. Fluids and electrolytes to support physical activity. Diets for physically active people. Ergogenic aids- nutritive and non-nutritive aids, merits and demerits of ergogenic aids.

Physical Activity and Disease Prevention

Physiological and biological effect of physical fitness on health status and vital systems. Role of physical activity and exercise on prevention and management of cardiovascular diseases, obesity, cancer, diabetes, healthy aging, musculoskeletal health, cognitive health and degenerative diseases.

COMMITTED TO EXCELLENCE