MARUDHAR KESARI JAIN COLLEGE FOR WOMEN (AUTONOMOUS)

Vaniyambadi – 635 751

PG & Research Department of Foods and Nutrition

for

Undergraduate Programme

Bachelor of Science in Nutrition Food Service Management & Dietetics

From the Academic Year 2024 - 25

Semester - III						
24UFTA31	Tamil -3	4	1	0	0	3
24UFEN31	English-3	4	1	0	0	3
24UNDC31	CC–5 Food Science	3	1	2	0	5
24UNDC32P	CC - 6 Practical III - Food Science	0	0	4	0	2
24UNDA31	EC - 4 AL Metabolism of Nutrients	3	1	0	0	4
24UNDA32P	EC - 5 AL Practical- Metabolism of Nutrients	0	0	2	0	2
24UNDS31	SEC – 4 Basics of Interior Design and Decor	1	0	1	0	2
24UAEC31	AEC – 2 Human Values and Professional Ethics	1	1	0	0	2
					30	**23**

Semester - IV						
24UFTA41	Tamil –4	4	1	0	0	3
24UFEN41	English–4	4	1	0	0	3
24UNDC41	CC-7 Human Nutrition	3	1	2	0	5
24UNDC42P	CC - 8 Practical- Human Nutrition Practical	0	0	4	0	2
24UNDA41	EC - 6 AL Foundation of Baking and Confectionary	3	1	0	0	4
24UNDA42P	EC-7AL(Practical) Foundation of Baking and Confectionary	0	0	2	0	2
24UNDS41	SEC 5 Preschool and Creche Management	1	0	1	0	2
24UAEC41	AEC–3 Environmental studies	1	1	**0**	0	2
					30	**23**

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

Part – 1 & 2	Tamil & English	8	SEC	Skill Elective Course	5
CC	Core Course	15	FC	Foundation Course	1
EC-AL	Elective Course–Applied	7	AEC	Ability Enhancement Course	4
EC	Elective Course–Major	4	SLC	Self-Learning Course	1
PEC					

2nd YEAR:THIRD SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDC31	**FOOD SCIENCE**	**Core**	**3**	**1**	**2**	**0**	**5**	**6**	25	75	100

Learning Objectives	
LO1	To enable students to obtain knowledge of different food groups and their contribution to nutrition.
LO2	Understand the Source and Nutritional Significance of Pulses, fruits and vegetables.
LO3	Understand the Classification and Nutritional Composition of Fleshy Foods, Eggs, and Milk Products.
LO4	Understand the sources of dietary fats and oils and stages of sugar cookery.
LO5	Recognize the uses of beverages**,** spices, condiments, food additives and food adulterants. Daily diets and culinary applications.

Unit	Content	Hours
1	**NUTRIENT CONTENT OF FOODS -** Classification of foods according to nutrient content. Food groups for balanced diets - Food in relation to health. **COOKING METHODS –** Objectives, preliminary preparation and Study of the different cooking methods, merits and demerits, Solar cooking and Microwave cooking. **CEREALS AND MILLETS -**Source of manufacture, structure, composition, processing of rice, wheat and millets (Maize, Jowar, Ragi). Fermented Cereal Products.	18
2	**PULSES**- Classification and Nutritive value. Effect of cooking and factors affecting quality**. VEGETABLES**- Classification, Composition and Nutritive value, Effect of cooking on color, texture, flavor, appearance and nutritive value. Vegetable cookery-Changes during cooking. **FRUITS** –Classification, Nutritive value, Enzymatic Browning**.**	18
3	**FLESH FOODS**- Meats - Classification, Composition and Nutritive value, Changes during cooking and Post mortem changes. Poultry**-Types, Nutritive value, selection, changes during cooking** **EGGS**- Structure, Composition and Nutritive value, Quality Evaluation, Egg white foams - factors affecting foam formation **MILK AND MILK PRODUCTS**- Composition and Nutritive value, types of milk, Coagulation of milk, Milk products – Fermented products and non-fermented products; Milk cookery-Effect of heat and enzymes; Milk processing- Pasteurization and Homogenization.	18
4	**NUTS AND OIL SEEDS**: Types, Nutritive value, Health benefits, Uses & toxins. **FATS AND OILS**: Source**,** Processing and refining of fats-Hydrogenation. Emulsification, Rancidity, Smoking point. **SUGAR COOKERY-** Types of sugars available, Stages in sugar cookery, Crystallization. Artificial sweeteners.	18
5	**BEVERAGES-** Sources, Classification/types, Nutritive value, Processing, Uses - Coffee, Tea and Cocoa. Carbonated and Nonalcoholic beverages **SPICES AND CONDIMENTS-**Origin and use in food preparation.	18

	FOOD ADDITIVES: Preservation, colorants, leavening agents, shortenings and stabilizers. **FOOD ADULTERATION:** Types and methods of detection.	

