SWAMI VIVEKANANDA UNIVERSITY

Telinipara, Barasat – Barrackpore Rd

Bara Kanthalia, West Bengal, 700121

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700121

Syllabus

For

M.Sc in Food and Nutrition(2021-2024)

Total credits: 96

Total marks: 2300

SEMESTER – I

Course Code	Course Name	L-T-P	Credits	Total Marks
MFNTC101	Principles of Human Health 1	4-0-0	4	100
MFNTC102	Human Nutrition	4-0-0	4	100
MFNTC103	Fundamentals of Food Processing	4-0-0	4	100
MFNTC104	Application of Principles of Physics andStatistics in Food and Nutrition	4-0-0	4	100
MFNTC191	Human Biology including Anthropometric Techniques Lab	0-0-8	4	100
MFNTS181	Computer skills for Nutrition	0-0-4	2	50
	Total		**22**	**550**

Semester – II

Course Code	Course Name	L-T-P	Credits	Total Marks
MFNTC201	Principles of Human Health 2	4-0-0	4	100
MFNTC202	Community Nutrition	4-0-0	4	100
MFNTC203	Food Microbiology	4-0-0	4	100
MFNTC204	Public Health and Epidemiology	4-0-0	4	100
MFNTC291	Human Biology, Microbiology and Clinical Nutrition Lab	0-0-8	4	100
MFNTS201	Principles of Communication, and Management for Self Entrepreneurship in Food and Nutrition	2-0-0	2	50
	Total		**22**	**550**

SEMESTER – III

Course Code	Course Name	L-T-P	Credits	Total Marks
MFNTC301	Advanced Quantitative Techniques for Food Nutrition	4-0-0	4	100
MFNTC302	Therapeutic Nutrition	4-0-0	4	100
MFNTE301	A. Human Development And Behaviour And Family Management B. Principle of Biophysics	4-0-0	4	100
MFNTE302	A. Food Preservation And Microbial Technology B. Food Service Management	4-0-0	4	100
MFNTC391	Internship and Nutrition Planning Lab	0-0-4	2	50
MFNTD301	Basics of Food and Nutrition	4-0-0	4	100
MFNTS381	Seminar and Project Proposal Submission	0-0-4	2	50
	Total		**24**	**600**

SEMESTER – IV

Course Code	Course Name	L-T-P	Credits	Total Marks
MFNTC401	Emerging Areas in Food and Nutrition	4-0-0	4	100
MFNTC402	Food and Nutrition in relation to other Sciences	4-0-0	4	100
MFNTC403	Policies and Standards in Food and Nutrition	4-0-0	4	100
MFNTS401	Visit to a food industry and market survey	0-0-8	4	100
MFNTS491	New Food Product Development Lab	0-0-8	4	100
MFNTS481	Project Work and Grand Viva	0-0-16	8	100
	Total		**28**	**600**

Semester 1

PRINCIPLES OF HUMAN HEALTH – 1

COURSE CODE: MFNTC101

Learning objectives

To understand different body systems, to enumerate the role of various nutrients and their physiological contributions and to understand the process of energy production from the nutrients.

Course Outcomes:	**After this course the student should be able to: 1. Understand the pathology of specific diseased conditions. 2. Understand the biochemistry of macromolecules**

- Anatomy and Physiology and Nutritional management of select disease conditions of G.I. System and Cardio Respiratory system
- Chemistry of Biomolecules: Carbohydrate, Protein and Lipid
- Enzymology
- Metabolism of Carbohydrate, Protein and Lipid including Inborn Errors

HUMAN NUTRITION

COURSE CODE: MFNTC102

Learning objectives

To understand the basis of derivation of Dietary Reference Intakes for micronutrients and how requirements change under special conditions

Course Outcomes:	**After this course the student should be able to: 1. Critically evaluate the methodology and derivation of requirements for micronutrients. 2. Understand nutritional management in special conditions. 3. Appreciate importance of nutrition immunity interactions and their operational implications.**

Energy metabolism Basal and resting metabolism –influencing factors. Methods to determine energy requirements and expenditure. Thermo genesis, adaptation to altered energy intake, latest concepts in energy requirements and RDA-ICMR and WHO Basis for computing nutrient requirements - latest concepts in dietary recommendations: their uses and limitations.

Growth and Development through the Life Cycle

- Different aspects of growth – cellular to physical
- Malnutrition and cognitive development
- Determinants of growth and development
- Impact of altered nutrition on growth and development
- Changes in body composition throughout the life cycle

Alterations in body composition and their consequences.

Human Nutrient Requirements –

Macronutrients: Methods of assessment of nutrient needs –
a critical review Critical evaluation of sensitive methods and derivations of requirements and recommended dietary allowances of macronutrients for all age groups: -
Energy, - Carbohydrates and dietary fibre, - Proteins and amino acids, - Lipids, - Water
Critical evaluation of national and international nutrient allowances; factors affecting the requirements.

