MARUDHAR KESARI JAIN COLLEGE FOR WOMEN (AUTONOMOUS)

Vaniyambadi – 635 751

PG & Research Department of Foods and Nutrition

for

Postgraduate Programme

Master of Science in Foods and Nutrition

From the Academic Year 2024 - 25

Semester - III						
24PNDC31	CC – 8 Advanced Dietetics	3	1	2	0	5
24PNDC32	CC – 9 Food Microbiology	3	1	2	0	5
24PNDC33P	CC – 10 Practical III - Advanced Dietetics	0	0	5	0	4
24PNDC34	CC –11Performance Nutrition	2	1	1	0	3
24PNDE31 24PNDE32	EC –7 Food Product Development EC-8 Nutrition in Emergencies	2	1	1	0	3
24PNDS31	SEC – 2 Diet Counselling and patient care	1	1	0	0	2
24PNDIN31	Internship	0	0	3	0	2
					30	**24**

Semester - IV						
24PNDC41	CC – 12Advanced Food Service Management	3	1	2	**0**	5
24PNDC42	CC –13 Public Health Nutrition	3	1	2	0	5
24PNDC43P	CC - 14 Project / Viva Voce	0	0	6	0	5
24PNDE41 24PNDE42	EC – 9 Functional Foods EC-10 Food Safety and Nutrition Security	4	1	1	0	4
24PNDP41	PEC – 1Entrepreneurial Development	1	1	0	0	2
24PNDL41	SLC – Nutrition and Child Psychiatry	0	0	1	3	2
					30	**23**
	Total Credits	**90+2***				

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, or Nan mudalvan within the fifth semester. Additionally, engaging in a specified Self-learning Course is mandatory to qualify for the degree, and successful participation will be acknowledged with an extra credit of 2*.

CC	Core Course	14
EC	Elective Paper	6
SEC	Skill Enhancement Course	2
AEC	Ability Enhancement Compulsory Courses	1
VE	Value Educations	1
	Internship	1
PEC	Professional Enhancement Course	1
SLC	Self-Learning Course	1

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC31	ADVANCED DIETETICS	Core	3	1	2	0	5	6	25	75	100

Learning Objectives	
LO1	Understand the aetiology, physiologic &metabolic of Gastrointestinal Disorders
LO2	Identify the crucial points of disease management of Liver and Pancreas.
LO3	To learn recent concepts in dietary management of different diseases in Cardiovascular & Lung Disorders.
LO4	To understand the Nutritional modifications and dietary requirements for the therapeutic condition.
LO5	To know the appropriate nutrition therapy for cancer and RA

Unit	Content	Hours
1	**Medical Nutrition Therapy for Gastrointestinal Diseases** a) Dietary management of physiologic &metabolic of Upper gastro intestinal diseases - Etiology, signs & symptoms, complications and dietary management for: Gastro-esophageal reflux disease (GERD) **Stomach:** Gastritis, Peptic & Duodenal Ulcer. b) Dietary management of Lower gastro intestinal diseases - Etiology, signs & symptoms, complications and dietary management of Flatulence – condition, Constipation, Diarrhea, Celiac Disease.	18
2	**Medical Nutrition Therapy for Liver, Biliary & Pancreatic Diseases** Assessment, Diagnosis and PES statement of GI diseases**.** a) Physiology, functions of Liver. Dietary management of Hepatitis, Stages & Progression of Liver Disease, Hepatic Encephalopathy, Fatty Liver. b) Etiology, symptoms and dietary management of Cholelithiasis, Cholecystitis and cholecystectomy. c) Dietary management and diagnostic tests of Pancreatic disorders; Acute & Chronic Pancreatitis, Type 1 Diabetes, Type 2 Diabetes, Gestational Diabetes.	18
3	**Medical Nutrition Therapy for Cardiovascular, Renal & Lung Diseases** a) Prevalence, Pathophysiology, risk factors, diagnostic tests and dietary management of cardiovascular diseases; Atherosclerosis and Hypertension. b) Pathophysiology, classification, diagnostic tests, risk factors and dietary management of acute and chronic renal failure Glomerulonephritis, Nephrotic Syndrome. C)Pathophysiology, risk factors and dietary management of lung diseases: Asthma, Tuberculosis and Lung Cancer.	18

4	**Medical Nutrition Therapy for Weight Management and Other Conditions** a) Etiology, classification, management of Obesity: Types & causes of Obesity, Nutritional Management. b) Etiology, clinical manifestation and Dietary management of Underweight. c) Classification, dietary management in Burns, AIDS, Stroke, Fever. **Preventive medicine**: A whole plant-based food without medications	**18**
5	**Nutritional management in cancer** Pathogenesis and progression of cancer, types, Symptoms and Dietary management. **Medical Nutrition therapy for Rheumatic disease** Etiology, Pathophysiology of Inflammation of Rheumatic diseases, Rheumatoid Arthritis, Osteoarthritis.	**18**

CO	**COURSE OUTCOMES**
CO1	Explain patho physiology, signs and symptoms and nutrition management of the various disease conditions of upper and lower Gastro Intestinal tract
CO2	Enumerate the types, Etiology, symptoms and complications and explain the dietary management of diseases of liver, Biliary and pancreatic diseases.
CO3	Comprehend the nutrient requirement for each disease condition including Cardiovascular, Renal and Lung diseases
CO4	Identifying the diet therapy for weight management and related interventions.
CO5	Apply the dietary principles to manage the life style disorders in the society

Text books:	
1	B.Srilakshmi.(2020).Dietetics.K.K.GuptaForNewageInternationalPvtLtd.NewDelhiPublisher.
2	Advanced Nutrition and Dietetics in Diabetes (Advanced Nutrition and Dietetics) Ph.D. Goff, Louise (Editor), Ph.D. Dyson, Pamela (Editor) 2015
3	Sue Rodwell Williams (2013) Nutrition, Diet Therapy (9th ed.). WB Saunders Company, London
4	RobinsonCh.,M.B.Lawlea,W.L.,Chenoweth,andA.E.,Carwick.BasicNutritionandDiettherapy,Mac millan Publishing Company.
Reference Books:	
1	GarrowJS,JamesWPT,RalphA.(2000).HumanNutritionandDietetics.ChurchillLivingstone,NY.10th edition.
2	Nix S. (2013) Williams' Basic Nutrition & Diet Therapy. 14th Edition. Pub. Elsevier
3	Whitney,E.N.andC.B.Cataldo.(1983).UnderstandingNormalandClinicalNutrition.WestPubS1.Paul.