CO	Course Outcomes
CO1	Understand the food groups, cereals and their functions, applying the principles of methods of cooking.
CO2	Analyze the Effect of Cooking on Pulses, Vegetables and fruits.
CO3	Assess the effect of cooking on sensory properties and nutrient composition of various animal-based foods.
CO4	Knowledge of different types of nuts, oilseeds, fats, and sugars, including their nutritional and health benefits
CO5	Students will be able to understand the different types of beverages, spices and condiments, food additives and food adulterants.

Text books:	
1	Srilakshmi, B.C. (2011). *Food Science* (7th ed.). New Delhi, ND: New Age International Publications
2	Potter, N. N. (2013). *Food Science*. Netherlands: Springer Netherlands
3	Manay, S., & Swamy, S. (2001). *Food Facts and Principles.* New Delhi, ND: New Age International Publications
4	Rajagopal, M. V., Mudambi, S. R., Rao, S. M. (2015). *Food Science*. India: New Age International (P) Limited, Publishers
5	Roday, (2007). *Food science and Nutrition.* New Delhi, ND: Oxford university press.
Reference Books:	
1	Parker, R. (2000). *Introduction to Food Science,* Delma: Thomson Learning Co.
2	Paul, P. C. and Palmer, H. H. (2000). *Food Theory and Applications*. (ed.). New York: John Wiley and Sons.
3	Brow, A. (2000). *Understanding Food.* Wadsworth: Thomson Learning Publications.
4	Reddy, S. M. (2015). *Basic Food Science and Technology.* New Delhi, ND: New Age Publishers.
5	Mc Cance & Widdowson. (2004). *Composition Microwave of Food* (6th ed.). Food Standards Agency.
E-LEARNING RESOURCES	
1	https://www.journals.elsevier.com/trends-in-food-science-and-technology
2	https://onlinelibrary.wiley.com/journal/20487177
3	https://www.annualreviews.org/journal/food
4	http://www.fao.org/home/en/
5	https://www.wfp.org/

Mapping with Programme Outcomes and Programme Specific Outcomes

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

3–Strong, 2-Medium, 1-Low

2nd YEAR:THIRD SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDC32P	**Practical III - Food Science**	**Core**	**0**	**0**	**4**	**0**	**2**	**4**	25	75	100

Learning Objectives	
LO1	To enable students to obtain knowledge of different food groups and their contribution to nutrition.
LO2	Understand the Source & Nutritional Significance of Pulses, Vegetables, and Fruits:
LO3	Apply the principles of cookery in cooking foods to preserve its nutrient content and minimize cooking time.
LO4	Acquire skills in preparation of foods with good palatability and preservation of nutritive value
LO5	Identify different stages of sugar crystallization and importance smoking temperatures of different fats and oils.

Unit	Content	Hours
1	**Introduction to Basic Cooking Skills - Edible portion** Introduction to different cooking methods, cooking terminology; equipment and techniques used for pre-preparation and for different cooking methods. Methods of measuring and weighing liquids and drying ingredients.	12
2	**Cereals** **Microscopic study of different starches** a. Methods of combining starch and boiling water. b. Study of effects of moist heat on starch. c. Cereal starch- Gelatinization. d. Gluten formation. Pulses - Effect of hard and soft water, alkali and acid. Cooking time of grams and dhals. Different recipes from cereals, Pulses and millets	12
3	**Vegetables -** Effect of acids, alkali, covering, steaming and pressure cooking on the different pigments and acceptability of vegetables. **Fruits** - Study of different methods of preventing enzymatic browning of cut fruits, pectin content of fruits. Different recipes from vegetables, fruits	12
4	**Milk cookery** - Coagulation of milk protein, Paneer, cooking of vegetables in milk. Different recipes from milk and milk products. Beverages - preparation of stimulating, nourishing and refreshing beverages.	12
5.	**Fats and oils -** comparison of smoking temperature of some fats and oils. Preparation of shallow and deep-fried foods. **Sugar and Jaggery** - Different stages of crystallization of sugar. Preparing recipes for different stages of sugar cookery. Visit to food Industry and Factories.	12

CO	Course Outcomes
CO1	Gain knowledge on various food groups, role of food items in Indian cookery.
CO2	Acquire knowledge on the various components of pulses, vegetables and fruits
CO3	Learn the different aspects of meat, milk and their products
CO4	Understand the changes taking place in nutrients while cooking the fleshy food.
CO5	Knowledge on classification and nutritive value of nuts, fats and sugars