Human Nutrient Requirements – Micronutrients

Critical evaluation of sensitive methods and derivations of requirements and recommended dietary allowances of micronutrients for all age groups: -
Water soluble vitamins –
Fat soluble vitamins –
Minerals and trace elements
Critical evaluation of national and international nutrient allowances; factors affecting the requirements, dietary guidelines for Indians.
Factors (nutritional and 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.

Nutritional requirements during lactation, dietary management, food supplements, galactogogues, preparation for lactation.Care and preparation of nipples during breast feeding.
LBW babies- feeding problems and their management

FUNDAMENTALS OF FOOD PROCESSING

COURSE CODE: MFNTC103

Learning objectives

This course is designed to know students how foods are industrially processed. Food Processing forms the base of food technology. Most of our research moves around this subject. The objective of lectures in the first year of the master's degree program is to ensure that students acquire essential knowledge of food technology in both industry and research. They learn various ways of designing and monitoring processing chains with the emphasis on how quality, safety, authenticity, etc. of raw materials, processes and products are preserved.

Course Outcomes:	**Student will learn the different physiological, physical, chemical and nutritional properties of grains, fruits and vegetables milk and meat products. Acquire insight in the various chemical and biochemical changes which can occur during processing and which can influence the functional properties of the possible end properties of food products.**

Introduction: Definition and scope of food Science And Technology, Historical Development of Food Processing and Preservation, General Principles of Food Preservation. Preservation by Heating: Introduction, thermal resistance of microorganism and enzyme. Genetic Engineering & Nano Technology: Recombinant DNA technology: Plasmids, cosmids and bacteriophage based vectors for cDNA and genomic libraries. Principles and methods of protein and genetic engineering and gene

targeting. Polymerase Chain Reaction, Genetically modified food for nutritional enhancement: principles, techniques, problem, prospects, and ethics. Biosensors-classification, Field of application, Transducers. Nanotechnology in food, Functional food, structured lipids, Probiotics, postbiotics, prebiotics, synbiotic and single cell proteins: commensalism. General development of nano science and nano technology in food and food processing processes.Nanocarriers for drug and nutraceuticle. Properties Characteristics

Processing of Food grain: Structure, composition of different grains like wheat, rice, barley, oat, maize and millets. Anti-nutritional factors in food grains and oilseeds. Milling of grains. Wheat flour/semolina and its use in traditional/non-traditional foods like breads, biscuits, cakes, doughnuts, pasta goods, extruded, confectionary products, breakfast and snack foods. Production, packaging and storage of vanaspati, peanut butter, protein concentrates, isolates and their use in high protein foods. International market and consumer preferences for quality in cakes for use in textured vegetable proteins. Millets: composition, nutritional significance, structure and processing. Dairy analogues based on plant milk. Spices Processing: Oleoresin and essential oil extraction.

Processing of Fruits and vegetable: post-harvest handling and storage of fresh fruits and vegetables. Preparation of fruits and vegetables for processing.Minimally processed products.Cold chain logistics. ZECC (Zero Energy Cool Chambers), CCSR (Charcoal cool storage Rooms) Solar drying.
Intermediate moisture foods. Preparation and utilization of fruits and vegetables juices in non-fermented/ fermented/ aerated beverages, health drinks. Chemistry and manufacture of pectin, role in gel formation and products like jellies and marmalades. Technology of preservatives, pickles, chutney's and sauces. Restructured fruits and vegetables. Processing methods of frozen fruits and vegetables, IQF products, packaging, storage and thawing. Tomato products such as juice, puree, paste, soup, sauce and ketchup. Other convenience foods from fruits and vegetables. Beverages, tea, cocoa and coffee processing. Medicinal and aromatic plants: their therapeutic values.

Processing of Milk and Milk Products: Milk and Milk production in India.Importance of milk processing plants in the country.Handling and maintenance of dairy plant equipment.Dairy plant operations viz. receiving, separation, clarification, pasteurization, standardization, homogenization, sterilization, storage, transport and distribution of milk. Milk products processing viz. cream, butter, ghee, cheese, condensed milk, evaporated milk, whole and skimmed milk powder, ice-cream, butter oil, khoa, channa, paneer and similar products. Judging and grading of milk products. Cheese spreads by spray and roller drying techniques. EMC (Enzyme modified cheese)

Technology of Meat / Fish / Poultry Products: Scope of meat, fish and poultry processing industry in India. Ante mortem inspection. Slaughter and dressing of various animals and poultry birds.Post mortem examination. Rigor mortis. Factors affecting meat quality. Curing, smoking, freezing, canning and dehydration of meat, poultry and their products.Sausage making.Processing and preservation of fish and its products.Handling, canning, smoking and freezing of fresh water fish and its products.Meat tenderization and role of enzymes in meat processing. Utilization of by-products.
Zoovosic diseases. Structure and composition of egg and factors effecting quality. Quality measurement. Preservation of eggs using oil coating, refrigeration, thermo stabilization and antibiotics.Technology of egg products viz. egg powder, albumen, flakes and calcium tablets.

