UNDERGRADUATE COURSE STRUCTURE

B.Sc. (Hons) Food, Nutrition, and Dietetics

BATCH 2024-28

SEMESTER I

S.No	Type of Course	Code	Title of the Course	Contact Hours Per Week				Remarks
				L	T	P	C	
1	CC	FND101	Human Nutrition	2	1	1	4	CC-1
2	CC	FND102	Human Physiology 1	2	1	1	4	CC-2
3	MDC	BIT105	Renewable Energy Resources	2	0	1	3	MDC1
4	AEC	AEC101	Communicative English-I	2	1	0	3	AEC1
5	Minor	CHM104	Elementary Chemistry	3	0	1	4	Minor1
6	VAC	VAC101	Environmental Education-I	2	0	0	2	VAC1
Semester Credits							**20**	
SEMESTER II								
7	CC	FND105	Basic Food Science	2	1	1	4	CC-3
8	CC	FND106	Human Physiology 2	2	1	1	4	CC-4
9	MDC	FND107	Food adulteration	2	0	1	3	MDC2
10	SEC	SEC174	Food Technology	1	0	1	2	SEC-1
11	VAC	VAC105	Community engagement and Social responsibility	1	0	1	2	VAC2
12	AEC	AEC102	Communicative English-II	2	1	0	3	AEC2
13	Minor	CHM108	Organo-physical chemistry	3	0	1	4	Minor2
Semester Credits							**22**	
SEMESTER III								
14	CC	FND201	Nutritional biochemistry	2	1	1	4	CC-5
15	CC	FND202	Food Microbiology	2	1	1	4	CC-6
16	MDC			2	0	1	3	MDC3
17	Minor		To be chosen from a pool of minors	2	1	1	4	Minor3
18	AEC	AEC106	Professional communication skills				2	AEC3
19	SEC	SEC175	Mushroom Culture	1	0	1	2	SEC-2
20	VAC	VAC102	Human values and ethics	2	0	0	2	VAC3
Semester Credits							**21**	
SEMESTER IV								
21	CC	FND205	Public Health Nutrition	2	1	1	4	CC-7

22	CC	FND206	Nutrition for life span	2	1	1	4	CC-8
23	CC	FND207	Epidemiology	2	1	1	4	CC-9
24	SEC	SEC176	Dairy technology	1	0	1	2	SEC-3
25	Minor		To be chosen from a pool of minors	2	1	1	4	Minor4
26	VAC		To be chosen from subjects offered from University	2	0	0	2	VAC4
Semester Credits							**20**	
SEMESTER V								
27	CC	FND301	Elementary Dietetics	2	1	1	4	CC-10
28	CC	FND302	Diet therapy for lifestyle disorders	2	1	1	4	CC-11
29	CC	FND303	Sports Nutrition	2	1	1	4	CC-12
30	Minor		To be chosen from a pool of minors	2	1	1	4	Minor5
31	SEC	SEC177	Management and preservation of Food and beverage	1	0	1	2	SEC-4
31	INT		Internship	0	0	4	4	
Semester Credits							**22**	
SEMESTER VI								
32	CC	FND305	Nutraceuticals, functional food and nutrigenomics	2	1	1	4	CC-13
33	CC	FND306	Science of Bakery & confectionary	2	1	1	4	CC-14
34	CC	FND307	Space Nutrition	2	1	1	4	CC-15
35	Minor		To be chosen from a pool of minors	2	1	1	4	Minor6
36	SEC	SEC178	Therapeutic Food Product development	1	0	1	2	SEC-5
37	Project		Project Work on Food and nutrition	0	0	4	4	
Semester Credits							**22**	
Total Credits of the Program after 3rd Year							**127**	
			SEMESTER VII					
38	CC	FND401	Food safety and quality control	2	1	1	4	CC-16
39	CC	FND402	Sports Nutrition	2	1	1	4	CC-17
40	CC	FND403	Food Processing and Technology	2	1	1	4	CC-18
41	CC (For With research)	FND404	Research Methodology for Food and nutrition&	3	1	0	4	CC-19 (Research)

			biostatistics (should start working on dissertation topic)					
42	CC (For Without research)	FND405	Modern techniques and bio instrumentation	3	1	0	4	CC-19(without Research)
43	Minor		To be chosen from a pool of minors	2	1	1	4	Minor7
Total Semester Credit							**20**	
			Semester VIII					
44	CC	FND407	Space Nutrition	2	1	1	4	CC-20
45	CC (For Without research)	FND408	Drug food interaction	2	1	1	4	CC-21 (without Research)
46	CC (For Without Research)	FND409	Nutritional Pharmacology	2	1	1	4	CC-22(without Research)
47	Minor (For without research)		To be chosen from a pool of minors				4	Minor8
48	Minor(For With /without research)		To be chosen from a pool of minors				4	Minor8
49	Dissertation (For With research)		Dissertation on Food and nutrition	0	0	12	12	
Total Semester Credit							**20**	
Total Credits of the Program after 4th Year							**167**	

*NOTE: With research is only allowed for Students ***who secure 75% marks and above in the first six semesters***

Minors to be offered by Department

Semester	Course Code	Courses	L	T	P	C
1	FND104	Fundamentals of Food& Dietetics	2	1	1	4
2	FND108	Public health Nutrition	2	1	1	4
			2	1	1	4
3	FND204	Basic metabolism of food	2	1	1	4
4	FND208	Nutrition for life span	2	1	1	4

5	FND304	Food Technology	2	1	1	4
6	FND308	Food safety and quality control	2	1	1	4
7	FND406	Introduction to nutraceuticals	2	1	1	4
8	FND410	Fundamentals of Diet therapy	2	1	1	4
	FND411	Elementary Dietetics				

List of Multi-disciplinary courses to be offered by Department

Semester	Course Code	Courses	L	T	P	C
1	FND103	Basic food science	2	0	1	3
2	FND107	Food adulteration	2	0	1	3
3	FND203	Basic metabolism of food	2	0	1	3

SEMESTER I								
S.No	**Type of Course**	**Code**	**Title of the Course**	**Contact Hours Per Week**				**Remarks**
				L	**T**	**P**	**C**	
1	CC	FND101	Human Nutrition	2	1	1	4	CC-1
2	CC	FND102	Human Physiology 1	2	1	1	4	CC-2
3	MDC	BIT105	Renewable Energy Resources	2	0	1	3	MDC1
4	AEC	AEC101	Communicative English-I	2	1	0	3	AEC1
5	Minor	CHM104	Elementary Chemistry	3	0	1	4	Minor1
6	VAC	VAC101	Environmental Education-I	2	0	0	2	VAC1

L	**T**	**P**	**C**
2	1	1	4

COURSE NAME: HUMAN NUTRITION - THEORY
COURSE CODE: FND101
CREDITS: 4

Course Objectives and Outcomes:

1.Utilize knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease processes.

2. Provide nutrition counseling and education to individuals, groups, and communities throughout the lifespan using a variety of communication strategies.

3. Evaluate nutrition information based on scientific reasoning for clinical, community, and food service application.

4. Apply technical skills, knowledge of health behavior, clinical judgment, and decision-making skills when assessing and evaluating the nutritional status of individuals and communities and their response to nutrition intervention.

5. Implement strategies for food access, procurement, preparation, and safety for individuals, families, and communities.

Unit – I: Introduction to Nutrition
Concept and definition of terms-Nutrition, Malnutrition and Health: Scope of Nutrition, Food as source of nutrients, functions of food, definition of nutrition, nutrients & energy, adequate, optimum & good nutrition, malnutrition, nutraceuticals and its importance, Interrelationship between nutrition &health : - Visible symptoms of goods health.
Unit – II: Energy Requirement

Minimum Nutritional Requirement and RDA: formulation of RDA and Dietary, Guidelines Reference Man and Reference Woman, Adult consumption unit, Energy in Human Nutrition: Idea of Energy and its unit, Energy Balance, Assessment of Energy Requirements, deficiency and excess, Determination of Energy in food, B.M.R. and its regulation, S.D.A.

