DEPARTMENT OF NUTRITION AND DIETETICS

COURSE STRUCTURE & SYLLABI
(For the students admitted from year 2023-2024 onwards)

Programme : M.Sc. Nutrition and Dietetics

Since 1951

JAMAL MOHAMED COLLEGE (AUTONOMOUS)
Accredited with A++ Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0
(Affiliated to Bharathidasan University)
TIRUCHIRAPPALLI – 620 020

M.SC. NUTRITION AND DIETETICS

Sem	Course Code	Course Category	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
						CIA	ESE	
I	23PND1CC1	Core - I	Advanced Food Science	6	5	25	75	100
	23PND1CC2	Core - II	Therapeutic Nutrition - I	6	5	25	75	100
	23PND1CC3	Core - III	Macro Nutrients	6	5	25	75	100
	23PND1CC4P	Core - IV	Food Analysis - Practical	6	4	20	80	100
	23PND1DE1A/B	Discipline Specific Elective - I		6	4	25	75	100
			Total	**30**	**23**			**500**
II	23PND2CC5	Core - V	Nutrition in Life Span	6	5	25	75	100
	23PND2CC6	Core - VI	Micro Nutrients	6	5	25	75	100
	23PND2CC7	Core - VII	Therapeutic Nutrition - II	6	5	25	75	100
	23PND2CC8P	Core - VIII	Therapeutic Nutrition - Practical	6	2	10	40	50
	23PND2CC8I	Core - VIII	Internship	4(weeks)	2	10	40	50
	23PND2DE2A/B	Discipline Specific Elective - II		6	4	25	75	100
	23PCN2CO	Community Outreach	JAMCROP	-	@	-	-	@
	@Only grades will be given		**Total**	**30**	**23**			**500**
III	23PND3CC9	Core - IX	Nutrition for Sports and Fitness	6	6	25	75	100
	23PND3CC10	Core - X	Food Microbiology and Sanitation	6	6	25	75	100
	23PND3CC11	Core - XI	Research Methodology and Statistics	6	6	25	75	100
	23PND3CC12P	Core - XII	Food Microbiology and Clinical Biochemistry - Practical	6	4	20	80	100
	23PND3DE3A/B	Discipline Specific Elective - III		6	4	25	75	100
	23PND3EC1	Extra Credit Course - I*	Online Course	-	*	-	-	-
			Total	**30**	**26**			**500**
IV	23PND4CC13	Core - XIII	Institutional Food Management	6	6	25	75	100
	23PND4CC14	Core - XIV	Community Nutrition and Public Health	6	5	25	75	100
	23PND4CC15P	Core - XV	Computer Applications - Practical	6	4	20	80	100
	23PND4PW	Project Work	Project Work	12	8	-	200	200
	23PCNOC	Mandatory Online Course**	Online Course	-	1	-	100	100
	23PND4EC2	Extra Credit Course - II*	Online Course	-	*	-	-	-
	23PCN4EC3	Extra Credit Course – III+	Innovation and Intellectual Property Rights	-	+	-	-	-
	*** Programme Specific Online Course for Advanced Learners** **** Any Online Course for Enhancing Additional Skills** **+ Course for Enhancing IPR Skills**		**Total**	**30**	**24**			**600**
					Grand Total	**96**		**2100**

DISCIPLINE SPECIFIC ELECTIVES

Semester	Course Code	Course Title
I	23PND1DE1A	Applied Physiology
	23PND1DE1B	Paediatric and Geriatric Nutrition
II	23PND2DE2A	Clinical Biochemistry
	23PND2DE2B	Nutrition During Emergency
III	23PND3DE3A	Nutraceuticals and Nutrigenomics
	23PND3DE3B	Food Packaging

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PND1CC1	CORE – I	6	5	25	75	100
Course Title	**ADVANCED FOOD SCIENCE**						

SYLLABUS

Unit	Contents	Hours
I	**CEREALANDCEREALPRODUCTS:** **Rice, Wheat, Corn**–Structure, Nutritional composition and functional properties. (swelling capacity, pasting behavior, viscosity, solubility, binding and bulking capacities, waxy and non-waxy characteristics) Rice Processing: Parboiling and hot soaking process. Wheat Milling, Corn Milling –dry milling, wet milling Byproducts-rice bran, wheat bran, maize husk, germ, powder. Processed products- rice flakes, rice puff, and rice starch, corn puffs, maize germ flour, syrup, flakes and pop-corn. Millet processing- Ragi, Jowar, Bajra, sorghum. Breakfast cereals-Ready-to-cooked cereals, *ready-to-eat cereals*. **Extrusion technology**-concepts and types, extruded products-vermicelli, pasta, macaroni and noodles.	**18**
II	**PULSES AND OILSEEDS:** **Pulses:** Nutritional composition and functional properties. (Foaming and emulsification, water and fat absorption and gelation), Milling of Pulses, Traditional Dry Milling Method. Modern CFTRI Method of Milling. **Oil Seeds:** Nutritional composition and functional properties, (Whipping capacity and viscosity, emulsification and water and oil holding capacities). Processing of Oil seeds- Blended oil, Cold press technology. By-products-oilcake. Processed products-*margarine, shortening, lard*	**18**
III	**VEGETABLES,FRUITS AND SUGAR:** **Vegetables & Fruits:** Nutritional composition and functional properties (enzymatic browning, flavor binding properties, pH). Processing methods: Dehydrated products-Juice powders by foam- mat drier. Preserved products-Jam, Jellies, juices, *ketch-up and sauces*. **Sugar:** Functional Role of Sugars in Crystallization of sugar, factors affectingcrystallization,Maillardreaction,Stagesofsugarcookery,Caramelisationofsugars,Dextrinizationofsugars,Interferingagentsandcrystalformation,Fudge,Fondant, Caramel and brittles, Sugar Substitutes.	18
IV	**Milk and milk products and Meat:** Definition of Milk, Types of Milk, Physico-chemical properties of milk, functional properties (emulsification, foaming and film formation) processing of Milk, Concept of Filtration, Clarification, Homogenization, Pasteurization, Introduction to various Milk Products: Non fermented products Whey protein, Evaporated Milk, Dry Milk, Ultra High temperature processed milk, flavored milk, ice cream, condensed milk, milk powder, Fermented product-Butter, ghee, cheese, paneer, curd, yoghurt, shrikh and ,Kefir. **Meat:** Nutritional composition, functional properties. (water and fat absorption, emulsification and stabilization of emulsion, gelation, texturizability) Processed meat products- cured meat, sausages, additives, luncheon meat, burgers, Drying of meat. **Poultry:** Nutritional compositions, functional properties. Steps involved in Slaughtering, Poultry products. **Egg:** Structure, Nutritional composition, *Preservation of eggs*. Processed products-egg yolk oil. Egg powder by spray drier. **Fish:** Nutritional compositions, functional properties .Fish processing methods, Processed fish product-fish protein concentrate.	**18**

V	**FOODPACKAGINGANDIPR (Intellectual Property Right)** **Food Packaging**: Definition, functions of packaging materials for different foods, characteristics of packaging material. Modern Packaging Materials and Forms, Biodegradable packaging material, *Edible Packaging*. **Intellectual Property Right (IPR)-**definition, types and the need, Patent, Copyright, Trade Mark, Design and Layout Design–Genetic Resources and Traditional Knowledge – Trade Secret – IPR in India: Genesis and development – IPR in abroad	**18**
VI	**Current Trends (For CIA only)–** Application of 3D printing technology in Food	

……. Self Study

Text Book(s):

1. Norman N. Potter, Joseph H. Hotchkiss, Food Science CBS Publishers & Distributors, NewDelhi,5th edition,1996
2. B.Srilakshmi, Food Science, New Age International Pvt.Ltd., Chennai, 2006.
3. V.A.Vaclavik. and E.W.Christian, Essentials of Food Science, Springer, New Delhi, 2nd edition 2003.
4. R.Roday, Food Science & Nutrition, Oxford UniversityPress1999.
5. B. Sivasankar, Food Processing & Preservation, Prentice hall of India Pvt.Ltd, New Delhi, 2002.

Reference Book(s):

1. Vijaya Khader, Textbook of Food Science and Technology, Indian Council of Agricultural Research, New Delhi, 2001.
2. Potter, N.N, Food Science, AVI Publishing company, INC, Westport,Connecticut,1996.
3. A.Chakraverty. Post-Harvest Technology of Cereals, Pulses and Oilseeds" CBS Publishers & Distributers Pvt Ltd, 2019.
4. TimBlackmore Handbook of Meat Poultry and Sea Food ProcessingPreservation&Packaging Black Prints, New Delhi, 2016.

Web Resource(s):

1. https://libguides.reading.ac.uk/food/websites
2. https://ift.onlinelibrary.wiley.com/journal/17503841
3. https://www.cabi.org/publishing-products/nutrition-and-food-sciences-database/

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Understand the nutrient content and functional properties of Food ingredients	**K2**
CO2	Apply expertise in optimization and utilization of food ingredient systems in processing and packaging techniques to successfully manufacture food products	**K3**
CO3	Explain the different processing techniques for different food ingredient .	**K4**
CO4	Evaluate the functions and types of packaging and packaging materials, labeling	**K5**
CO5	Write the legal and practical steps needed to ensure that intellectual property rights remain valid and enforceable	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	-	-	3	3	3	2	3	2	3	2.2
CO2	3	2	3	3	2	-	3	2	3	2	2.3
CO3	2	3	2	3	3	-	2	-	3	3	2.1
CO4	1	3	2	3	2	3	3	-	2	3	2.2
CO5	-	-	3	3	3	-	-	-	-	2	1.1
Mean Overall Score											1.98
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:
Dr.A.Sangeetha

Semester	Course code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PND1CC2	CORE – II	6	5	25	75	100

Course Title	THERAPEUTIC NUTRITION – I	
Unit	**Content**	**Hours**
I	**Role of Dietitian in patient care:** **Dietician**- Definition, classification of dietician, codeofethics, role and responsibilities. Indian Dietetic Association- Objectives and functions.IDA guidelines for Food service dietitians and Clinical dietitians and Registered Dietitian. **Therapeutic care process**: Care process- Patient-Centered care and Health care team, Phases of the care process. Nutrition education and Diet counseling – phases, Ethical principles of counseling. **Nutrition Screening and Assessment** – Anthropometric measurements, Biochemical tests, clinical observations and Nutrition physical assessment tools, dietary assessment, nutrition intervention: *food plan and management*, Evaluation: Quality patient care.	**18**
II	**Therapeutic Nutrition and Febrile conditions:** **Therapeutic Diet**-Therapeutic adaptation of normal diet, principles and classification of therapeutic diets, Routine hospital diet. Special diets- keto diets, paleo diet and intermittent fasting diet- definition, types, metabolic effects on health. **Special Feeding Methods**- Enteral feeding and parenteral feeding, Jejunostomy, gastrostomy, **LCHF** (Low Carb High Fat).Pre and post operative diet. **Nutrition care in Febrile condition**-Immunity, Immune response -Types. Fever- Classification and Dietary management -Short term fever-Typhoid and Influenza, Intermittent-Dengue Fever, Malaria, Long term fever – Tuberculosis, *AIDS*.	**18**
III	**Nutritional Management in Pulmonary and Gastro intestinal disorder:** **Pulmonary disorders**: Pathophysiology, Medical nutrition therapy for asthma, Broncho Pulmonary Dysplasia (BPD), Chronic Obstructive Pulmonary disease, *Respiratory Failure*. **Gastro intestinal tract disorders**: Upper gastro intestinal tract disorders– Aetiology, symptoms and dietary management for Esophagitis, gastritis, peptic ulcer, GERD (Gastro Esophageal Reflux Disorder) , diarrhoea, Inflammatory bowel disease ,short bowel syndrome, Irritable bowel disease **Lower gastro intestinal tract disorders**-Aetiology, symptoms and dietary management for Diverticular disease, Irritable bowel syndrome, ulcerative colitis, Constipation, Hemorrhoids and Fissures.	**18**

IV	**Nutritional management in Liver, Gall Bladder Pancreatic disorder:** **Liver disorder:** Pathophysiology, aetiology, symptoms and dietary regimen for Hepatitis, Fatty liver, cirrhosis, hepatic encephalopathy. **Gall bladder disorders**: Aetiology, clinical symptoms and dietary regimen for Cholecystitis, *cholelithiasis* **Pancreatitis**- Aetiology, clinical symptoms and dietary management in Acute and chronic Pancreatitis	**18**
V	**Dietary supplements, Food and Drug Interactions:** Dietary supplements-definition, requirements, types, forms and *supplement pyramid* **Effects on Drug therapy**–drug absorption, medication and Enteral nutrition, interactions**.** Effects of drug on food and nutrition– nutrient metabolism, nutrient absorption, and Nutrient excretion. **Effects of drugs on nutritional status**–oral, taste, smell, gastro–intestinal effects, appetite changes, toxic effect on liver and kidney.	**18**
VI	**Current Trends (For CIA only)–** Role of functional foods and herbal foods in treating diseases and disorders.	