Application of Principles of Physics and Statistics in Food and Nutrition

COURSE CODE: MFNTC104

Learning objectives

The course deals with the development, application and study of analytical procedures for characterizing the properties of foods and their constituents. The objective of this course is to evaluate the basic principles of the analytical procedures commonly used to analyze foods and to discuss their application to specific food components, e.g. lipids, proteins, water, carbohydrates and mineral.

COURSE OUTCOME	**After this course the student should be able to understand the application of physical methods for analysis of food products. They will be familiar with data handling.**

Introduction to Thermodynamic and Thermal Properties:

Importance of thermodynamics in food processing and nutrition; conservation and conversion of energy; Thermal energy and thermal units-Nutritionist's Calorie;

Thermodynamic terms-Thermal equilibrium and thermodynamic equilibrium; system and surroundings; types of thermodynamic systems;

Thermodynamic coordinates- Macroscopic and microscopic coordinates and their properties; Extensive and Intensive variables; Equation of state; Thermodynamic process- Quasistatic process, Cyclic process, Reversible and irreversible processes, Adiabatic and isothermal processes, Indicator diagrams;

Laws of Thermodynamics:

Thermal equilibrium and nature of the boundary; Zeroth law of thermodynamics; Isotherms and concept of temperature;

Infinitesimal changes in thermodynamics; Concept of work and Internal energy; First Law of Thermodynamics; Enthalpy;

Heat engines; Efficiency of heat engines; The Carnot Cycle and its efficiency; Refrigerator- Coefficient of performance and its relation with efficiency of a heat engine;

Concept of Entropy and Principle of Increase in Entropy; Second law of Thermodynamics; Equivalence of Kelvin-Planck and Clausius Statements; Carnot's Theorem;

Thermodynamics and Food:

Heat or energy balances; Energy value of food; Energy conservation in food processing; Specific heat; Latent heat; Latent heat values for foods; Behaviour of water in foods during freezing; Oils and fats: solid-liquid transitions;

Biostatistics: Concept; Purpose.

Organization of data: Types of data-qualitative and quantitative; Data processing; Preparation of master chart; Tabulation and organization of data- frequency distribution, contingency tables; Graphical presentation- histogram, graphs, bar-Diagram and pie-charts.

Descriptive statistics: Quantitative data - measures of central tendency, measures of variability- Mean, Median, Mode, Quartiles, Range and Standard Deviation, measures of relative positions, measures of relationships; Qualitative data – statistical inference from proportions, relative risk and odds ratio, analysis of descriptive qualitative data. Skewness and Kurtosis –definition; Correlation studies.

Practical on Human Biology including Anthropometric Techniques

COURSE CODE: MFNTC191

Learning objectives

To understanding the basic concepts of Human Biology and different anthropometric measurements techniques.

COURSE OUTCOME	**After this course the student should be able to assess anthropometric techniques for different purpose in the field of Food and Nutrition.**

Introduction to Human Biology

Introduction, Structural Organization of the Human Body, Functions of Human Life , Classification ofOrganism

Biological Factors on Human growth and development

Different biological factors, Child growth and development, Causes, symptoms, management, Inborn Error Metabolisms

Anthropometric assessments of nutritional status

Introduction, Nutritional status: Protein Energy Malnutrition (PEM), Obesity, Under weight

Anthropometric measurements

Different Anthropometric techniques, Height, Weight, BMI, MUAC, Chest circumference, Headcircumference, Chest-Head Ratio, Waist measurements, Hip Measurement, Waist-Hip ration,

Skinfold caliper, Growth curve for infants and Pre-school Children, Weight for Height, Weight forAge, Height for Age

Application of anthropometry

Computer skills for

NutritionCOURSE CODE:

MFNTS181

Learning Objectives

To be able to make effective presentations using computers

COURSE OUTCOME	**The students will acquire computer skills, especially the presentation and computational skills for Nutrition**

Usage of power point and excel.

Semester 2

PRINCIPLES OF HUMAN

HEALTH-2COURSE CODE:

MFNTC201

Learning objectives

To understand different body systems, to enumerate the role of various nutrients and their physiological contributions and to understand the process of energy production from the nutrients.

COURSE OUTCOME	**After this course the student should be able to: 1. Understand the pathology of specific diseased conditions. 2. Understand the biochemistry of nucleic acids etc.**

Anatomy and Physiology and Nutritional management of select disease conditions of Excretory, Musculo- skeletal, Reproductive and Nervous system, Chemistry and Metabolism of Nucleic acids,Elements of Immunology, Genetics and Molecular Biology , Systems Biology.

COMMUNITY

NUTRITION COURSE

CODE: MFNTC202

Learning objectives

The purpose of this course is to enable the students to understand the concept and methods of nutritional status assessment of a community. This will help them to comprehend the nutrition concerns among communities, the correct screening criteria for malnutrition, along with strategiesto combat and prevent them.