Text books:	
1	Krishna Arora (2008) Theory of cookery, Frank Brothers & Co.,
2	Martland,R.E. and Welsby,D.A.(1980)Basic Cookery, Fundamental Recipes and Variations. William Heinemann Ltd., London
3	Negi J (2013). Fundamentals of Culinary Art,S.Chand and Co
4	Peckham,G.C. and Freeland-Graves,J.H.(1987)Foundation of food preparation.4thed. Macmillan Publishing co, New York
5	Penfield MP and Ada MarieC(2012),Experimental Food Science, Academic Press, San Diego
Reference Books:	
1	Parker, R. (2000). *Introduction to Food Science,* Delma: Thomson Learning Co.
2	Paul, P. C. and Palmer, H. H. (2000). *Food Theory and Applications*. (ed.). New York: John Wiley and Sons.
3	Brow, A. (2000). *Understanding Food.* Wadsworth: Thomson Learning Publications.
4	Reddy, S. M. (2015). *Basic Food Science and Technology.* New Delhi, ND: New Age Publishers.
5	Mc Cance & Widdowson. (2004). *Composition Microwave of Food* (6th ed.). Food Standards Agency.
E-LEARNING RESOURCES	
1	https://www.journals.elsevier.com/trends-in-food-science-and-technology
2	https://www.ihmnotes.in/assets/Docs/Books/Theory_of_Cookery.pdf
3	http://staffnew.uny.ac.id/upload/132318572/pendidikan/buku-esp.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	3	3	3	3	3	3
CO2	3	2	1	3	2	3	3	3	3	3	3
CO3	3	2	1	3	3	3	3	2	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	2	1	3	3	2	3	3	3	3	3
Total	15	10	5	15	14	13	15	13	15	15	15
Average	3	2	1	3	2.8	2.6	3	2.6	3	3	3

3–Strong, 2-Medium, 1-Low

2nd YEAR:THIRD SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDA31	**Elective-AL METABOLISM OF NUTRIENTS**	**Core**	**2**	**1**	**1**	**0**	**4**	**4**	25	75	100

Learning Objectives	
LO1	To gain knowledge about enzymes and metabolism of Carbohydrates
LO2	Understand the concept of Proteins and their biological activity
LO3	Analyze the lipid metabolism and cholesterol biosynthesis
LO4	To know the significance of recent biochemical concepts namely Nucleic acids and recombinant DNA technology
LO5	To learn about the diseases caused due to metabolic disorder.

Unit	Content	Hours
1	**Enzymes and metabolism of carbohydrates**- Enzymes-classification, Factors affecting Enzyme activity. Carbohydrates classification, metabolism of glucose- Glycolysis, Krebs cycle, Gluconeogenesis, glycogenesis, glycogenolysis,(No structure) blood glucose maintenance and its regulation.	12
2	**Proteins -** classification based on amino acid, primary, secondary and tertiary structure of proteins, hydrolysis of proteins, denaturation, precipitation and coagulation, Metabolism of Amino acids deamination, transamination, decarboxylation- urea cycle	12
3	**Lipids** - chemical composition of fats, classification, metabolism - beta oxidation of fatty acids & bio-synthesis of fatty acids - ketone bodies, Ketogenesis and ketosis, cholesterol- biosynthesis.	12
4	**Metabolism of Nucleotides-** Bio synthesis and degradation of Purine and Pyrimidine Nucleotides. Definition of nucleic acid, Functions and components of nucleic acids. DNA and RNA – Types, Structure and function. Recombinant DNA technology	12
5	**etabolic disorders**-Elementary knowledge on inborn errors of metabolism with reference to carbohydrate- Fructosuria, Pentos Uria, Galactosemia, Protein-albinism, Phenylketonuria, alkaptonuria, maple syrup urine disease, Lipids- Niemann- pick disease, Tay- Sach's disease.	12

CO	Course Outcomes **Students will be able to**
CO1	Describe the role of enzymes and metabolism and regulation of carbohydrates
CO2	Analyze the integration of protein metabolism
CO3	To understand about the metabolism of lipids and their synthesis
CO4	Comprehend the significance of recent biochemical concepts namely Nucleic acids, recombinant DNA technology
CO5	To understand about the various disease due to metabolic disorders

Text books:	
1	"Lehninger Principles of Biochemistry" by David L. Nelson and Michael M. Cox:Essentials of Bio Chemistry (Satyanarayana and Chakrapani)
2	"Biochemistry" by Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer:
3	"Biochemical Pathways" by Gerhard Michal:
4	"Medical Biochemistry" by John W. Baynes and Marek H. Dominic Zak:
Reference Books:	
1	"Lehninger Principles of Biochemistry" by David L. Nelson and Michael M. Cox
2	"Enzyme Chemistry: Dynamics of Structure and Function" by Peter R. Berget Hon
3	Free Radicals in Biology and Medicine" by Barry Halliwell and John M. C. Gutteridge
4	Human Metabolism: A Regulatory Perspective" by Donald R. Matthews and Donald W. Bryson:
5	"Principles of Nucleic Acid Structure" by B.D. Hames and D. W. Glover

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	3	1	3	3	2	2	3	3	3	3
CO2	3	2	2	3	2	3	3	3	3	3	3
CO3	3	2	2	3	3	3	3	2	3	3	3
CO4	3	2	2	3	3	3	3	2	3	3	3
CO5	3	2	2	3	3	2	3	3	3	3	3
Total	15	10	11	15	14	13	14	13	15	15	15
Average	3	2	2.2	3	2.8	2.6	2.8	2.6	3	3	3

3–Strong, 2-Medium, 1-Low

2nd YEAR:THIRD SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDA32P	**Practical-Metabolism of Nutrients**	**Core**	**0**	**0**	**2**	**0**	**2**	**2**	25	75	100

Learning Objectives	
LO1	Understand the qualitative estimation of Carbohydrates
LO2	Recognize the importance of proteins and qualitative analysis
LO3	Analyze the concept of qualitative analysis of Reducing sugars
LO4	Learn the quantitative estimation in Reducing Sugar
LO5	Develop skills in Iodine estimation in oil/fat.

