

WEST BENGAL STATE UNIVERSITY



M.Sc. in Food and Nutrition Syllabus

Department of Food and Nutrition
2019-20

1. Course content

Semester	Courses		Course Title	Internal Assessment (20% weightage)	End semester Examination (80% weightage)	Full marks	Credit
1	FNTPCOR01T	T	Principles of Human Health - 1	10	40	50	4
	FNTPCOR02T	T	Human Nutrition	10	40	50	4
	FNTPCOR03T	T	Fundamentals of Food Processing	10	40	50	4
	FNTPCOR04T	T	Application of Principles of Physics and Statistics in Food and Nutrition	10	40	50	4
	FNTPCOR05P	P	Human Biology including Anthropometric Techniques	10	40	50	4
						250	20
	FNTPAECC01M	M	Computer skills for Nutrition			50	2
						300	22
2	FNTPCOR06T	T	Principles of Human Health 2	10	40	50	4
	FNTPCOR07T	T	Community Nutrition	10	40	50	4
	FNTPCOR08T	T	Food Microbiology	10	40	50	4
	FNTPCOR09T	T	Public Health	10	40	50	4
	FNTPCOR10P	P	Human Biology, Microbiology and Clinical Nutrition	10	40	50	4
						250	20
	FNTPSEC01T	T	Principles of Communication, and Management for Self Entrepreneurship in Food and Nutrition			50	2
						50	22
3	FNTPCOR11T	T	Advanced Quantitative Techniques for Food	10	40	50	

			and Nutrition				
	FNTPCOR12T	T	Therapeutic Nutrition	10	40	50	
	FNTPDSE01T	T	Human Development And Behavior And Family Management	10	40	50	
	OR						
	FNTPDSE01T	T	Principle of Biophysics				
	FNTPDSE02T	T	Food Preservation And Microbial Technology	10	40	50	
	OR						
	FNTPDSE02T	T	Food Service Management				
	FNTPCOR13P	P	Nutrition Planning and Internship	10	40	50	
						250	20
	FNTPGEC01T	T	Basics of Food and Nutrition			50	4
						300	24
4	FNTPCOR14T	T	Emerging Areas in Food and Nutrition	10	40	50	4
	FNTPCOR15T	T	Food and Nutrition in relation to other Sciences	10	40	50	4
	FNTPCOR16T	T	Policies and Standards in Food and Nutrition	10	40	50	4
	FNTPCOR17M	M	Visit to a food industry and market survey			50	4
	FNTPCOR18M	M	Project Work	10	40	100	8
						300	24
						1200	

DSE01: Human Development/ Principle of Biophysics/

DSE02: Food Preservation and Microbial Technology/ FSM

Semester 1

Paper FNTPCOR01T: PRINCIPLES OF HUMAN HEALTH – 1

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

Learning outcomes	After this course the student should be able to: 1. Understand the pathology of specific diseased conditions. 2. Understand the biochemistry of macromolecules
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- 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

Paper FNTPCOR02T: HUMAN NUTRITION

Learning objectives

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

Learning 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.
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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

Paper FNTPCOR03T: FUNDAMENTALS OF FOOD PROCESSING

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.

<p>Learning outcomes</p>	<p>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.</p>
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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. Re-structured 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. Zoonotic 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.

Paper FNTPCOR04T: Application of Principles of Physics and Statistics in Food and Nutrition

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

Learning outcomes	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
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Principles of Thermodynamics

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.

Paper FNTPCOR05P: Human Biology and Quantitative Techniques

Learning objectives

To understanding the basic concepts of different statistical tools used for analysis of biological systems and analysis of the food related research work.

Learning outcomes	After this course the student should be able to practically analyze the data of different areas of food and nutrition
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Experiments and assignments on Human Biology, Biochemistry, Histology and Application of statistical tools in Food and Nutrition

Paper FNTPAECC01M: Computer skills for Nutrition

Learning objectives

To be able to make effective presentations using computers

Learning outcomes	The students will acquire computer skills, especially the presentation and computational skills for Nutrition
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Usage of power point and excel

Semester 2

Paper FNTPCOR06T: PRINCIPLES OF HUMAN HEALTH – 2

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

Learning outcomes	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.
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- 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

Paper FNTPCOR07T: COMMUNITY NUTRITION

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 strategies to combat and prevent them.

Learning outcomes	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.
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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.

Paper FNTPCOR08T: Food Microbiology:

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.

<p>Learning outcomes</p>	<p>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.</p>
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Classification and nomenclature of microorganisms.Morphology and Structure of Microorganisms in Foods (Yeasts and Molds, Bacterial Cells, Viruses).Important genera of Mold, 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 , F Value , 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, Aflatoxin, 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)

Paper FNTPCOR09T: PUBLIC HEALTH

Learning objectives

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 as it 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

Learning outcomes	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.
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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; Experimental/intervention studies.