COURSE OUTCOME	**Students will be able to plan and prepare low-cost nutritious dishes / menus for vulnerable groups, they will develop skills in preparation of communication aids and planning nutrition education programme for the community. They will be familiar with the ongoing national nutrition programmes**

Introduction: Meaning of community and Community Nutrition

Malnutrition: Meaning, Types of Malnutrition, Ecology of malnutrition-environmental, social, and economical factors. Classification of PEM- causes, signs and symptoms, Treatment and Preventive measures.

Measurement to combat malnutrition — Nutritional policy and programme Planning and role of agencies of government and non-government (private/ voluntary), international organisation.

Assessment of Nutritional Status

Critical overview of various methods of nutritional assessment

Diet surveys, anthropometric measurements, biochemical and clinical. Rapid methods of assessment Analysis and Interpretation of results, National and International Growth Standards/References, development of WHO Child, Growth Standards National Nutrition Surveys

Nutrition Surveillance and monitoring: definition, milestone in the development of nutrition surveillance. AAP approach, monthly monitoring and nutrition surveillance

Nutrition education — meaning and objectives suitable aids and methods for functioning nutrition education to different groups within the community

Food Microbiology

COURSE CODE:

MFNTC203

Learning Objectives:

Food microbiology encompasses the handling, preparation, and storage of food in ways that prevent food borne illness. It covenants with the study of how the microorganisms get into foods, what can be done to control microbial growth in foods or why pathogenic microorganisms are a problem in particular foods. This subject is of much importance as there has been a paradigm shift to food safety and prevention of major outbreaks is of prime focus.

COURSE OUTCOME	**Student will learn different methods to preserve foods and prevent them from spoiling the food production chain. Student will learn the ecology to determine how the microorganisms get into foods, what can be done to control microbial growth in foods or why pathogenic microorganisms are a problem in particular foods. Learn how microorganisms can be beneficial and determine its utilization in food industry.**

Introduction: Classification and nomenclature of microorganisms. Morphology and Structure of Microorganisms in Foods (Yeasts and Moulds, Bacterial Cells, Viruses). Important genera of Mould, yeast, bacteria (gram negative aerobes and facultative anaerobes, gram-positive cocci, endospore- forming rods, non-sporulating), bacterial groups (lactic acid, acetic acid, butyric acid), thermophilic, proteolytic, saccharomyticetc, coliforms, faecal coliforms, enteric pathogens in food industry.

Microbial Growth Characteristics: Reproduction and growth (fission, generation time, optimum growth, growth curve). Microbial growth in foods: Intrinsic (pH, Moisture Content, Oxidation–Reduction Potential, Nutrient Content, Antimicrobial Constituents) and Extrinsic Parameters (Temperature of Storage, Relative Humidity of Environment, Presence and Concentration of Gases in the Environment). Thermal Destruction of Microorganisms, Thermal Death Time, D Value , Z Value , FValue , Thermal Death Time Curve, 12 D Concept.

Food Borne Diseases and Food contaminants: Food borne diseases: food pathogens (Aeromonashydrophila, Bacillus cereus and other Bacillus Species, Brucella, Campylobacter, Clostridium botulinum, Clostridium perfringens, Escherichia coli, Listeria monocytogenes, Salmonella, Shigella, Staphylococcus aureus, Vibrio, Yersinia enterocolitica, Fungi, virus and rotavirus. Food contaminants: Their occurrence, composition, physiological, significance in foods, Metals and toxic Metals e.g. Cd, Hg etc. Pesticide residues e.g. Dioxin, Aldrin, Malathion etc. iii.Mycotoxins, Argemone, Khesari dal, Ergot,Karnal bunt, Dhatura, etc. Allergens, Antibiotic & hormone residues, Veterinary drug residue, other new contaminants and toxins, Naturally Occurring Toxic Substances (NOTS) and Deoxynivalenol (DON).

Food Laws and Sensory evaluation: Food Safety and Standards Act of India, 2006 ,Agricultural Produce Act, 1937 (Grading and Marketing), Export (Quality Control & Inspection), Act, 1963 and Rules, Bureau of Indian Standards relevant to Food Safety, CODEX Alimentarius Commission, WTO agreements: SPS/TBT, Role of OIE, IPPC. Setting up of Food Analysis Laboratory including NABL /ISO / IEC-17025: 2017, HACCP and Food Safety Management Systems: ISO 22000 Good Manufacturing Practices (GMP), & Good Hygienic Practices (GHP)

Public Health & Epidemiology:

COURSE CODE: MFNTC204

Learning Objective:

To understand the concept of public health and nutrition, its scope, to explain the concept of health care and the different levels at which it is available to the community, describe the health system asit operates in public health domain, describe primary health care and the various components of primary health care, and define the role of the public, nutritionist in health care delivery.

COURSE OUTCOME	**Students will be able to understand the principles and methods of epidemiologic research in order to enable them to design, conduct, analyze, and interpret epidemiologic research**

Epidemiology: - Concept, purpose and goals; Development of modern epidemiology; Descriptive variables for the health of the community.