Unit	Content	Hours
1	Qualitative Analysis of Carbohydrates	6
2	Qualitative Analysis of Proteins	6
3	Qualitative test for Sugars-Glucose, Fructose, Lactose, Maltose, Galactose	6
4	Quantitative Estimation in Reducing Sugar	6
5	Quantitative Estimation of Iodine and Acid value in oil/fat	6

CO	Course Outcomes
CO1	Identify the presence of carbohydrates in biological samples using standard qualitative tests.
CO2	To understand the proteins in biological samples using standard qualitative tests.
CO3	Detect and differentiate various sugars such as glucose, fructose, lactose, maltose, and galactose using specific biochemical test
CO4	Determine the iodine value of oils to assess the degree of unsaturation.
CO5	Gain hands-on experience with biochemical testing and standard laboratory procedures.

Textbooks:	
1	**Practical Biochemistry** by Keith Wilson and John Walker Bio chemical methods – Sadashiv and A.Manic
2	**Dairy Chemistry and Biochemistry by** P. F. Fox and P. L. H. McSweeney
3	**Clinical Chemistry: Principles, Techniques, and Correlations** by Michael L. Bishop, Edward P. Fody, and Larry E. Schoeff

4	**Practical Clinical Biochemistry** by A. G. G. W. J. McQueen
5	**Fundamentals of Clinical Chemistry"** by Norbert W. Tietz

Reference Books:	
1	**Food Chemistry** by H. D. Belitz, W. Grosch, and P. Schieberle
2	**Analytical Chemistry: A Modern Approach to Analytical Science** by Gary D. Christian
3	**Handbook of Dairy Chemistry** by Richard K. Robinson
4	**Clinical Chemistry: A Laboratory Perspective** by Kenneth D. McCulloch
5	**Textbook of Clinical Chemistry and Molecular Diagnostics** by Nader Rifai

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	3	3	2	2	3	3	3	3
CO2	3	2	1	3	2	3	3	3	3	3	3
CO3	3	2	1	3	3	3	3	2	3	3	3
CO4	3	2	1	3	3	3	3	2	3	3	3
CO5	3	2	1	3	3	2	3	3	3	3	3
Total	15	10	5	15	14	13	14	13	15	15	15
Average	3	2	1	3	2.8	2.6	2.8	2.6	3	3	3

3–Strong, 2-Medium, 1-Low

2nd YEAR:THIRD SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDS31	**BASICS OF INTERIOR DESIGN AND DECOR**	**Core**	**1**	**0**	**1**	**0**	**2**	**2**	25	75	100

Learning Objectives	
LO1	Gain knowledge of the basic designing principles and characteristics.
LO2	Develop ability to apply the above knowledge to create interesting and beautiful Interiors for varied purposes
LO3	Identify the impact of design principles on space planning and décor.
LO4	Understanding the Concept and characteristics of Color in Interiors.
LO5	Understand the role of lighting in enhancing mood, functionality, and visual comfort.

Unit	Content	Hours
1	**UNIT – 1-Design**- Meaning and Definition, Types –Structural and Decorative design, their characteristics, classification of decorative design.	6
2	**UNIT –2-Elements of Design** - Meaning, various elements – line, form and shape, size, color, texture, pattern, space, light.	6
3	**UNIT – 3-Principles of Design Harmony**, Balance, Rhythm, Emphasis, proportion. Application of design principles in interiors	6
4	**UNIT – 4-Color harmony** - Concept, qualities – Hue, value, intensity Classification of colors, Prang color system, color harmonies – Related and contrasting color harmonies, psychology of color. Application of color in interiors.	6
5	**UNIT – 5- Lighting in interiors** - Importance, classification based on sources, uses, illumination, factors to be considered in lighting for different areas of house.	6

CO	Course Outcomes **Students will be able to**
CO1	Learn the basic concepts and classification of interior design.
CO2	Develop the skill of applying the principles of design in decorating the interiors.
CO3	Analyze and implement balance, rhythm, and harmony in different spaces
CO4	Understand the psychological impact of colors on human emotions and behavior.
CO5	Understand the impact of lighting on mood, well-being, and space perception.

