

2025

B.Sc. Nutrition and Dietetics

Course Structure and Syllabus

(For the candidates admitted from the academic year 2025-2026 onwards)

**CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-BASED
CURRICULUM FRAMEWORK**

(CBCS-LOCF)



**THANTHAI HANS ROEVER COLLEGE
(Autonomous)**

(Accredited with 'A'Grade by NAAC (3rd cycle) with CGPA 3.23 out of 4)

ELAMBALUR, PERAMBALUR – 621 220



B.Sc. Nutrition and Dietetics

Choice-Based Credit System – Learning Outcomes-Based Curriculum Framework

(For the candidate admitted from the academic year 2025 -2026)

Semester	Part	Course Code	Title of the Course	Int. Hrs / Week	Credits	End Sem. Exam Hrs	Max. Marks			
							CIA	ESE	Total	
I	I	25UT1/H1/F1	Language -I	6	3	3	25	75	100	
	II	25UEI	English-I	6	3	3	25	75	100	
	III		25UND1CC1	Food Science	5	5	3	25	75	100
			25UND1CP1	Food Science - Practical	4	4	3	40	60	100
			25UND1AC1	Food Chemistry	4	3	3	25	75	100
			25UND2AP1	Food Chemistry and Nutritional Biochemistry Practical	3	--	--	--	--	--
	IV	25UVE	Value Education	2	2	3	25	75	100	
			Value Added Course*	--	2*	3	50	50	100*	
Total				30	20	-	-	-	600	
II	I	25UT2/H2/F2	Language -II	6	3	3	25	75	100	
	II	25UE2	English-II	6	3	3	25	75	100	
	III		25UND2CC2	Human Physiology	5	4	3	25	75	100
			25UND2CP2	Human Physiology - Practical	3	3	3	40	60	100
			25UND2AC2	Nutritional Biochemistry	3	3	3	25	75	100
			25UND2AP1	Food Chemistry and Nutritional Biochemistry Practical	3	2	3	40	60	100
	IV		25UND2NME1	Nutrition for Health and Wellbeing	2	2	3	25	75	100
			25UES	Environmental Studies	2	2	3	25	75	100
			Value Added Course*	--	2*	3	50	50	100*	
Total				30	22	-	-	-	900	
III	I	25UT3/H3/F3	Language -III	6	3	3	25	75	100	
	II	25UE3	English-III	6	3	3	25	75	100	
	III		25UND3CC3	Food Service Management	5	5	3	25	75	100
			25UND3CP3	Food Service Management - Practical	3	3	3	40	60	100
			25UND3AC3	Macronutrients	3	2	3	25	75	100
			25UND2AP2	Food Analysis Practical	3	--	--	--	--	--
	IV		25UND3NME2	Nutrition for the Family	2	2	3	25	75	100
			25UND3SE1	Bakery and Confectionery	2	2	3	25	75	100
			Value Added Course*	--	2*	3	50	50	100*	
Total				30	20	-	-	-	700	

Semester	Part	Course Code	Title of the Course	Int. Hrs / Week	Credits	End Sem. Exam Hrs	Max. Marks		
							CIA	ESE	Total
IV	I	25UT4/H4/F4	Language -IV	6	3	3	25	75	100
	II	25UE4	English-IV	6	3	3	25	75	100
	III	25UND4CC4	Nutrition Through Life Cycle	5	5	3	25	75	100
		25UND4CP4	Nutrition Through Life Cycle Practical	3	3	3	40	60	100
		25UND4AC4	Micronutrients	4	3	3	25	75	100
		23UND4AP2	Food Analysis Practical	3	2	3	40	60	100
	IV	25UND4SE2	Food Product Development and Marketing	2	2	3	25	75	100
		25UHW	Health and Wealth	1	1	--	--	--	100
		Value Added Course*	--	2*	3	50	50	100*	
Total				30	22	-	-	-	800
V	III	25UND5CC5	Public Health and Community Nutrition	5	5	3	25	75	100
		25UND5CC6	Food Microbiology	5	5	3	25	75	100
		25UND5CC7	Dietetics I	5	5	3	25	75	100
		25UND5CP5	Dietetics - Practical	3	3	3	40	60	100
		25UND5DE11	Functional Foods and Nutraceuticals	5	4	3	25	75	100
		25UND5DE12	Dietary Guidance and Counselling						
	IV	25UND5DE21	Food Packaging and Labelling	5	4	3	25	75	100
		25UND5DE22	Instrumentation in Food Analysis						
		25USS	Soft Skills	2	2	3	25	75	100
	25UND5SI	Summer Internship	--	2*	3	--	--	100	
		Value Added Course*	--	2*	3	50	50	100*	
Total				30	28	-	-	-	700
VI	III	25UND6CC8	Food Preservation and Processing	5	5	3	25	75	100
		25UND6CC9	Food Standards and Quality Control	5	5	3	25	75	100
		25UND6CC10	Dietetics II	6	5	3	25	75	100
		25UND6DE31	Perspectives of Home Science	5	4	3	25	75	100
		25UND6DE32	Hospitality Industries and Management						
		25UND6DE41	Life Span Development	5	4	3	25	75	100
	25UND6DE42	Palliative Care							
	V	25UND6PW	Project Work	3	3	3	20	80	100
		25UGS	Gender Studies	1	1	3	25	75	100
		Extension Activity	--	1	--	--	--	--	
		Value Added Course*	--	2*	3	50	50	100*	
Total				30	28	-	-	-	800
Total				180	140				4500

PROGRAMME OUTCOMES (POs):

PO1: Acquire sound theoretical and practical knowledge in nutrition, food science, and dietetics to pursue advanced learning and professional careers.

PO2: Use scientific thinking and creativity to address food, nutrition, and health problems with environmental and social awareness.

PO3: Exhibit ethics, teamwork, communication, and leadership through projects, internships, and fieldwork.