Web resources:
https://www.espen.org
https://www.nutritioncare.org/home
https://www.idf.org
https://ispad.org
https://www.diabetes.org

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	3	3	3	3	3	3
CO2	3	3	1	3	2	3	3	3	3	3	3
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	**15**	**12**	**5**	**15**	**13**	**14**	**14**	**14**	**15**	**14**	**13**
Average	**3**	**2.4**	**1**	**3**	**2.6**	**2.8**	**2.8**	**2.8**	**3**	**2.8**	**2.6**

3–Strong, 2-Medium,1-Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC33P	**Practical III - Advanced Dietetics**	Core	**0**	**0**	5	0	4	5	25	75	100

Learning Objectives	
LO1	To understand the therapeutic modifications of diet.
LO2	To acquire knowledge in planning diets for Cardiovascular Disorders
LO3	To acquire knowledge in planning diets for various disorders.
LO4	Apply principles of diet therapy in planning and preparation of foods for various disease conditions.
LO5	Know the various nutritional supplements available and identify its appropriate usage.

Unit	Content	Hours
Unit I	1. Routine hospital diet: Regular diet, Clear liquid, soft diet, Full liquid diet 2. Assessing requirements and planning diet for obesity and underweight individual	15
Unit II	Planning and preparation of diet for A. Atherosclerosis B. Hypertension	15
Unit III	Assessing and planning diets for the following conditions A. Peptic ulcer B. Hepatitis C. Cirrhosis	15
Unit IV	1. Planning and preparation of diet for cancer according to the condition. 2. Planning and preparing diet for Rheumatic arthritis	15
Unit V	1. Planning and preparation of diet for Glomerulonephritis 2. Planning diet for postburn condition Nutritional supplements for above disease condition	15

CO	COURSE OUTCOMES
CO1	Evaluate various therapeutic diets
CO2	Acquire the skill to accurately assess and interpret the nutritional status
CO3	Apply dietetic principles in planning, preparing and evaluating meals intended for various disease conditions.
CO4	Create knowledge in nutrient calculations and dietary principles.
CO5	Identify the reequipments for disease conditions and critically ill patients

Text books:	
1	EliaM,LjunggvistO,StrattonRJ,LanhamSA.(2013).ClinicalNutrition.TheNutritionSociety Textbook.WileyBlackwellPublishers.2ndedition.
2	Mitch,W.andIkizler,Alp.(2010).HandbookofNutritionandtheKidney.LippincottWilliams and Wilkins, New Delhi.6thedition.
Reference Books:	
1	Clinical Dietetics Manual.(2018).IndianDieteticAssociation.2nd edition.
2	William's.(2012).BasicNutritionandDiettherapy.14thedition.
Website:	
https://www.espen.org	
https://www.nutritioncare.org/home	
https://www.idf.org	
https://ispad.org	
https://www.diabetes.org	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3–Strong, 2-Medium,1-Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC32	FOOD MICROBIOLOGY	Core	3	1	2	0	5	6	25	75	100

Learning Objectives	
	Define and classify microorganisms based on their characteristics.
LO2	Explain the techniques for culturing, sampling, and isolating microorganisms.
LO3	Understand the role of microorganisms in food fermentation and identify common fermented foods in India.
LO4	Identify foodborne pathogens and describe their effects on human health.
LO5	To learn the food preservation methods and their applications in food safety.

Unit	Content	Hours
1	**Definition and classification of microorganism**. General morphology of microorganism – bacteria, fungi, algae, yeast and virus. Microbial growth –growth curve, factors affecting growth: intrinsic factors and extrinsic factors	**18**
2	**Culturing of an organism** Sampling, sample collection, transport and storage, sample preparation for analysis. Microscopic and culture dependent method- Direct microscopic observation, culture, enumeration and isolation methods	**18**
3	**Beneficial Use of Microorganism in Food** Definition Of Fermentation, Principles of culture maintenance and preparation, Types of Starter Cultures Used for Food Fermentation. Cereal, Pulse, Milk, Fruit and Vegetable Based Fermented Products of India/Asian Countries. Concept Of Probiotics, Prebiotics, Symbiotic, Single Cell Protein And Psychobiotics	**18**
4	**Harmful effects of Microorganisms** Food borne diseases: Definition, Bacterial food borne diseases (Staphylococcal intoxication, Botulism, Salmonellosis, Shigellosis, Escherichia Coli, Clostridium Perfringens gastroenteritis, Bacillus cereus Gastroenteritis).	**18**
5	**Principles of food preservation**. Physical methods and chemical methods – high temperature, Principles and techniques of canning, low temperature, chemical and natural preservatives, dehydration, food irradiation, hurdle technology. Food Safety and its importance.	**18**

CO	Course Outcomes
CO1	Acquire the knowledge about different Microorganisms
CO2	Relate the theoretical knowledge with sampling and culturing of organisms
CO3	To understand the concept of beneficial use of Microorganisms
CO4	Comprehend the knowledge gained on the concepts of food borne diseases and to assess the microbiological quality of food
CO5	Apply knowledge in field of food preservation and its recent advances.