Textbooks:	
1	Varghese and ogale, 1994, Home Management, Wiley Eastern, New Delhi
2	Faulkner, S.-and Faulkner,R,(1987), Inside Today's Home, Rine hart Publishing Company, New York
3	Caroline cliften et. al., The complete Home Decorator, Portland House New York.
4	Seetharaman, P and Pannu, P. Interior Design and Decoration, CBS Publishers and Distributors, New Delhi.
5	Pratap R.M (1988), Interior Design Principles and Practice, Standard Publishers Distribution, Delhi.
6	Goldstein, Art in Everyday life, Oxford and IBH Publishing House
Reference Books:	
1	**"Human Physiology Laboratory Manual" by G. A. R. S. (Ravi) Ghosh**
2	Laboratory Exercises in Human Physiology" by David M. D. Alworth and L. C. T. Tansley
3	Physiology Laboratory Manual" by R. C. McKinley
4	A Photographic Atlas for the Anatomy and Physiology Laboratory" by Michael J. Arguello
5	"Human Physiology: An Integrated Approach" by Dee Unglaub Silverthorn

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	2	3	3	3	2	2	3	1	1	1
CO2	2	2	2	3	2	3	2	3	1	1	1
CO3	2	2	2	3	3	3	2	2	1	1	1
CO4	2	2	2	3	3	3	2	2	1	1	1
CO5	1	2	2	3	3	2	2	3	1	1	1
Total	9	10	11	15	14	13	10	13	5	5	5
Average	1.8	2	2.2	3	2.8	2.6	2	2.6	1	1	1

3–Strong, 2-Medium, 1-Low

2nd YEAR:FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDC41	CC-HUMAN NUTRITION	Core	3	1	2	0	5	6	25	75	100

Learning Objectives

LO1	Provide the importance of carbohydrates, dietary fiber, and water in maintaining overall health and well-Being.
LO2	Apply their knowledge to calculate energy requirements, understand factors that affect energy Metabolism and dietary recommendations.
LO3	Impart knowledge about protein nutrition and its implications for human health.
LO4	Understand the effect of lipid on health status & Understand the Water-Soluble and fat-soluble Vitamins.
LO5	Understand of minerals, including their roles in maintaining health, preventing disease, and Managing toxicity.

Unit	Content	Hours
1	**Carbohydrates & Water** Basic concepts of Nutrient, Carbohydrates - Definition, Sources, requirements, Digestion and absorption. **Dietary fiber-** definition, Types-soluble and insoluble fiber, sources of fiber, role of fiber in human nutrition. **Water** -functions, water compartment, regulation, water balance and disorders.	18
2	**Energy** Energy units, determination of energy value of foods using Bomb calorimeter, Physiological energy value of foods, determination of energy requirement using direct calorimetry, indirect calorimetry. **BMR** - determination of energy metabolism during work - energy requirements for various types of activities, recommended dietary allowances for energy for various age groups.	18
3	**Proteins-** Classification, Sources, Requirements and functions of protein. **Amino Acids** -Indispensable and dispensable amino acids. **Protein deficiency**-Protein Energy Malnutrition- Kwashiorkor and Marasmus– etiology, clinical features, treatment and prevention. Evaluation of protein quality Protein Efficiency Ratio, Biological Value, Net Protein Utilization and Net Protein Ratio.	18
4	**Lipids** **Lipids** - Definition, sources, requirements and functions. Digestion, absorption and metabolism. **Essential Fatty Acids (EFA)** - definition, functions, sources and effects of deficiency. **Fat soluble vitamins and Water-soluble vitamins** - functions, deficiency, sources and requirements.	18

5	**Minerals** **Macro minerals** -Calcium, Phosphorous, Magnesium, Potassium, Sodium and Chloride Distribution in the body, functions, food sources, requirements, effects of deficiency and toxicity. **Micro/Trace minerals** -Iron, Zinc, Iodine, Fluoride and Copper Distribution in the body; functions, food sources, requirements, effects of deficiency and toxicity.	18

CO	Course Outcomes
CO1	Understanding the basics of carbohydrates and water, optimal health and well-being.
CO2	Understanding of energy metabolism, including determination of energy values and requirements.
CO3	To analyze protein nutrition, protein quality, protein-energy malnutrition, and protein Supplementation.
CO4	To identify the importance of lipids and vitamins, including their functions, deficiency symptoms, sources, and requirements, and will be able to apply this knowledge to promote optimal health and well-being
CO5	Understand of minerals, including their roles in maintaining health, preventing disease, and managing toxicity.

Textbooks:	
1	Shubhangini. A. Joshi; Nutrition and Dietetics III edition, McGraw Hill Education (India) private Limited, 2015.
2	Srilakshmi B; Nutrition Science, 15th edition, New Age International (P) Limited, Publishers, 2016.
3	Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I 2nd edition. The Bangalore Printing and Publishing Co., LTD, Reprint 2015.
4	Sunterra Roday; Food Science and Nutrition, 2nd edition, Oxford University Press, 2013
5	Carol Byrd – Bred banner; Wardlaw's perspectives in Nutrition, 9th edition MC Graw – Hill International Edition 201
Reference Books:	
1	1. Anderson J. J.B., Root M.M., Garner S.C.(2015) Human Nutrition: Healthy Options for Life. Jones & Bartlett Learning, Massachusetts, USA.
2	Guthrie, H.A. (1989) Introductory Nutrition. 7thed.TimesMirror/Mos by College Publishing, St. Louis
3	Insel P., Ross D., Mc Mahon K., Bernstein M. (2016) Discovering Nutrition.5th Ed. Jones & Bartlett Learning, Massachusetts, USA.
4	Mahan K and Sylvia E. Stump (2000) Krause's Food Nutrition and Diet Therapy, Saunders, USA 75
5	Medeiros D. M., and Wildman R. E. C. (2019) Advanced Human Nutrition. 4th Ed., Jones & Bartlett Learning, Massachusetts, USA.
E-**Learning Resources:**	
1	https://lifesciencedirect.com/determination-of-energy-value-of-food-using-bomb calorimeter/
2	https://my.clevelandclinic.org/health/articles/15416-carbohydrates