PO4: Acquire critical thinking and analytical capabilities to deliver effective nutrition and health solutions.

PO5: Foster cultural competence, social responsibility, and ethical practice in nutrition counselling and community interaction.

PO6: Apply interdisciplinary knowledge to design and implement innovative nutrition programs that improve community health and well-being.

PO7: Demonstrate effective communication skills to educate diverse populations about nutrition, food safety, and healthy lifestyle practices.

PO8: Engage in research and evidence-based practice to contribute to advancements in nutrition science and public health policy.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1: Apply nutrition and food science knowledge to solve health, food service, and industry problems.

PSO2: Evaluate nutritional status and develop customized, sustainable, and therapeutic diet plans.

PSO3: Integrate physiological, biochemical, and microbiological phenomena with nutrition and disease.

PSO4: Develop professional, technical, and communication competencies for food service, hospitality, and diet counselling.

PSO5: Develop research, critical, and entrepreneurial skills through projects, internships, and product development.

Sem.	Course Code	Credits	Title of the Course	CC / AC / DE / SE / GS / EVS / VE / VAC	Category			Sem. Exam	Max. Marks		
					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
I	25UND1CC1	5	FOOD SCIENCE	CC	5	-	-	3 Hrs.	25	75	100
Pre-Requisite: Familiarity with general concepts of food and nutrition.											
Course Objectives: The purpose of learning this course is:											
1. To introduce the foundational concepts related to food science and nutrition.											
2. To describe the characteristics, composition, and processing of various food groups.											
3. To outline traditional and modern cooking methods along with their nutritional impacts.											
4. To highlight the nutritional significance and structural details of cereals, pulses, fruits, vegetables, milk, meat, poultry, fish, fats, nuts, sugars and spices.											
5. To explore the physical and chemical changes in food during preparation and cooking.											
Course Outcomes:											
CO1: Define and differentiate key terms in food science and nutrition.											
CO2: Categorize food groups based on their functional roles and nutritional contributions.											
CO3: Compare various cooking methods and their effects on nutrient retention and food quality.											
CO4: Summarize the structure, composition, and processing of cereals, pulses, vegetables, and fruits.											
CO5: Describe the nutritive values and processing techniques of milk, meat, poultry, and fish.											
Unit-I	Introduction to Food Science									15 Hrs.	
Definitions: Food Science, Food, Nutrients, Balanced diet, Food Fortification, Health. Food Groups: Basic five, Functional classification of foods – Energy yielding, Body building and Protective foods, Food Pyramid. Cooking: Cooking Methods– Moist and Dry heat methods of cooking – Advantages and Disadvantages. Recent Methods of Cooking- Microwave cooking and Induction Cooking.											
Unit-II	Cereals and Pulses									15 Hrs.	
Cereals: Structure and Nutritive value – Rice and Wheat, Milling of Rice and Wheat, Malting of Wheat, Parboiling of Rice. Nutritional Importance of Millets – Maize, Jowar, Ragi, Bajra. Gelatinisation – Definition, Factors affecting Gelatinisation, Changes in Cooked Starches. Convenient Cereal foods. Pulses: Nutritive value, Factors affecting cooking quality of Pulses, Toxic Constituents of Pulses, Germination – Definition, Advantages. Cooking process- Soaking, Parching, and Puffing.											
Unit-III	Vegetables and Fruits									15 Hrs.	
Vegetables: Classification, Nutritive value, Selection of vegetables, Pigments – Water Insoluble, Water Soluble. Changes during cooking, Loss of Nutrients during cooking, Effect of Cooking on pigments. Fruits: Classification, Nutritive value, Pigments, Ripening of fruits, Enzymatic Browning, Non-enzymatic Browning.											
Unit-IV	Milk and Meat									15 Hrs.	
Milk and Milk Products: Composition and Nutritive value, Physical Properties, Types of Milk, Pasteurization and Homogenization of Milk, Milk products– Cheese, Paneer. Egg: Structure, Composition and Nutritive value, Quality of Egg. Meat: Composition, Post-mortem changes in meat, Tenderising and Curing of Meat, Cuts and Grades of Meat. Poultry: Classification, Composition and Nutritive value. Fish: Composition and Nutritive value, Selection of fish.											

Unit-V	Fats, Nuts, Sugars, and Spices	15 Hrs.
<p>Fats and Oils: Composition and Nutritive value, Rancidity, Refining and Processing of Fats –Refined oils, Plasticity, Hydrogenation, Winterization, Shortening of Fat.</p> <p>Nuts and Oilseeds: Composition and Nutritive value, Role of nuts and oil seeds in cookery.</p> <p>Sugar: Nutritive value, Properties, Sugar-related products, Stages of Sugar cookery, Crystallization, Factors affecting Crystallization.</p> <p>Spices: General functions of Spices, Medicinal Properties of Indian spices (Ajwain, Aniseed, Asafoetida, Cardamom, Cinnamon, Cumin seeds, Fenugreek seeds, Garlic, Ginger, and Pepper)</p>		

Text Book(s):

1. Srilakshmi. B, “Food Science”, 8th Edition, New Age International Publishers, 2021, ISBN: 9789388642277
2. Swaminathan. M, “Handbook of Food and Nutrition”, Revised Edition, The Bangalore Printing and Publishing Co. Ltd, 2020, ISBN: 9788176371438
3. Mudambi, S.R., Rajagopal, M.V., “Fundamentals of Foods, Nutrition and Diet Therapy”, 7th Edition, New Age International, 2020, ISBN: 9788122437058
4. Shubhangini A. Joshi, “Nutrition and Dietetics”, 4th Edition, McGraw Hill Education, 2021, ISBN: 9789354600264
5. Damodaran, S., Parkin, K.L., Fennema, O.R., “Fennema’s Food Chemistry”, 5th Edition, CRC Press, 2020, ISBN: 9780367336837