Unit – III: Growth and Development

Growth & Development from infancy to adulthood: Somatic, physical, brain and mental development, puberty, menarche, pre-pubertal and pubertal changes, Factors affecting growth and development. Importance of Nutrition for ensuring adequate development, Growth monitoring and promotion: Use of growth charts and standards, Prevention ofgrowth faltering.

Unit – IV: Carbohydrate, Fats and Proteins, Vitamins and Minerals 12hours

Carbohydrates: Functions, classification, food sources, storage in body. Fats and oils: composition, saturated and unsaturated fatty acids, classification, food sources, function of fats. Proteins - composition, sources, essential & non-essential amino acids, functions, Protein deficiency.

Digestion and absorptions of carbohydrate, protein, lipid, fat-soluble vitamins waste water-soluble (thiamine, riboflavin, niacin, pyridoxine, folate, vit B12, vit C), minerals (Ca, Fe, I, F, Cu, Zn)

Unit – V: Water

Water - as a nutrient, function, sources, requirement, water balance & effect of deficiency

REFERENCE BOOKS:

1.) Sumati R. Mudambi, M.V. Raja gopal – Fundamentals of Foods and Nutrition 4th edition, New Age International (P) Limited, Publishers, 2001.

2.) MangalaKargo – Normal nutrition Fundamentals and management, RBSA Publishers, 2003.

3.) Michael J. Gibney, Hester H. Vorster and Frans J. Kok – Introduction to Human nutrition, Blackwell publishing 2003.

4.) Srilakshmi B (2015) Nutrition science - 4 th Ed., New age international Publ., New Delhi Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2005) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins.

COURSE NAME: HUMAN NUTRITION - PRACTICAL
COURSE CODE:FND101
CREDITS: 1

1. Process involved in cooking: pressure cooking, microwave, steaming, grilling, deep fat frying.
2. General concepts of weights and measures. Eye estimation of raw and cooked foods
3. Preparation of food from different food groups and their significance in relation to health.
4. Preparation of supplementary food for different age group and their nutritional significance.
5. Planning and preparation of low cost diet for Grade I and Grade II malnourished child

REFERENCE BOOKS:

1) Srilakshmi B (2015) Nutrition science - 4 th Ed., New age international Publ., New Delhi

Shills ME, Shike M, Ross AC, Caballero B, Cousins RJ (2005) Modern Nutrition in health and disease – 10th Ed., Lippincott Williams and Wilkins.

Semester –I

L	T	P	C
2	1	1	4

COURSE NAME: HUMAN PHYSIOLOGY - I THEORY
COURSE CODE:FND102
CREDITS: 4

Course objectives and outcomes:

1.Demonstrate an understanding of the physiology and basic regulatory concepts related to the functioning of life processes.

2. Name the key physiology themes (homeostasis & regulation, structure/function relationships, compartmentation, biological energy transformation, and communication & information flow), and be able to provide or recognize examples of each from the different organ systems.

3. Discuss the significance of maintaining homeostasis to the survival of the whole organism.

4. Demonstrate the use of the scientific method and quantitative reasoning to field of physiology.

5. Demonstrate a mechanistic (how) and teleologic (why) understanding of the levels of organization comprising the human organism.

Unit – I: Introduction to human body **10 hours**

Terminology and General Plane of the Body, Body Parts and Areas, Terms of Location and Position, Body Cavities and Their Membranes, Dorsal cavity, Ventral cavity, Planes and Sections.
Cells: Structure, function and location, Prokaryotic and eukaryotic cells, Cell organelles, Cell division, Cell physiology: Structure, membrane, transport across cell membrane, Active, Passive, Organization of the Body, Body Composition, Body Fluid Volumes and its measurement, Diffusion, Osmosis, Tonicity, Homeostasis, Tissue, Types, Structure, Location and Function of Epithelial Tissue, Connective, Tissue, Muscle Tissue, Nerve Tissue, Membranes, Glandular tissue.

Unit – II: Digestive System **07 hours**

Introduction: Physiological anatomy of Gastro-Intestinal tract, Functions of digestive system. Salivary Secretion: Saliva: Composition. Functions. Regulation. Swallowing: Different stages &Function. Stomach: Functions. Pancreatic Secretion: Composition, production, function. Regulation. Liver: Functions of liver. Bile secretion: Composition, functions and regulation. Gallbladder: Functions.

Unit – III (a): Body fluids, and blood **10 hours**

Body fluids, composition and functions of blood, Structure and function of RBC, WBC and platelets, Erythropoiesis, formation of haemoglobin, anaemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion of blood and its significance and disorders of blood.

(b): Lymphatic system

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system.

Unit – IV:Cardiovascular system **08 hours**

Heart - anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heartbeat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.

Unit – V: Respiratory System **10 hours**

Physiological anatomy of respiratory system, Respiratory tract, Respiratory Muscles, Functions of respiratory system. Respiratory muscles. Mechanics of breathing, Lung compliance and factors affecting compliance and its variations. Surfactant - Composition, production, functions. Lung volumes and capacities: Dead Space: Types and their definition. Pulmonary Circulation. Ventilation-perfusion ratio and its importance. Transport of respiratory gases. Regulation of Respiration: Neural Regulation. Hering - Breuer's reflex. Voluntary control. Chemical Regulation. Applied physiology and Respiration: Hypoxia, Hypercapnia. Asphyxia, artificial respiration, Apnea, Cyanosis.

REFERENCE BOOKS:

1.) Chatterjee C.C (2004), Human Physiology Volume I, Medical Allied Agency, Kolkata.
2.) Chatterjee C.C (2004), Human Physiology Volume II, Medical Allied Agency, Kolkata.
3.) Sembulingam, K. (2000) Essentials of Medical Physiology, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
4.) Best and Taylor, (1992) The Physiological Basis for Medical Practice, Saunders Company.
5.) Chaudhri, K. (1993) Concise Medical Physiology, New Central Book Agency (Parentral) Ltd., Calcutta.

COURSE NAME: HUMAN PHYSIOLOGY - I Practical
COURSE CODE:FND102
CREDIT:1

Course Objective: This course will give an overview of testing of different parameters associated with human body.

Prerequisite: Nil.

Course Outcome: After the completion of the course, students would be able to:

CO1: Remember and reproduce the experimentation on different haematological and basic cardio respiratory parameters.

CO2: Understanding and performing the experimental protocol for estimation of different haematological and basic cardio respiratory parameters.

CO3 : Evaluate and correlate the knowledge in the practical field as and when required

L	T	P	C
2	0	1	3

CO4 : Analyse and apply this knowledge for social need

CO5: Appraise and comprehend this knowledge for independent and lifelong learning towards sustainable development.

Module I **[4H]**

Determination of pulse rate in Resting condition and after exercise (30 beats/10 beats method)

Module II **[4H]**

Determination of blood pressure by Sphygmomanometer (Auscultatory method).

Module III. **[8H]**

Interpretation of normal ECG curve with 6 chest leads.

Module IV **[8H]**

Measurement of Peak Expiratory flow rate.(By spirometer)

Module V **[12H]**

Determination of Bleeding Time (BT) and Clotting Time (CT).

Module VI **[12H]**

Detection of Blood group (Slide method)

Module VII **[12H]**

Measurement of Haemoglobin level (Sahli`s or Drabkinmethod).