3	https://basicmedicalkey.com/protein-and-amino-acid-requirements/
4	https://www.brainkart.com/article/Fat_37819/
5	https://www.brainkart.com/article/Minerals_37822/

Mapping with Programme Outcomes and Programme Specific Outcomes

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

3 – Strong, 2- Medium, 1- Low

2nd YEAR:FOURTH SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDC42P	**CC Practical - Human Nutrition**	Core	**0**	**0**	4	0	2	4	25	75	100

Learning Objectives	
LO1	To learn the Preparation of Ash Solution
LO2	To learn the extraction of Vitamin C
LO3	Analyze the amount of phosphorous, Calcium in a given sample.
LO4	Determine phosphorus content phosphorus in a given sample.
LO5	To understand the Principles of Iron

Unit	Content	Hours
1	Preparation of Ash Solution (Thermogravimetric Method)	12
2	Quantitative estimation of vitamin C.	12
3	Quantitative estimation of phosphorous.	12
4	Quantitative estimation of Calcium	12
5	Qualitative Analysis of Minerals	12
6	Demonstration Experiments Estimation of total nitrogen in foods (Micro or Macro Kjeldahl method) • Estimation of Iron	12

CO	Course Outcomes
CO1	Students will be able to understand Ash properties in the sample
CO2	Students will be able to understand Vitamin C properties in the sample
CO3	Students will learn to estimate calcium, phosphorous levels.
CO4	Students will learn to estimate Minerals levels.
CO5	Gain hands-on experience with biochemical testing and standard laboratory procedures.

Textbooks:	
1	**Practical Biochemistry** by Keith Wilson and John Walker Bio chemical methods – Sadashiv and A. Manic
2	**Dairy Chemistry and Bio chemistry** by P. F. Fox and P. L. H. Mc Sweeney
3	Food Chemistry by Keith A. Cox.
4	Vitamin Analysis for the Health and Food Sciences by Ronald R. Eiten miller.
5	**Fundamentals of Clinical Chemistry"** by Norbert W. Tietz
Reference Books:	
1	Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, William Intiman Medical Books, London, 2000.

2	Oser, B.L., Harke's Physiological Chemistry XIV Edition Tata McGraw Hill Publishing Company Ltd., Bombay, 2001
3	Sadasivam, S. and Manickam, A. Biochemical Method, Second Edition, New Age International P. Ltd., Publishers, New Delhi, 2003.
4	Raghuramulu,N, N., Madhavannair, K. and Kalyana Sundaram, National Institute of Nutrition, 2013, A Manual of Laboratory Techniques, Hyderabad, 500007
5	Textbook of Clinical Chemistry and Molecular Diagnostics by Nader Rifai
Web Resources	
https://lifesciencedirect.com/determination-of-energy-value-of-food-using-bomb calorimeter/	
https://my.clevelandclinic.org/health/articles/15416-carbohydrates	
https://basicmedicalkey.com/protein-and-amino-acid-requirements/	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	4	3	4	4	3	4	3	4	4	3	4
CO2	3	3	3	3	3	2	3	3	3	3	3
CO3	3	2	3	3	2	3	3	3	4	3	3
CO4	3	3	4	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	4	3	3	4	4	3
Total	**16**	**14**	**17**	**16**	**14**	**16**	**15**	**16**	**18**	**17**	**17**
Average	**3.2**	**2.8**	**3.4**	**3.2**	**2.8**	**3.2**	**3**	**3.2**	**3.6**	**3.4**	**3.4**

3 – Strong, 2- Medium, 1- Low

2nd YEAR:FOURTH SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	Externa l	Total
24UNDA41	**EC AL- Foundation of Bakery and Confectionery**	Elective	3	1	0	0	4	4	25	75	100

Learning Objectives	
LO1	Gain knowledge about bakery and confectionery and hygiene practice.
LO2	Familiarize ingredients involved in varieties of baking.
LO3	Understand the role of various ingredients used in cakes, bread and jelly cake.
LO4	Acquire knowledge about the process involved in pastries, cookies, biscuits, pudding and pie .
LO5	Marketing strategies involved in sales promotion of bakery and confectionery.