……. Self Study

Text Book(s):

1. Krause's food and Nutrition Care process, L.Kathleen Mahan, Sylvia escort- stump, Janice Raymond, Thirteenth Edition, 2012.
2.MahanL.KandArlinM.T,FoodandtheNutritioncareprocess,W.B.SaunderCompany,London Thirteenth Edition, (2012),
3. JoshiS.A, Nutrition and Dietetics, TataMc. Graw Hill Publication, New Delhi.
Second Edition,(2008)

Reference Book(s):

1. Robinson, Normal and Therapeutic Nutrition, Oxford&LB Publishing, Bombay. Seventeenth Edition, 1990.
2. Mahtab.S, Bamji Prasad RaoNand Vinodini Reddy, Textbook of Human, Nutrition, Oxford and IBH Publishing Co.,Pvt.,Ltd SecondEdition,2003.
3. ShilsM.E, OslonJ.A, ShikeM. &Ross A.C, Modern Nutrition in Health& Disease, Lippincott Williams and Wilkins, Tenth Edition, 2006.Web source: www.idaindia.com

CO Statement	
At the end of the course, students will be able to	**Cognitive Level (K-Level)**
Examine the Nutritional screening techniques and nutritional care process	**K2**
Apply the current concepts of therapeutic diets and critically ill	**K3**
Appraise the dietary principles on various disorders	**K4**
Critique the knowledge of diet counseling skills	**K5**
Intervene the nutritional management for disorders and diseases	**K6**

Relationship Matrix

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO 5	PSO1	PSO2	PSO3	PSO4	PSO 5	
CO1	2	2	3	2	3	2	1	2	2	3	2.2
CO2	3	2	2	2	1	1	2	2	2	3	2.0
CO3	2	3	3	2	1	2	1	3	3	2	2.2
CO4	2	3	2	3	3	2	3	2	2	3	2.5
CO5	3	2	1	2	3	2	2	3	3	2	2.3
Mean Overall Score											2.24
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr.V.Kavitha

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PND1CC3	CORE – III	6	5	25	75	100

Course Title	MACRO NUTRIENTS

SYLLABUS		
Unit	**Contents**	**Hours**
I	**INTRODUCTION TO NUTRIENTS:** Definition, Classification of nutrients**.** Macronutrients-Definition, Classification of Macronutrients: Macronutrients -providers and non providers of energy. **ENERGY** Definition, Energy balance, Energy expenditure, Components of energy expenditure-physical activity, basal metabolism, *Thermic Effect of food (TEF)*, energy expended in physical activity. Adaptive thermo genesis. Methods of estimation of calorific value of food, direct and indirect calorimetry-doubly labelled water. Metabolic states in fed, fasting and starvation condition. Calculation of energy requirements **BMR** Definition, factors affecting basal metabolic rate.	**18**
II	**CARBOHYDRATES:** Classification of dietary carbohydrates and its Occurrence, Digestion, Absorption, Utilization. Physiological and nutritional significance of disaccharides. Fermentation of carbohydrate in the large bowl. Imbalance in carbohydrate intake-High and low carbohydrate diets. Glycaemic response to carbohydrate foods: Glycaemic Index and classification of GI Foods, Glycaemic Load, , Importance and Role of carbohydrate in Human nutrition. **DIETARY FIBRE** Definition, Classification and its Sources. Role of dietary fibre in health and disease (lipid metabolism, colon function, blood glucose level and GI tract functions), *excess consumption of dietary fibre in health*.	**18**
III	**PROTEINS:** Classification and Functions, Sources, Digestion, Absorption, Utilization and storage of proteins. Protein intake and turnover, Imbalance in intake of protein-excess and deficiency. Methods of evaluating protein quality- Biological Value, Protein Efficiency Ratio, Net Protein Utilization, Protein digestibility corrected amino acid score. *Role of protein in human nutrition*. **AMINO ACIDS:** Classification - essential, semi essential, non-essential amino acids -their role in growth and development. Amino acid balance, imbalance and toxicity, Nitrogen balance concept. Therapeutic application of amino acids in human nutrition	**18**
IV	**LIPIDS:** Classification and its occurrence in food, Digestion, absorption of lipids, metabolism and transport of lipids in blood. Types of fatty acids: Saturated Fatty Acids, Unsaturated fatty acids- Mono unsaturated fatty acids, Poly unsaturated fatty acids and Highly unsaturated Fatty Acids, *Essential Fatty Acids –sources* and physiological functions. Role of cholesterol, triglycerides and associated lipoproteins in health risks. Importance of EFA- omega-3, 6, 9 in human health.	**18**

V	**WATER:** Distribution and functions of water, sources of water in human body. Water balance- maintenance and determination. Physiological variations in the intake and output of water. *Edema and dehydration*. **DIETARY MACRONUTRIENT SUPPLEMENTS:** Carbohydrate supplements for weight gain and muscle recovery; Protein supplements –whey protein, Plant based protein. Omega-3 and 6 supplements in cardiac health.	**18**
VI	**Current Trends (For CIA only)** **ROLE OF MACRONUTRIENTS IN VARIOUS PATHOLOGICAL CONDITIONS** : Type 2 Diabetes mellitus, obesity	

……. Self Study

Text Book(s):
1. Denis M.Medeiros and Robert E.C.Wildman, Advanced Human Nutrition, Jones and Bartlett learning, LLC..3rd Edition, 2015. 2.Srilakshmi.B, Nutrition Science, New Age International (Pvt) Ltd, New Delhi, 7th edition, 2021.
Reference Book(s):
1. Krause, M.V and Hunsher, M.A, Food, Nutrition and Diet Therapy, W.B. Saunders company, Philadelphia, London, 11th edition 2004. 2. Jim Mann, and A. Stewart Truswell, Essentials of Human Nutrition, Oxford University press, fourth edition, 2012. 3.JohnJ.B.Anderson,MartinM.Root,SanfordC.Garner,Human Nutrition, Jones and Bartlett learning,LLC,2015 4.Eleanor D. Schlenker, Sara long Roth, Essentials of Nutrition and Diet Therapy, Elsevier Mosby, Missouri, tenth edition,2011.
Web Resource(s):
1.https://www.muscleandstrength.com/experts-guides/carb supplements 2. https://www.researchgate.net/publication/313715199_Whey_protein. 3. https://www.researchgate.net/publication /359534546_An_Overview_of_Plant-Based_Protein_Rich_Products. 4.https://www.deonlinedrogist.nl/meer_info/Bio-Omega-3-6-Eng.pdf 5. Role of macronutrients and suitability of upcoming dietary trends for Asian adults with type 2 diabetes- https://www.journalofdiabetology.org › article › issn=20. 6. Role of Dietary Macronutrients and Fatty Acids in Obesity and Fatty Acids in Obesity and Metabolic Risk in Older Adults- https://madridge.org › ijons-1000102.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Describe the importance of macronutrients in human nutrition	**K2**
CO2	Apply the knowledge on functional use of macronutrients in the therapeutic diets.	**K3**
CO3	Distinguish the various classifications present in macronutrients along with their functions and food sources.	**K4**
CO4	Summarize the effect of excess and deficiency intake of macronutrients in human health	**K5**
CO5	Develop the knowledge in formulation of macronutrient supplementary products for special conditions.	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	1	2	1	1	3	1	2	1	2	1.7
CO2	1	2	2	1	1	1	1	2	1	2	1.4
CO3	1	1	2	2	2	1	1	2	1	2	1.5
CO4	1	1	2	1	1	2	1	1	1	3	1.4
CO5	1	2	2	2	2	2	1	2	1	3	1.8
										Mean Overall Score	1.56
										Correlation	Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: B.Rajalakshmi

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PND1CC4P	CORE – IV	6	4	20	80	100

Course Title	FOOD ANALYSIS - PRACTICAL

SYLLABUS		
Exercise	**Contents**	**Hours**
1	Determination of Moisture content in the food sample	**90**
2	Determination of pH content in the fruit juice	
3	Determination of Total Acidity content in the fruit juice	
4	Estimation of Crude Fibre content in the food sample	
5	Estimation of Total Carbohydrate content present in the food sample	
6	Estimation of Protein content in the food sample by Lowry's method and Kjeldhal method	
	a)Estimation of amino acid present in food sample by Paper Chromatography	
7	Estimation of Fat content in the Food Sample by Soxhlet Apparatus	
	a) Estimation of Acid Number b) Estimation of Iodine Number c) Estimation of Peroxide Value	
8	Ashing of food sample and preparation of Ash Solution for Mineral estimation	
	a) Estimation of calcium b) Estimation of Iron	
9	Estimation of vitamins present in the food sample	
	a) Estimation of Carotene b) Estimation of Ascorbic acid	
10	Qualitative analysis of phyto chemicals	
11	Determination of Rancidity in the stored oil and packed fried foods	
12	Determination of antioxidant activity of the fresh vegetables and fruits	

Text Book(s):

1. 1. S.Ranganna, Hand Book of Analysis and Quality Control for Fruit and Vegetable Products, TataMcGraw-HillPublishingCompanyLimited,New Delhi, 2004.
2. S.Sadasivam,A.Manickam,biochemicalmethods,NewAgeInternationalPublisher,NewDelhi, 2004.

Web Resource(s):

1.https://fssai.gov.in/upload/uploadfiles/files/Manual_Spices_25_05_2016(1).pdfhttps:/https://www.fssai.gov.in/upload/uploadfiles/files/MILK_AND_MILK_PRODUCTS.pdf

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Understand the principles behind in analytical techniques	**K2**
CO2	Apply modern instrumental methods to analyse proximate composition of foods	**K3**
CO3	Analyse the nutrient content of food analysis by standard methods	**K4**
CO4	Evaluate the purposes and methods of food analysis in research, government and food industry	**K5**
CO5	Develop skills required in various industries ,food analytical labs and in the field of food	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	**3**	3	**2**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**2.2**
CO2	**3**	**3**	**2**	**3**	**3**	**3**	**1**	**1**	**-**	**1**	**2.0**
CO3	**2**	**3**	**3**	**3**	**3**	**3**	**1**	**-**	**1**	**-**	**1.9**
CO4	**2**	**2**	**3**	**3**	**2**	**1**	**3**	**-**	**-**	**3**	**1.9**
CO5	**3**	**3**	**2**	**3**	**2**	**1**	**2**	**1**	**-**	**3**	**2.0**
Mean Overall Score											**2.0**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator :Dr.A.Sangeetha

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PND1DE1A	DISCIPLINE SPECIFIC ELECTIVES - I	6	4	25	75	100

Course Title	APPLIED PHYSIOLOGY

SYLLABUS		
Unit	**Contents**	**Hours**
I	**General System** Homeostasis: Role of various system of body in homeostasis, positive and negative mechanisms of homeostasis, internal and external factor influencing homeostasis cell: structure and functions of cell organelles. **Blood and immunity** Blood and Constituents: structure and function-red blood cells (RBC), white blood cells (WBC), platelets, Blood Groups: types of blood, agglutination, factor affecting blood coagulation, coagulation disorders, *anticoagulants*, blood transfusion. Immunity-Definition and types of immunity, development of cellular immunity and humoral immunity.	18
II	**Nerve and Muscle System** Structure and function of neuron, action potential of the nerve, propagation of the nerve impulse, peripheral nerve damage, neuromuscular transmission, excitation-contraction coupling, molecular basis of skeletal muscle contraction, chemical changes during skeletal muscle contraction, characteristics of skeletal muscle contraction. **Gastrointestinal System** Structure and function of digestive system, movements of intestine, physiology of digestion. Characteristic, composition and functions of-Saliva, gastric juice, pancreatic juice and bile, Liver, Pancreas and *gallbladder- anatomy and function*.	18
III	**Cardio-vascular System** Structure and function of Heart, physical characteristics of the circulation-pulmonary circulation, systemic circulation, Properties of cardiac muscle, origin and conduction of cardiac impulse, Cardiac cycle, Cardiac output, heart rate, blood pressure, factors affecting blood pressure, Electrocardiogram, *ECHO*, Angiogram **Respiratory System** Structure and Function of respiratory system, mechanics of breathing, Pulmonary volume and capacities, chemistry of respiration, regulation of respiration, role of respiration in acid-base balance, respiratory acidosis and alkalosis, pulmonary oedema, hypoxia, artificial respiration.	18
IV	**Endocrine system** Organization of the endocrine system, hormone-receptor interactions, anterior pituitary gland and hypothalamus, posterior pituitary gland, thyroid gland, parathyroid, thymus and pineal gland, adrenal cortex, adrenal medulla, endocrine pancreas. **Reproduction system** Structure of male and female reproductive system, functions- spermatogenesis and oogenesis, menstrual cycle and female hormones. Fertilization, physiology of pregnancy,*parturition and lactation*.	18

V	**Renal Physiology and Fluid balance:** Structure and function of kidney, structure of nephrons, types of nephron-superficial nephron and juxta medullary nephron, renal blood flow, *glomerular filtration rate (GFR)*, water and electrolytes balance, measurement of renal blood flow, calculation of glomerular filtration rate, micturition, dialysis techniques-haemodialysis and peritoneal dialysis **Nervous System, Skin and Special Sense:** Structure and functions-nerve cell, spinal cord, brain. Autonomic nervous system- sympathetic and para sympathetic-function. Skin-structure and function. Ear, Eye, Nose and Tongue-structure and functions	**18**
VI	**Current Trends (For CIA only) –** Heart and liver transplantation, stem cell therapy, Calcium and glucose homeostasis.	