Text books:	
1	**Food Microbiology** by Martin R. Adams, Peter J. McClure, and Maurice O. Moss
2	**Modern Food Microbiology** by James M. Jay, Martin J. Loessner, and David A. Golden
3	**Fundamental Food Microbiology** by Bibek Ray and Arun Bhunia
4	**Foodborne Microorganisms of Public Health Significance** edited by Ailsa D. Hocking
5	**Principles of Food Sanitation** by Norman G. Marriott and Robert B. Gravani
Reference Books:	
1	Microbiology of Fermented Foods by B. J. Wood
2	Food Microbiology by Frazier and Westhoff
3	Industrial Microbiology by Prescott and Dunn
4	Microorganisms in Foods by International Commission on Microbiological Specifications for Foods (ICMSF)
5	Fundamentals of Microbiology by L. M. Prescott and J. P. Harley
Web resources:	
https://www.microbiologysociety.org/	
https://www.cdc.gov/foodborneburden/index.html	
https://www.who.int/health-topics/food-safety	
https://pubmed.ncbi.nlm.nih.gov/	
https://www.asm.org/	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3–Strong, 2-Medium,1-Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC34	PERFORMANCE NUTRITION	Core	2	1	1	0	3	4	25	75	100

Learning Objectives

LO1	Understand about the Nutritional assessment and Energy Requirements for athletes
LO2	Understand the role of Carbohydrate, Protein and Fat Requirement for Sports Performance.
LO3	Learn about the role of Micronutrients and Hydration in enhancing Sports Performance.
LO4	Understand the fundamentals of planning diet for different sports.
LO5	Know about the different types of sports supplements and nutrition for special athletes.

Unit	Content	Hours
1	**Nutritional assessment for athletes**-assessment of body composition, techniques of measuring body composition, surface anthropometry, Biochemical, clinical and dietary assessment, Body composition and sports performance. **Energy requirements for optimal athletic performance**- Energy production, Energy metabolism in Athletes, Fatigue and exercise, energy requirements of athletes, factors affecting energy requirements of athletes	12
2	**Carbohydrates in sports performance-** Carbohydrate types, Glycemic index and Glycemic load, carbohydrate utilization during exercise, carbohydrate loading, fueling before during and after exercise, carbohydrate requirements for athletes. **Protein and fat requirement for sports performance** -protein and exercise, requirements of protein and fat for athletes, factors affecting protein requirements, protein needs and vegetarian athletes.	12
3	**Micronutrients in sports-** vitamins and mineral requirements in athletes, sports anemia, antioxidants and exercise induced free radicals. **Hydration for athletes-** Fluid balance and thermoregulation, fluid and electrolyte requirements for athletes, Effects of dehydration, factors affecting fluid intake, gastric emptying and fluid delivery to working muscles, Fluid intake before, during and after exercise.	12
4	**Nutrition for competition performance**-Nutrient timing, pre-competition nutritional guidelines, nutrition during exercise and nutrition after exercise, nutrition plan for specific sports events. **Ergogenic aids-** Categories of Ergogenic aids and Ergolytics. **Sports foods-**sports drinks, sports gels dietary supplements, MCT diets, Antioxidant rich diet supplements.	12
5	**Nutrition for athletes with special dietary needs-** Nutrition for special population like children, young and older athlete, Female athlete triad, weight loss and weight gain in athletes, vegetarian athlete, diabetic athlete, athletes with disabilities, factors affecting nutritional needs for travel athlete, GI stress and athletes.	12

CO	Course Outcomes
CO1	Analyze and assess the body composition of athlete
CO2	Comprehend the role of Macronutrients towards athletic performance
CO3	Emphasize the Role of Micronutrients, principles of fluid balance and thermoregulation in athletes.
CO4	Retrieving the various sports supplements and Ergogenic aids for the athletes
CO5	Apply personalized nutrition guidance in the area of sports nutrition.

Text books:	
1	B.Srilakshmi, Suganthi.v, C.Kalaivani Ashok.(2017). Exercise physiology fitness and sports Nutrition, New age publishers. 1st edition.
2	Bourns, Fred.(2002).Essentials of Sports Nutrition. John and Wiley. 2nd edition.
3	Bean, Anit. (2010).The complete guide to Sports Nutrition. A & C. Black. London.6th edition.
Reference Books:	
1	D. Enette Larson-Meyer.(1963).Vegetarian sports nutrition. Human kinetics.
2	Natalie Digate Muth.(2015).Sports Nutrition for health professionals. Quincy Mc Donald.
3	Burke, Louise. (2007).Practical Sports Nutrition. Human Kinetics.
Web resources:	
http://ijpnpa.biomedcentral.com	
www.acsm.org	
www.ausport.govt.au	
www.sportsci.org	
www.gssiweb.com	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3–Strong, 2-Medium,1-Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE31	FOOD PRODUCT DEVELOPMENT	Core	2	1	1	0	3	4	25	75	100

Learning Objectives

LO1	To Learn the Steps Involved in Food Product Development, Consumer preference and Formulation of Nutritious Food Product.
LO2	To Learn about the Sensory characteristics and Rating Test of Food product.
LO3	To Understand the Different types of Packaging Materials.
LO4	To Learn the Product Labelling and Nutritional Information in Governing Laws.
LO5	To Develop Advertising and Marketing Strategies