Reference Book(s):

1. Belitz, H.-D., Grosch, W., Schieberle, P., “Food Chemistry”, 5th Edition, Springer, 2020, ISBN: 9783662620173
2. Charis Michel Galanakis, “Nutraceutical and Functional Food Components”, 1st Edition, Academic Press, 2019, ISBN: 9780128168431
3. Shahidi, F., “Handbook of Functional Beverages and Human Health”, 1st Edition, CRC Press, 2022, ISBN: 9780367552596
4. David Kilcast, “Food and Beverage Stability and Shelf Life”, 2nd Edition, Wood head Publishing, 2021, ISBN: 9780128227138
5. Mehta, R., Sharma, R., “Essentials of Food Science and Nutrition”, 1st Edition, Kalyani Publishers, 2022, ISBN: 9789391638709

Web Resources:

1. <https://openoregon.pressbooks.pub/nutritionscience/chapter/unit-1-intro/>
2. https://pietsanskritinfl.com/wp-content/uploads/2021/09/834_Food-nutrution-XI.pdf
3. <https://ddceutkal.ac.in/Syllabus/MBA-BOOK/FND.pdf>
4. <https://www.tdk.com/en/tech-mag/inductive/how-does-a-microwave-oven-work>

Sem.	Course Code	Credits	Title of the Course	CC / AC / DE / SE / GS / EVS / VE / VAC	Category			Sem. Exam	Max. Marks		
					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
I	25UND1CP1	4	FOOD SCIENCE - PRACTICAL	CC	-	-	4	3 Hrs.	25	75	100
Pre-Requisite: Familiarity with common kitchen tools, utensils, and hygiene practices.											
Course Objectives: The purpose of learning this course is:											
1. To perform hands-on food preparation and demonstrate changes in physical and chemical characteristics of food components.											
2. To apply laboratory safety protocols and measurement techniques in food-based experiments.											
3. To compare the cooking behaviour and quality of different food groups under various conditions.											
4. To carry out standard food tests for assessing freshness, quality, and functional properties.											
5. To utilize common spices and condiments in the preparation of traditional health drinks and therapeutic recipes.											
Course Outcomes:											
CO1: Classify and organize foods into the basic five food groups and apply this knowledge in practical food handling and preparation.											
CO2: Perform analytical tests on cereals, pulses, and dairy to observe physical and chemical changes during cooking and processing.											
CO3: Apply cooking techniques to evaluate pigment behaviour, enzymatic browning, and nutrient retention in vegetables and fruits.											
CO4: Conduct quality assessment procedures for milk, eggs, fats, and oils using standard laboratory methods and cooking variations.											
CO5: Prepare traditional health-based beverages using spices and condiments, demonstrating their functional and therapeutic properties.											
General: <ul style="list-style-type: none"> ➤ Different types of cereals, pulses, vegetables, fruits and nuts and oil seeds. ➤ Guidelines to be followed in laboratory. ➤ Method of Measuring Ingredients. ➤ Demonstration of Cooking Methods. 											
Food Science Practical: <ol style="list-style-type: none"> 1. Grouping of foods according to Basic Five Food groups. 2. Cereals: Observe the microscopic structure of raw and cooked starch in various cereals (Rice, Ragi and Wheat flour). Determination of Gluten content in Wheat and Rice flour weight of wet and dry gluten. 3. Pulses: Germination of few pulses (Peas, Cowpea, Green gram) – Soaking and Germination. Demonstrate the effect of hard water, vinegar and sodium bi carbonate on cooking quality of pulses. 4. Vegetables and Fruits: Selection, cleaning, coring, pitting and chopping of vegetables and fruits. Effect of heat on vegetable pigments like: chlorophyll, carotenoids, anthocyanin, anthoxanthin. 5. Milk: Effect of prolonged heat, acid and enzyme on cooking milk. Preparation of Casein and Whey. 6. Egg: Determine the Quality of egg (Floating test and Candling test). Effect of Cooking time on the colour, texture and acceptability of whole egg. 7. Fats: Determine the Smoking point temperature of different fats and oils (Gingelly oil, Groundnut oil, Coconut oil and Palm oil). 8. Sugar: Demonstrate the Stages of Sugar cookery. 9. Spices: Preparation of medicinal value foods by using Spices and Condiments – Golden Milk, Pepper Rasam, Panagam, and detoxifying drink – Cumin-Coriander-Fennel Tea (CCF Tea), Herbal tea. 											

Text Book(s):

1. Srilakshmi, B., "Food Science", 7th Edition, New Age International Publishers, 2021, ISBN: 9788122431094
2. Manay, S., Shadaksharaswamy, M., "Foods: Facts and Principles", 3rd Edition, New Age International, 2021, ISBN: 9788122437386
3. Damodaran, S., Parkin, K.L., Fennema, O.R., "Fennema's Food Chemistry", 5th Edition, CRC Press, 2020, ISBN: 9780367336837
4. Roday, S., "Food Science and Nutrition", 2nd Edition, Oxford University Press, 2020, ISBN: 9780199487200
5. Labensky, S.R., Hause, A.M., Martel, P., "On Cooking: A Textbook of Culinary Fundamentals", 7th Edition, Pearson, 2020, ISBN: 9780134720104

Reference Book(s):

1. Belitz, H.D., Grosch, W., Schieberle, P., "Food Chemistry", 5th Edition, Springer, 2020, ISBN: 9783662620173
2. Shahidi, F., "Handbook of Functional Beverages and Human Health", 1st Edition, CRC Press, 2022, ISBN: 9780367552596
3. Kilcast, D., "Food and Beverage Stability and Shelf Life", 2nd Edition, Woodhead Publishing, 2021, ISBN: 9780128227138
4. Damodaran, S., "Encyclopedia of Food Chemistry", 1st Edition, Academic Press, 2020, ISBN: 9780128144705
5. Walstra, P., Wouters, J.T.M., Geurts, T.J., "Dairy Science and Technology", 3rd Edition, CRC Press, 2021, ISBN: 9780367234273