Reference Book(s):

1. General and comparative Physiology,Hoar WS ,Prentice-Hall of India.3rd ed,1984
2. Anatomy and Physiology in Health and Illness,Wilson,Edinburgh, Churchill Livingstone, 1989
3. Sear's Anatomy and Physiology for Nurses,Winword,London, Edward Arno ll. 1988

COURSE NAME: Fundamentals of Food& Dietetics
COURSE CODE: FND104
CREDITS: 4

Course Objectives

1. **To understand the fundamental principles of food science and dietetics.**
2. **To study the classification, composition, and functions of food.**
3. **To explore the relationship between nutrition and health.**
4. **To develop practical skills in food preparation and nutritional assessment.**

Unit 1: Introduction to Food and Nutrition (10 Hours)

- Definition and scope of food science and dietetics.
- Classification of food (based on origin, function, and nutrient content).
- Basic concepts of nutrition: Nutrients, their classification, and functions.
- Food groups and the Food Pyramid.

Unit 2: Macronutrients and Micronutrients (12 Hours)

- Macronutrients: Carbohydrates, proteins, fats – sources, functions, and deficiencies.
- Micronutrients: Vitamins (fat- and water-soluble), minerals, and water – sources, functions, and deficiencies.
- Role of dietary fiber and antioxidants in health.

Unit 3: Balanced Diet and Meal Planning (8 Hours)

- Definition and importance of a balanced diet.
- Factors affecting meal planning (age, gender, activity, health conditions, socio-economic status).
- Dietary guidelines for Indians.
- Introduction to therapeutic diets (low salt, low fat, and diabetic diet).

Unit 4: Food Preparation and Preservation (8 Hours)

- Methods of cooking and their impact on nutrient retention.

- Principles of food preservation (refrigeration, freezing, canning, dehydration).
- Basic food safety and hygiene practices.

Unit 5: Introduction to Dietetics (7 Hours)

- Concept of dietetics and role of a dietitian.
- Diet in special conditions (pregnancy, lactation, infancy, old age).
- Common nutrition-related disorders (obesity, undernutrition, anemia) and their dietary management.

Practical Syllabus

Experiments:

1. **Introduction to Weighing and Measuring:** Understanding standard measurements for food items.
2. **Food Group Identification:** Analysis of various foods and their classification.
3. **Meal Planning:**

   Planning a balanced diet for different age groups.

   Modifying a normal diet for therapeutic needs.
4. **Cooking Demonstrations:**

   Study of cooking methods (boiling, steaming, frying) and their effect on nutrient retention.
5. **Food Preservation Techniques:**

   Simple preservation techniques such as pickling and dehydration.

COURSE NAME: Basic Food Science
COURSE CODE: FND103
CREDITS: 3

Basic Food Science (MDC103)

1. Basic concept of Food, Nutrition, and Nutrients. Classification of Food, Classification of Nutrients.

2. Carbohydrates - Definition, Classification, Structure and properties.

Monosaccharides - glucose, fructose, galactose.

Disaccharides - Maltose, lactose, sucrose

Polysaccharides - Dextrin, starch, glycogen, resistant starch.

Carbohydrates - Sources, daily requirements, functions. Effects of too high and too

Low carbohydrates on health. Digestion and absorption of carbohydrates.

3. Lipids -Definition, Classification & Properties. Fatty acids-composition, properties,

types. Lipids - sources, daily requirements, functions. Digestion & Absorption of

nutrients. Role & nutritional significances of PUFA, MUFA, SFA, W-3 fatty acid.

4. Proteins- Definition, Classification, Structure & properties. Amino acids Classification, types, functions. Proteins - Sources, daily requirements, functions.

Effect of too high - too low proteins on health. Digestion & absorption. Assessment of

Protein quality (BV, PER, NPU). Factors affecting protein bio-availability including

anti-nutritional factors.

FOOD SCIENCE (PRACTICAL)

1. Identification of Mono, Di, and polysaccharides

2. Identification of Proteins

3. Identification of glycerol.

SEMESTER II

Type of Course	Code	Title of the Course	Contact Hours Per Week				Remarks
			L	T	P	C	
CC	FND105	Basic Food Science	2	1	1	4	CC-3
CC	FND106	Human Physiology 2	2	1	1	4	CC-4
MDC			2	0	1	3	MDC2
SEC	SEC174	Food Technology	1	0	1	2	SEC-1
VAC	VAC105	Community engagement and Social responsibility	1	0	0	1	VAC2
AEC	AEC102	Communicative English-II	2	1	0	3	AEC2
Minor			2	1	1	4	Minor2
Semester						**22**	

COURSE NAME: Basic Food Science
COURSE CODE: FND105
CREDITS: 4

L	T	P	C
2	**1**	**1**	**4**

Course outcomes:

CO1. Knowledge of the nutrients, vitamins, and minerals in various foods, helping individuals make informed dietary choices.

CO2. Enhanced cooking techniques and the ability to modify recipes for taste and health benefits.

CO3. Ability to analyze the impact of food on health, fostering better nutrition practices and dietary planning.

CO4. Learn about the chemical composition of different foods and how they change during cooking and processing.

CO5. Apply food science principles to control and assure the quality of food products

Course content:

Unit I. Food Science **8 hours**

Definitions- Food, Food Groups- Basic 4,5 & 7, Importance of food groups, Balanced diet, Hunger-Meal, Menu, Nutritional classification of foods – Energy yielding, Body building and protective foods, Food Pyramid, My Plate. Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting, broiling, and cooking under pressure.

Unit II. Cereals, Pulses, and Nuts **12 hours**

Cereals and Cereal products- Structure and Nutritive value, parboiling of rice, Products of wheat and rice, Enrichment and fortification, Malting of cereals.

Pulses and Nuts- Nutritive value, Types, factors affecting the cooking quality of pulses, Germination,

Unit III. Vegetables and Fruits **8 hours**

Vegetables- Botanical classification, Nutritive value, Pigments- fat soluble, water soluble, selection of vegetables, cooking of vegetables- changes during cooking, nutrient loss, the effect of cooking on the pigments

Fruits- Classification, Nutritional value, changes during ripening of fruits, enzymatic browning, and prevention, storage.

Unit IV. Milk, Milk Products, Eggs, Meat, Poultry **14 hours**

Milk and Milk Products- Composition and Nutritive value, Different types of milk, pasteurization of milk, milk products- dry milk, cheese. Steps of milk processing: collection, chilling, standardization, pasteurization, homogenization, bactofugation, and principles of dehydration

Eggs- Structure, Composition, and Nutritive value. Measures of egg quality, the role of egg in cookery, foam formation and factors affecting foam formation.

Meat - structure, composition, a list of different types of meat, cuts of meat, post-mortem changes in meat, and tenderness of meat.

Poultry- composition and classification. e. Fish- structure, composition, nutritive value, selection of fish.

Unit V Fats, Sugars, Spices, and Condiments **8 hours**

Fats and oils- composition processing and refining of fats, refined oils, plasticity, hydrogenation, winterization. The smoking point, factors that lower the smoking point, absorption of fat during cooking.

Sugar- nutritive value, Artificial Sweeteners, sugar-related products, stages of sugar cookery, crystallization, and factors affecting crystallization.

Spices and condiments- types and uses in Indian cookery, medicinal values of spices & condiments.

REFERENCE BOOKS:

1. Essentials of Food Science,**Vickie A. Vaclavik,Elizabeth W. Christian,Tad Campbell,2021**
2. **Srilakshmi B (2015) Food Science - 7th Ed., New age international Publ., New Delhi**

COURSE NAME: Basic Food Science-Practical
COURSE CODE: FND105
CREDITS: 1

Course outcomes:

CO1. Students will gain hands-on experience in identifying the different components of food, such as proteins, carbohydrates, fats, vitamins, and minerals, and learn how these components contribute to the nutritional value of food.

CO2. Enhanced cooking techniques and the ability to modify recipes for taste and health benefits.

CO3. The course will emphasize proper food handling, storage, and sanitation practices, teaching students how to prevent foodborne illnesses and maintain hygiene standards in a food preparation environment.

CO4. Students will explore the chemical changes that occur during food preparation, such as Maillard reaction, fermentation, and enzymatic browning, and understand their impact on flavor, color, and texture.

CO5. Students will conduct sensory evaluations to assess the appearance, texture, aroma, and taste of food products, helping them understand how sensory characteristics influence consumer preferences and food quality.