……. Self Study

Text Book(s):

1. CC Chatterjee's, Human Physiology, CBS Publication & Distributors Pvt. Ltd, 12th Edition, 2018.
2. Guyton and Hall, Textbook of Medical Physiology, RELX India Pvt. Ltd and is Published by the arrangement with Elsevier Inc, 3rd South Asia Edition, 2021.
3. Ross and Wilson, Anatomy and Physiology in Health and Illness, Elsevier Ltd, 13th Edition, 2018.

Reference Book(s):

1. K. Sembulingam, and Prema sembulingam, Essentials of Medical Physiology, Jay Pee Brothers Medical Publishes (p) Limited New Delhi, Second Edition, 2010.
2. Kim E. Barrett, Susan M. Barman, Scott Boitano and Heddwen L. Brooks, Ganong's Review of Medical Physiology, McGraw Hill Education India Private Limited, 25th Edition, 2016.
3. S.M. Subramanian and Mathavan Kutty, Text Book of Physiology, Chand and Company New Delhi, 2001.

Web Resource(s):

1. https://download.e-bookshelf.de/download/0000/5992/24/L-G-0000599224-0002363654.pdf
2. https://books.google.co.in/books?id=fPbsDwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Explain the anatomy and physiology of various levels of organization basic homeostasis mechanisms	**K2**
CO2	Interpret the normal functions and structure of various organs of the human body	**K3**
CO3	Correlate the physiological characteristics of the organs of the human body	**K4**
CO4	Evaluate the knowledge related to physiological basis to analysis clinical situations and therapeutic applications	**K5**
CO5	Formulate the relative contribution of each organ system towards maintenances of health	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	**2**	**3**	**2**	**1**	**1**	**2**	**3**	**1**	**1**	**2**	**1.8**
CO2	**3**	**2**	**1**	**3**	**1**	**2**	**2**	**1**	**2**	**1**	**1.8**
CO3	**2**	**3**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**1**	**1.7**
CO4	**3**	**3**	**2**	**1**	**1**	**2**	**2**	**1**	**1**	**1**	**1.7**
CO5	**2**	**3**	**2**	**1**	**1**	**1**	**2**	**1**	**1**	**2**	**1.6**
Mean Overall Score											**1.72**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: S.Sheerin

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PND1DE1B	DISCIPLINE SPECIFIC ELECTIVES -I	6	4	25	75	100

Course Title	PAEDIATRIC AND GERIATRIC NUTRITION

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Specific Aspects of Childhood Nutrition** Child growth-review**,** Nutritional assessment- anthropometry, bio chemical, clinical evaluation and diet history and dietary intake assessment, use of technical measurements and use of laboratory measurements in nutritional assessment, nutritional needs- nutrition intake values: concept and applications, *energy requirement of infants*, physiological activity, health and nutrition, early nutrition and long-term health, gastrointestinal development, nutrient digestion and absorption	18
II	**Nutrition of Health Infants, Children and Adolescents** Effect of nutrition in pregnancy and lactation, Lactose intolerance and alternative dietary approach, Breast Feeding-Concept of Human Milk, positive effect on the infant and mother, potential untoward effect of breastfeeding, steps involved in successful breastfeeding, breastfeeding of preterm infants, nutritional support for cleft palette infant, formula feeding, growth of the breastfeed infant. Feeding the children, adolescent nutrition, nutrition in school, preschool, and *child care*.	18
III	**Nutrition Challenges in Special Conditions and Diseases** Primary and Secondary Malnutrition, Micronutrient Deficiencies in Children, Enteral Nutritional Support. Parenteral Nutritional Support, Management of Child and Adolescent Obesity, Reducing the Burden of Acute and Prolonged Childhood Diarrhoea, Mal absorptive Disorders and Short Bowel Syndrome, Nutritional Management in Cholestasis Liver Disease, Celiac Disease, Food Intolerance and Allergy, Regurgitation and Gastroesophageal Reflux, Childhood Feeding Problems, Preterm and *Low Birth-Weight Infants*, Nutritional Management of Diabetes in Childhood, Inborn Errors of Metabolism, Nutrition in Cystic Fibrosis, Nutritional Management in Children with chronic Kidney Disease, Nutrition rehabilitation in eating disorders.	18

IV	**Diet and Energy Needs of Elderly** Introduction, Nutritional / Energy requirements of elderly, Need for dietary alteration, Causes and Prevention of Taste Loss in Elderly patients, Gender related differences in nutrition, Assessing the nutritional status according to body weight, composition, & other variables, Factors affecting nutrition in the elderly. Diet related degenerative changes: Introduction, Diet-related diseases & health maintenance, *Common problems related to nutrition in elderly*.	**18**
V	**Need for Dietary Alteration and Formulation of Diet for Elderly** Introduction, dietary needs change with aging, nutritional needs of seniors, Food based recommendations for multiple disorders, *dietary guidelines to stay well in older age*, Tips for better elderly nutrition, Nutrition and older adults, Special considerations for older adults, major diseases of the elderly. **Physical Activity** Definition, physical activity for all elderly, myths about activity and aging, importance and needs of physical and mental health benefits, types of exercise in elderly, building a balanced exercise plan, ways to increase physical activity, effect of exercise on elderly with chronic diseases	**18**
VI	**Current Trends (For CIA only)-** 3D anomaly scan-To detect congenital anomalies in the foetus	

……. Self Study

Text Book(s):

1. B.Koletzko, Pediatric Nutrition in Practice, Library of Congress Cataloguing in Publication Data, 2nd Revised Edition, 2015.
2. John E. Morley and David R. Thomas, Geriatric Nutrition, CRC press by taylor and francis group LLC, 2007.
3. Ronald E. Kleinman, and Frank R. Greer, American Academy of Pediatrics, 7th Edition, 2013.

Reference Book(s):

1. Patricia Queen Samour and Kathy King, Pediatric Nutrition, Library of Congress Cataloguing in Publication Data, 4th Edition, 2012.
2. A. Santhosh kumar, Pediatrics, All India Publisher and Distributors, Fifth Edition, 2015

Web Resource(s):

1. http://repository.poltekkes-kaltim.ac.id/1157/1/Pediatric%20Nutrition%20in%20Practice%2C%202nd%20Edition.pdf
2. https://media.oiipdf.com/pdf/01864025-228c-4b99-9bb8-609fecb02642.pdf
3. https://egyanagar.osou.ac.in/download-slm.php?file=GC-01-BLOCK-02.pdf

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Explain the relationship of physiology and nutrition to different stages of infant development.	**K2**
CO2	Identify the nutritional needs for infants and elderly during special condition	**K3**
CO3	Analyse the implications of nutrition in the growth process and in the prevention and treatment of different childhood pathologies.	**K4**
CO4	Evaluate the dietary pattern and social issues related to old age with treatment measures.	**K5**
CO5	Modify the dietary plan for pregnant women, lactating mother and elderly people, based on their nutritional requirements	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**1**	**2**	**1**	**1.8**
CO2	**3**	**1**	**1**	**2**	**1**	**3**	**1**	**2**	**2**	**1**	**1.7**
CO3	**2**	**3**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1.8**
CO4	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**1**	**1.6**
CO5	**2**	**3**	**1**	**1**	**1**	**2**	**2**	**1**	**1**	**2**	**1.6**
Mean Overall Score											**1.7**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: S. Sheerin

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PND2CC5	CORE - V	6	5	25	75	100

Course Title	NUTRITION IN LIFE SPAN

SYLLABUS		
Unit	**Contents**	**Hours**
I	**MEAL PLANNING AND RDA** **Introduction to Human Nutrition** Terms of Human Nutrition, Essential of meal planning- meal pattern, factors to be considered in meal planning Usage of exchange list, physical activity level and *portion control in planning diets*.	18
II	**NUTRITION DURING PREGNANCY AND LACTATION** **Nutrition in Pregnancy** Importance of nutrition in pre gestational and gestational periods. Dietary guidelines and nutritional requirements during pregnancy, nutritional adaptations in pregnancy. Effect of malnutrition on maternal and fetal health, Physiological changes during pregnancy, expansion in blood volume, hormonal profile in pregnancy, Nutritional assessment and guidance in prenatal care, complication and management of pregnancy. **Nutrition in Lactation** Growth and development of mammary gland, physiology of lactation-synthesis of milk Components, role of hormones, Nutrient requirement and dietary modification during lactation. Breastfeeding- Types, *Advantages of breastfeeding to the infant*, effect of breast feeding on Maternal health	18
III	**NUTRITION DURING INFANCY** **Nutrition in Infancy** Growth and development, factors influencing growth. Uses of growth chart to monitor growth and development. Physiological changes, Determinants of birth weight and consequences of low birth weight, Assessment and management of moderate and severe malnutrition among children. Dietary Reference Intakes, patterns of intake, nutritional issues during infancy. Nutritional requirements and *Dietary guidelines for infant feeding*. Weaning Foods -Weaning foods and homemade baby foods. Supplementary foods and low cost supplementary foods. Feeding problems encountered for normal and premature infants. Current feeding practices and nutritional concerns	18
IV	**NUTRITION FOR PRESCHOOL CHILDREN, SCHOOL CHILDREN AND ADOLESCENCE** **Nutrition for Preschool Children** Growth and development, Dietary guidelines and Nutritional requirements, Physiological changes, Dietary Reference Intakes, patterns of intake, nutritional issues of Preschool children, Food habits and meal pattern. Malnutrition –under nutrition and over nutrition. Micro nutrient malnutrition among preschool children. **Nutrition for School Children** Growth and development, Dietary guidelines and Nutritional requirements, Physiological changes, Dietary Reference Intakes, patterns of intake, nutritional issues of School going children. Factors influencing nutritional status, packed lunch, *establishing healthy eating habits*. **Nutrition for Adolescents:** Growth and development during adolescence. Dietary guidelines and Nutritional Requirements, Physiological changes, Dietary Reference Intakes, patterns of intake, nutritional issues of adolescents. Nutrient demand during adolescent – Adolescent pregnancy, exercise and sports.	18

V	**NUTRITION DURING ADULTHOOD AND OLD AGE** **Nutrition in Adulthood** Reference man and woman, Dietary guidelines and Nutritional requirements, Physiological changes, Dietary Reference Intakes, patterns of intake, nutritional issues of adults based on occupation – sedentary, moderate and heavy. Women health-Menopausal, pre-menopausal and postmenopausal women. **Nutrition in Old Age** The ageing process- physiological, socio-psychological. Aspects of ageing. Nutritional problems of elderly. *Dietary guidelines* and Nutritional requirements of elderly. Nutritional consideration in some common diseases such as obesity, diabetes, cardiovascular and cancer,	**18**
VI	**Current Trends (For CIA only)** Breastfeeding-Types Difference between breast feeding and bottle feeding, factors to be considered in bottle feeding. Different types of milk formulae. Breastfeeding support and counselling ,Feeding problems of the mother and the infant – sore nipples, inverted nipples, engorged breast, poor latching , different feeding position and reflux	

……. Self Study

Text Book(s):

1. B.Srilakshmi, Dietetics, Sixth edition, New Age International Pvt Ltd (2010).
2. S.Ghosh, The Feeding and Care of Infants and Young Children, VHAI, Sixth edition, New Delhi (1992).
3. M.Swaminathan, Essentials of Food and Nutrition, Vol I, Ganesh & Co. Madras (1985).
4. M.Swaminathan, Essentials of Food and Nutrition, Vol II, Ganesh & Co. Madras (1985).
5. C.Gopalan, Recent Trends in Nutrition, Oxford University Press (1993).
6. H.P.S.Sachdeva, P. Chaudhary, Nutrition in Children. Developing Country Concerns Department of Pediatrics, Maulana Azad Medical College, New Delhi (1994).
7. Vinodhini Reddy, Prahlad Roa, Govmth Sastry and Kashinath, Nutrition Trends in India, NIN, Hyderabad, 1993.