Sem.	Course Code	Credits	Title of the Course	CC / AC / DE / SE / GS / EVS / VE / VAC	Category			Sem. Exam	Max. Marks		
					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
I	25UND1AC1	3	FOOD CHEMISTRY	AC	4	-	-	3 Hrs.	25	75	100
Pre-Requisite: Basic knowledge of chemistry and human biology.											
Course Objectives: The purpose of learning this course is:											
1. To introduce fundamental concepts of food chemistry and water interactions in foods.											
2. To describe the structure, properties, and reactions of carbohydrates, starches, and sugars in food systems.											
3. To outline the characteristics and functional roles of food proteins and enzymes.											
4. To discuss the chemical and physical properties of lipids and their behaviour during processing.											
5. To explore the chemistry and applications of food flavours, pigments, and additives in the food industry.											
Course Outcomes:											
CO1: Demonstrate familiarity with the chemical principles governing food components.											
CO2: Differentiate the behaviour and interactions of carbohydrates, proteins, and fats in various food conditions.											
CO3: Interpret the role of enzymes and their industrial applications in food processing.											
CO4: Summarize the changes in food constituents during cooking, storage, and processing.											
CO5: Apply the principles of food chemistry in selecting and using food additives, pigments, and flavour agents.											
Unit-I	Introduction to Food Chemistry and Water									12 Hrs.	
Food Chemistry: Definition of Food chemistry. Role of food chemist in Food Industry, Physico-chemical properties of foods. Water: Physical properties of water and ice, types of water, Water Activity in Foods and stability, Sorption phenomenon, temperature dependence, Determination of Moisture Content in Foods. True Solutions, Dispersions, Sols, Gels, Foams, Colloids, and Emulsions.											
Unit-II	Chemistry of Carbohydrates									12 Hrs.	
Starch: Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums). Modified celluloses and starches. Components of Starch, Swelling of Starch Granules, Gel Formation, Retrogradation, Syneresis. Effect of Sugar, Acid, Alkali, Fat, and Surface-Active Agents on Starch.											
Unit-III	Chemistry of Proteins									12 Hrs.	
Nature of Food Proteins (Plant and Animal): Properties of Protein- Electrophoresis, Sedimentation, Denaturation, Solubility, Viscosity, Binding, Gelation, Texturization, Emulsification, and Foaming. Changes in protein during cooking. Enzymes: Introduction, Classification, General characteristics, Enzymes in food processing, Industrial Uses of Enzymes, Immobilized enzymes.											
Unit-IV	Chemistry of Fats and Oils									12 Hrs.	
Classification and Characteristics of Lipids: Physical properties - melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point. Chemical properties- Reichert meissel value, Polenske value, Iodine value, Peroxide value, Saponification value. Effect of frying on fats: Changes in fats and oils - rancidity, lipolysis, flavor reversion. Technology of edible fats and oils- Refining, Plasticity, Hydrogenation and Interesterification. Shortening power of fats, Changes in fats and oils during heating, Factors affecting fat absorption in foods											

Unit-V	Flavours, Food Additives and Food Pigments	12 Hrs.
<p>Flavors: Definition and basic tastes, Chemical structure and taste, Description of food flavors, and Flavor enhancer</p> <p>Food Additives: Definition, Classification, Functions, Categories of food additives, Antioxidants, Colouring agents, Favouring agents, Preservatives, Sweeteners, Anticaking agents.</p> <p>Food Pigments: Natural Food Colours - Chlorophylls, Myoglobins, Anthocyanins, Betalins, Tannins, Caramel, Carotenoids. Artificial Food Colour Types.</p>		

Text Book(s):

1. Damodaran, S., Parkin, K. L., "Fennema's Food Chemistry", 5th edition, CRC Press (Taylor & Francis), 2021, ISBN: 9780367331547
2. Belitz, H.D., Grosch, W., Schieberle, P., "Food Chemistry", 5th edition, Springer, 2022, ISBN: 9783030931525
3. DeMan, John M., "Principles of Food Chemistry", 4th edition, Springer, 2020, ISBN: 9783030439571
4. Manay, S. N., Shadaksharaswamy, M., "Foods: Facts and Principles", 4th edition, New Age International Publishers, 2021, ISBN: 9789389418798
5. Subbulakshmi, G., Udipi, S. A., "Food Processing and Preservation", 2nd edition, New Age International Publishers, 2020, ISBN: 9788122431333

Reference Book(s):

1. Coultate, Tom, "Food: The Chemistry of Its Components", 6th edition, Royal Society of Chemistry, 2020, ISBN: 9781788012428
2. Bhatt, Gita, "Essentials of Food Chemistry", 1st edition, Scientific Publishers, 2021, ISBN: 9789389832884
3. Vaclavik, Vicki, Christian, Elizabeth W., "Essentials of Food Science", 6th edition, Springer, 2021, ISBN: 9783030715958
4. Tiwari, B. K., Cummins, E., "Food Chemistry: Advanced Analytical Techniques", 1st edition, CRC Press, 2021, ISBN: 9781138611744
5. Prakash, V., "Encyclopedia of Food Chemistry", 1st edition, Academic Press (Elsevier), 2020, ISBN: 9780128140260

Web Resources:

1. <https://www.colss.net/sample-chapters/c10/e5-08-07-00.pdf>
2. <http://egyankosh.ac.in/handle/123456789/69055>
3. <https://gpbhiwani.ac.in/e-content-food-technology/>
4. <https://www.sciencedirect.com/topics/chemistry/colloid-chemistry>