Unit	Content	Hours
1	**INTRODUCTION TO NEW FOOD PRODUCT DEVELOPMENT** Definition, significance of product development, food needs and consumer preferences, market survey and designing a questionnaire to find consumer needs fora product. Steps involved in product development, formulation of nutritious food products and standardization, Factors that influence new product development success,	12
2	**SENSORY EVALUATION OF THE PRODUCT** **Assessing the sensory characteristics of food** - color, texture, odor and taste. **Sensory evaluation of foods** – Laboratory set up, equipment, panel selection and training, judging quality. **Subjective evaluation techniques** – Difference tests: paired comparison test, duo-trio test, triangle test. **Rating tests –** Ranking single sample, two samples and multiple samples. Objective tests to assess the sensory properties of foods.	12
3	**ESSENTIALS OF FOOD PACKAGING** Importance, definition, principles design requirement and basic FSSAI lawspackaging functions, Package testing, Safety of food packaging **Selection criteria and types of packaging material** – metal, glass, paper, plastic, edible, wooden. **Packages with special features** – Boil-in-bag package, plastic-shrink package, cryovac film, microwave oven packaging, aseptic packaging and Distribution packaging.	12
4	**PRODUCT LABELLING AND REGULATIONS** Definition, purpose, importance, Function,Nutritional information and laws Governing product labeling. **Types of labeling** – smart labels, barcode labels, radioactive labels, antimicrobial labels, security labels and other specialized food labels. General Labeling , Food Labeling and Nutritional Labeling Standards and regulations for nutrition harming and Nutrition claims in food labels.	12

5	**QUALITY CONTROL, PRICING AND MARKETING** Analyzing the product stability, evaluation of shelf life, determining the changes insensory attributes due to environmental conditions. Pricing a product, Methods of pricing-cost plus pricing, Demand pricing, Competitive pricing, markup pricing, Principles of pricing, determining the selling price and profit margin, price bundling, promotional pricing and quantity discounts. **Advertising and marketing strategies**- Basic techniques, Food advertising regulations.	12

CO	Course Outcomes Students will be able to
CO1	Understand the Concept of Food Product Development and Market Strategies.
CO2	Analyze Subjective Evaluation Techniques
CO3	Evaluate Selection Criteria and Types of Packaging Materials in Food Product
CO4	Understand standards and regulations concerning nutritional labeling, including guidelines for nutrient content claims and health claims
CO5	Analyze about Types of Pricing and Marketing Strategies.

Text books:	
1	Food Product Development: From Concept to the Marketplace" by I. Sam Saguy and Ernest Graf
2	Sensory and Consumer Research in Food Product Design and Development" by Howard R. Moskowitz, Jacqueline H. Beckley, and Anna V. A. Resurreccion
3	Food Labeling Compliance Review" by James L. Summers
Reference Books:	
1	Quality Control for the Food Industry" by Amihud Kramer and Bernard A. Twigg
2	Sensory Evaluation of Food: Principles and Practices" by Harry T. Lawless and Hildegarde Heymann
Web resources:	
www.slideshare.net/slideshow/food-product-development-process-design-strategies/262044800	
https://www.fssai.gov.inPDF	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3–Strong, 2-Medium,1-Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE32	NUTRITION IN EMERGENCIES	Core	2	1	1	0	3	4	25	75	100

Learning Objectives	
LO1	Understand the types of natural and manmade disasters that lead to emergency situation.
LO2	Identify the specific nutritional challenges faced by vulnerable groups (e.g., children, pregnant women, elderly, displaced populations) during emergencies.
LO3	Understand the nature of communicable diseases: Identify the types of communicable diseases.
LO4	Understand the different aspects of malnutrition assessment and how it varies depending on the context (e.g., refugee camps, disaster zones, conflict areas).
LO5	Understand the methods and tools used to evaluate the nutritional requirements of populations affected by disasters, conflicts, or other emergencies.

Unit	Content	Hours
1	Natural / manmade disasters resulting in emergency situations. Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies. Factors giving rise to emergency situation in these disasters. Illustration using case studies from Indian Subcontinent.	12
2	Nutritional problems in emergencies in vulnerable groups. Causes of malnutrition in emergency situations. Major deficiency diseases in emergencies. **Protein** – energy malnutrition. Specific deficiencies.	12
3	**Communicable diseases:** Surveillance and treatment. Control of communicable diseases in emergencies Role of immunization and sanitation. Public nutrition approach to tackle nutritional problems in emergencies.	12
4	Assessment and surveillance of nutritional status in emergency affected populations. Scope of assessment of malnutrition in emergencies. Indicators of malnutrition clinical signs for screening acute malnutrition, Subjective Global Assessment Index **Anthropometric assessment of nutritional status** – Indicators and cut – offs indicating seriously abnormal nutrition situation weight – for – height-based indicators, MUAC, social indicators. Organization of nutritional surveillances and individual screening.	12
5	**Nutrition Relief and Rehabilitation**. Assessment of food needs in emergency situations. Food distribution strategy – identifying and reaching the vulnerable group – Targeting Food Aid. Mass and supplementary feeding. Special foods / rations for nutritional relief. Local production of special foods. Local food rehabilitation. Organization of mass feeding / general food distribution. Feeding centers. Transportation and food storage. Sanitation and hygiene. Evaluation of feeding programmes.	12

CO	Course Outcomes
CO1	Gained insight on Natural / manmade disasters resulting in emergency situations.
CO2	To understand the common nutritional problems prevalent among the vulnerable groups in emergencies
CO3	Learned about communicable diseases in emergencies and public nutrition approach to tackle them.
CO4	The student will gain knowledge to assess the nutritional status of emergency affected population and organize nutritional surveillance and individual screening.
CO5	Learned knowledge to apply the principles of massive supplementary feeding and food safety for the welfare of the community

Text books:	
1	The Management of Nutrition in Major Emergencies. WHO, UNHCR, IFRC, WFP. Geneva,. World Health Organization. 2000.
2	Kielmann AA, Taylor CE, Parker RL. The Narangwal Nutrition Study: a summary review. American Journal of Clinical Nutrition. 1978;31:2040–2052. [PubMed]
3	Nutrition in Public Health: A Handbook for Developing Programs and Services" by Arlene Spark.
4	Essential Nutrition Actions: Improving Maternal, Newborn, Infant and Young Child Health and Nutrition" by UNICEF.
5	The Science and Fine Art of Food and Nutrition" by Arnold Ehret
Reference Books:	
1	Shills, M.E., Olson, J.A, Shike, M and Ross, A.C. (2003): Modern Nutrition in Health and Disease, 9th Edition, A. Williams and Willdens.
2	Goyet, fish.. V.; Seaman, J. and Geiger, u-(2008): The Management of Nutritional Emergencies in Large Populations, World Health Emergency Nutrition: From Response to Recovery" by Lesley J. Mills Organization, Geneva
3	Mahan, L.K. and Escort-Stump, S. (2000): Krause's Food Nutrition and Diet-Therapy, 10th Edition, W-13 Saunders Ltd.
4	Emergency Nutrition: From Response to Recovery "by Lesley J. Mills.
5	Nutrition and Health in a Disaster" by Pierre M. L. Chaves.