Design strategies in epidemiological studies - Case study/report; Cross- sectional study/survey.

Design strategies in epidemiological studies – Analytical studies: Analytical studies; Observational studies; Cohort study; Case-control study; Analytical cross-sectional studies, Management of stressincluding oxidative stress through nutritional interventions Environmental, Occupational, Community Health and Nutrition health.

Management of stress including oxidative stress through nutritional interventions Environmental,Occupational, Community Health and Nutrition health.

Human Biology, Microbiology and Clinical Nutrition

LabCOURSE CODE: MFNTC291

Learning Objectives:

To understand the laboratory hands-on practical exposure on different areas of clinical nutrition.

COURSE OUTCOME	**After this course the student should be able to practically analyse the data of different areas of food and nutrition.**

Experiments in Human Biology, Microbiology and Clinical Nutrition.

PRINCIPLES OF COMMUNICATION, AND MANAGEMENT FOR SELFENTREPRENEURSHIP IN FOOD AND NUTRITION

COURSE CODE: MFNTS201

Learning Objectives:

To understand necessary knowledge and skills required for organizing and carrying out entrepreneurial activities, of analysing and understanding to develop the ability business situations.

COURSE OUTCOME	**After this course the student should be able to correlate the requirement of Management and Extension education techniques with that of Food and Nutrition**

Basics of communication- nature, characteristics, functions, process, models, elements, principles, barriers, perception, persuasion and empathy, types of communication, levels (settings) of communication transactions, process of listening.

Communication systems and communication theories- human interaction theories, mass communication theories, message design theories, communication systems, culture and communication.

Concept of development- theories, models, measurement and indicators of development.

Concept of development- communication models and approaches, diffusion and innovation, mass media, social marketing.

Role of communication in development- need and importance, development journalism, writing for development-print, radio, television and internet.

Concerns of development communication- gender, health, environment, sustainability, human rights, population, literacy, rural and tribal development.

Advocacy and behaviour change communication- concept, theories, models, approaches, application and challenges Traditional, modern and new media for development - folk forms of songs, art, dance, theatre, puppetry, advertisement, cinema, ICTs for development-community radio, participatory video, social media and mobile phones.

Entrepreneurship-concept, process, barriers, entrepreneurial motivation, challenges, enterprise setting, project planning and appraisal, enterprise management.

Management-concept, approaches, and functions; Resources and its management Financial management, HRM, Marketing management : Consumer and Consumer Protection and Fashion including Food fashion

Organisation/agencies/institutes working for development communication international/national/state and local.

Body measurements-procedure, need, figure types and anthropometry. Ergonomics;

Elements and principles of design and its application to apparel.

Community development- perspectives, approaches, community organization, leadership, support structures for community development, Panchyati raj institutions, NGOs and community based organisations.

People's participation and stakeholders' perspectives, Participatory Learning and Action-methods and techniques.

Development programmes in India for urban, rural and tribal population groups programmes for nutrition, health, education, wage and self-employment, women's development, skill development, sanitation and infrastructure.

SEMESTER 3

Advanced Quantitative Techniques for Food NutritionCOURSE CODE: MFNTC301

Learning Objectives:

For understanding the basic concepts of different types of research, their purposes, design, documentation and different statistical tools used for analysis of the food related research work.

COURSE OUTCOME	**After this course the student should be familiar with data handling.**

Research: Concept of scientific research – facts and theory; Scope of research in nutrition; Research process.

Formulation of research problem: Selection; Objectives; Formulating hypothesis; Research design;Sample size considerations.

Research tools: Scales of data measurement; Characteristics of a good research tool – reliability, validity, usability; Types of tools and their uses – questionnaire and schedules, rating scale, attitude scale; Interview; Observation; Documents.

Sampling methods: Probability sampling – Simple or unrestricted random sampling, stratified sampling, systematic sampling, cluster sampling, multi-stage sampling; Nonprobability sampling – Purposive sampling, incidental sampling, quota sampling

Statistical testing of hypothesis: Parametric tests – sampling distribution of means; Application-Definition of type I and II errors; Level of Significance, t-test, Z–test.; Nonparametric tests and application of chi-square test, application of median test.

Research methods-sampling techniques, types of sampling, sampling procedures, probability and non-probability sampling

Elementary ideas on probability (Simple Probability): Elementary ideas of random variable and its density function (Binomial, Poison, Uniform Normal varieties, Normal Distribution and its properties,Use of Normal Probability Tables).

Data management and analysis: introduction, features, basic steps in data analysis, data entry, data management, data analysis

Therapeutic Nutrition

COURSE CODE:

MFNTC302

Learning Objectives:

To understand the nutrition assessment, planning, implementation, monitoring and follow up in nutrition care process, the causative factors and metabolic changes in various diseases/disorders and acquire knowledge on the principles of diet therapy and comprehend principles of dietary counselling and the rationale of prevention of various diseases/disorders.