Course Content:

1. Food group- Grouping of foods, discussion on nutritive value.
2. Measuring ingredients Methods of measuring different types of foods – grains, flours & liquids
3. Edible portion: Determination of edible portion percentage of different foods.
4. Cooking methods Moist heat methods – (i) boiling, simmering, steaming, & Pressure cooking, (ii). Dry heat methods – baking. (iii), Fat as a medium for Coking-shallow and deep fat frying.
5. Methods of cooking fine and coarse cereals. Examination of starch
6. Cooking of soaked and un soaked pulses, Common preparations with pulses.
7. Experimental cookery using vegetables of different colours & textures. Common Preparations with vegetables. Preparation of soups and salads, Prevention of darkening in fruits & vegetables.
9. Milk & milk products: Common preparation with milk, cheese & curd.
10. Flesh foods: Fish, meat & poultry- preparations.
11. Egg Experimental cookery- boiled egg, poached egg. Common preparations with egg.
12. Beverages Preparation of hot beverages- coffee, tea. Preparation of cold Beverages-fruit drinks & milk shake.
13. Sensory Evaluation and preparation of score card.

REFERENCE BOOKS:

1.) Potter, N. and Hotchkiss, J.H. Food Science, 5th Ed., CBS Publications and Distributors, Daryaganji, New Delhi, 1998.
2.) Shakuntala Manay, Shadaksharaswamy. M (2000) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition.
3.) Usha Chandrasekhar, Food Science and Application in Indian Cookery, Phoenix Publishing House P. Ltd., New Delhi, 2002.
4.) X Srilakshmi, B. Food Science, New Age International Publishers, New Delhi, 2010 5. Swaminathan, M, Hand Book of Food Science and Experimental Foods, BAPPCO, Bangalore, 1992.
5.) Brow, A., Understanding Food, Thomson Learning Publications, Wadsworth, 2000.
Mehas, K.Y. and Rodgers, S.L. Food Science and You, McMillan McGraw Company, New York, 2000.

COURSE NAME: Human Physiology 2
COURSE CODE: FND106
CREDITS: 4

L	T	P	C
2	1	1	4

Course Outcomes:

CO1. Describe the structure of major human organs and explain their role in the maintenance of healthy individuals.

CO2. Define basic biological processes essential for maintenance of homeostasis.

CO3. Explain the structure and functional organization of the human nervous system and its subdivisions.

CO4. Describe the basic anatomy and functions of the pulmonary system.

CO5. Know the physiological relationships between endocrine organs, distributed endocrine tissues.

Course content:

Unit I. Endocrine System **12 hours**

Definition, classification of endocrine glands and their hormones, properties of hormones. Thyroid gland hormones – regulation of secretion. Disorders – hypo and hypersecretion of hormone. Adrenal gland - physiological anatomy. Adrenal cortex, cortical hormones – functions and regulation. Adrenal medulla – hormones, regulation and secretion. Functions of adrenaline and nor-adrenalin. Pituitary hormones – anterior and posterior pituitary hormones, secretion, function. Pancreas – hormones of pancreas. Insulin – secretion, regulation, function and action. Diabetes mellitus – regulation of blood glucose level. Parathyroid gland – function, action, regulation of

secretion of parathyroid hormone. Calcitonin – function, action, Ca metabolism and hormone regulating Ca metabolism.

Unit II. Nervous System **15 hours**

Functions of nervous system, neuron structure, classification and properties, neuroglia. Nerve fibre, classification, conduction of impulses, factors affecting conduction. Synapse - structure, types, properties. Receptors - definition, classification, properties. Reflex action - reflex arc, properties of reflex action. Spinal cord nerve tracts - function. Functions of medulla, pons, and hypothalamus. Cerebral cortex, lobes and functions, sensory cortex, motor cortex. Cerebellum - functions. Basal ganglia - functions, EEG, Parkinson's disease. Cerebro Spinal Fluid (CSF) - formation, circulation, properties, composition and functions, lumbar puncture, sleep, types of sleep.

Unit III. Skeletal system **7 hours**

Divisions of skeletal system, types of bone, salient features and functions of bones of axial and apendicular skeletal system, Axial Skeleton, Apendicular skeleton, skeletal muscle physiology, neuromuscular junction.

Unit IV: Joints **5 hours**

Joints: Structural and functional classification, types of joints movements, types of joints movements, articulation.

Unit V Sense Organs **6 hours**

Eye- Function of different parts of eye, light reflex, refractive errors, colour blindness, night blindness, accommodation. Ear –Function of ear, deafness, and vestibular apparatus. Taste buds – functions, smell physiology, receptors. Smell and cutaneous sensations.

REFERENCE BOOKS:

1. Guyton AC, Hall JE (1996) Textbook of Medical Physiology, 9th Ed., Prism Books Pvt Ltd., Bangalore.
2. Chatterjee CC (1988) Human Physiology, Calcutta, WB Wilson (1989).

3. Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone Sembulingam K, Sembulingam P (2012).
4. Essentials of medical physiology, Jaypee Publ.

COURSE NAME: HUMAN PHYSIOLOGY - PRACTICAL
COURSE CODE: FND106
CREDITS: 1

Course Outcomes:

CO1. Perform the haematological tests on human subjects and interpret the results

CO2. Record, monitor and document the vital physiological parameters of human subjects and interpret the results

CO3. Describe the anatomical features of the important human tissues under microscopical conditions

CO4. Discuss the significance of various anatomical and physiological characteristics of the human body

CO5. Expanding physiological knowledge helps to understand how the body works.

Course content:

1. Histology of Tissues – Columnar, cubical, ciliated, squamous, stratified squamous.
2. Microscopic structure of organs – lungs, artery, vein, stomach, ovary, testis, uterus, pancreas.
3. Histology of muscles – cardiac, striated, non – striated.
4. Estimation of Haemoglobin, bleeding time, Clotting time.
5. Measurement of Blood pressure – before and after exercise.
6. Determination of Respiratory rate and Pulse rate – before and after exercise.
7. Determination of Blood group.
8. Determination of Rh factor.
9. Enumeration of Red blood cells – Demonstration.
10. Enumeration of White blood cells – Demonstration.
11. Differential Leucocyte count – Demonstration.
12. Visit to a Clinical laboratory.

REFERENCE BOOKS:

1. Guyton AC, Hall JE (1996) Textbook of Medical Physiology, 9th Ed., Prism Books Pvt Ltd., Bangalore.
2. Chatterjee CC (1988) Human Physiology, Calcutta, WB Wilson (1989).
3. Anatomy and Physiology in Health and Illness, Edinburgh Churchill Livingstone Sembulingam K, Sembulingam P (2012).
4. Essentials of medical physiology, Jaypee Publ.

COURSE NAME: Food Technology
COURSE CODE: SEC174
CREDITS: 2

L	T	P	C
1	0	1	2

Course Outcomes:

CO1. Understand the basic concepts of food technology

CO2. Gain knowledge about the processing of different food items.

CO3. Understand the preservation of foods.

CO4. Understand packaging technology.

CO5. Know the importance of food chemistry in today's fast lifestyle, the chemical reactions of nutrients

Course content:

Unit I. Concepts of Food Technology **10 hours**

Introduction to the concept of food technology, physicochemical properties of food, classification of food groups, Ingredients of food, techniques and equipments for food preservation such as drying, refrigeration, thermal treatments.

Innovative techniques in food processing: Ready-to-eat (RTE), ready-to-serve (RTS), edible coatings, edible film, instant premixes.

Significance of packaging and its various requirements.

Unit II. Cereals, Millets, Pulses and Legumes **10 hours**

Processing of cereals and millets, malting, different types of browning, composition of rice obtained by different dehusking methods, milling of rice.

Pulses and legumes- Milling of legumes, processing of pulses,toxic constituents in pulses and its detoxification processes, latest technologies of processing legumes-canning, quick cooking legumes, instant legume powder, legume protein concentrates.