Web resources:
Handbook of Nutrition and Food, Third Edition by Carolyn D. Berdanier (Editor); Johanna T. Dwyer (Editor); David Heber (Editor).
The Atlas of Food by Erik Millstone; Tim Lang; Marion Nestle (Foreword by)
Dietary Reference Intakes by Jennifer J. Otten (Editor); Jennifer PitziHellwig (Editor); Linda Meyers (Editor)
Encyclopaedia of Food Sciences and Nutrition.
Scrimshaw NS, Taylor CE, Gordon JE. Interactions of nutrition and infection. Geneva: WHO; 1968.

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	15	13	14	14	14	15	14	13
Average	3	2.4	1	3	2.6	2.8	2.8	2.8	3	2.8	2.6

3–Strong, 2-Medium,1-Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDS31	**DIET COUNSELING AND PATIENT CARE**	Core	**1**	**1**	**0**	0	2	2	25	75	100

Learning Objectives	
LO1	To familiarize students with diet counselling skills and acquaint them with basic principles of psychology
LO2	Understand the interrelationship between Nutrition and Psycho social disorders.
LO3	To understand the special needs and health challenges of the human life cycle.
LO4	familiarize with the health promoting treatment.
LO5	To understand the Concept of Diet Counselling in Therapeutic Diet

Unit	**Content**	**Hours**
1	**UNIT-1: Introduction to counselling** Definition of counselling, Theories of counselling – Reality theory, Gestalt theory, cognitive behavioral, counselling theory. Types of counselling - client centered counselling, Behavioral counselling. Directive and non-directive and eclectic counselling. Areas of counselling- individual (personalized), family, group.	6
2	**UNIT-2: Basic counselling skills** Observation Skills, questioning skills, Communication Skills (Listening, Feedback, Non-Verbal),Making Notes and Reflections · The Counselling Interview, History Taking, Interviewing (Characteristics, Types and Techniques). Counselling to special group – children, adolescent and elderly.	6
3	**UNIT-3: Component of counselling** Relationship of the Counsellor, Role Model, Need of the Counsellor. Objectivity/Subjectivity, Emotional Involvement,Counsellor Limits in Practice.	6
4	**UNIT-4: Counselling ethics** Need for Ethical Standards, Ethical Codes and Guidelines, Rights of Clients Dimensions of Confidentiality, Dual Relationships in Counselling Practices. The Counsellor's Ethical and Legal Responsibilities, Ethical Issues in the Assessment Process.	6
5	**UNIT-5: Diet counselling at hospital and community level** Role of counselling in hospital, Role of counselling in community ,organizing health camps and patient feedback – at hospital level, Organizing health camps and patient feedback – at community level, Diet counselling for obese people. Diet counselling for Diabetics. Diet counselling for CVD. Diet counselling for mother and child care. Diet counselling for adolescent. Patient follow up / home visits.	6

CO	Course Outcomes
CO1	Enriches in knowing the guidelines for counseling.
CO2	Understanding the techniques embedded in skills of counseling
CO3	Comprehending the different components involved in counseling
CO4	Evaluating and analyzing the ethical standard in counseling
CO5	Apply and relate the knowledge obtained in counseling and patient care

Text books:	
1	Linda, G. Sensillar, (2009). Nutrition Counseling Skills for the Nutrition Care Process. (4th ed.,)Jonesand Bartlett Publishers.
2	Mahan, L.K., Raymond, J.L(2017). Krause&39;s Food and Nutrition Therapy.(12th ed.,), United Kingdom :Elsevier.
3	Richard, O. Straub. (2017) .“Health Psychology”. (6th ed.,) New York: Worth Publishers
4	Robinson, C. H. (1990). Normal and Therapeutic Nutrition. United States: Macmillan Publishing Company.
5	Taylor, S. E. (2006). Health Psychology. India: McGraw-Hill Education (India) Pvt Limited.
6	Nix McIntosh, S. (2016). Williams&39; Basic Nutrition & Diet Therapy - E-Book. India: Elsevier Health Sciences.
Reference Books:	
1	Beena, C and Parmeswaran, E.G. Invitation to Psychology. Neel Kamal Publications.
2	Gable, J.and Herrmann, T. (2016). Counselling skills for dieticians (3rd ed.). United Kingdom: Blackwell publishing Ltd.
3	Gibson, R.L. and Mitchell, M.H.(2005). Introduction to counselling and guidance. (6th ed.,). 4.Gelso, C.J.andFretz, B.R.(1995). Counselling Psychology. Bangalore: Prism Books Pvt Ltd. 5.Sharma, T.C.(2002).Modern Methods of Guidance and Counseling. New Delhi: Sarup& Sons.
	Web sources
	1. https://www.ncbi.nlm.nih.gov/pmc/articles 2. https://www.betterhealth.vic.gov.au/health/servicesandsupport/dietitians 3. https://www.art-of-patient-care.com/medical-references.html 4. http://www.webmd.com/ 5. https://onlinelibrary.wiley.com/journal

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	2	2	3	3	2	2
CO2	3	3	1	3	2	3	3	3	3	3	2
CO3	3	2	1	3	2	3	3	3	3	3	3
CO4	3	2	1	2	3	2	3	2	2	2	3
CO5	3	3	1	3	3	3	3	3	3	3	3
Total	15	12	5	14	13	14	14	14	14	13	13
Average	3	2.4	1	2.8	2.6	2.8	2.8	2.8	2.8	2.6	2.6

3–Strong, 2-Medium, 1-Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC41	CC -ADVANCED FOOD SERVICE MANAGEMENT	Core	3	1	2	0	5	6	25	75	100

Learning Objectives	
LO1	Understand the modern trends and approaches in food service management
LO2	Understand various modes of purchasing and the importance of systematic procurement in food service establishments.
LO3	Learn the different food delivery service systems and types of service styles used in food service establishments.
LO4	Gain knowledge of employee welfare facilities and benefits, and their role in improving job satisfaction and retention.
LO5	Learn the phases of layout planning, including determining workflow, identifying work centers, and selecting equipment.