Reference Book(s):

Reference Book(s):
1. WHO, A Growth Chart for International Use in Maternal and Child Health, Geneva (1978).
2. C. Gopalan, Indian Council of Medical Research Recommended Dietary Intakes for Indians (1989)
3.Ellie Whitney Sharon and Rady Rolfes, Understanding Nutrition Fourteenth Edition
4. Ellie Whitney Sharon , Kathyrn Pinna and Rady Rolfes, Understanding Normal and clinical Nutrition.

Web Resource(s):

https://www.sssihl.edu.in/wp-content/uploads/2019/09/SSSIHL-SyllabusMSc_Food_Nutritional_Sciences-2018-19.pdf
https://nutrition.rutgers.edu/undergraduate/courses/F21_345.pdf
https://umanitoba.ca/faculties/afs/dept/fhns/media/pdf/HNSC_2130.pdf

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Differentiate various terms of Human Nutrition, distinguish between various life stages and their nutritional needs	**K2**
CO2	Apply and Practice various ready reckoner such as Dietary reference intakes, exchange Lists , Influencing Factors, Dietary guidelines and Nutritional requirements	**K3**
CO3	Analyze Physiological changes nutritional issues of all the stages of life	**K4**
CO4	Assess growth, development and processes of stages of life	**K5**
CO5	Develop and validate on planning of diet and portion controlling	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	**3**	3	**2**	**3**	**2**	**3**	**1**	**2**	**1**	**3**	**2.3**
CO2	**2**	**3**	**-**	**-**	**3**	**3**	**2**	**1**	**1**	**3**	**1.8**
CO3	**2**	**2**	**-**	**-**	**2**	**3**	**3**	**2**	**1**	**3**	**1.8**
CO4	**3**	**3**	**1**	**-**	**1**	**2**	**2**	**2**	**1**	**2**	**1.7**
CO5	**3**	**3**	**1**	**-**	**1**	**3**	**2**	**2**	**1**	**3**	**1.9**
Mean Overall Score											**1.9**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: N.Asiffa Jabeen

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PND2CC6	CORE - VI	6	5	25	75	100

Course Title	MICRO NUTRIENTS

SYLLABUS		
Unit	**Contents**	**Hours**
I	**MACRO MINERALS** Calcium - Calcium in skeleton and other tissues, measurements, bone mass, calcium functions, absorptions and utilization, calcium balance, requirements, source. Hyper calcemia and *hypocalcemia*. Phosphorus – function, distribution in the body, calcium-phosphorus ratio, phosphorus absorption and utilization, deficiency and toxicity. Sodium, Potassium, magnesium – distribution, absorption, utilization, role in human nutrition, deficiency and toxicity.	**18**
II	**MICRO AND TRACE MINERALS** Iron – Functions, sources, recommended intake, absorption, transport and utilization, storage, deficiency and toxicity, role & types in prevention of anemia. Iodine - Functions, *sources*, recommended intake, metabolism, deficiency, toxicity. Fluorine, zinc, copper - Functions, sources, recommended intake, deficiency and toxicity of Selenium, molybdenum, chlorine, chromium, cobalt, boron & manganese.	**18**
III	**FAT SOLUBLE VITAMINS** Vitamins A, D, E and K – Chemistry, physiological action, absorption, transport, utilization and storage, hyper and *hypo vitaminosis*.	**18**
IV	**WATER SOLUBLE VITAMINS** Thiamine, riboflavin, B12, folic acid, pyridoxine, pantothenic acid, niacin, biotin, ascorbic acid – Chemistry, *recommended intake*, physiological action, absorption, transport, utilization and storage, deficiency and toxicity.	**18**
V	**INTERRELATIONSHIP OF SPECIFIC MINERALS AND VITAMINS** Interrelationship between Calcium, Phosphorus, vitamin D and *Parathyroid*.	**18**
VI	**Current Trends (For CIA only)** Vitamin A & Vitamin C interaction. Iron & Calcium interaction.	

***…….* Self Study**

Text Books :

1. Bamji, Textbook of Human Nutrition, 3rd edition, Oxford & IBH Publishing Co Pvt Ltd, New Delhi, (2003).
2. Srilakshmi.B, Nutrition Science, 4th edition, New Age International Pvt Ltd, (2012)

Reference Books :

1. Wildman, Robert E.C., "Handbook of Nutraceuticals and Functional Foods", CRC Press, New York. (2006)
2. Webb G.P, Dietary Supplements and Functional Foods, Blackwell Publishing Ltd, New York. (2006).
3. John Shi, Chi-Tang Ho and Fereidoon Shahidi, "Asian Functional Foods", First Edition, CRC Press, (2005)

Web sources :

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Compare the functions of micro and macro minerals	**K2**
CO2	Justify the role of fat soluble and water soluble vitamins in human health.	**K3**
CO3	Identify the micronutrients deficiency symptoms and interpret.	**K4**
CO4	Compare the toxicity level of the vitamins and minerals	**K5**
CO5	Focus on the inter relationship of Nutrients.	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	1	2	2	3	1	2.1
CO2	3	1	1	1	2	2	1	1	2	2	1.6
CO3	2	2	2	2	3	1	2	1	1	1	1.7
CO4	1	1	2	3	2	1	1	3	2	2	1.8
CO5	2	2	1	2	2	2	1	2	1	2	1.7
Mean Overall Score											1.78
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: S.Ashma Banu

Semester	Course code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PND2CC7	CORE - VII	6	5	25	75	100
Course Title	THERAPEUTIC NUTRITION - II						

UNIT	CONTENT	HOURS
I	**Nutritional management in Obesity, Underweight and Diabetes mellitus :** **Obesity**: Pathophysiology, Etiology, classification energy balance, dietary modifications and Bariatric surgery – types and dietary modifications of pre and post bariatric surgery. **Underweight** – Pathophysiology, *Etiology* and dietary management. **Diabetes Mellitus**–Pathophysiology, Classification, symptoms, etiology and complications. Treatment - Diet therapy, Drug therapy- Insulin and oral hypoglycemic agents. Nutritional management, Dietary considerations, food exchange list Glycemic index and glycemic load of food. **Gestational diabetes** – causes, complications and dietary management. Therapeutic life style changes in Diabetes Mellitus	**18**
II	**Nutritional management in Cardiovascular Diseases:** **Coronary Heart Disease** – Pathophysiology Atherosclerosis, Ischemic Heart Disease, Stroke - etiology and dietary modification,Cardiac diet – *Mediterranean diet.* **Hypertension** – Pathophysiology, types, symptoms, Nutritional management, dietary modification and DASH Diet. Hyperlipidemia - Pathophysiology, types, symptoms and dietary modification. **Cardiovascular disease**– (i) Acute–Pathophysiology, clinical symptoms, and nutritional management (ii) Chronic: congestive heart failure–aetiology, clinical symptoms, Nutritional management, Prudent diet.	**18**
III	**Nutritional management in Renal Diseases :** **Renal diseases** – Glomerulonephritis- types, Nephrotic syndrome - aetiology, clinical symptoms, nutritional management and Renal diet. **Renal Calculus** –types, *etiology*, clinical symptoms, diagnosis, Nutritional Management. Urinary tract infection – etiology and treatment. **Renal failure** – Acute and Chronic renal failure – aetiology, clinical symptoms, Nutritional Therapy. Dialysis – types, Diet during post kidney transplantation.	**18**
IV	**Nutritional support in Disability Diseases and developmental disorder :** **Nutritional care in metabolic disorders** – Gout, Phenylketonuria and *Lactose intolerance*. **Nutritional care in musculo-skeletal disease** – Muscular dystrophy, osteoarthritis and rheumatoid arthritis. **Developmental Disorder** – Attention deficit hyperactivity disorders, Autism, cerebral palsy- etiology and dietary needs.	**18**
V	**Nutritional management in cancer and Neurological disorder:** **Cancer:** Pathophysiology, types, aetiology, symptoms risk factors. Role of functional foods in treating cancer, Dietary Management. **Nutritional effects of cancer therapy** – problems related to surgery, chemotherapy, radiation therapy, *nutritional requirements*. **Neurological disorder** – Pathophysiology and nutrition management in Alzheimer's disease, migraine, multiple sclerosis and Parkinson's disease.	**18**
VI	**Current Trends (For CIA only)** Therapeutic opportunity for food supplement in degenerative disease	

……. Self Study

Text Book(s):

1. Srilakshmi B, Dietetics, New Age International (P) Ltd. Publishers, Chennai, Seventh Edition, 2011.
2. Mahan L.K and Arlin M.T, Food and the Nutrition care process, W.B. Saunder Company, London, Thirteenth Edition, 2012.
3. Joshi S.A, Nutrition and Dietetics, Tata Mc. Graw Hill Publication, New Delhi, Second Edition, 2008.

Reference Book(s):

1. 1 Robinson, Normal and Therapeutic Nutrition, Oxford & LBM Publishing, Bombay, Seventeenth Edition, 1990.
2. Mahtab. S, Bamji Prasad Roa N and Vinodini Reddy, Text book of Human Nutrition, Oxford and IBH Publishing Co., Pvt., Ltd, Second Edition, 2003.
3. Shils M.E, Oslon J.A, Shike M & Ross A.C., Modern Nutrition in Health & Disease, Lippincott Williams and Wilkins, Tenth Edition, (2006),

Course Outcomes		
At the end of the course, students will be able to		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Apply the principle of diet and nutritional management of disease and disorders	**K2**
CO2	Interpret the Pathophysiology of disease condition	**K3**
CO3	Review the Pathophysiology of degenerative diseases	**K4**
CO4	Assess the nutritional care process	**K5**
CO5	Modify the dietary regimen for life style disorders	**K6**

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**2**	**2**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**2**	**2.1**
CO2	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2.2**
CO3	**3**	**2**	**2**	**3**	**2**	**2**	**1**	**3**	**2**	**3**	**2.3**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**2.4**
CO5	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2.4**
Mean Overall Score											**2.28**
Correlation											**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: M.Nelofer

Semester	Course code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PND2CC8P	CORE – VIII	6	2	10	40	50
Course Title	THERAPEUTIC NUTRITION - PRACTICAL						

SYLLABUS		
Exercise	Contents	Hours
1	Routine Hospital Diet – clear fluid, full fluid, soft diet. Special diet- keto diet, paleo diet	90
2	Diet in febrile conditions: Typhoid, Malaria, Dengue, Tuberculosis, Acquired immune deficiency syndrome.	
3	Diet in metabolic conditions: Lactose intolerance	
4	Diet in gastro-intestinal disorders: Ulcer, irritable bowel syndrome.	
5	Diet in Liver diseases: Hepatitis, cirrhosis, Fatty liver	
6	Diet in obesity and underweight	
7	Diet in diabetes mellitus :Insulin dependent, Non –insulin dependent,	
8	Gestational diabetes mellitus.	
9	Diet in renal diseases: Acute renal failure, chronic renal failure, Renal Calculi.	
10	Diet in Heart diseases: Hypertension (sodium restricted diet),	
11	Atherosclerosis (low fat diet).	
12	Diet in cancer- Breast cancer, colon cancer	
13	Submit a case study report for any one disease conditioned patient.	