Unit III. Fruits, Vegetables, Meat, Fish and Poultry 10 hours

Enzymatic browning, Post harvest changes occurring in fruits and vegetables – Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes occuring during the storage.

Ageing and tenderizing of meat, storage and preservation, cuts and grades of meat.

Preservation of fish by drying, curing, brining, fermentation.

Preservation of eggs, egg powder, frozen eggs.

Unit IV. Food Processing and Preservation Techniques 15 hours

Introduction to refrigeration and freezing, principles of freezing, types of freezing, introduction to thawing, principles involved in thawing and its effect on food.

Introduction to drying and dehydrationas a means of preservation, factors affecting rate of drying, types of driers.

Introduction to food irradiation, kinds of ionizing radiations food irradiation, radiation processing in food industry, safety of irradiated foods, introduction to cold sterilization.

Processing of milk products- Pasteurization, homogenization, drying, packaging, standardization, recombination, reconstitution.

Unit V. Packaging Technology 5 hours

Introduction to packaging technology, materials used in packaging, effects of packaging materials on the nutritive value of foods.

Different types of additives used in foods and their advantages and disadvantages.

REFERENCE BOOKS:

1.) Food Technology, Prescott and Proctor.B.B.Mc Graw Hill Book Co., New York, 1937.

2.) Rahman, M.S., Handbook of Food Preservation. MARCEL DEKKER Inc. 1999

COURSE NAME: Food Technology- Practical
COURSE CODE: SEC174
CREDITS: 1

Course outcomes:

CO1. Interactions among food components and water relationships in foods.

CO2. Analyze different food packaging methods and conduct shelf-life studies, evaluating the effects of packaging on food quality and safety over time.

CO3. Implement and evaluate food safety protocols and hygiene practices in the laboratory, ensuring compliance with industry standards and regulations.

CO4. Understanding the role of various food preservation methods.

CO5. Formulate food products using appropriate ingredients and methods, applying principles of food science to create innovative recipes that meet consumer needs.

Course content:

1.) Introduction to basic laboratory instruments and equipment related to food technology.
2.) Development of processed cereal products.
3.) Development of processed meat and fish products.
4.) Survey of processed foods available in the market.
5.) Drying of food products.
6.) Freezing of food products.
7.) Study of various types of food packaging materials.
8.) To perform organoleptic testing of food products.
9.) Study of concept of shelf-life of processed and unprocessed food products.
10.) Visit to different food processing industries.

REFERENCE BOOKS:

1.) Food Technology, Prescott and Proctor.B.B.Mc Graw Hill Book Co., New York, 1937.

2.) Rahman, M.S., Handbook of Food Preservation. MARCEL DEKKER Inc. 1999.

Course Code: VAC105	Community Engagement and Social Responsibility	L	T	P	C
	1 credit (1 lecture hr/week) is for Theory and 1 credit is for Field work (2 hr field work/week).	1	0	1	2

Course Objectives:

- To develop an appreciation of rural culture, life-style and wisdom amongst students
- To learn about the status of various agricultural and rural development programmes
- To understand causes for rural distress and poverty and explore solutions for the same
- To apply classroom knowledge of courses to field realities and thereby improve quality of learning

Course Outcomes

On completion of this course, the students will be able to

CO1 Gain an understanding of rural life, culture and social realities

CO2 Develop a sense of empathy and bonds of mutuality with local community

CO3 Appreciate significant contributions of local communities to Indian society and economy

CO4 Learn to value the local knowledge and wisdom of the community

CO5 Identify opportunities for contributing to community's socio-economic improvements

Catalog Description

Along with Intelligent Quotient, it is important for students to enhance their Emotional Quotient as well. The Social Internship offers opportunity to the student to be empathetic towards social issues facing our society. To help and support the affected community / cause through a field internship is the essence of the course in 'giving back to the society'.

Course Content

Unit I: Appreciation of Rural Society:

Rural and peri-urban life style, rural society, caste and gender relations, rural values with respect to community, rural culture, nature and resources, elaboration of "soul of India lies in villages' (Gandhi), rural infrastructure.

Unit II: Understanding rural and local economy and livelihood:

Agriculture, farming, land ownership, water management, animal husbandry, non-farm livelihoods and artisans, rural entrepreneurs, rural markets, migrant labourer, impact of COVID-19 on Migrant Labourers.

Unit III: Rural and Local Institutions:

Traditional rural and community organizations, local administration and community involvement, Self-help Groups, Panchayat raj, institutions (Gram Sabha, Gram Panchayat, Standing Committees), Nagarpalikas and municipalities, local civil society.

Unit IV: Rural and National Development Programme:

History of rural development in India, Current national programs in India: Sarva Shiksha, Abhiyan, Beti Bachao, Beti Padhao, Ayushman Bharat, Swatchh Bharat, PM AwaasYojana, Skill India, Gram Panchayat Decentralised Planning, NRLM, MNREGA, SHRAM, Jal Jeevan Mission, SFURTI, Atma Nirbhar Bharat, etc.

Various schemes of West Bengal Government: Kanyashree, Rupashree, Lakshmir Bhandar, Yuvasree, Sikshashree, Jai Bangla, Lokprasar, Nijo Griha Nijo Bhumi, Swasthya Sathi, Gatidhara, Gitanjali, Khadya Sathi, Sabooj Sathi, Sabujshree, Sufal Bangla, Shishu Sathi, Sabala etc.

Recommended field-based practical activities:

- Interaction with SHG women members, and study of their functions and challenges; planning for their skill building and livelihood activities.
- Visit MGNREGS project sites, interact with beneficiaries and interview functionaries at the work site.
- Field visit to Swachh Bharat project sites, conduct analysis and initiate problem solving measures.
- Conduct Mission Antyodaya surveys to support under Gram Panchayat Development Plan (GPDP).
- Interactive community exercise with local leaders, panchayat functionaries, grass-root officials and local institutions regarding village development plan preparation and resource mobilization.
- Visit Rural Schools / mid-day meal centres, study Academic and infrastructural resources and gaps.
- Participate in Gram Sabha meetings, and study community participation.

- Associate with Social audit exercises at the Gram Panchayat level, and interact with programme beneficiaries.
- Attend Parent Teacher Association meetings, and interview school drop outs Fostering Social Responsibility & Community Engagement in Higher Education Institutions in India.
- Visit local Anganwadi Centre and observe the services being provided.
- Visit local NGOs, civil society organisations and interact with their staff and beneficiaries.

- Organize awareness programmes, health camps, Disability camps and cleanliness camps.
- Conduct soil health test, drinking water analysis, energy use and fuel efficiency surveys.
- Raise understanding of people's impacts of climate change, building up community's disaster preparedness.
- Organise orientation programmes for farmers regarding organic cultivation, rational use of irrigation and fertilizers and promotion of traditional species of crops and plants.
- Identifying the small business ideas (handloom, handicaraft, khadi, food products, etc.) for rural areas to make the people self-reliant.

Recommended Readings

Books:

1. Singh, Katar, Rural Development: Principles, Policies and Management, Sage Publications, New Delhi, 2015.
2. A Hand book on Village Panchayat Administration, Rajiv Gandhi Chair for Panchayati Raj Studies, 2002.
3. United Nations, Sustainable Development Goals, 2015 un.org/sdgs/
4. M.P.Boraian, Best Practices in Rural Development, Shanlax Publishers, 2016.

Journals:

1. Journals of Rural development, (published by NIRD & PR Hyderabad)
2. Indian Journal of Social Work, (by TISS, Bombay)
3. Indian Journal of Extension Education (by Indian Society of Extension Education)
4. Journal of Extension Education (by Extension Education Society) Fostering Social Responsibility & Community Engagement in Higher Education Institutions in India
5. Kurukshetra (Ministry of Rural Development, GoI)
6. Yojana (Ministry of Information and Broadcasting, GoI)

Multi-disciplinary courses to be offered by the Department

COURSE NAME: Food adulteration (Theory)
COURSE CODE: FND107
CREDITS: 4

L	T	P	C
2	0	1	3

Course outcomes:

CO1: Students will be able to define adulteration and identify common adulterants used in various food products.