Unit	Content	Hours
1	**HISTORY, DEVELOPMENT OF FOOD SERVICE SYSTEM, MENUPLANNING -** History and development, Types of food service establishments- Commercial establishments & non-commercial establishments, Approaches to food service management. Menu planning – definition, importance, needs and skills required for planning menu. Types of Menu and its applications- Steps in menu planning, construction of menu, characteristics of a good menu.	18
2	**PURCHASE AND STORAGE,QUALITY AND FOOD PRODUCTION** - Mode of purchasing, centralized purchasing, group purchasing, minimum stock level, maximum stock level. Storage space-dry storage, low temperature storage, store room management. Production control, use of standardized recipes, safeguard in food production, quality control in food preparation and cooking.	18
3	**FOOD MANAGEMENT: DELIVERY AND SERVICE STYLES** Methods of delivery service system-centralized delivery system, decentralized delivery system, conventional food service system. Different types of service in food service establishments- table and counter service, self-service. Types of service in a restaurant-silver service, plate service cafeteria service, and buffet service. Specialized forms of service-hospital tray service, home delivery, room service.	18
4	**PERSONNEL MANAGEMENT,WORK PLACE SAFETY** Definition of leadership, leadership styles recruitment, selection and induction, Employee facilities and benefits, Training and development. Hygiene and sanitary practices, types of accidents, precautions to prevent accidents. **Garbage and refuse sanitation**- inside and outside storage, Pest control- pests, signs of infestation.	18

5	**SETTING UP AND PLANNING FOOD SERVICE UNIT** **Layout and design** – Phases of planning layout, determining work centers equipment, Factors influencing layout design, evaluation of plan and time management. **Planning**- steps and types of planning, Preparing a planning guide , Credit facilities for startup .	**18**

CO	COURSE OUTCOMES
CO1	Explain the historical development and classify food service establishments.
CO2	Implement food safety practices and quality control checks during food preparation and Cooking in institutional settings.
CO3	Identify the main types of food delivery systems and explain different service styles used in Restaurants, cafeterias, and institutional food outlets.
CO4	Discuss the importance of employee facilities, benefits, and training for workplace Productivity and development and human resource management in food service organizations.
CO5	Identify the critical design factors that affect efficiency, hygiene, and customer satisfaction in a food service unit.

Text books:	
1	"Foodservice Management: By Design"
2	"On Cooking: A Textbook of Culinary Fundamentals" by Sarah R. Labensky, Steven G. Labensky, and Alan M. Hause:
3	"Foundations of Lodging Management" by Michael J. O'Fallon and Roger G. Clouser:
4	"Business Plan for a Restaurant: How to Write a Winning Plan to Open a Restaurant" by Brian A. Cohen:
Reference Books:	
1	"Foundations of Menu Planning" by Daniel Traster
2	"HACCP: A Practical Guide" by the Food and Drug Administration (FDA):
3	"Food and Beverage Management" by Bernard Davis, Sally Stone, and Andrew Lockwood:
Web resources:	
https://www.haccpalliance.org – Safety standards in food service systems	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	4	4	3	3	4	3	3	3	4	4	4
CO2	4	3	3	4	3	3	4	3	4	3	3
CO3	3	3	4	3	4	4	3	3	4	4	3
CO4	4	4	4	4	3	3	4	3	3	3	4
CO5	3	3	3	4	3	3	4	4	4	4	4
Total	**18**	**17**	**17**	**18**	**17**	**16**	**18**	**16**	**19**	**18**	**18**
Average	**3.6**	**3.4**	**3.4**	**3.6**	**3.4**	**3.2**	**3.6**	**3.2**	**3.8**	**3.6**	**3.6**

3–Strong, 2-Medium, 1-Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDC42	**CC-PUBLIC HEALTH NUTRITION**	Core	3	1	2	0	5	**6**	25	75	100

Learning Objectives	
LO1	To understand the concept of Public Nutrition.
LO2	Impart the knowledge about Assessment of Nutritional status.
LO3	To enable students to develop a holistic knowledge based on the importance of understanding the Nutrition problems and their prevention
LO4	To understand the nutritional problems during the emergencies/disasters as well as the strategies to tackle them.
LO5	develop skills in preparation of communication Aids and planning nutrition education Programme for the community

Unit	Content	Hours
1	**CONCEPT OF PUBLIC NUTRITION** a) Role of Nutrition and Health in National Development b) Relationship between health and nutrition, National Health Care Delivery System c) Determinants of Health Status, Indicators of Health. **Nutritional deficiency disorders in India** d) Prevalence .Etiology, Symptoms, Current status and Recent Updates-Protein Energy Malnutrition, Vitamin A deficiency disorder, Iodine Deficiency Disorder, Anemia. Role of public nutritionists in the health care delivery system	**18**
2	**ASSESSMENT OF NUTRITIONAL STATUS** **Direct methods:** Direct methods of Nutritional assessment, Nutritional anthropometry, biochemical, clinical and dietary assessment and Growth charts-plotting of growth charts. **Indirect methods:** Demography, population dynamics and vital health Statistics and their health implications. Food balance sheets, recent Nutritional assessment methods- MUST, SGA, SOAP. Indicators of health and nutrition. Basic concepts of Nutritional Surveillance- Millennium Development Goals (MDG).	**18**
3	**STRATEGIES FOR IMPROVING NUTRITIONAL STATUS AND HEALTH STATUS OF THE COMMUNITY** a) **Immunization**: Awareness, types of vaccines, Importance and schedule of Immunization. **b) Nutrition intervention programme-** Balwadi Feeding Programme, Antyodaya Anna Yojana (AAY), Annapurna Scheme, Mid-day Meal Program, CM Breakfast Scheme Food For Work Programme, Special Nutrition Programme.	**18**