COURSE OUTCOME	**The student will be able to 1. Understand the importance of nutritional assessment in the care of patients. 2. Gain knowledge about causative factors and metabolic changes in various diseases / disorders and the associated principles of diet therapy. 3. Learn the principles of dietary counselling. 4. Comprehend the rationale of prevention of various diseases/disorders.**

Weight Management & Diabetes Management: Aetio-pathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, MNT, dietary counselling and recent advances in

a) **Weight imbalance disorders** –Overweight and Underweight

b) **Diabetes Mellitus** – Type 1, Type 2 and Gestational diabetes Etiopathophysiology, metabolic &clinical aberrations, diagnosis, complications, treatment, MNT, dietary counseling and recent advances in Cardio Vascular Diseases

Dyslipidimia, Myocardial infarction, Dietary effects on serum lipids & lipoproteins.

Atherosclerosis, Dietary guidelines for CVD

Prevention of CVDs by lifestyle and non-lifestyle modifications

Congestive heart failure, Nutrition on hypertension Congenital heart disease Hepatic functions & nutrition: Role of liver in normal nutrient metabolism, Impact of liver disease in nutritional metabolism Nutritional evaluation & management of hepatic diseases Gallbladder and Pancreatic Disorders Renal functions and nutrition:

Nutritional assessment in renal patient, Daily nutrient & fluid needs, Stages in renal failure, Practicalapplication of diet

OVERVIEW OF SOME DEGENERATIVE DISORDERS a) Cancer - Role of diet in aetiology and management b) Alzheimer's disease and Parkinson's disease 2 c) HIV- Role of diet in aetiology andmanagement

NUTRITION CARE Diet, Nutrient and Drug interactions,

Nutrition Support – Parenteral and Enteral Nutrition Metabolic & clinical aberrations, diagnosis, complications, treatment, MNT and dietary counselling in ,Metabolic Stress –Surgery and Burns Fevers and infection

Gastrointestinal tract Disorders Etio-pathophysiology, metabolic & clinical aberrations, diagnosis,complications, treatment, MNT, dietary counseling and recent advances in GERD, hiatal hernia, peptic ulcer, diarrhoea, diverticular disease, IBS, inflammatory bowel disease, dyspepsia, celiac disease, hemorrhoids

Gout- Etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, MNT, dietary counseling and recent advances, Nutritional management

Nutrition issues in the treatment of eating disorders □ Nutrition education and counseling specific to the complex medical, physiological, psychological and behavioral aspects of eating disorders Dietary as well as the non-diet approach to weight management

HUMAN DEVELOPMENT AND BEHAVIOR AND FAMILY MANAGEMENTCOURSE CODE: MFNTE301A

Learning Objectives

Students will learn about the stages of development from infancy to adulthood, how to promote healthy family development, diversity and many other skills.

COURSE OUTCOME	**After this course the student should be able to understand human development in order to learn to help others. The knowledge can help reduce the stress of people going through medical treatment and help ease family worry.**

Principles of growth and development, care during pregnancy and pre-natal and neonatal development, Theories of human development and behaviour, Early childhood care and education – activities to promote holistic development, Influence of family, peers, school, community and culture on personality development, Children and persons with special needs, care and support, special education, prevention of disabilities, rehabilitation.

Children at risk-child labour, street children, children of destitute, orphans, child abuse and trafficking., Adolescence and youth: changes, challenges and programs to promote optimal development, Adulthood, characteristics, changing roles and responsibilities in early and middle adulthood, Aging-physical and psychological changes and care needs. Dynamics of marriage and family relationships, Family welfare-approaches, programmes and challenges, role in national development, Domestic violence, marital disharmony, conflict, resolution of conflict, Parent education, positive parenting, community education, Family disorganization, single parent families Family studies-family in crisis, family therapy, initiatives for child development, Human rights, rightsof children, rights of women, status of women, gender roles, Guidance and counseling- across life span and for care givers, Health and well-being across life span development

PRINCIPLE OF

BIOPHYSICS COURSE

CODE: MFNTE301B

Learning Objectives:

The course deals with the development, application and study of analytical procedures for characterizing the properties of foods and their constituents. The objective of this course is to evaluate the basic principles of the analytical procedures commonly used to analyze foods and to discuss their application to specific food components, e.g. lipids, proteins, water, carbohydrates and minerals.

COURSE OUTCOME	**At the end of the course the student will be capable to prove knowledge of the fundamental concepts in physics and chemistry that underlie biological processes and describe the principles that govern biomolecular interactions and appreciate how conventional methods of research and examination are employed to analyse the different features of these interaction**

Physicochemical properties and biological applications: a) Viscosity b) surface tension c) absorption d) photochemistry e) colloids f) osmosis g) Donnan membrane equilibrium.

Chromatographic technique: Principle and application of Affinity, Adsorption, Gel exclusion and Gas chromatography, High pressure liquid chromatography (HPLC) and Thin layer chromatography (TLC),Paper chromatographyLC-MS-MS, GCMS-MS, ICP-MS.