CO2: Learners will analyze the harmful effects of adulterated products on human health, including long-term and short-term consequences, and understand the importance of quality control.

CO3: Students will gain knowledge about different methods and techniques used to detect adulteration in various products, such as physical, chemical, and biological tests.

CO4: Learners will explore the legal framework and ethical considerations regarding adulteration, including relevant laws, regulations, and consumer rights.

CO4: Students will be equipped with the skills to raise awareness among consumers about the dangers of adulteration, as well as strategies to prevent and control it within industries and communities.

Course Content:

Unit 1. Detection of food adulterants **2 hours**

Detection of common food adulterants in various food products (theoretical aspects)

i. Spices

ii. Grains

iii. Coffee

iv. Tea

v. Oil fats

vi. Food colours

vii. Milk

Uni II. Food safety **2 hours**

Aspects of food safety- HACCP, GMP, role of FDA, Agmark, ISI, PFA

Unit III. Sanitation and Hygienic **2 hours**

Concept of sanitation and hygienic production of food

Unit IV. Fundamentals of food additives **2 hours**

ADDITIVES: (i) Organic acids, propionate, benzoates, sorbates, acetates (ii) Ethlene and propylene oxide (iii) Sugar and salt (iv) Alcohol (v) Wood smoke (vi) Esters (vii) Legal aspects

COURSE NAME: Food adulteration (Practical)
COURSE CODE: FND107
CREDITS: 1

Course outcomes:

CO1. Students will learn techniques to detect common adulterants in food products through simple tests and laboratory methods.

CO2: Students will understand the health hazards associated with food adulteration and the impact on consumer safety.

CO3: Students will gain practical experience in using tools and techniques for analyzing food samples for adulteration.

CO4: Students will become familiar with food safety standards and regulations related to food adulteration.

CO4: Students will learn how to educate consumers on identifying adulterated foods and promote safe food practices.

Course content:

1. Detection of Vanaspati in Ghee/Butter.

2. Detection of Khesari flour in besan.

3. Detection of Metanil yellow in turmeric/colored sweet products.

4. Detection of Argemon oil in edible oil

5. Detection of artificially colored / foreign matter in tea (dust/leaves).

6. Detection of adulteration in some spices.

7. Detection of adulteration in milk.

Minor Course

Course Name: Public Health Nutrition-Theory
COURSE CODE: FND108
CREDITS: 4

L	T	P	C
2	1	1	4

Course Outcomes:

CO1. Students will develop effective communication skills to advocate for nutrition-related health policies and programs, and to educate communities about healthy eating and nutrition.

CO2. Students will develop the ability to apply epidemiological methods to study the relationship between nutrition and public health, including analyzing nutritional data and trends in different populations.

CO3. Students will be able to assess the nutritional needs of diverse populations, including vulnerable groups like children, pregnant women, and the elderly, and design appropriate interventions.

CO4. Students will be equipped to evaluate and contribute to public health nutrition policies, understanding the role of government and organizations in shaping nutrition-related health initiatives and programs.

CO5. Students will learn to design, implement, and evaluate nutrition-based public health programs and interventions that address malnutrition, obesity, and chronic diseases in various communities.

Course content:

Unit 1: Introduction to Public Health **8 hours**

Definition and Scope of Public Health: Public health vs. clinical health, Key principles and functions of public health

Determinants of Health: Social, economic, environmental, and behavioral determinants, Health equity and disparities

Public Health Systems and Organizations: Role of WHO, CDC, and other public health agencies, Public health laws, policies, and regulations

Unit 2: Epidemiology in Public Health **6 hours**

Introduction to Epidemiology: Definition, scope, and methods of epidemiology

Epidemiological Study Designs: Descriptive, analytical, and experimental study designs, Cohort, case-control, and cross-sectional studies.

Measures of Disease Frequency and Association: Incidence, prevalence, mortality rates, relative risk, and odds ratio

Outbreak Investigation: Steps in investigating an outbreak, Control measures and surveillance

Unit III: Environmental and Occupational Health **14 hours**

Environmental Health: Impact of environmental factors (pollution, climate change) on health, Water, air, and food safety, Disparities in environmental exposure and health outcomes, Public health interventions for environmental health issues.

Occupational Health: Workplace hazards and their impact on worker health, Occupational diseases and Injury prevention

Global Environmental Health Issues: Emerging environmental health threats (e.g., climate change, pandemics)

Unit 4: Health Promotion and Disease Prevention 14 hours

Health Promotion Theories and Models: Social determinants of health and health behavior theories, Models of health behavior change (e.g., Health Belief Model, Social Cognitive Theory)

Disease Prevention Strategies: Primary, secondary, and tertiary prevention, Immunization programs, screenings, and early detection

Health Education and Communication: Principles of health education, Effective communication strategies in public health

Chronic Disease Prevention: Preventing cardiovascular diseases, diabetes, and cancer, Nutrition, physical activity, and lifestyle interventions

Unit 5: Public Health Policy and Global Health 8 hours

Public Health Policy: Role of government in public health, Health policies, laws, and their impact on population health

Global Health Challenges: Infectious diseases (HIV, malaria, TB) and non-communicable diseases (NCDs), Global health initiatives and partnerships (e.g., SDGs, WHO)

Healthcare Systems and Public Health: Overview of healthcare systems globally (primary, secondary, tertiary care), The role of public health in strengthening healthcare systems

Emerging Public Health Issues: Mental health, substance abuse, and pandemic preparedness, Health disparities and the role of public health advocacy

REFERENCE BOOK:

1.) Agarwal A.N, Indian Economy, Problems of development and planning, Publications, 1981.
2.) Park J.E. and park K. Text book of preventive and social medicine, Publications, 1994.
3.) B. Srilakshmi, Nutrition Science New Age International (CP) Ltd, New Delhi, 2002.
4.) Mahtab, S. Bamji, N. Pralhadrao, Vinodini Reddy, Text book of Human Nutrition, Oxford and IBIT Publishing co Pvt. Ltd, New Delhi, reprint 1999.
5.) Shukla,P.K., Nutritional problems of India,1982.
6.) Temple, N.J. and Steyn, N. Community Nutrition for Developing Countries Athabasca University Press and UNISA Press 2016.

Course Name: Public Health Nutrition-Practical
COURSE CODE: FND108
CREDITS: 1

Course outcomes:

CO1. Understanding the concept of health from the perspective of the community and the individual.

CO2. Understanding the causes, symptoms, treatment, and prevention of common nutritional problems in the community.

CO3: Learning about the schemes, programs, and policies of the Government of India to combat malnutrition.

CO4: Understanding modern methods of assessing the nutritional quality of food .

CO5: Ability to apply their skills to assess the health status of individuals by using ABCD methods of nutritional assessment

Course Content:

1. Assessment of nutritional status by direct methods such as height, weight, head circumference, chest and mid arm circumference.
2. Assessment of nutritional status by indirect methods including clinical and biochemical methods.
3. Identification of vulnerable groups as part of diet and nutrition surveys.
4. Preparation of visual aids.
5. Observation of the working of nutrition and health oriented programmes.
6. Visit to hospitals to observe nutritional deficiencies.
7. Plotting of growth charts, growth monitoring and promotion.

8. Understanding the different programs implemented by the government with respect to community health.
9. Determination of clinical parameters like blood glucose and haemoglobin to monitor the health status.
10. Study of different signs of nutrient deficiencies such as kwashiorkor, marasmus, vitamin A deficiencies, anaemia, rickets, B-Complex deficiencies and their clinical assessment.
11. Estimation of food and nutrient intake - Household food consumption data, adult consumption unit, 24 hours dietary recall, 24 hours record.