Unit	Content	Hours
1	**An Overview of Bakery Industry** Introduction to bakery and confectionery, Scope of Baking, Terms used in Baking, Weights and measurements. Baking–principles and process. Equipment-tools used in baking and Confectionery. Bakery sanitation and personnel hygiene.	12
2	**Ingredients in Bakery and Confectionery** **Ingredients**-Flour, Sugar, Shortenings, Egg. Leavening agents- yeast, baking soda, baking powder, chocolates, cocoa powder. Other ingredients- salt, milk and milk derivatives, malt products, dough improve ,oxidizing agents, Flavours and colors, nuts, spices and condiments, preserved and candied fruit peels.	12
3	**Breads and Cakes** **Bread-**ingredients, types of breads, faults and its prevention **Cakes**–ingredients, types of cakes, **c**ake judging, faults and remedies. **Jelly cake –**ingredients and Processing of jelly fruit cake **Modified baked goods**–using alternative healthy ingredients for special dietary needs. Different types and techniques of cake decoration-icings and fillings.	12
4	**Pastries, Cookies and Biscuits** **Pastries-**types of pastries-puff pastry, short crust, phyllo pastry, flaky pastry, choux pastry **Cookies &biscuits**–ingredients, types and processing, millet cookies and Coconut macaroons. **Pudding & Pies -** millet pudding, trifle pudding, almond crunch pudding Apple and pineapple pie.	12

5	**Confectionery and Marketing of Baked Products** Chocolates-production, types, chocolate decorations Sugar based confectionery–fudge, fondant, sugar candies. **Marketing and sales promotion**-costing, packaging and labeling.	12

CO	Course Outcomes
CO1	Understand the principles and process of baking and confectionery.
CO2	Acquire knowledge on various ingredients and its role in baking and confectionery
CO3	Develop skills to use of alternative healthy ingredients to dietary needs
CO4	Acquire skill to bake pastries ,cookies and biscuits
CO5	Enhance entrepreneurial skills in bakery and confectionery to improve business.

Textbooks:	
1	John Kingslee (2006) A Professional Textbook to Bakery and Confectionary. New Age International Pvt Limited Publisher, New Delhi.
2	Uttam K Singh (2011).Theory of Bakery and Confectionary- An Operational Approach. Kanishka Publishers and Distributors, New Delhi.
3	Yogambal Ashok kumar (2012) Theory of Bakery and Confectionary, PHI publication. New Delhi.
4	colelloI .and Foote, R (2000).Complete Confectionary Techniques. Hodder and Solution, London.
Reference Books:	
1	Bakersh and Book on practical Baking (2000) Published by U.S.Wheat Associates, New Delhi.
2	Dubey.S.C (2002) Basic Baking. 4th Edition. Published by the Society of Indian Bakers, New Delhi.
3	Sarah R . Lebensky, Pricillaetal., (2004) Textbook of Baking and Pastry Fundamentals, third edition, Pearson Education Ltd.
4	The Culinary Institute of America, Baking & Pastry: Mastering the Art and Craft, John Wiley & Sons, Inc New Jersy.2009.
Web resources	
https://www.lifestyleasia.com/ind/food-drink/dining/bookmark-the-best-baking-youtube-channels-to-bake-like-a-pro/	
http://www.bakels.in/	

Mapping with Programme Outcomes and Programme Specific Outcomes

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

3 – Strong, 2- Medium, 1- Low

2nd YEAR:FOURTH SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDA43P	**ECAL Practical Foundation of Bakery and confectionery**	**Elective**	**0**	**0**	2	0	2	2	25	75	100

Learning Objectives	
LO1	Gain knowledge about bakery and confectionery and hygiene practice.
LO2	Familiarize ingredients involved in varieties of baking
LO3	Understand the role of various ingredients used in cakes, bread and jelly cake.
LO4	Acquire knowledge about the process involved in pastries, cookies, biscuits, pudding and pie .
LO5	Marketing strategies involved in sales promotion of bakery and confectionery

Unit	Content	Hours
1	**Baking & Hygiene Practices** Terms used in Baking ,Weights, measurements, tools involved in baking and hygiene practices.	6
2	**Ingredients in Bakery and Confectionery** Ingredients , Leavening agents, other ingredients, Oxidizing agents Preparation of buns, rolls and pizza base.	6
3	**Breads and Cakes-**Preparation of butter cake, sponge cake, chocolate cake, cupcake. **Modified baked products**- High Fiber, alternative sugar, low fat and millet-based bakery products for special nutritional requirements –Obesity, Diabetes Mellitus.	6
4	**Pastries, Cookies and Biscuits** Preparation of biscuits, cookies. Preparation of Pies.	6
5	**Confectionery and Marketing of Baked Products** Preparation of fudge, fondant and candies. Marketing strategies.	6

CO	Course Outcomes
CO1	Understand the principles and process of baking and confectionery.
CO2	Acquire knowledge on various ingredients and its role in baking and confectionery.
CO3	Develop skills to use of alternative healthy ingredients to dietary needs.
CO4	Acquire skill to bake pastries, cookies and biscuits.
CO5	Enhance entrepreneurial skills in bakery and confectionery to improve business.