Reference Book(s):

1. Vimla.V, Advances in diet therapy practical manual, New age international publication, NewDelhi. (2010)

Course Outcomes		
At the end of the course, students will be able to		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Apply the principle of diet and plan therapeutic diets for various diseases and disorders	K2
CO2	Int Interpret the Pathophysiology of disease condition and plan the diet	K3
CO3	Plan diet for degenerative diseases	K4
CO4	As Assess the nutritional care process during disease conditions	K5
CO5	M Modify the dietary regimen for life style disorders	K6

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO 5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2.1**
CO2	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2.2**
CO3	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2.4**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2.3**
CO5	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2.4**
Mean Overall Score											**2.28**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: M.Nelofer

Semester	Course code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PND2CC8I	CORE – VIII	4 (Week)	2	10	40	50
Course Title	Internship						

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PND2DE2A	DISCIPLINE SPECIFIC ELECTIVES - II	6	4	25	75	100

Course Title	CLINICAL BIOCHEMISTRY

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Clinical Biochemistry**-Definition, Scope and importance. Preparation of solutions-Acids and bases, Buffers, Buffer capacity, Buffers of body fluids, Respiratory regulation of pH, Renal regulation of pH, Titratable acid, Cellular buffers, Disturbances in acid-base balance, Anion gap, Metabolic acidosis, Metabolic alkalosis, Respiratory acidosis, Respiratory alkalosis. **Specimen collection and Handling**-Syringe, Arterial puncture, collection and preservation of urine and blood samples. **Immunochemical techniques**-RIA and *ELISA*	**18**
II	**Regulation of Blood Glucose, Insulin and Diabetes Mellitus**: Regulation of blood glucose, Determination of glucose in body fluids, Glucose tolerance test, Causes of abnormal GTT curve glucose tolerance- Impaired fasting glycemia, Gestational diabetes mellitus, Alimentary glycosuria, Renal glycosuria.Factors affecting GTT. Reducing sugars in urine, Glycosuria, *Diabetes mellitus*, Clinical presentation, Diabetic keto acidosis, Hyper osmolar non ketotic coma, Lactic acidosis, Chronic complications, Glycated hemoglobin Inherited disorders of carbohydrates: Galactosaemia, fructosuria, Essential pentosuria.	**18**
III	**Proteins:** **Plasma Proteins:** Serum electrophoretic pattern in normal and abnormal states, Albumin-function and clinical significance, Albumin-Globulin ratio. Hypoproteinemia, hyper gamma globulinemias. Transport proteins. Acute phase proteins-c-reactive protein, Ceruloplasmin, Alpha-1-antitrypsin, Alpha-2-macroglobulin.Wilson's diseases and its clinical features. Negative acute phase proteins, Clotting factors and abnormalities in coagulation. Anticoagulants. Polymorphism. **Inherited disorders of Protein metabolism**-Maple syrup disease, Alkaptonuria, albinism, Tyrosinosis, *Phenylketonuria*, Histidinuria, Homocystinuria, Hartnup syndrome.	**18**

IV	**Lipids:** **Clinical significance in digestion and absorption of lipids-** steaterrhoes, Chyluria, chylothorax. **Brown adipose tissue**-types, role in thermogenesis, characteristics of brown adipose tissue. Mechanism of heat production. Ketosis clinical aspects of bile salts & bile salt in blood cholelithiasis, relation of cholesterol and other lipids as risk factor in coronary heart disease, clinical disorders associated with lipoprotein metabolism-Wolman's disease, Atherosclerosis and *fatty liver*. **Inherited disorders of Lipid metabolism:** Refsum's disease, Zellweger'sdisease and carnitine deficiency.	**18**
V	**Liver and Gastric Function Tests:** Tests for liver function, Serum bilirubin, Classification of jaundice, Bile acids and bile salts, Tests based on the metabolic capacity of the liver, Test based on synthetic function, Serum enzymes as markers of hepatobiliary diseases, Gastric function, Hydrochloric acid secretion, Assessment of free and total acidity, Pancreatic function tests. **Kidney Function Tests:** *Formation of urine*, Functions of the tubules, Renal threshold, Tubular maximum, Abnormal constituents of urine, Proteinuria, Reducing sugars, Clearance tests, Inulin clearance, Creatinine clearance test, Cystatin C, Urea clearance test, Tests 18 for tubular function, Osmolality, Acidification test.	**18**
VI	**Current Trends (For CIA only) –** Concept of Allograft	

……. Self Study

Text Book(s):

1. DM Vasudevan, Sreekumari S & Kannan Vaidyanathan, Textbook of Biochemistry for Medical Students, Jaypee Brothers Medical Publishers(P)Ltd, New Delhi,8th Edition,2013 Authors, Title of the Book, Publication, Edition, Year
2.Dr MN Chatterjea & Rana Shinde, Textbook of Medical Biochemistry, Jaypee Brothers Medical Publishers(P)Ltd, NewDelhi,8th Edition,2013
3. Nanda Maheshwari, Clinical Biochemistry, Jaypee Brothers Medical Publishers(P)Ltd, New Delhi,1 st Edition, 2008
4.Shivananda Nayak B, Manipal Manual of Clinical Biochemistry, Jaypee Brothers Medical Publishers(P)Ltd, New Delhi,3rd Edition, 2008

Reference Book(s):

1. Dr U.Sathyanarayana and Chakrapani, Biochemistry, Reed Elsevier India Private Limited, 4th Edition, 2013.
2. A.C.Deb, Fundamentals of Biochemistry, New Central Book Ageny (P) Ltd, 9th Edition, 2008.
3. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Wolters Kluwer (India) Pvt.Ltd, 7th Edition, 2013.

Web Resource(s):
1. https://libguides.ucc.ie/biochemistry/selectedwebpagesforBiochemistry 2. https://academic.oup.com/clinchem 3.https://www.academia.edu/43534261/Clinical_Biochemistry_AN_ILLUSTRATED_COLOUR_TEXT_FIFTH_EDITION

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Illustrate the basic principles of specimen collection and handling, Immunochemical techniques	**K2**
CO2	Appraise the role of Hormones in blood glucose homeostasis	**K3**
CO3	Discriminate the normal and abnormal Serum electrophoretic pattern in normal and abnormal states	**K4**
CO4	Prioritize the clinical significance of digestion and absorption of Lipids	**K5**
CO5	Invent the normal and abnormal variations of Liver, Gastric and kidney function test	**K6**

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**3**	1	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2.1**
CO2	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**1**	**1**	**2.2**
CO3	**2**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**2**	**2**	**2.1**
CO4	**1**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**2**	**2.1**
CO5	**1**	**2**	**2**	**2**	**3**	**1**	**3**	**2**	**3**	**3**	**2.2**
Mean Overall Score											**2.14**
Correlation											**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: J. PRIYA

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PND2DE2B	DISCIPLINE SPECIFIC ELECTIVES - II	6	4	25	75	100
Course Title	NUTRITION DURING EMERGENCY						

SYLLABUS		
Unit	Contents	Hours
I	**INTRODUCTION TO NUTRITION IN EMERGENCY** - overview & importance of nutrition in emergencies - characteristics of an emergency – *causes of emergency*.	18
II	**VULNERABLE GROUPS IN EMERGENCIES** - Physiological vulnerablility – children, lactating mother, pregnant mother, elderly. Geographical & political vulnerability. *Reasons for vulnerability*.	18
III	**FOOD AND NUTRITION EMERGENCY RESPONSE** Response option aimed at preventing under nutrition - objectives, description and limitations of income and employment, production support, market support, emergency school feeding, infant and *young child feeding support*. Response aimed at treating under nutrition – objectives, description and limitations of therapeutic care, targeted supplementary feeding and treatment of micronutrient deficiency diseases.	18
IV	**NUTRITION INTERVENTIONS PROGRAMS –** introduction of general feeding programme, Selective feeding programme - definition and types (Blanket supplementary feeding & targeted supplementary feeding). *Therapeutic feeding programme*.	18
V	**MONITORING AND EVALUATION OF FOOD AND NUTRITION RESPONSES –** introduction of monitoring – types of monitoring, types of evaluation, *reasons for evaluation*	18
VI	**Current Trends (For CIA only)** NATIONAL NUTRITION MONITORING (NNMB) – remote sensing & GLS application in burns & assessment of nutrition status. First aid – disaster management, high attitude.	

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Text Books :

1. Edelstein S. Nutrition in Public Health. A handbook for developing programmes and services, second edition. 2006.
2. Srilakshmi.B, Nutrition Science, 4th edition, New Age International Pvt Ltd, 2012
3. Klein R.E (Ed), Evaluating the impact of nutrition and health programmes. London and new York, plenum press. 1979.

Reference Books:

1. Rome, Food and Nutrition Hand book draft, world food programme, 1999.
2. Swaminathan.M, Essentials of Food and Nutrition, Vols. II, Ganesh and Co., Madras. 2010
3. Rome and geneva , Guidelines for selective feeding programmes in emergency situations. WFP and UNHCR.1988

Web Source :

1. https://www.studocu.com/row/n/24814508?sid=0167717808

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Identify different types of malnutrition.	**K2**
CO2	Categorize global trends on nutrition in emergencies and the global significance and impact of under nutrition.	**K3**
CO3	Assess the Nutrition interventions programs.	**K4**
CO4	Develop the preventive measures for under nutrition.	**K5**
CO5	Formulate to Monitoring And Evaluation Of Food And Nutrition Responses.	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	1	2	1	1	3	1	2	1	2	1.7
CO2	1	2	2	1	1	1	1	2	1	2	1.4
CO3	1	1	2	2	2	1	1	2	1	2	1.5
CO4	1	1	2	1	1	2	1	1	1	3	1.4
CO5	1	2	2	2	2	2	1	2	1	3	1.8
Mean Overall Score											1.56
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: S. Ashma Banu

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23PND3CC9	CORE - IX	6	6	25	75	100

Course Title	NUTRITION FOR SPORTS AND FITNESS

SYLLABUS

Unit	Contents	Hours
I	**Introduction to Sports nutrition** Meaning and importance of sports nutrition. Different types of sports. Physiological changes during sports and exercise. Benefits of fitness training. Nutritional requirements for Sports and exercise. Nutritional consideration for sports person as compared to normal active person. Energy substrate for activities of different intensity and duration.	18
II	**Role of macronutrients** – Carbohydrate – requirements, Carbohydrate as energy source for sports and exercise. Glycogen re-synthesis and carbohydrate loading. Consumption of carbohydrate – pre exercise, during and after exercise. Factors affecting utilization of carbohydrates during exercise. Protein and amino acid – requirements, importance of protein and amino acids during sports. Factors affecting protein turnover during enduranceexercise, resistance exercise and recovery process. Lipids – requirements, Role of lipids, Fat stores, oxidation of fats, factors affecting fat oxidation (intensity, duration, training status and carbohydrate feeding).Utilization of fats, Factors that influence the fat utilization – total fat intake, high carbohydrate diets, dietary fibre and alcohol.	18
III	**Importance of micronutrients for sports** – Role of vitamins, minerals. Fluids– role of hydration during exercise, requirements. **Snacking** – importance, interval of snacking. **Dietary supplements and ergogenic aids** (Mechanical, nutritional, pharmacological, physiological and psychological) – concept.	18
IV	**Exercise Physiology and Nutrition for Physical activity** – Pulmonary structure and function, cardiovascular regulation and integration, skeletal and neural control, endocrines and exercise. **Physical activity training** – Aerobic and anaerobic training – to enhance cardiovascular endurance, flexibility and body composition, Measurement of Physical Activity Level (PAL), Benefits of fitness training and gadgets for measuring PA – motorized treadmill, functional trainer, fluid rower(upper body), Elliptical bicycle and bicycle Ergometer (lower body), Stretch trainer (whole body), multi gym for different muscle groups.	18
V	**Eating Disorders and Deficiencies -** Sports anaemia, Chronic dieting and eating disorder. Influence factors - Female athlete triad, stress, type of exercise, gender influence, lipid metabolism and weight loss, caffeine and athletic performance. **Exercise, Stress and health Management –** Stress assessment and management techniques – exercise at medium and high altitudes, relaxation techniques, Yoga and meditation for health.	18
VI	**Current Trends (For CIA only) –** Myths and facts about Sports and fitness Nutrition.	