Electrophoresis: Introduction, principle and types of electrophoresis, PAGE, Capillaryelectrophoresis, SDS- PAGE, Isoelectric focusing and Isotachophoresis.

Centrifugation: Principle and applications of centrifugation in food processing, Ultra centrifugationand their types, applications in food industry.

Spectroscopic techniques: Lamberts-Beer law, Colorimetry, Principle and application of UV, Visible, IR and fluorescence spectroscopy, AASfor determination of heavy metal contaminants in foods such as Lead, Cadmium, Mercury, Arsenic, Zinc, Copper, Tin, etc, FTIR, Polorimetry and Refrectrometry.

FOOD PRESERVATION AND MICROBIAL TECHNOLOGYCOURSE CODE: MFNTE302A

Learning Objectives:

The course will make the students learn about fermentation techniques and industrial microbiology.

COURSE OUTCOME	**They will understand basic concepts of food preservation, processing and know the existing packaging technology and understand its better utilization in food industry. At the end of the course the student will be able to apply major food preservation techniques and analyses and evaluate novel food processing methods including non-thermal food processing techniques using pressure, light, sound and microwave. They will apprehend the need of innovation in food packaging and industrial application of food packaging in different industry.**

Food Preservation: Food Preservation by Heat: Principles of Heat Transfer, Blanching, Pasteurization, Heat Sterilization, thermal extrusion, cooking. Water Removal: Forms of Water in Foods, Sorption of Water in Foods, Water Activity, Drying and Evaporation Technology, TemperatureReduction: Chilling, Freezing Radiation: Ionizing Radiation, Microwave.

Food Preservation by use of chemicals: Class-I and Class-II preservatives, smoke other Chemical Additives. New non-thermal methods: high hydrostatic pressure, modified atmosphere, high intensity pulsed electric fields, intense pulsed light, oscillating magnetic fields), hurdle technology, ultrasonic and ohmic heating etc.

Food Packaging: Different packaging materials used for food packaging and their properties – including barrier properties, strength properties, optical properties: Glass, Metals, Departmental, Plastics, Biodegradable and Edible Films and Coatings, aseptic packaging and Combinations. Selection of packaging material and design for various food commodities including fresh produce (fruits and vegetables), milk and milk products (dairy), cereal, pulses, oil, meat, fish, poultry, water and processed foods. Functions of Packaging: Protective Packaging and active packaging smart and intelligent packaging. Newer packaging technologies- CAP/MAP packaging, aseptic processing and packaging, irradiated packaging, retort pouch, microwaveable packaging

Fermentative production, purification & storage of biomass: Different microorganisms and their uses in food fermentation, propagation of microorganisms in food (different propagation processes), Baker's yeast production, Mushroom Cultivation

Fermentative production & purification of alcoholic beverages: Technology of production and purification of ethyl alcohol, non-distilled beverage (beer, wine), distilled beverage (whisky, rum,champagne)

Fermentative production & purification of organic acids: Production of alcoholic beverages, organicacids, enzymes and immobilization of enzymes. Biological waste treatment.

Fermentative production of saccharifying agents, vitamins & antibiotics: Saccharifying Agents, Production, isolation & use of different saccharifying agents (amylase, pectinase, etc.), principlesbehind enzyme immobilization and its application. Vitamins- Production of vitamin B2 & B12 (Antibiotics, Production, isolation & use of penicillin, streptomycin, neomycin use & activities of antifungal antibiotics)

Solid state fermentation Technique: Basic principle of solid-state fermentation process, Production and isolation of amyloglucosidase by solid state fermentation process.

FOOD SERVICE MANAGEMENTCOURSE CODE: MFNTE302B

Learning Objectives:

To develop a knowledge base about the facilities required for different types of food service units and to equip individuals in understanding and managing resources in a food service institution.

COURSE OUTCOME:	**Student will be able to: 1. Gain expertise to function as a food service manager. 2. Develop knowledge in managing various food service systems. 3. Understand and manage resources in a food service institution. 4. Provide practical experience in managing food material for food service management**

Introduction to Catering Industry -Types of catering, types of service, food production and foodservice basics.

Health and hygiene - Significance of hygiene for food handlers, types of food contamination,prevention of food contamination in catering industries, HACCP.

Design and Infrastructure -Design and Layout of Hospital kitchen, hostel kitchen and otherinstitutional kitchen, importance of selecting correct equipment, procedure of equipment maintenance, safety in handling equipment.

Menu Planning -Planning of nutritionally balanced meals Factors affecting meal planning o Critical evaluation of few meals served at the Institutes/Hotels based on the principle of meal planning. o Calculation of nutritive value of dishes/meals.