4	**ORGANIZATIONS TO COMBAT MALNUTRITION AND NUTRITION DURING EMERGENCIES AND SPECIAL CONDITIONS** International organizations concerned with food and nutrition-AFPRO, CWS, CRS and World Bank. National organization – CHEB, NIPCCD, DFRL, NGOs. Nutritional deficiency diseases in emergencies-Major and micronutrient. Control of communicable diseases in emergencies- Factors responsible for spread of communicable disease, mode of transmission and prevention of chicken pox, malaria, swine flu, COVID-19 and AIDS.	**18**
5	**NUTRITION EDUCATION AND EXTENSION OF BETTER NUTRITION** Nutrition education for the community –Objectives, Definition and Importance of nutrition education to the community, Principles Of planning, executing and evaluating nutrition education programmes. Development and Use of AV aids in Public Nutrition Education.- Charts flipchart, posters, flannel board, models, OHP.	**18**

CO	Course Outcomes
CO1	Understand the role of nutrition in national development
CO2	Acquire skill in assessment of nutritional status of Community.
CO3	Gain depth knowledge on strategies for improving nutritional Status and health status of the community.
CO4	Evaluate the role organization in combating malnutrition.
CO5	Understand and apply nutrition education for the community Welfare.

Text books:

1. Park, K. (2013). Text Book of Preventive and Social medicine. M/s. Banarsidas Bhanot Publishers ,Jabalpur. 22nd Edition
2. Suryatapa Das (2020).Textbook of Community Nutrition. Academic Publishers,Kolkata.4th Edition
3. Srilakshmi, B (2017).Nutrition Science. New Age International Publishers. Multi Color 6th Edition.
4. WHO (2002).The management of Nutrition in Major Emergencies. Published by AITBS Publishers, New Delhi.

Reference Books:

1. Muthu V K (2014).A Short Book of Public Health, Jaypee Brothers Medical Publishers.2nd edition
2. Owen,A.Y. and Frackle,R.T.,(2002).Nutrition in the Community. The Art of Deliv erring Services. Times Mirror /Mosby.2nd Edition
3. Carolyn Deadener Johanna T. Dwyer David Heber (2014).Hand book of Nutrition and Food, CRC Press, New York. Third Edition.

Web Resource

https://bradley.libguides.com/publichealthedu/websites

https://unl.libguides.com/c.php?g=332530&p=2234794

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	4	4	4	3	4	3	4	4	3
CO2	4	3	4	3	4	3	4	3	3	3	4
CO3	3	4	3	3	4	4	3	3	4	4	3
CO4	4	3	4	3	3	4	3	4	4	3	4
CO5	3	4	3	4	4	3	3	4	3	3	4
Total	**17**	**17**	**17**	**17**	**19**	**17**	**17**	**17**	**18**	**17**	**18**
Average	**3.4**	**3.4**	**3.4**	**3.4**	**3.8**	**3.4**	**3.4**	**3.4**	**3.6**	**3.4**	**3.6**

3 – Strong, 2- Medium, 1- Low

2nd YEAR: FOURTH SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE41	**EC-Functional Foods & Nutraceuticals**	Elective	**4**	**1**	1	0	4	6	25	75	100

Learning Objectives	
LO 1	To gain knowledge about functional foods and Nutraceuticals
LO 2	To have thorough understanding about the health effects
LO 3	To be familiar with applications in industry.
LO 4	Identify other Nutraceuticals and its Benefits.
LO 5	To gain knowledge about how Nutraceuticals in Medical Foods and their Functions

Unit	Content	Hours
1	**Introduction**- Functional foods and nutraceuticals Introduction, definition, importance, Health attributes of functional foods– Introduction, Health living Index provides information on healthy diet.	18
2	Prebiotic and Probiotic immune system, sources of microalgal health supplement, Colonic Functional Foods: Introduction, Metabolism, Probiotics, Symbiotic Health aspects of functional colonic foods Host–microbe interaction treatment of GI tract disorders	18
3	**Phytochemicals** – Introduction, Sources and Functions –Terpenoids, Polyphenolics, Anthocyanins, Isoflavones, Silymarin, Tange Retin, Saponins Other dominant phytochemicals.	18
4	**Other Nutraceuticals** – Source and Functions, Functional foods in the control of aging, mood and performance.	18
5	**Nutraceuticals in medical foods** – Anti-Tumour properties: Nature of tumor growth, mode Of carcinogenesis, Diet and gene interactions, Mechanisms of action, Nutrients & their role of functional foods.	18

CO	Course Outcomes
CO1	Describe about source, chemistry and uses of several natural Nutraceuticals
CO2	Describe occurrence, chemical nature and medicinal benefits of natural Nutraceuticals belong to different phytochemical categories.
CO3	Explain about Different dietary fibers and complex carbohydrate as functional food Ingredients
CO4	Explain the role of free radicals in development of different diseases and aging
CO5	Explain the role of natural and synthetic antioxidants, functional foods