Sem.	Course Code	Credits	Title of the Course	CC / AC / DE / SE / GS / EVS / VE / VAC	Category			Sem. Exam	Max. Marks		
					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total.
II	25UND2CC2	4	HUMAN PHYSIOLOGY	CC	5	-	-	3 Hrs.	25	75	100
Pre-Requisite: Basic knowledge of human body structure and general concepts of organs and their functions.											
Course Objectives: The purpose of learning this course is:											
1. To provide foundational concepts of blood composition, circulation, and lymphatic system functions.											
2. To describe mechanisms involved in digestion, muscle function, and bone physiology.											
3. To introduce the physiology of respiration and excretion, highlighting key anatomical structures.											
4. To offer insights into hormonal regulation and reproductive physiology in humans.											
5. To outline the functional aspects of the nervous system and major sensory organs.											
Course Outcomes:											
CO1: Describe the components and functions of blood and the circulatory system.											
CO2: Summarize the process of digestion and muscle activity.											
CO3: Outline the structure and function of the respiratory and excretory systems.											
CO4: Discuss the roles of endocrine glands and reproductive organs.											
CO5: Present the basic structure and function of the nervous system and sense organs.											
Unit-I	Blood and Circulatory System									15 Hrs.	
Blood: Composition and Functions; White Blood Cells–Types and Functions, Red Blood Cells – Structure and functions; Haemoglobin – Structure and functions, Erythropoiesis, Blood coagulation, Reticulo-Endothelial System–Definition and Functions; Blood group – ABO, Rh - Lymphatic System. Heart and Circulation: Structure of heart and blood vessels; Properties of Cardiac muscle, Cardiac cycle, Cardiac output, Origin and Conduction of heartbeat, Measurement of arterial blood pressure.											
Unit-II	Digestive System									15 Hrs.	
General Anatomy: Digestion in the mouth, stomach, and intestines. Movements of the Intestine, Role of Liver and Pancreas–Structure and Functions. Musculoskeletal System: Formation and functions of Muscles, Bones. Mechanism of Muscle contraction, Isometric and Isotonic muscle contraction.											
Unit-III	Respiratory and Excretory System									15 Hrs.	
Respiratory System: Structure of Respiratory organs; Subdivisions of lung air; Chemistry of respiration. Gaseous exchange (oxygen and carbon dioxide transport) Excretory system: Physiology of the Urinary System- Structure of the Kidney and Nephron; Formation of Urine, Micturition.											
Unit-IV	Endocrine and Reproductive System									15 Hrs.	
Endocrine System: Structure and Functions of Thyroid, Pituitary, Parathyroid, Adrenal and Islets of Langerhans of Pancreas. Reproductive System: Anatomy of the Male and Female Reproductive Organs, Menstrual Cycle, Mammary Glands, Spermatogenesis, Oogenesis, Fertilization, Development of the Embryo, Pregnancy and Parturition.											
Unit-V	Nervous System and Sense Organs									15 Hrs.	
Nervous System: General classification of the Nervous system; Structure of Nerve cell and Spinal cord and their functions; Basic Knowledge of different parts of the Brain – Anatomy and Functions of Cerebrum, Cerebellum and Medulla oblongata. Sense Organs: Structure and function of the Eye, Ear, Tongue and Nose and Cutaneous Sensations. Skin –Structure and Functions, Regulation of body temperature.											

Text Book(s):

1. Silverthorn, Dee Unglaub, "Human Physiology: An Integrated Approach", 8th ed., Pearson, 2020, ISBN: 978-0135292415
2. Peate, Ian & Evans-John, "Fundamentals of Anatomy and Physiology: For Nursing and Healthcare Students", 3rd ed., Wiley, 2020, ISBN: 978-1119576518
3. McKinley, Michael P.; O'Loughlin, Valerie D.; Bidle, Theresa Stouter, "Anatomy & Physiology: An Integrative Approach", 3rd ed., McGraw-Hill, 2019, ISBN: 978-1260137750
4. Widmaier, Eric P.; Raff, Hershel; Strang, Kevin T., "Vander's Human Physiology: The Mechanisms of Body Function", 16th ed., McGraw-Hill, 2020, ISBN: 978-1260248246
5. Boron, Walter F.; Boulpaep, Emile L., "Medical Physiology", 3rd ed., Elsevier, 2020, ISBN: 978-0323756359

Reference Book(s):

1. Hall, John E., "Guyton & Hall Textbook of Medical Physiology", 14th ed., Elsevier, 2021, ISBN: 978-0323757288
2. Barrett, Kim E.; Barman, Susan M.; Boitano, Scott; Brooks, Heddwen L., "Ganong's Review of Medical Physiology", 27th ed., McGraw-Hill, 2023, ISBN: 978-1264260735
3. Widmaier, Eric P.; Raff, Hershel; Strang, Kevin T., "Vander's Human Physiology" (reference use), 16th ed., McGraw-Hill, 2020, ISBN: 978-1260248246
4. Arthur C. Guyton, John E. Hall, "Guyton and Hall Textbook of Medical Physiology", 14th Edition, Elsevier, 2020, ISBN: 9780323672801
5. Gerard J. Tortora, Bryan H. Derrickson, "Principles of Anatomy and Physiology", 15th Edition, Wiley, 2017, ISBN: 9781119329398

Web Resources:

1. <https://www.khanacademy.org/science/health-and-medicine/human-anatomy-andphysiology>
2. <https://www.biologyonline.com/tutorials/the-human-physiology>
3. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=NuAs6SreCGryddEfs4kkB>
4. <https://open.umn.edu/opentextbooks/textbooks/169>

Sem.	Course Code	Credits	Title of the Course	CC / AC / DE / SE / GS / EVS / VE / VAC	Category			Sem. Exam	Max. Marks		
					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total.
II	25UND2CP2	3	HUMAN PHYSIOLOGY- PRACTICAL	CC	-	-	3	3 Hrs.	25	75	100

Pre-Requisite: Basic theoretical knowledge of human anatomy and physiology.