Text Book(s):

1. Paul Insel, R. Elaine Turner and Don Ross, Nutrition, Third Edition, Jones and Bartlett Publishers, 2007.
2. D. Eleanor, Schlenker and Sara Long Roth, Essentials of Nutrition and Diet Therapy, Tenth Edition Library of Congress Cataloging-in- Publication Data, 2011.
3. Smolin and Grosvenor , Nutrition Science and Application, Library of Congress Catalogingin– Publication Data, 2008.
4. Anjana Agarwal and A. Shobha Udipi, Textbook of Human Nutrition, First Edition, Jaypee Brothers Medical Publishers (p) Ltd, 2014.
5. V. Satyanarayana, Sports Nutrition and weight Management, 2019

Reference Book(s):

1. Don MacLaren., Advances in Sport and Exercise Science : Nutrition and Sport , Ch Published by Churchhill Livingstone, Elsevier 2007.
2. Judy A Driskell , Ira Wolinsky Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition, Edited by, CRC Press, 2000.
3. Brouns Fred and Caustan – Cargill, Essentials of Sports Nutrition – 2nd edition, John Wiley and Sons,England, 2002.
4. Burke Louse and Deakin Vicky,Clinical Sports Nutrition, McGraw – Hill Pvt. Ltd. Australia, 2006.

Web Resource(s):

https://en.wikipedia.org/wiki/Sports_nutrition
https://www.healthline.com/health/fitness-exercise-eating-healthy#workoutsnacks
https://www.verywellfit.com/fitness-sports-nutrition-4157142
Nutrition_&_Hyd_Guidelines_for_Athletes_Final_report.pdf

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Determine the nutrition required for sports in order to enhance performance	K3
CO2	Integrating the specific activity of macronutrients in Sports nutrition	K3
CO3	Demonstrate the role of Lipid and its utilization during sports activities	K2
CO4	Appraise the various functions of micronutrients, water balance and Dietary supplements	K5
CO5	Construct the eating disorders and deficiencies in Sports individuals	K6

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	1	1	3	1	1	1	2	1	1	1.4
CO2	3	1	2	1	2	1	2	1	2	3	1.8
CO3	2	2	2	3	1	1	1	2	1	1	1.6
CO4	1	2	2	2	2	2	2	1	2	2	1.8
CO5	2	2	1	1	1	2	2	2	3	1	1.7
Mean Overall Score											1.66
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: M.Padmapriya

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23PND3CC10	CORE - X	6	6	25	75	100
Course Title	**FOOD MICROBIOLOGY AND SANITATION**						

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Importance of Microorganisms in Food Microbiology:** General characteristics of Bacteria, Fungi, Yeast, Molds and Viruses. Role of microbes in food microbiology, Growth and multiplication of microorganisms, Growth curve and biomass, Factors affecting growth of microorganisms – Intrinsic and Extrinsic factors.	18
II	**Foods and Enzymes Produced by Microorganisms:** Principles of Culture Maintenance - Bacteria, Fungi, Yeast And Molds. Food Fermentation – Bread , Indian Fermented Foods (Dosa, Appam, Adai, Urad Dal Batter, Rice Fritters Batter), Malt, Wine, Beer And Dairy Products. Probiotics And Its Products (Yoghurt, Sauerkraut) Amino Acids And Enzymes Production.	18
III	**STERLIZATION & SANITATION :** Definition – Food Sanitation & Safety. Personal Hygiene and facilities. Hygiene, design of facilities and equipments. Changing pattern of microbial hazards. Sanitary aspects of waste disposal and Cleaning Practice.	18
IV	**Contamination and Spoilage of different kinds of Foods:** Contamination- Types, Sources, Prevention. Preservation and Spoilage of Cereals and products , Sugar and sugar products , Vegetables and Fruits Products , Meat and meat products, Fish and Sea foods, Eggs , Milk and milk products and Canned food products.	18
V	**Food Borne diseases and Sanitation:** Food borne diseases – Salmonellosis, Botulism, gastric enteritis, Escherichia coli, Hepatitis A, Shigellosis, Listerissis, Brucellosis, Toxoplasmosis, Viral Gastro Enteritis – causal organism, epidemiology, symptoms and control measures . Food borne poisioning, infections and intoxication, Alfatoxin , Mycotoxins and Neurotoxins. Principles of Food laws and standards, Food sanitation – Bacteriology of water supplies, sewage and waste water treatment and disposal. HACCP (Hazard Analysis and Critical Control Point) Food safety education and consumer education.	18
VI	**CURRENT TRENDS (For CIA Only):** Current laws related to food safety and sanitation. *Bureau of Indian standards* *International standards*	

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Text Book(s):

1. Pelczar and Krieg., Microbiology, Fifth Edition, Tata McGraw Hill Book Co., London. 2006.
2.Adams M.R. and Moss M.O, Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
3. James M. Jay Modern Food Microbiology, Fourth edition, CBS Publishers and Distributors, New Delhi, 2005
4. RC Dubey , DK.Maheshwari " A Textbook of Microbiology" S Chand publishers, 5 th edition ,2023.

Reference book(s):
1.W.C. Frazier, Food Microbiology, Fifth Edition, Tata McGraw Hill Book Company, New Delhi. 2014. 2.Prescott's microbiology , Mc Graw Hill publishers ,11 th edition ,2019 2. Prescott's, Microbiology, 12th Edition, Willey Publications, 2023 3. Ronald M Atlas, Principles of Microbiology, 3 rd Edition, C Brown Publishers, 2019
Web Resourc(s):
1.https://www.frontiersin.org/journals/microbiology/sections/food-microbiology 2. https://microbiologysociety.org/publication/past-issues/food-microbiology.html 3.https://vikaspedia.in/health/nutrition/food-borne-diseases-or-food-poisoning

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Interpreting the characteristics and growth of microorganisms	K2
CO2	Organise the techniques of food fermentation and its products	K3
CO3	Categorize the principles of food preservation	K4
CO4	Perceive the food borne diseases and toxins	K5
CO5	Adapt the sanitation methods and standards	K6

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**3**	**2**	**2**	**1**	**2**	**3**	**2**	**1**	**3**	**1**	**2.0**
CO2	**2**	**1**	**1**	**2**	**2**	**3**	**1**	**1**	**3**	**2**	**1.8**
CO3	**1**	**1**	**1**	**2**	**1**	**3**	**2**	**1**	**2**	**3**	**1.7**
CO4	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**2**	**1**	**3**	**1.5**
CO5	**2**	**1**	**1**	**2**	**3**	**3**	**3**	**2**	**2**	**1**	**2.0**
Mean Overall Score											**1.8**
Correlation											**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr.M.Ghouse Basha
S.Ashma Banu

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23PND3CC11	Core - XI	6	6	25	75	100
Course Title	**Research Methodology and Statistics**						

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Introduction to research and research design** Research - Meaning, objectives and characteristics of research and types of Research and their application in the field of Nutrition and Dietetics, Research Design – Definition, Steps in Research Design, Qualities of Good Research and problems encountered by a researcher. Ethics of doing Research Sampling methods– Introduction, Probability sampling -Random sampling methods, stratified, systematic, cluster sampling, Non-Probability sampling - Judgement, Convenience, Quota sampling and their application in the field of epidemiological studies. Sampling and non-sampling errors.	**18**
II	**Methods of data collection** Source of data– Definition, methods- primary and secondary data. Tools of data Collections- Primary data – Questionnaire-, preparation of schedules, Interview method. Secondary data - Sources, precautions while using secondary data. Pre-testing and Pilot Study. Editing and Coding of data. Classification of data- qualitative, quantitative- frequency distribution, discrete and continuous distribution, Tabulation of data- parts of a table, preparation of blank tables, Consolidating data and forming tables	**18**
III	**Representation of Data and Report writing** Diagrammatic and graphical representation- One dimensional diagrams, two dimensional diagrams-pictogram and cartography. Graphical, frequency graphs- Line, polygon, curve Histogram cumulative frequency graphs–Ogive Components or layout of a thesis scientific writing by using Drawing graphs and diagrams appropriately. Report writing- layout of research paper, significance of report writing, *Steps in report Writing*, types of research report, oral presentation, method of report writing, precautions and essentials of writing a good research report, footnotes and bibliographical citations, Plagiarism and Self-Plagiarism, Method of writing a Research proposal, Journals for Nutrition and Dietetics, Impact factor of Journals, Ethical issues related to publishing	**18**
IV	**Statistical Methods and Tools** Descriptive measures: Measures of central Tendency – Mean, Median, Mode and their applications. Measures of dispersion- Mean deviation, standard deviation, quartile deviation, co-efficient of variation, percentiles and percentile ranks. Correlation- Definition, co- efficient and its interpretation, Rank correlation, Regression equations and predictions. Association of attributes, contingency table working out numerical sums and interpretations, Rank Difference Method, Concept of Variance, Regression and Multiple Regression equations (concept and applications only) Biostatistics –Introduction, Inductive statistics, Inferential statistics, Classification of Biostatistic, RSM software, evidence based	**18**

V	**Probability and Test of significance** Probability - Rules of probability and its applications Normal, binomial, their properties, importance of these distributions in research studies Tests of significance- Large and small sample tests, "t" and "f" test and chi-square test and its applications ANOVA technique – ANOVA table, types- one way and two way ANOVA and its application in research, SPSS – Application of SPSS package for statistical analysis	**18**
VI	**Current Trends (For CIA only) –** Search engine for academic Research - Google Scholar, Medline plus, Pubmed, Zotero/ Mendeley Application of Geo spatial statistics in food and agriculture data Government and NGO schemes for Nutritional Research	

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Text Book(s):

1. C. R. Kothari, Gaurav Garg, Research Methodology. 5th Edition, New Age Publications, 2023.
2. S. P. Gupta, Statistical Methods, Sulthan Chand & Sons Publishers 2017
3. R.S.N.Pillai and V. Bagavathi, Statistics, Chand and Company Limited. 2001.
4. Khan and Khanum, Fundamentals of Biostatistics, Ukaaz publications, Hyderabad, 2019

Reference Book(s):

1. R. Barker Bausell, Yi-Fang Li, Power Analysis for Experimental Research- A Practical Guide for the Biological, Medical and social Sciences by Cambridge University Press. 2002
2. Robert O, Design of Experience: Statistical Principles of Research Design and Analysis, . Kuehl Brooks/cole . 2007
3. ROIG (M). Avoiding plagiarism, self-plagiarism and other questionable writing practices: A guide to ethical writing, 2006

Web Resource(s):

1. https://study.sagepub.com/swain/student-resources/chapter-3/weblinks
2. https://scholar.google.com/
3. https://academic.microsoft.com/
4. https://www.base-search.net/
5. https://core.ac.uk/
6. https://www.refseek.com/

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Interpret the types of research and various tools of data collection	**K2**
CO2	Execute the report writing methods based on available data	**K3**
CO3	Analyse the Statistical tool for compute the Research data and interpretation	**K4**
CO4	Prioritise the role of biostatistics in research findings	**K5**
CO5	Formulate the importance of data and report writing for a research finding	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	1	2	3	1	1	2	3	3	2	1	1.9
CO2	1	2	3	2	2	1	2	2	2	1	1.8
CO3	1	2	3	2	3	1	1	2	3	1	1.9
CO4	2	1	1	2	2	1	1	2	3	2	1.7
CO5	1	2	3	1	1	2	3	3	2	1	1.9
Mean Overall Score											1.8
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator : Dr. A. Sangeetha

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23PND3CC12P	CORE - XII	6	4	20	80	100
Course Title	**Food Microbiology and Clinical Biochemistry - Practical**						

Exercise	Content for practical	Hours
I	**Food Microbiology** 1. Isolation of microbes (Bacteria and fungi) by serial dilution technique . 2. Media preparation - Broth, Solid and Semi solid medium. 3. Pure Culture Technique -Pour, Spread and Streak Plate methods 4. Isolation and identification of molds from spoiled food materials 5. Staining Technique - Gram staining and Lacto phenol cotton blue reagent staining. 6. Hanging drop technique. 7. Microbial count by Colony Counter 8. Qualitative analysis of milk by methylene blue reduction test	**45**
II	**Clinical Biochemistry** 1. Estimation of Urine Glucose (Benedict's Method) 2. Estimation of Urine Urea (DAM Method) 3. Estimation of creatinine in urine. 4. Estimation of phosphorus in urine. 5. Estimation of Blood Urea (DAM Method) 6. Estimation of serum cholesterol (Zak's Method) 7. Estimation of uric acid by Caraway method. 8. Estimation of serum SGPT, SGOT and Alkaline Phosphatase	**45**