SEMESTER III								
S.No	**Type of Course**	**Code**	**Title of the Course**	**Contact Hours Per Week**				**Remarks**
				L	**T**	**P**	**C**	
1	CC	FND201	Nutritional biochemistry	2	1	1	4	CC-5
2	CC	FND202	Food Microbiology	2	1	1	4	CC-6
3	MDC			2	0	1	3	MDC3
4	Minor		To be chosen from a pool of minors	2	1	1	4	Minor3
5	AEC	AEC106	Professional communication skills				2	AEC3
6	SEC	SEC175	Mushroom Culture	1	0	1	2	SEC-2
7	VAC	VAC102	Human values and ethics	2	0	0	2	VAC3

COURSE NAME: NUTRITIONAL BIOCHEMISTRY-THEORY

COURSE CODE:FND201

CREDIT:4

COURSE OBJECTIVES: The course will enable the students to

1.) Understand the principles of biochemistry.
2.) Remember the classification of different macro and micronutrients.
3.) Analyse the metabolic pathways of different food components (carbohydrate, protein, fat).
4.) Evaluate the biochemical processes of different macromolecules.
5.) Apply the principles of buffers, fluids and electrolytes in maintenance of normal health.

Unit I Carbohydrates

12 hours

Carbohydrates- Definition, classification.Structure (linear) of Monosaccharides- Glucose, fructose and galactose; Disaccharides- Maltose, lactose and sucrose; Polysaccharides- Starch and glycogen. Metabolism- Glycolytic pathway, electron transport chain and oxidative phosphorylation. Definition of glycogenesis, glycogenolysis and gluconeogenesis.

Unit II Proteins

10 hours

Protein- Definition, classification, structure, physical properties, chemical properties and utilization. Aminoacids- Types, definition of deamination, transamination and decarboxylation. Enzymes and co-enzymes- Definition, types, classification and factors affecting velocity of enzyme catalyzed reactions.

Unit III Lipids

10 hours

Lipids- Definition, classification and properties. Metabolism- Oxidation and biosynthesis of fatty acids. Definitions- Ketone bodies, ketogenesis and ketosis.

Unit IV Nucleic Acids

8 hours

Introduction to genetic control of metabolism- Nucleic acids, types, composition, structure, functions, replication and transcription. Elementary knowledge of biosynthesis of protein.

Unit V Buffers, Fluids and Electrolytes

10 hours

Acid-base balance in normal health, definition of buffers, principles of buffers, major sources of acid produced in the body, physiological buffer system and role of different buffer systems. Fluid and electrolyte balance- Maintenance in normal health.

REFERENCE BOOKS:

1.) Pattabiraman. T.N. Concise text Book of Bio- chemistry, 2nd edition, all India publishers and distributors Regd., 1998.
2.) Deb. A.C., Fundamental of Biochemistry, New centrul book agency (p)Ltd, reprint 2004.
3.) Ambikashanmugam, Fundamentals of biochemistry for Medical students, Karthik printers, 7th edition, 1992.
4.) West ES, Todd WR, Mason HS, Van Bruggen JT (1974) Text book of Biochemistry, 4th Ed., Amerind Publ. Co. Pvt. Ltd.
5.) Lehninger AL, Nelson DL, Cox MM (1993) Principles of Bio Chemistry, 2nd Ed., CBS Publ., and distributors.

6.) Devlin TM (1986) Textbook of Biochemistry with clinical correlations, 2nd Ed., John Wiley & Sons.
7.) Stryer L (1995) Biochemistry, Freeman WH and Co.
8.) Jain JL (2012), Fundamentals of Biochemistry, S. Chand and Company Ltd.

COURSE NAME: NUTRITIONAL BIOCHEMISTRY – PRACTICAL 2 HOURS/WEEK
COURSE CODE: FND201
CONTACT: 2P
CREDITS: 1

COURSE OBJECTIVES: The course will enable the students to

1.) Understand the biochemical alterations that enable the qualitative and quantitative assessment of biomolecules.
2.) Remember the mechanism lying behind the biochemical processes.
3.) Analyze the biochemical pathways with the gathered knowledge from various estimation methods of biomolecules.
4.) Evaluate the methods implemented to assess various biochemical phenomena.
5.) Create a detailed understanding of the critical mechanisms of biochemistry to utilize them in every analytical procedure.

1.) Qualitative analysis for carbohydrates - Glucose, Fructose, Maltose, Lactose, Sucrose, Starch and Galactose.
2.) Qualitative tests of amino acids and proteins.
3.) Quantitative analysis in blood and serum - Blood glucose, cholesterol, urea.
4.) Enzymes – effect of pH on human salivary α-amylase activity.
5.) Estimation of serum Protein (Biuret Rhethod and Lowry method).
6.) Estimation of blood Glucose (Folin Wu method).
7.) Estimation of Serum inorganic phosphorus (Fiske and SubbaRow method).
8.) Estimation of blood creatinine.
9.) Quantitative analysis of calcium by titrimetry.
10.) Quantitative analysis of vitamin C 2,6 dichloro indophenol dye method.

COURSE NAME: FOOD MICROBIOLOGY-THEORY

COURSE CODE: FND202

CREDITS: 4

Module – I: Introduction and scope of food microbiology: 10 Hours

Introduction of microbiology and its relevance to everyday life, General characteristics of bacteria, fungi, virus, protozoa, and algae, Identification of microorganisms, Morphological characteristics important in food bacteriology, Industrial importance.

Module – II: Growth of microorganisms: 10 Hours

Growth curve, Intrinsic Factors (Substrate Limitations), nutrient content, pH and buffering Capacity, antimicrobial barriers and constituents water Activity – Intrinsic Factors (Substrate Limitations), relative Humidity, temperature, gaseous atmosphere.

Module – III: Microbiology of food 10 Hours

a) Cereal and cereal products.
(b) Sugar and sugar products.
(c) Vegetables and fruits.
(d) Meat and meat products.
(e) Fish, egg and poultry,
(f) Milk and milk products
(g) Canned foods.

Module - IV Fermented foods 12Hours

Microbiology of fermented milk - Starter lactic cultures, fermented milk products: yogurt, butter and cheese, other fermented foods: idly, bread. Nutritional value of fermented foods. Microorganisms as food: single cell protein, edible mushrooms. Probiotics: definition and uses.

Module – V: Food borne diseases 10Hours

a) Definition of food poisoning, food infections and toxications.
b) Causative agents, foods involved, symptoms and preventive measures.
c) Food intoxications: Staphylococcus aureus, Clostridium botulinum and mycotoxins; Food infections: Bacillus cereus, Escherichia coli, Shigella, Listeria monocytogenes.

Module – VI: Relevance of microbial standards for food safety 5 Hours

Food Agricultural Organization (FAO),
World Health Organization (WHO),
Codex Alimentarius
The International Commission on Microbiological Specifications for Foods(ICMSF)
The Food and Drug Administration(FDA)
United States Department of Agriculture (USDA)

REFERENCEBOOKS:

1.) M.R. Adams and M.O. Moss, Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
2.) Vijaya Ramesh, K. Food Microbiology, MJP Publishers, Chennai, 2007.
3.) James G. Cappuccino and Natalie Sherman, Microbiology – A Laboratory Manual, Pearson Education Publishers, USA, 2008.
4.) James M. Jay Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi, 2005.

5.) Adams Tamine, Probiotic Dairy Products, Blackwell Publishing, USA, 2005.

COURSE NAME: FOOD MICROBIOLOGY-PRACTICAL **2 Hours/Week**

COURSE CODE: FND202

COURSE OBJECTIVES: The course will enable the students to

1.) Understand the cultivation processes of microorganisms and introduced with the preparation of laboratory and special media.
2.) Remember the principles of staining procedures of bacteria.
3.) Analyze the processes of identifications and cultivation of important moulds and yeast in food items
4.) Evaluate the rapid methods and diagnostic kits used in identification of microorganisms or their products
5.) Create an intricate concept of equipments frequently used in a microbiology laboratory.