Course Objectives: The purpose of learning this course is:

1. To observe and recognize different types of tissues and muscle fibers using permanent slides.
2. To perform basic haematological tests such as haemoglobin estimation and blood grouping.
3. To demonstrate measurement techniques for physiological parameters before and after physical activity.
4. To interpret the microscopic structures of key human organs using histological slides.
5. To introduce practical exposure to laboratory equipment and diagnostic procedures.

Course Outcomes:

CO1: Gain practical skills in observing histological structures of tissues and organs under a microscope.

CO2: Conduct blood-related procedures like haemoglobin estimation, blood pressure, and pulse rate measurement.

CO3: Perform simple diagnostic tests such as blood group detection and Rh factor determination.

CO4: Differentiate between various physiological responses before and after exercise through measured parameters.

CO5: Acquire hands-on experience and familiarity with standard laboratory practices and settings.

1. Histology of Tissues – Columnar, Cubical, Ciliated, Squamous and Stratified Squamous (Observation with the help of permanent slide).
2. Histology of Muscles – Cardiac, Striated and Non-striated (Observation with the help of permanent slide).
3. Microscopic Structure of Organs - LS of Lungs, Artery, Vein, Stomach, Liver, Ovary, Testis, Uterus and Pancreas (observation with the help of permanent slide).
4. Estimation of haemoglobin by Shali's method.
5. Measurement of Blood Pressure by using sphygmomanometer – Before and After Exercise.
6. Determination of Respiratory rate and Pulse rate – Before and After Exercise.
7. Determination of Blood group.
8. Enumeration of Rh factor.
9. Enumeration of Red Blood Cells and White Blood Cells – Demonstration.

Text Book(s):

1. Ross, M.H., Pawlina, W., "Histology: A Text and Atlas with Correlated Cell and Molecular Biology", 8th edition, Wolters Kluwer, 2020, ISBN: 9781496383426
2. Young, B., O'Dowd, G., "Wheater's Functional Histology: A Text and Colour Atlas", 7th edition, Elsevier, 2020, ISBN: 9780702075599
3. Tortora, G.J., Derrickson, B.H., "Principles of Anatomy and Physiology", 16th edition, Wiley, 2020, ISBN: 9781119662686
4. Hall, J.E., "Guyton and Hall Textbook of Medical Physiology", 14th edition, Elsevier, 2021, ISBN: 9780323672801
5. Singh, I., "Human Histology", 9th edition, Jaypee Brothers Medical Publishers, 2022, ISBN: 9789354655599

Reference Book(s):

1. Mescher, A.L., "Junqueira's Basic Histology: Text and Atlas", 16th edition, McGraw Hill Education, 2021, ISBN: 9781260462982
2. Sharma, P., "Practical Hematology", 2nd edition, CBS Publishers, 2020, ISBN: 9789389261635
3. Panday, R.K., Sinha, P., "Practical Manual of Physiology", 2nd edition, CBS Publishers, 2021, ISBN: 9789388108825
4. Chatterjea, M.N., Shinde, R., "Textbook of Medical Biochemistry", 9th edition, Jaypee Brothers Medical Publishers, 2021, ISBN: 9789390020646
5. Khurana, I., "Textbook of Human Physiology for Dental Students", 3rd edition, Elsevier, 2019, ISBN: 9788131255712

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					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total.
II	25UND2AC2	3	NUTRITIONAL BIOCHEMISTRY	AC	3	-	-	3 Hrs.	25	75	100
Pre-Requisite: Basic knowledge of biology and chemistry from and familiarity in biomolecules and cell functions.											
Course Objectives: The purpose of learning this course is:											
1. To describe the chemistry, classification, metabolism, and physiological significance of carbohydrates.											
2. To outline the structural and metabolic aspects of proteins and amino acids, including inborn metabolic disorders.											
3. To provide knowledge on lipid classification, metabolism, and related metabolic disorders.											
4. To highlight the structure and metabolism of nucleotides and nucleic acids, along with enzyme mechanisms and kinetics.											
5. To introduce common biochemical diagnostic tests used for assessing organ functions.											
Course Outcomes:											
CO1: Describe the structure, metabolism, and functions of carbohydrates.											
CO2: Summarize protein and amino acid metabolism and related disorders.											
CO3: Outline lipid metabolism and associated metabolic conditions.											
CO4: Present the structure and function of nucleic acids and enzymes.											
CO5: List the biochemical tests used to assess major organ functions.											
Unit-I	Carbohydrates									9 Hrs.	
Carbohydrates: Definition, Classification, Structure, and Functions. Digestion and Absorption of carbohydrates. Regulation of Blood Glucose. Metabolism- Glycolytic pathway, Oxidation of pyruvic acid, Citric Acid Cycle, Pentose Phosphate Pathway. Inborn errors of metabolism – Fructosuria and Galactosemia.											
Unit-II	Protein									9 Hrs.	
Proteins: Definition, Classification, Structure, and Functions. Digestion and Absorption of Protein. Hydrolysis of proteins- Denaturation, Precipitation, Coagulation. Amino acids- Definition, Types, General pathways of metabolism of amino acids - Deamination, Transamination, Decarboxylation, Urea cycle. Inborn errors of metabolism - Phenylketonuria, Alcaptonuria, Maple Syrup Urine Disorder.											
Unit-III	LIPIDS									9 Hrs.	
Lipids: Definition, Classification, Structure, Properties, and Functions. Digestion and Absorption of lipids, Oxidation of Fatty Acids (saturated &unsaturated), Metabolism of Lipoproteins and Ketone Bodies, Relationship between Fat metabolism and Adipose tissue. Definitions- Ketone bodies, Ketogenesis, and Ketosis. Disorder of Lipoproteins- Hyperlipoproteinemia and Hypolipoproteinemia.											
Unit-IV	Nucleotides, Nucleic Acids, Enzymes and Hormones									9 Hrs.	
Nucleotides and Nucleic Acids: Structure of Purine and Pyrimidine nucleotides, RNA – Structure and Types, Double Helical Structure of DNA, Biosynthesis and Catabolism of purine and pyrimidine nucleotides. Enzymes: Definition, Enzyme classification, Nomenclature, Factors affecting enzymatic activity, Mechanism of action. Role of Hormones: Thyroxine, Insulin, Glucagon, Epinephrine, Corticoid, Androgens, Estrogen, Progesterone											