Practical Manual

1. RC Dubey , DK.Maheshwari " Practical Manual of Microbiology " S chand publishers, 5 th Edition ,2023.
2. Ritu Mahajan, Practical Biochemistry (Laboratory manual) for pharmacy students, , Vayu education of India, New Delhi, First Edition,2009.
3. K.K.Pillai & J.S.Qadry, Biochemistry & Clinical pathology (Theory & Practical), CBS Publishers& Distributors, New Delhi, First edition(Reprint), 2008 .
4. Varley's Practical Biochemistry, Alan H Gowenlock, CBS Publishers & Distributors, New Delhi, 6th Edition, 2008.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Experiment with pure culture methods and staining techniques in food products	**K3**
CO2	Appraise the bacterial count in various food products.	**K5**
CO3	Acquire skills to analyze various clinical samples	**K4**
CO4	Determine the clinical abnormalities in blood by analysing sugars, Uric acid	**K5**
CO5	Compose the clinical report based on analysis	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**3**	2	**1**	**2**	**1**	**3**	**1**	**2**	**1**	**2**	**1.8**
CO2	**2**	**1**	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**1**	**1.8**
CO3	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**1**	**1**	**2**	**1.7**
CO4	**2**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**2**	**1**	**1.6**
CO5	**1**	**2**	**2**	**3**	**1**	**1**	**2**	**1**	**2**	**1**	**1.6**
Mean Overall Score											**1.7**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr.M.Ghouse Basha
J.Priya
S.Ashma Banu

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23PND3DE3A	DSE - III	6	4	25	75	100
Course Title	**Nutraceuticals and Nutrigenomics**						

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Introduction to Functional Foods and Nutraceuticals** Definition, History, Types of nutraceuticals- designer foods and Pharma foods, Health effects of functional foods, stages involved in development of functional foods. Categorize of Nutraceuticals: Classification – Based on food source, basic chemical nature and mechanism of action - isoprenoid, phenolic substances, fatty acids and structural lipids, Terpenoids-Saponins, tocotrienols and simple Terpenes carbohydrates derivatives, Proteins and peptides, amino acid based derivatives, isoflavones. Conjugated linoleic acid, omega 3, 6, 9 fatty acids, Vitamins , minerals and Microbes	**18**
II	**Probiotics, Prebiotics and synbiotics**: **Probiotics** : Concept, human gastrointestinal and its microbiota, classification of probiotics, role of probiotics in health and diseases. **Prebiotics:** Non-digestible carbohydrates and FOS (Fructo oligosaccharides) Inulin, Dietary fibre , Resistant Starch, Gums, spirulina as bioactive compounds, short chain fatty acids **Synbiotic :** Concept and synbiotics foods with examples.	**18**
III	**Functional role of Nutraceuticals and Phytochemicals** **Polyphenols and Bioactive compounds :** flavonoids, catechins, Isoflavones. Tannins: Phytoesterogens, Phytosterols, Glucosinolates. Pigments- Carotenoids, lycopene , chlorophyll anthocyanin, Curcumin, Organo sulphur compounds. Curcumin, saponins, Reservatrol, kaempferol, quercetin, trignollin, gingerol, capcisin, piperine**,** cinnamaldehyde, eugenol **Role of Herbs in Health and its Efficacy status**: a) Nervous System-Ashwagandha (*Withania somnifera*) b) Heart and Circulatory System- Green tea, Garlic c) Immune System –Neem, Shallot (small onion) d) Digestive System-Ginger , fennel e) Respiratory System-Tulsi (O*cimum sanctum*), Tutuvaḷai (S*olanum trilobatum) Athimathuram (Glycyrrhiza glabra)* f) Musculoskeletal System-Indian gooseberry (*Phyllanthus emblica*) and Indian Aloe Vera Isolation of phytochemicals from plant materials, Extractive methods for maximum recovery and minimal recovery and minimal destruction of active material, stability studies. Recent developments in the isolation, purification and delivery of phytochemicals	**18**
IV	**Nutrigenomics:** Definition, Introduction and Importance, Advantage and disadvantage of nutrigenomics, Effects of antioxidants on gene expression, Methods and applications, **Genetic determination of dietary antioxidant stress:** Free radical Production, antioxidant and oxidative stress. Endogenous antioxidant (GSH, SOD), dietary antioxidant – vitamin C, vitamin E & Carotenoids	**18**
V	**Nutrigenomics and disease Condition:** Modulating the Risk of Cardiovascular disease through Nutrigenomics - Introduction, Nutrigenetics and Lipid Metabolism, Nutrigenetics and Hypertension. Effect of environmental condition and food matrix, Effects of processing conditions and storage, Development of biomarkers to indicate efficacy of functional ingredients, Research frontiers in functional foods, delivery of immunomodulators / vaccines through functional foods. Nutrigenomics concept of personalized medicine. Modulating the Risk of obesity and Diabetes through Nutrigenomics: Introduction, Genetic Determinants of Diabetes, and Potential role of different nutrient.	**18**
VI	**Current Trends (For CIA only) –** ICMR guidelines for probiotics	

Text Book(s):

1. Hari Niwas Mishra, Rajesh Kapur, Navneet Singh Deora, Aastha Deswal, "Functional Foods", New India Publishing Agency, India,2016.
2. Bibek Ray and Arun Bhunia, Fundamental Food Microbiology, CRC Press ,2008.
3. Robert E C Wildman, Handbook of Nutraceuticals and Functional Foods , 2001.
4. Gerald Rimbach, Jürgen Fuchs, "Nutrigenomics", CRC Press, 2005.
5. Lynnette R. Ferguson, "Nutrigenomics and Nutrigenetics in Functional Foods and Personalized Nutrition" CRC Press, 2014.

Reference Book(s):

1. Wildman, Robert. Nutraceuticals and Functional Foods, second edition. Taylor and Francis Group. 2007.
2. Gibson GR & William CM. Functional Foods - Concept to Product. 2000.
3. Goldberg I. Functional Foods: Designer Foods, Pharma Foods. 1994.
4. Brigelius-Flohé, J & Joost HG. Nutritional Genomics: Impact on Health and Disease. Wiley VCH. 2006.
5. Cupp J & Tracy TS. Dietary Supplements: Toxicology and Clinical Pharmacology. Humana Press. 2003.

Web Resource(s):

1. www.ajpcr.com/vol3Issue1/265.pdf
2. www.ncbi.nlm.nih.gov/pubmed/-
3. www.nutrition.org/content/136/6/1636s.long

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Construct the skills to categorize nutraceuticals	K2
CO2	Aware about the functional foods and Nutraceuticals of biotics	K3
CO3	Utilise the knowledge on functional nature of Nutraceuticals	K3&K4
CO4	Execute the concept of Nutrigenomics	K3
CO5	Interpret the risk of Nutrigenomics and disease condition and its preventive measures	K5&K6

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	1	2	1	3	1	2	1	2	1.8
CO2	2	1	3	2	2	2	1	2	2	1	1.8
CO3	1	2	3	1	2	3	1	1	1	2	1.7
CO4	2	2	1	2	1	2	1	2	2	1	1.6
CO5	1	2	2	3	1	1	2	1	2	1	1.6
									Mean Overall Score		1.7
									Correlation		Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator : Dr. V. Kavitha

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
III	23PND2DE3B	DSE – III	6	4	25	75	100
Course Title	**Food Packaging**						

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Introduction to Food Packaging Materials** **Selection of packaging materials and types-** Ceramics (glass, ceramics and earthenware), Paper and paper board, Corrugated fibre board (CFB), Metal containers: Tin Plate and Aluminium, Composite containers, Collapsible tubes, Plastic Films, Laminations, Metalized films, Co extruded films, their mechanical sealing and barrier properties. Testing of packaging material. **Rigid and flexible plastics-** polyamides, polyester, PVC, PVDC, PVA, polycarbonates, olefins, cellophane, inomers, copolymers, phenoxy, acrylic, and polyurethanes.	**18**
II	**Food Packaging** **Packaging Terminology-** Definition. Functions of food packaging, Packaging environment. Characteristics of food stuff that influences packaging selection. **Food Package Development-**Current trends in food packaging in India and abroad. **Properties of packaging materials-** Properties of materials such as tensile strength, bursting strength, tearing resistance, puncture resistance, impact strength, their methods of testing and evaluation.	**18**
III	**Packaging Systems and Methodology** **Types of Packaging-** Vacuum Packaging (VP), controlled atmospheric packaging(CAP), Modified atmospheric packaging (MAP), Aseptic Packaging, Retort processing, and Microwave packaging, Active Packaging, Intelligent packaging, Shrink and stretch packaging. **Packaging equipment and its Application**-Vacuum packaging machine, gas packaging machine, seal and shrink packaging machine, bottling machines, carton making machines. Liquid and powder filling machines – like aseptic system, form and fill (FFS) (volumetric and gravimetric), and multilayer aseptic packaging machines.	**18**
IV	**Packaging of Fresh and Processed Foods** **Food packaging systems and safety-** Packaging of Fruits and vegetables, Fats and Oils, Spices, meat, Poultry and sea foods, Dairy Products, Bakery, beverages,Dehydrated and frozen foods. **Intelligent packaging**: Role of packaging in the supply chain, creating integrated packaging, storage and distribution: alarm systems and time temperature indicators, traceability, radio frequency identification	**18**
V	**Packaging Design and Healthy Solutions** **Food marketing and role of packaging-** Migration in food packaging. FSSAIregulations for packaging and food labelling. **Labelling and patent-** Standards, bar coding, purpose, description types of labels, nutrition labelling, health claims, and mandatory labelling provision. **Recycling packaging materials-** Recyclability of packaging plastics, improvingthe recyclability of plastics packaging, Testing the safety and quality of recycledmaterial, using recycled plastics in packaging, **Modern packaging systems-** Sources of Bio-plastics for food packaging, problems of plastic packaging on human, livestock and environment, range of biopolymers, developing novel biodegradable and edible materials and films.	**18**

VI	**Current Trends (For CIA only)** 1. Technology-Enabled Solutions 2. Sustainability

Text Book(s):
1. Gordon Robertson, Food Packaging and Shelf Life: CRC, Taylor and Francis New York. 2010 2. Food Packaging: The Smarter Way edited by Ashutosh Kumar Shukla, Springer Singapore, 2022 3. Gordon L. Robertson, Food Packaging: Principles and Practice, Third Edition, 2013. 4. Walter Soroka, Fundamentals of Packaging Technology-Fourth Edition.
Reference Book(s):
1. Luciano P, Sara L, 2016, Food Packaging Materials, Springer cham Heidelberg, New York 2. Food Packaging and Preservation, 1st Edition - October 10, 2017 3. Ruben Hernandez, Susan E. M. Selke, John Culter, John D. Culter, Plastics Packaging: Properties, Processing, Applications, and Regulations, 2000.
Web Resource(s):
1. https://www.bizongo.com/blog/food-packaging-trends 2. https://www.sciencedirect.com/journal/food-packaging-and-shelf-life 3. https://www.sciencedirect.com/science/article/abs/pii/B9780128115169000014 4. https://www.annualreviews.org/doi/abs/10.1146/annurev.food.080708.100836

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Adapt the various packaging concepts and its properties	**K6**
CO2	Make use of various available packaging materials and choose them accordingly	**K3**
CO3	Prioritize various packaging systems, equipments and machineries	**K5**
CO4	Distinguish the appropriate packaging systems for different kinds of foods	**K4**
CO5	Infer the role of FSSAI regulations and development of eco friendly packaging options	**K2**

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**2**	**3**	**2**	**1**	**3**	**1**	**2**	**1**	**1**	**2**	**1.8**
CO2	**3**	**2**	**1**	**1**	**2**	**1**	**2**	**2**	**1**	**2**	**1.7**
CO3	**2**	**3**	**3**	**3**	**1**	**3**	**1**	**3**	**1**	**2**	**2.2**
CO4	**3**	**1**	**3**	**-**	**1**	**1**	**1**	**1**	**1**	**-**	**1.2**
CO5	**1**	**1**	**3**	**2**	**3**	**3**	**2**	**-**	**3**	**2**	**2.0**
									Mean Overall Score		**1.78**
									Correlation		**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. A. Ayisha Sukaina

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23PND4CC13	CORE - XIII	6	6	25	75	100