Mass Food Production -Effect of cooking on nutritive value of food

Newer Trends in Food Service Industry In Relevance To Nutrition And Health -Need for introducingnutritionally balanced and health specific meals, Critical evaluation of fast foods, New products being launched in the market (nutritional evaluation)

Internship and Nutrition Planning

LabCOURSE CODE: MFNTC391

Learning Objectives:

To acquire knowledge on the principles of diet therapy and comprehend principles of dietary counselling and the rationale of prevention of various diseases/disorders, to gain hands on experience of working in hospitals under the guidance of a professional dietician

COURSE OUTCOME	**The student will be able to 1. Understand the importance of nutritional assessment in the care of patients. 2. Gain knowledge about causative factors and metabolic changes in various diseases / disorders and the associated principles of diet therapy. 3. Learn the principles of dietary counselling. 4. Comprehend the rationale of prevention of various diseases/disorders.**

Planning or/and preparation, service and evaluation of therapeutic diets covered in theory.

Internship: The students could work with Hospital and must perform at least six different case studies. They would be required to present a report of their Internship in their Department.

BASIC FOOD AND

NUTRITIONCOURSE

CODE: MFNTD301

Learning Objectives:

To learn the principles of diet chart calculation, acquire knowledge on the fundamentals of food processing and will be able to understand the basics of Physiology and Biochemistry for Food and Nutrition.

COURSE OUTCOME	**Students will be able to learn: Principles of macronutrients calculation for preparing a menu planning, Basic knowledge of food processing, Biochemical and Physiological aspects for Nutrition.**

Principles of Diet chart calculation

Basic knowledge of food processing

Anatomy, Biochemistry and Physiology for Nutrition.

Seminar and Project Proposal Submission

COURSE CODE: MFNTS381

Learning Objectives:

To learn the principals and procedure of making power point presentation while presenting any research proposal or seminar proposal.

COURSE OUTCOME	**Students will be able to learn: Preparation of a Power Point Presentation with application of proper project submission.**

Power point presentation: Knowledge of slide making at M.S Power Point, Usage of animations, Choice of colours, Presentation skill development.

The concept of seminar presentation with the help of M.S power point Presentation

Innovative Project Proposals on the field of Food & Nutrition.

Semester 4

EMERGING AREAS IN FOOD AND NUTRITIONCOURSE CODE: MFNTC401

Learning Objectives:

To understand different aspects of malnutrition and its underlying economic and social factors, and the multidisciplinary approaches to solve these problems, better management of nutritional status in different condition including disaster.

COURSE OUTCOME	**Students will able to learn multidisciplinary areas in food and nutrition, Assessment and management of different physiological, pathological, economic and social conditions & nutritional status.**

Nutrigenomics, Food drug interaction, Nutrition for Sports persons, Nutritional management in Space, Nutrition in Special Conditions: Extreme temperatures - low and High altitude, Interactions of Nutrition, Immunity and Infection, Nutrition at the time of Disasters Food and Nutrition Security.

FOOD AND NUTRITION IN RELATION TO OTHER SCIENCESCOURSE CODE: MFNTC401

Learning Objectives:

To understand the interdisciplinary nature of food and nutrition sciences.

COURSE OUTCOME	**Students will be able to learn the interidisciplinary relation with other subjects with nutrition.**

Concepts of Cognitive Science, Anthropology, Sociology in relation to Food and Nutrition Foodculture, Food and culinary tourism, Evolution of food.

POLICIES AND STANDARDS IN FOOD AND NUTRITIONCOURSE CODE: MFNTC403

Learning Objectives:

To know about different national and international nutrition policy, various nutrition intervention programmes launched by the Government, and the major features of the nutrition intervention programmes, understand the requirements of standards, quality assurance.

COURSE OUTCOME	**Students will be able to learn National and International laws, policies, standards in Food and Nutrition**

National and International laws, policies, standards in Food and Nutrition

Ethics of Food and Nutrition.

VISIT TO A FOOD INDUSTRY AND MARKET SURVEY

COURSE CODE: MFNTS401

Learning Objectives:

To familiarize students with industrial processing of foods and make them aware of commercial food product.

COURSE OUTCOME	**Students will be able to learn industrial processing of commercial food products, handling and management in different food industries.**

Project preparation on food industry visit, Assessment of products and commodities in the market, formulate price list, list and categorize food production and service equipment, nutritional assessment of the product , critical analysis of food label

New Food Product Development Lab

COURSE CODE: MFNTS491

Learning Objectives:

To develop new innovative food products for health enhancement and for prevention of various chronic and acute diseases.

COURSE OUTCOME	**Students will be able to learn the innovation of new food products with help of different equipment in Lab for serving health benefits.**

Innovation of -Probiotic rich Food Products, Prebiotic Rich Food Products, Antioxidant rich FoodProducts, Gluten Free, DAG & DHA enriched food Products.

Project Work and Grand

VivaCOURSE CODE:

MFNTS481

Learning Objectives:

The aim of dissertation is to develop skills in conducting a research study/ working in a project and learn the process of writing a dissertation/ project report.

COURSE OUTCOME	Student will be able to know the practical aspects of, collecting data/ project work and prepare a dissertation document/ project report based on research process/ project work done

An introduction to your Dissertation topic, Research questions, an explanation of research methodology, An Overview of your research, Discussion of the results, A conclusion that shows what your research has contributed.