Unit-V	Liver and Renal Function Tests	9 Hrs.
<p>Bile: Formation and functions of Bile acids and Bile salts, Bile pigments. Liver Function Test: Test for bile pigment metabolism in Jaundice, Bile pigment metabolism in Health and in Jaundice, Jaundice-Biochemical changes in Jaundice. Test for plasma protein concentration, Test for detoxifying functions, Test for serum enzymes, Test for excretion of foreign substances. Renal Function Tests: Composition of Urine, Normal and abnormal constituents of urine. Inulin clearance test, Urea Clearance test, Addis test, Mosenthal test</p>		

Text Book(s):

1. Satyanarayana, U., Chakrapani, U., "Biochemistry", 5th edition, Elsevier, 2020, ISBN: 9789389034981
2. Vasudevan, D.M., Sreekumari, S., Vaidyanathan, K.V., "Textbook of Biochemistry for Medical Students", 9th edition, Jaypee Brothers Medical Publishers, 2019, ISBN: 9789352706022
3. Ambika Shanmugam, "Fundamentals of Biochemistry for Medical Students", 8th edition, Wolters Kluwer India Pvt Ltd, 2020, ISBN: 9789387964686
4. Pankaja Naik, "Biochemistry for Nurses", 3rd edition, Jaypee Brothers Medical Publishers, 2020, ISBN: 9789390020552
5. Ashok Kumar J., Sucharita K., "Biochemistry: For Nursing and Allied Health Sciences", 2nd edition, CBS Publishers, 2021, ISBN: 9789390046132

Reference Book(s):

1. Nelson, David L., Cox, Michael M., "Lehninger Principles of Biochemistry", 8th edition, W.H. Freeman and Company, 2021, ISBN: 9781319381493
2. Devlin, Thomas M., "Textbook of Biochemistry with Clinical Correlations", 8th edition, Wiley-Blackwell, 2022, ISBN: 9781119770641
3. Ferrier, Denise R., "Lippincott Illustrated Reviews: Biochemistry", 8th edition, Wolters Kluwer, 2021, ISBN: 9781975155063
4. Marks, Anthony C., Smith, Michael, "Marks' Basic Medical Biochemistry: A Clinical Approach", 6th edition, Wolters Kluwer, 2022, ISBN: 9781975154066
5. Murray, Robert K., Bender, David A., Botham, K. M., "Harper's Illustrated Biochemistry", 32nd edition, McGraw-Hill Education, 2022, ISBN: 9781260288421

Web Resources:

1. <https://opentextbc.ca/anatomyandphysiology/chapter/24-4-lipid-metabolism/>
2. <https://www.ncbi.nlm.nih.gov/books/NBK9921/>
3. <https://books.apple.com/ie/book/biochemistry-free-for-all/id1149493662>

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					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total.
II	25UND2AP1	2	FOOD CHEMISTRY AND NUTRITIONAL BIOCHEMISTRY PRACTICAL	AC	-	-	3	3 Hrs.	25	75	100
Pre-Requisite: Basic knowledge of biochemistry											
Course Objectives: The purpose of learning this course is:											
1. To perform curdling of milk using natural acidic agents and observe physical changes.											
2. To demonstrate enzymatic browning in plant-based foods and test effective prevention techniques.											
3. To carry out qualitative tests for detecting abnormal constituents in urine.											
4. To conduct biochemical estimations of glucose, urea, cholesterol, and creatinine in blood and urine samples.											
5. To apply standard laboratory procedures and techniques in clinical biochemistry.											
Course Outcomes:											
CO1: Gain hands-on skills in performing food-based biochemical reactions such as curdling and browning.											
CO2: Perform qualitative detection of sugar, proteins, and ketone bodies in urine samples.											
CO3: Apply titration and colorimetric methods to estimate key biochemical markers in body fluids.											
CO4: Differentiate normal and abnormal biochemical values using established laboratory protocols.											
CO5: Acquire basic laboratory handling, reporting, and analytical abilities relevant to clinical biochemistry.											
<ol style="list-style-type: none"> 1. Curdling of milk using lime juice, buttermilk, and tomato juice. 2. Demonstrate Enzymatic browning in vegetables and fruits and its prevention methods. 3. Qualitative analysis of Urine for Sugar, Protein and Ketone bodies 4. Estimation of Urine Glucose (Benedict's Method) 5. Estimation of Urine Urea (DAM Method) 6. Estimation of Blood Glucose 7. Estimation of Blood Urea (DAM Method) 8. Estimation of SERUM CHOLESTEROL (Zak's Method) 9. Estimation of Creatinine in urine. 											