Textbooks:	
1	Functional Foods and Nutraceuticals by Rotimi E. Aluko
2	Functional Foods and Nutraceuticals: Bioactive Components, Formulations and Innovations (2020)
3	Functional Foods and Nutraceuticals: Chemistry, Health Benefits and the Way Forward (2024)
4	Functional Foods: Designer Foods, Pharmafoods, Nutraceuticals (1995) Edited by Israel Goldberg
Reference Books:	
1	Evidence-Based Nutraceuticals and Functional Foods (2025) Edited by Debian Huang and Liangli (Lucy) Yu.
2	Functional Foods and Nutraceuticals: Chemistry, Health Benefits and the Way Forward (2024) Edited by Khalid Bashir, Kulsum Jan, and Farhan Jalees Ahmad (Jamia Hamdard, New Delhi).
3	Handbook of Nutraceuticals and Natural Products: From Concepts to Application (2022) Edited by Sreerag Gopi and Preetha Balakrishnan.
4	Functional Food Ingredients and Nutraceuticals: Processing Technologies, 2nd Edition.Edited by John Shi
Web Resources:	
https://www.routledge.com/Advances-in-Nutraceuticals-and-Functional-Foods-Concepts-and-Applications/Gopi-Balakrishnan/p/book/9781774637524?utm_source=chatgpt.com	
https://www.sciencedirect.com/journal/journal-of-functional-foods/about/editorial-board	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	4	4	3	3	3	3	4	4	3	4	3
CO2	3	3	3	3	3	4	4	3	4	3	4
CO3	4	4	3	4	3	4	3	4	3	4	3
CO4	3	4	3	3	3	4	3	4	4	3	4
CO5	4	3	4	4	3	4	3	4	3	4	3
Total	**18**	**18**	**16**	**17**	**15**	**19**	**17**	**19**	**17**	**18**	**17**
Average	**3.6**	**3.6**	**3.2**	**3.4**	**3**	**3.8**	**3.4**	**3.8**	**3.4**	**3.6**	**3.4**

3 – Strong, 2- Medium, 1- Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24PNDE42	**EC-FOOD SAFETY AND NUTRITION SECURITY**	Elective	4	1	1	0	4	**6**	25	75	100

Learning Objectives	
LO1	To understand the concept of food safety, food safety issues and their regulatory authorities
LO2	Describe the key components of a food safety management system.
LO3	Identify and categorize common food additives, adulterants, and pesticide residues
LO4	Explain the structure and purpose of national and international food safety legislation.
LO5	Understand the interconnectedness of hunger and malnutrition and their impact on individuals and communities.

Unit	**Content**	**Hours**
1	**Introduction to Food Safety** - Definition, Food safety issues in India, food hazards (physical, chemical and biological) natural toxins, Need and importance of food safety in household, Factors affecting food safety in household, Regulatory authorities at local, national and global level for Ensuring food safety in food industries and establishments.	**18**
2	**Food Hygiene and Microbiology** -Inspection of premises, Quality Control and Quality Assurance, Personal Hygiene of Food Handlers, Routes of Contamination, Danger Zone –In food storage, Food Spoilage-Microbes responsible for Food spoilage-Effect on Health, Incubation Period, Symptoms and Treatment .Steps to overcome microbial spoilage.	**18**
3	**Safety Assessment** -Food additives, adulterants, pesticide residues, safety aspects of water and beverages, Good Manufacturing Practices (GMP), Good Agricultural Practices (GAP), Good Hygienic Practices and Good Laboratory Practices, Management and disposal food wastes in food industries and establishments.	**18**
4	**Food Laws and Regulations** -National Food Safety Legislation, International food safety legislation ,Codex Alimentarius, APEDA and ISO 22000 series, Food Safety Act 2006, Food Safety Rules and Regulations 2018, FSSAI, Essential Commodities Act, BIS, AGMARK, HACCP-Principles and Applications.	**18**
5	**Food and Nutrition Security** -Definition, Importance, Hunger and malnutrition. Factors contributing to food insecurity, Food security model, Food availability, Household and individual food security survey, Public Distribution System, Strategies to combat food and nutrition insecurity, Food Security Bill and Act.	**18**

CO	COURSE OUTCOMES
CO1	Identify and explain the major food safety issues prevalent in India.
CO2	Apply the principles of food hygiene to effectively inspect food handling premises.
CO3	Identify and categorize potential hazards arising from food additives, adulterants, and pesticide residues.
CO4	Explain the structure and purpose of national and international food safety legislation.
CO5	Explain the relationship between hunger and malnutrition and their impact on human health and development.

Text books:	
1	Food Safety: The Science of Foodborne Illness by Gary J. O.
2	Essentials of Food Safety and Sanitation" by David McSwane et al.– Includes QA/QC, HACCP, and hygiene standards.
3	Food Adulteration and Laws, Rekha Rani ,Publisher: Centrum Press Focus on detection of food adulteration, consumer protection acts, and food law
4	Food Safety and Standards Act, Rules & Regulations (with FSSAI Guidelines) Publisher: Commercial Law Publishers (India) Pvt. Ltd.
Reference Books:	
1	Food Safety and Standards: Laws, Tools and Management Systems by D. Vijayalakshmi and Mrunal D. Barbhai
2	Food Safety and Quality Control M.K. Tripathi ,Publisher: Pointer Publishers
3	Compendium of Food Safety and Relevant Laws in India by R.G. Gupta
Web Resources	
https://www.haccpalliance.org – Safety standards in food service systems	
https://www.who.int/foodsafety	
https://www.fao.org/fao-who-codexalimentarius	
https://www.iso.org/iso-22000-food-safety-management.html	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	4	3	4	4	3	4	3	4	4	3	4
CO2	3	4	3	3	4	3	4	3	3	4	3
CO3	4	3	3	4	3	4	3	4	4	3	3
CO4	3	4	4	3	3	3	4	3	3	4	4
CO5	4	3	4	3	3	4	3	3	4	4	3
Total	**18**	**17**	**18**	**17**	**16**	**18**	**17**	**17**	**18**	**18**	**17**
Average	**3.6**	**3.4**	**3.6**	**3.4**	**3.2**	**3.6**	**3.4**	**3.4**	**3.6**	**3.6**	**3.4**

3–Strong, 2-Medium,1-Low