Management of stress including oxidative stress through nutritional interventions

Environmental, Occupational, Community Health and Nutrition health

Paper FNTPCOR10P: HUMAN BIOLOGY, MICROBIOLOGY AND CLINICAL NUTRITION (PRACTICAL)

Learning objectives

To understanding the basic concepts of different statistical tools used for analysis of biological systems and analysis of the food related research work.

Learning outcomes	After this course the student should be able to practically analyze the data of different areas of food and nutrition
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Experiments in Human Biology, Microbiology and Clinical Nutrition

Paper FNTPSEC01T: PRINCIPLES OF COMMUNICATION, AND MANAGEMENT FOR SELF ENTREPRENEURSHIP IN FOOD AND NUTRITION

Learning objectives

To understand the basic concepts of Management and Extension education

Learning outcomes	After this course the student should be able to correlate the requirement of Management and Extension education techniques with that of Food and Nutrition.
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- 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 behavior 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

Paper FNTPCOR11T: ADVANCED QUANTITATIVE TECHNIQUES FOR FOOD AND NUTRITION

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.

Learning outcomes	After this course the student should be familiar with data handling
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- **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; Non-probability 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.; Non-parametric 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, Poisson, 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.

Paper FNTPCOR12T: THERAPEUTIC NUTRITION

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 counseling and the rationale of prevention of various diseases/disorders.

Learning outcomes	<p>The student will be able to</p> <ol style="list-style-type: none"> 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 counseling. 4. Comprehend the rationale of prevention of various diseases/disorders.
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Weight Management & Diabetes Management

Etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, MNT, dietary counseling 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
- Cogestive 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, Practical application of diet

OVERVIEW OF SOME DEGENERATIVE DISORDERS

- a) Cancer - Role of diet in etiology and management
- b) Alzheimer’s disease and Parkinson’s disease 2
- c) HIV-AIDS

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

Etiopathophysiology, 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.

Paper FNTPDSE01T: HUMAN DEVELOPMENT AND BEHAVIOR AND FAMILY MANAGEMENT

Learning objective

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

Learning outcomes	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.
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- Principles of growth and development, care during pregnancy and pre-natal and neonatal development.
- Theories of human development and behavior.
- 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. 2
- 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, rights of 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.

OR

Paper FNTPDSE01T: PRINCIPLE OF BIOPHYSICS

Learning objective

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.

<p>Learning outcomes</p>	<p>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 analyze the different features of these interactions.</p>
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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 chromatography LC-MS-MS, GCMS-MS, ICP-MS.

Electrophoresis: Introduction, principle and types of electrophoresis, PAGE, Capillary electrophoresis, SDS- PAGE, Isoelectric focusing and Isotachopheresis.

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

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

Paper FNTPDSE02T: FOOD PRESERVATION AND MICROBIAL TECHNOLOGY

Learning objective

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

Learning outcomes	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.
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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, Temperature Reduction: 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, organic acids, 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.), principles behind 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.

OR

Paper FNTPDSE02T: FOOD SERVICE MANAGEMENT

Learning objective

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

Learning outcomes	<p>Student will be able to:</p> <ol style="list-style-type: none"> 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
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- **Introduction to Catering Industry**
 - Types of catering, types of service, food production and food service 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 other institutional 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
- Critical evaluation of few meals served at the Institutes/Hotels based on the principle of meal planning.
- 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 introducing nutritionally balanced and health specific meals
 - Critical evaluation of fast foods
 - New products being launched in the market (nutritional evaluation)

Paper FNTPCOR13P: Nutrition Planning and Internship Report

Learning objective

To acquire knowledge on the principles of diet therapy and comprehend principles of dietary counseling 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

Learning outcomes	<p>The student will be able to</p> <ol style="list-style-type: none"> 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 counseling. 4. Comprehend the rationale of prevention of various diseases/disorders.
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- Planning or/and preparation, service and evaluation of therapeutic diets covered in theory.

Internship

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

Paper FNTPGEC01T: Basics of Food and Nutrition

Learning objective

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.

- Principles of Diet chart calculation
- Basic knowledge of food processing
- Anatomy, Biochemistry and Physiology for Nutrition.

Semester 4

FNTPCOR14T: EMERGING AREAS IN FOOD AND NUTRITION

Learning objective

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

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

FNTPCOR15T: FOOD AND NUTRITION IN RELATION TO OTHER SCIENCES

Learning objective

To understand the interdisciplinary nature of food and nutrition sciences

Concepts of Cognitive Science, Anthropology, Sociology in relation to Food and Nutrition

Food culture, Food and culinary tourism, Evolution of food

FNTPCOR16T: POLICIES AND STANDARDS IN FOOD AND NUTRITION

Learning objective

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.

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

FNTPCOR17M: VISIT TO A FOOD INDUSTRY AND MARKET SURVEY

Learning objective

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

- 1) Project preparation on food industry visit
- 2) Assessment of products and commodities in the market
 - formulate price list
 - list and categorize food production and service equipments
 - nutritional assessment of the product
 - critical analysis of food label

FNTPCOR18M: PROJECT REPORT AND PRESENTATION

Learning objective

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

Learning 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.