Text Book(s):

1. Sembulingam, K., Sembulingam, P., "Essentials of Medical Physiology", 9th edition, Jaypee Brothers Medical Publishers, 2023, ISBN: 9789356962561
2. Murray, R.K., Bender, D.A., Botham, K.M., "Harper's Illustrated Biochemistry", 32nd edition, McGraw Hill Education, 2022, ISBN: 9781260288421
3. Sharma, B.K., "Biochemistry for Nurses", 2nd edition, Elsevier India, 2021, ISBN: 9788131263156
4. Rajagopal, K., "Food Science and Nutrition", 2nd edition, PHI Learning Pvt Ltd, 2020, ISBN: 9789389347789
5. Rao, B.S.N., Deosthale, Y.G., "Nutritive Value of Indian Foods", Revised edition, National Institute of Nutrition/ICMR, 2021, ISBN: 9788195074701

Reference Book(s):

1. Damodaran, S., Parkin, K.L., "Fennema's Food Chemistry", 5th edition, CRC Press, 2021, ISBN: 9780367331232
2. Nelson, D.L., Cox, M.M., "Lehninger Principles of Biochemistry", 8th edition, W.H. Freeman and Company, 2021, ISBN: 9781319381493
3. Nollet, L.M.L., Toldra, F., "Handbook of Food Analysis", 4th edition, CRC Press, 2020, ISBN: 9781138608516
4. Arora, S., "Textbook of Biochemistry for Medical Students", 10th edition, CBS Publishers, 2023, ISBN: 9789390046177
5. Satyanarayana, U., Chakrapani, U., "Essentials of Biochemistry", 3rd edition, Elsevier India, 2020, ISBN: 9788131257247

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					Theo. Hrs.	Tutorial Hrs.	Lab. Hrs.		CIA	ESE	Total
II	25UND2NME1	2	NUTRITION FOR HEALTH AND WELL-BEING	SE	2	-	-	3 Hrs.	25	75	100
Pre-Requisite: Basic knowledge of human biology and physiology.											
Course Objectives: The purpose of learning this course is:											
1. To define key concepts in nutrition and describe the historical development of the field.											
2. To outline the role and classification of macronutrients and micronutrients in human health.											
3. To recognize the physiological functions and dietary sources of water and its role in body fluid balance.											
4. To distinguish between types of vitamins and minerals, including their dietary requirements and health implications.											
5. To describe the nutritional significance of carbohydrates, proteins, fats, and dietary fibers in maintaining health.											
Course Outcomes:											
CO1: Demonstrate knowledge of nutrients and their significance in food and health.											
CO2: Classify various nutrients and relate them to their dietary sources and daily requirements.											
CO3: Discuss the impact of water, vitamins, and minerals on normal body functioning.											
CO4: Illustrate the importance of balanced nutrition in preventing deficiencies and promoting well-being.											
CO5: Apply principles of nutrition in assessing and planning for different age groups and health needs.											
Unit-I	Basics in Nutrition									6 Hrs.	
Definitions: Food Science, Food, Nutrients, Balanced diet, Health. Food Groups: Basic five, Functional classification of foods – Energy yielding, Body building and Protective foods, Food Pyramid.											
Unit-II	Carbohydrates and Dietary Fibre									6 Hrs.	
Carbohydrates: Classification, Sources, Requirements, and Functions of carbohydrates in the body. Dietary Fibre: Definition, Soluble and insoluble fibres, sources of fibre, Role of fibre in human nutrition.											
Unit-III	Proteins and Lipids									6 Hrs.	
Proteins: Classification, Sources, Requirements, and Functions of Proteins in the Body. Protein deficiency. Lipids: Classification, Sources, Requirements, and Functions of fat in the body, Deficiency.											
Unit-IV	Vitamins									6 Hrs.	
Fat-Soluble Vitamins: Classification, Functions, Food Sources, Requirements and Effects of Deficiency, Requirements for different age groups. Water Soluble Vitamins: Classification, Functions, Effects of Deficiency, Food Sources, and Requirements for different age groups.											
Unit-V	Macro and Micro Minerals									6 Hrs.	
Macro Minerals: Classification, Functions, Effects of Deficiency, Food Sources, Requirements for different age groups. Micro / Trace Minerals: Classification, Functions, Effects of Deficiency, Food Sources, Requirements for different age groups.											

Text Book(s):

1. Srilakshmi, B., "Nutrition Science", 7th edition, New Age International Publishers, 2021, ISBN: 9788122459134
2. Mudambi, S.R., Rajagopal, M.V., "Fundamentals of Foods, Nutrition and Diet Therapy", 7th edition, New Age International Publishers, 2020, ISBN: 9789389261714
3. Gopalan, C., Rama Sastri, B.V., Balasubramanian, S.C., "Nutritive Value of Indian Foods", Updated edition, National Institute of Nutrition (ICMR), 2020, ISBN: 9788195079512
4. Reddy, R. Sudarshan, "Applied Nutrition and Dietetics for Nursing", 2nd edition, Paras Medical Publisher, 2021, ISBN: 9789387593343
5. Kumud Khanna, Sharda Nahata, "Textbook of Nutrition and Dietetics", 2nd edition, Elsevier India, 2020, ISBN: 9788131256381

Reference Book(s):

1. Gibney, Michael J., Lanham-New, Susan A., Cassidy, Aedin, Vorster, Hester H., "Introduction to Human Nutrition", 3rd edition, Wiley-Blackwell, 2021, ISBN: 9781119608326
- 2.Sizer, Frances S., Whitney, Ellie, "Nutrition: Concepts and Controversies", 15th edition, Cengage Learning, 2020, ISBN: 9780357368241
3. Whitney, Ellie, Rolfes, Sharon Rady, "Understanding Nutrition", 16th edition, Cengage Learning, 2022, ISBN: 9780357763978
4. Mahan, L. Kathleen, Raymond, Janice L., "Krause's Food & the Nutrition Care Process", 15th edition, Elsevier, 2020, ISBN: 9780323636551
5. Boyle, Marie A., Holben, David H., "Community Nutrition in Action: An Entrepreneurial Approach", 8th edition, Cengage Learning, 2021, ISBN: 9780357367954

Web Resources:

1. <https://open.umn.edu/opentextbooks/textbooks/an-introduction-to-nutrition>
2. <https://oer.galileo.usg.edu/health-textbooks/5/>
3. <https://www.e-booksdirectory.com/details.php?ebook=3504>