Textbooks:	
1	John Kingslee (2006) A Professional Textbook to Bakery and Confectionary. New Age International Pvt Limited Publisher, New Delhi.
2	Uttam K Singh (2011).Theory of Bakery and Confectionary- An Operational Approach. Kanishka Publishers and Distributors, New Delhi.
3	Yogambal Ashok kumar (2012) Theory of Bakery and Confectionary, PHI publication. New Delhi.
4	colelloI .and Foote, R (2000).Complete Confectionary Techniques. Hodder and Solution, London.
Reference Books:	
1	Bakersh and Book on practical Baking (2000) Published by U.S.Wheat Associates, New Delhi.
2	Dubey.S.C (2002) Basic Baking. 4th Edition. Published by the Society of Indian Bakers, New Delhi.
3	Sarah R . Lebensky, Pricilla Tal., (2004) Textbook of Baking and Pastry Fundamentals, third edition, Pearson Education Ltd.
4	The Culinary Institute of America, Baking & Pastry: Mastering the Art and Craft, John Wiley & Sons, Inc New Jersy.2009.
Web resources	
https://www.lifestyleasia.com/ind/food-drink/dining/bookmark-the-best-baking-youtube-channels-to-bake-like-a-pro/	
http://www.bakels.in/	

Mapping with Programme Outcomes and Programme Specific Outcomes

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

3 – Strong, 2- Medium, 1- Low

2nd YEAR:FOURTH SEMESTER

Subject Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UNDS41	**SEC -PRE-SCHOOL AND CRECHE MANAGEMENT**	Sec	1	0	1	0	2	2	25	75	100

Learning Objectives

LO1	To Understand the concepts & organization of Creche and preschool.
LO2	Create awareness on resource management.
LO3	To familiarize the students with the Significance of managing the Records & Registers.
LO4	Understand the elements involved in organization and management of Preschool and crèche.
LO5	Create awareness on Personnel Management dealing with Preschool and crèche.

Unit	Content	Hours
1	**Concept and organization of Creche and Preschool** Introduction, types of preschools, need, importance Of organization, Elements of organization and administration. Difference between crèche and preschool, Preschool Programme -Principles of preschool programme.	6
2	**Resource Management** Location and building, Food Distribution and Preparation, Types of rooms, Storage facilities, arrangement of room (activity centers), ventilation, lighting and safety, Provision of safe drinking water and sanitary facilities & safety measures.	6
3	**Records and registers** Need, importance and maintenance of records and registers. Types Of records (Important records)–Admission, Progress, Financial, Equipment, Health sickness of child and immunization. Types of register , importance Attendance (Staff, children), Accounts, Stock, Staff Profile, services for children and daily diary.	6
4	**Planning of Preschool Education Activities** Skills & qualities of preschool children, Introductory Games for Rapport Building with Children. **Physical & Motor Development-**Gross Motor & Fine Motor Skills. Essentials of Physical Development Games for Gross and Fine Motor Skills **Social &Emotional Development-**Essentials for Social & Emotional Development Activities and games for Social-Emotional development	6
5	**Personnel Management** Roles and responsibilities of teacher and care - taker and other staff involved In welfare and care of children, Recruitment and selection, Teacher child ratio, Need for and importance of in-service training	6

CO	Course Outcomes
CO1	Describe key Concept and organization of Creche and Preschool
CO2	Explain Resource Management for creche and preschools
CO3	Understand the criteria for Records and registers maintenance
CO4	Identify importance and Planning of Preschool Education Activities
CO5	Introduction to Personnel Management required for crèche and preschools

Textbooks:	
1	Ax line,V.M.(1964).Dibs insearchofself.NewYork:Ballentinebooks754
2	Clarke,P.(2001).Teaching & learning: the culture of pedagogy. New York: Sage
3	Thomson, C.L., Holmberg, M.C., Baer, D.M., Hodges, W. L., and Moore, S.G.(1978). An Experimental Analysis of Some Procedures to Teach Priming
4	Jaya, N., & Jayapoorani. N. (2004). Participation in a nursery school – Laboratory manual for students. Coimbatore: Sarada Laya.
Reference Books:	
1	TN Forces and IAPE, (2000). Pre- school Curriculum, Activity based developmentally appropriate curriculum for preschoolers. Chennai
2	Tileston,D.W.(2005).Training Manual for Every Teacher, Chennai: Sage.
3	S.Mono graphs of the Society for Research in Child Development. 43 (4), pp 1-86.
4	Management Of Nursery Education (Pre-School Child Development Centre)" by Dr. K.S. Bhardwaj
Web Resources:	
https://www.nextos.in/preschool-erp-software.html	
https://scert.kerala.gov.in/wp-content/uploads/2020/06/07-creche%20and%20preschool.pdf	
https://wcd.nic.in/sites/default/files/national_ecce_curr_framework_final_03022014%20%28	

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	4	3	3	3	2	3	2	3	2	2
CO2	4	3	3	3	2	3	3	2	2	2	2
CO3	3	3	3	3	2	2	3	3	3	3	3
CO4	3	4	3	4	3	3	3	3	3	3	2
CO5	3	2	2	3	3	2	3	2	3	2	2
Total	**16**	**16**	**14**	**16**	**13**	**12**	**15**	**12**	**14**	**12**	**11**
Average	**3.2**	**3.4**	**2.8**	**3.6**	**2.6**	**2.4**	**3**	**2.4**	**2.8**	**2.4**	**2.2**

3 – Strong, 2- Medium, 1- Low