Course Title	Institutional Food Management

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Food service industry** History and development of food service establishments in India. **Classification of catering institutions** - commercial and non-commercial, **Institutional food service**: definition- objectives, types and functions of institutional food service. **Kitchen Layout** – Layout plan for Institutional food service, institutional kitchen, office canteen and Hospital kitchen. Steps involved in developing the kitchen plan. **Entrepreneurial opportunity:** Legal Requirement – Licenses in starting a food business in India. **Employability:** Responsibilities and qualification of Food service dietitian.	**18**
II	**Management, Resources and Menu planning:** **Management** – Definition, Principles and Tools of Management- tangible and intangible tools, Management Approaches -Management by Objectives, Total Quality Management, Strength Weakness Opportunity Threat Analysis **Managing the Resources**-Money, space, time, energy. Equipment- classification of equipment, care and maintenance of equipment. **Menu Planning** - definition, functions and types of menus. **Skill:** Knowledge and skills required for planning menu Designing the menu card - points to be considered while writing menus. Desiging the menu card /menu board for different types of institution food service	**18**
III	**Food Purchase, Production and Service** **Food purchase** – definition, purchasing policy, purchasing function, purchasing procedure, methods of purchasing, forms used in food purchase. **Receiving:** Delivery procedure, goods received book. Storing and issuing – store records -Requisition slip, order form, stock book. **Food production:** standardisation process, portion size, effective use of leftover foods. **Styles of service** -Formal and Informal styles of service. **Food service system** - Conventional systems, Convenience systems, ready prepared food system- Ready to Cook and Ready to Eat, cook chill, Cook freeze and vending systems.	**18**
IV	**Financial management:** **Financial and management accounting** -definition, application of management accounting in catering operation. **Concept and components of cost**- Food cost, Labour cost and Over Head cost. Cost control, pricing of dish- Formal and Informal methods. **Accounting system** – Accounting techniques-single and double entry system, advantages of double entry book keeping system. Types and Book of accounts.	**18**
V	**Fuel, Food waste management and Hygiene, sanitation** **Fuel management**- types of fuel, merits and demerits, fuel saving economy in relation to food service industries. *Food waste management in food service industry-Guidelines by FSSAI* **Hygiene and sanitation** - definition, importance, environmental hygiene and sanitation. Hygiene in food handling, personnel hygiene, *importance of pest and rodent control in food service units * (.....* Self-study portion) **A visit to Institutional Food service:** **Submission of Report: Hostel /Hospital/Industrial canteen.**	**18**

VI	**Current Trends (For CIA only)** Innovation in Food production equipment. Role of NGOs in food waste management. Artificial Intelligence (AI) in food service technology-concept and application.

*……*Self Study**

Text Book(s):
1. Mohini Sethi Institutional Food Management, New Age International (P) Limit Publishers New Delhi, 2011. 2. William Lever Food Service Layout, Design and Theory. Discovery Publishing House PVT. LTD. 4831/24, Prahlad Street, Ansari Road, Darya Ganj, New Delhi – 110002, India, 2011 3. West's and Wood's, Introduction to Food service, Second Edition, Mac Millan Publishing New York ,1998. 4. Dr. Jagmohan Negi Food Presentation Techniques (Garnishing and Decoration). S. Chand & Company PVT. LTD. 7361, Ram Nagar, New Delhi -110055, 2013.
Reference Book(s):
1. Bernard Davis, Andrew Lockwood, Peter Alcott and Loannis Pantelidis . Food and Beverage Management. Roultedge 2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN. 5th Edition , 2012 2.John Cousins, Dennis Lillicrap, Suzanne Weekes. Food and Beverage Service. Book point Ltd, 130 Milton Park, Abingdon, Oxon OX14 4SB. 9th Edition, 2014 3.V. Suganthi ~ C. Premakumari Food Service Management. 7/3L, Second Floor Madley Road, T.Nagar, Chennai - 600 017. 2nd Reprint, 2019 4.Singaravelan. R. Food and Beverage Service. Oxford University Press YMCA Library Building, 1 Jai Singh Road, New Delhi 110001, India. 8th Impression , 2014.
Web Resource(s):
1.taxguru.in › corporate-law › 10-legal-licenses-required-... 2. https://www.marketingtutor.net/swot-analysis-of-the-food-and-beverage-industry/ 3.https://www.fssai.gov.in/cms/food-safety-and-standards-regulations.php 4.medium.com › eatos › ai-the-future-of-food-service-tec... 5.emerj.com › ai-sector-overviews › ai-in-restaurants-foo...

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Outline and classify the various Institutional food service	**K2**
CO2	Develop skills to obtain the various managerial functions, menu planning and designing of menu card in food service units.	**K6**
CO3	Analyse the workforce planning process in food purchase, production and service in food service establishments.	**K4**
CO4	Illustrate the financial concepts involved in food service units.	**K2**
CO5	Adapt the concept of Food waste management, Hygiene and sanitation (Guidelines by FSSAI in food service institutions.	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	1.5	1.5	1.5	2	2	1.5	1.5	1.5	1.5	1.6
CO2	1.5	1.5	2	1	1	1	2	1.5	1.5	2	1.5
CO3	2	1.5	1.5	2	1.5	2	1.5	1.5	2	1.5	1.7
CO4	1.5	1.5	2	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
CO5	2	2	1	2	2	1	1	2	2	1	1.6
Mean Overall Score											1.58
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Revision 15%

Course Coordinator: B.Rajalakshmi

Semester	Course code	Course Category	Hours/Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23PND4CC14	Core - XIV	6	5	25	75	100

Course Title	Community Nutrition and Public Health

SYLLABUS

Unit	Contents	Hours
I	**Public Health Nutrition** Public Health Nutrition – an overview, Definition of Nutrition, Changing concepts in Nutrition, Nutrition and Health in National Development, Nutrition Security, Relation between Health and Nutrition, National Health Care Delivery System, Role of public health nutritionists in the health care delivery system, Sustainable Developmental Goals. **Assessment of Nutritional Status –** Nutritional Assessment – Anthropometry, Clinical Examination, Laboratory and Biochemical Assessment, Dietary Assessment.	**18**
II	**Major Nutritional problems –** Etiology, prevalence, clinical manifestations, preventive and nutritional measures of malnutrition – causative factors - Low birth weight, faulty child feeding practices, dietary inadequacy, frequent infections, large families, illiteracy, taboos and superstitious, Viscious Cycle, Under Nutrition in Children and Adults, Macro and Micro Nutrient Deficiencies – PEM, Anaemia, Fluorosis, *Iodine deficiency* Osteoporosis, Prophylaxis Programme – Vitamin A. **Special Health Problems** – Smoking, alcoholism, Drug addiction, AIDS and AIDS Control Programme	**18**
III	**National, International and Voluntary Organizations to combat Malnutrition** *History of malnutrition in India* National Organizations – ICAR, ICMR, CSWB, SSWB, NNMB, NIN, CFTRI, DFRL, NIPCCID and NFI; International Organizations- WHO, FAO, UNICEF, World Bank, FFHC, WFP; Voluntary Organizations – Global Alliance for Improved Nutrition (GAIN), NGO's - M.S. Swaminathan Research Foundation. Micronutrient Initiatives, CARE, CRS, AFPRO, IDA; Concepts of Community Health; Health care of the community	**18**
IV	**Approaches and strategies for improving nutritional status and health, Nutrition Education and IEC** **Food based Interventions and nutrition gardens –** Food based interventions including fortification and genetic improvement of foods, Supplementary feeding and Nutrition gardens. **Social protection measures**- PDS, TPDS **Nutrition Education** - Definition, importance, Principle in Planning, Program Execution and Evaluation, Mass Media, Types, Preparation of Educational Material-Coverage, Evaluation. **Introduction to IEC -** Aims and Objectives, Importance of IEC.	**18**
V	**Nutritional approach during Epidemiology of Communicable Diseases and Disaster Management :** Epidemiology – Definition, causes, signs and symptoms, treatment and prevention of communicable diseases, respiratory infections, intestinal infections. Other infection – dengue, filariasis. Disaster - Types of disaster – natural and man made – earthquakes, volcanic eruptions, flash floods, major floods, tsunami and drought, fire accidents, bomb blast; Disaster management – mitigation strategies- Role of NGO's and GO's and nutritionists. Prevention, warning systems and relief; Major nutritional and health considerations in disaster Emergency feeding, mass and supplementary feedings, management of feeding operations, water and food safety.	**18**
VI	**Trends in Global Nutrition** – Initiatives to address malnutrition globally and in India. Nutritional surveillance globally and in India.	

…… **Self Study**

Text Book(s):
1. M.S. Bamji, N. PrahladRao, V. Reddy. Textbook of Human Nutrition, Second Edition, Oxford and PBH Publishing Co,Pvt.Ltd, New Delhi, 2004. 2. M. Swaminathan, Essentials of Food and Nutrition. An Advanced Textbook Vol.I, Printing and Publishing Co.Ltd, Bangalore. 2007. 3. B. Srilakshmi, Nutrition Science, Sixth Edition, New Age International (Pvt) Ltd, New Delhi. 2022.
Reference Book(s):
1. A. Park, Textbook of preventive and Social Medicine, Nineteenth Edition, M/S Banarasids, Bharat Publishers, Jabalpur. 2007. 2. D.P Bhatt, Health Education, KhelSahitya Kendra Publishers, New Delhi. 2008 3. M.J. Gibney, B.M Margetts, J.M Kearney, L. Arab, Public Health Nutrition, Blackwell Publishing Co.UK. 2004
Web Resources(s):
www.oxfamindia.org www.fao.org

Course Outcomes		
Upon successful completion of this course, the student will be able to :		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Plan and disseminate the nutrition for National development.	K3
CO2	Assess the nutritional status and health problems in the community.	K5
CO3	Analyze the various nutritional organizations combating malnutrition	K4
CO4	Demonstrate the strategies for improving the nutritional status and dissemination of nutrition education.	K2
CO5	Develop knowledge about epidemiology and apply the principles of supplementary feeding intervention during emergency.	K6

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	2	3	3	3	2	1	2.4
CO2	3	3	2	1	1	2	2	3	2	2	2.1
CO3	3	3	2	2	3	3	3	3	2	2	2.6
CO4	3	2	3	2	2	3	2	2	2	2	2.3
CO5	3	2	2	1	2	2	2	1	1	1	1.7
										Mean Overall Score	2.2
										Correlation	**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. J. Harine Sargunam

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
IV	23PND4CC15P	CORE – XV	6	4	20	80	100
Course Title	**Computer Application- Practical**						

Exercise	Contents
1	**Application of MS Word in Nutrition related content framing** 1.1 Starting, creating, editing, saving, print previewing and printing a document, encryption of document 1.2 Hyperlink setting, Data representation in Tabular form and its types, manipulation of tables, tabulating nutrient content of foods, working with chart.
2	**Application of MS Power point in preparation of various awareness programs** 2.1 Starting, Creating, inserting pictures and slides, transition and effects, hyperlink setting and recording. 2.2 Creating slide show presentation with animations on nutrition related topics and encryption of document
3	**Application of MS Excel in Nutritional calculation and assessment** To analyse Mean, standard deviation and dietary calculation 3.1 Starting Excel, working with spread sheet, tabulating data, Formulation Bar diagram, Pie diagram, Line diagram from the data. 3.2 Applying Excel for nutrient calculations and formatting chart and encryption of document 3.3 Statistical analysis of data – mean and standard deviation.
4	**Statistics and Online publication in Journals** 4.1 Application of SPSS software in nutrition related research- Computation of mean, median, Standard deviation, t-test, f test, ANOVA, Chi square test. 4.2 Writing of a review or a research article 4.3 Framing the content and Submission of the article through online.
5	**Photoshop & Illustrator** Editing of photos for posters and blog writing Creating pamphlets, pictorial posters Creating manuals on nutritional deficiencies for education

Web Resource(s):
1. http://www.bcpls.org/Docs/Computer_Handouts/PowerPoint101.pdf 2. https://corporatefinanceinstitute.com/resources/excel/study/basic-excel-formulas-beginners/ 3. https://business.tutsplus.com/tutorials/how-to-learn-powerpoint--cms 29884#:~:text=Think%20of%20slides%20as%20the,your%20content%20to%20in%20PowerPoint. 4. https://www.instructables.com/How-to-Create-a-PowerPoint-Presentation/

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Compute ideas into posters and develop printed reports with finesse	**K3**
CO2	Create and combine various data into single report.	**K6**
CO3	Categorize the nutritional calculation and assessment	**K4**
CO4	Categorize and publish research articles by understanding SPSS software	**K4**
CO5	Illustrate the enhanced pictures and create engaging content	**K2**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**3**	**2**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2.4**
CO2	**2**	**1**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**2.6**
CO3	**3**	**2**	**2**	**1**	**1**	**3**	**3**	**2**	**2**	**3**	**2.2**
CO4	**3**	**1**	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**2.5**
CO5	**2**	**2**	**3**	**1**	**3**	**2**	**3**	**3**	**3**	**3**	**2.5**
Mean Overall Score											**2.44**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator
Ms. A. Ayisha Sukaina