1. Study of equipments in a microbiology lab.
2. Preparation of laboratory media and special media, cultivation of bacteria, yeasts and moulds.
3. Differential Staining of bacteria
4. Cultivation and identifications of important moulds and yeast in food items.
5. Demonstration of available rapid methods and diagnostic kits used in identification of microorganisms or their products.
6. Visit (at least two) to food processing units or any other organization dealing with advanced methods in food microbiology

REFERENCEBOOKS:

1) M.R. Adams and M.O. Moss, Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
2) Vijaya Ramesh, K. Food Microbiology, MJP Publishers, Chennai, 2007.
3) James G. Cappuccino and Natalie Sherman, Microbiology – A Laboratory Manual, Pearson Education Publishers, USA, 2008.
4) James M. Jay Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi, 2005.
5) Adams Tamine, Probiotic Dairy Products, Blackwell Publishing, USA, 2005.

COURSE NAME: MUSHROOM CULTURE -THEORY **45 HOURS**
COURSE CODE: SEC175
CONTACT: 3T+1L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to

1. Identify the edible and poisonous mushrooms.
2. Remember the hands-on training for the preparation of bed for mushroom cultivation and its harvesting, pests and diseases control and post harvesting management.
3. Understand the marketing trends of Mushrooms.
4. Evaluate the exposure to the experiences of experts in the field and to functioning mushroom farms.
5. Create a means of self-employment and income generation.

Unit I **[10H]**
Definition and characteristics of mushroom. Morphology and life cycle of mushrooms. Identification and classification of mushroom

Unit II **[10H]**
Nutritional and medicinal value of edible mushrooms; poisonous mushrooms

Unit III **[10H]**
Types of edible mushrooms available in India- Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.

Unit IV **[10H]**
Process of mushroom cultivation.

Unit V **[5H]**
Storage and nutrition: short term storage (Refrigeration- upto 24 hours), long term storage (canning, pickles, papads), drying, storage in salt solutions.

REFERENCE BOOKS:

1. Paul Stamets, J.S. and Chilton, J.S. 2004. Mushroom cultivation A practical guide to growing mushrooms at home, Agarikon Press.
2. Tewan and Pankaj Kapoor S.C. 1993. Mushroom cultivation. Mittal Publication. Delhi.
3. Marimuth et al., 1991. Oyster Mushrooms. Dept. of Plant pathology, TNAU, Coimbatore.
4. Nita Bahl. 1988. Hand book of Mushrooms, 2nd Edition, Vol I & II.
5. Shu Fing Chang, Philip G. Miles and Chang, S.T. 2004. Mushrooms Cultivation, nutritional value, medicinal effect and environmental impact. 2nd ed., CRC press.

COURSE NAME: - MUSHROOM CULTURE -PRACTICAL **2 HOURS/WEEK**
COURSE CODE: SEC175

CONTACT: 2P
CREDITS: 1

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the principles of mushroom culture.
2.) Remember the types and varieties of mushroom.
3.) Analyze the identification of edible and poisonous mushroom.
4.) Evaluate the process involved in mushroom cultivation.
5.) Apply the gathered knowledge in preparation of food from mushroom.

1. Visit to Mushroom Culture Centers/ Farms for: Process involved in mushroom cultivation Types and varieties of mushroom Visual Identification of edible and poisonous mushroom Marketing
2. Different Food preparation from mushroom

REFERENCE BOOKS:

COURSE NAME: HUMAN VALUES AND ETHICS **30 HOURS**
COURSE CODE: VAC102
CONTACT: 2L
CREDITS: 2

COURSE OBJECTIVES: This course will enable the students to-

CO1: **Understanding of Core Ethical Theories**: Students will gain a deep understanding of key ethical frameworks and philosophies, including utilitarianism, deontology, virtue ethics, and relativism, and learn how these theories apply to real-world moral dilemmas.

CO2: Application of Ethical Decision-Making: Students will develop the skills to analyze complex ethical issues in various contexts, such as business, medicine, and technology, and make informed decisions based on ethical principles.

CO3: Awareness of Human Values in Society: Students will gain insight into the role of human values such as respect, honesty, compassion, and justice in shaping individual behavior and societal norms, and learn how to foster these values in different environments.

CO4: Critical Thinking on Contemporary Ethical Issues: Students will engage with current ethical challenges, such as environmental sustainability, digital privacy, artificial intelligence,

and social justice, critically evaluating the moral implications of these issues in a globalized world.

CO5: Personal Ethical Growth and Integrity: Students will reflect on their personal values and ethical beliefs, fostering a greater sense of responsibility, integrity, and empathy, both in their professional and personal lives, while developing strategies for ethical leadership and conflict resolution.

UNIT-I 4 HOURS

Course Introduction- Need, Content

Understanding the need, content and process for Value Education. (Students should be aware of the difference among skills, values and ethics and their respective needs in life.)

UNIT-II 4 HOURS

Process for Value Education

Classification of Value Education: understanding Personal Values, Social Values, and Moral Values& Spiritual Values; Understanding the difference between ideology and values.
Understanding Harmony with self, Society and Nature.

UNIT-III 7 HOURS

Human Values and Ethics

Meaning and nature of human values; Significance of human values in life;Relation between values and ethics. Relevance of Human values: Integrity, Empathy, Loksangrah, Brahmvihara.Theory of Naya (Jainism), Deontology, Virtue Ethics, Utilitarianism

UNIT-IV 7 HOURS

Integrated Personality and Well-being

Understanding the relationship among: Self, Identity and Personality. Understanding Integrated Personality – with the three gunas theory of Sankhya, the fourAntah-karanas (inner instruments) in Yoga, and Panchkosha (five sheaths) in Upanishad. Approaching comprehensive understanding of well-being and its relation to Happiness.

UNIT-V

Professional Ethics and Global Citizenship

Nature, characteristics and scope of professional ethics; Types of Professional Ethics; Professional Values: Trusteeship, Inclusiveness, Commitment, Sustainability, Accountability, Transparency, Impartiality. Values for Global Citizenship: Equality, Justice, and Human Dignity. Nature and need of competency based education; Types of Competencies, Core Competencies: communication, teamwork, planning and achieving goals, Functional Competencies: analytical thinking, knowledge sharing and learning, decision making,partnership building.

REFERNCES:

1. R.R. Gaur, R Sangal, G.P. Bagaria (2009): A Foundation Course in Human Values and Professional Ethics, Excel Books.
2. D.R. Kiran (2014) Professional Ethics and Human Values, McGraw Hill Education (India).
3. Happiness and Well-Being, NIOS Module V (Health and well-being)
4. Kiran Kumar, K. Salagame (2016): Meaning and Well-Being: Indian Perspectives, Journal of Constructivist Psychology
5. Dan P. McAdams, Kali Trzesniewski, Jennifer Lilgendahl, Veronica Benet-Martinez, Richard W. Robins (2021) Self and Identityin Personality Psychology, Personality Science, 2021, Vol. 2, Article e6035,https://doi.org/10.5964/ps.603
6. S.K. Kiran Kumar (2003): An Indian conception of wellbeing, in Henry, J. (Ed) European Positive Psychology Proceedings2002. Leicester, UK: British Psychological Society.
7. Vivian L Vignoles (2017): Identity: Personal and Social, Chapter to appear in Oxford Handbook of Personality and SocialPsychology (2nded.), edited by Kay Deaux and Mark Snyder.

Wong, S.-C. (2020). Competency Definitions, Development and Assessment: A Brief Review. International Journal ofAcademic Research in Progressive Education and Development, 9(3),95–114.

SEMESTER IV

Type of Course	Code	Title of the Course	Contact Hours Per Week				Remarks
			L	T	P	C	
CC	FND205	Public Health Nutrition	2	1	1	4	CC-7
CC	FND206	Nutrition for life span	2	1	1	4	CC-8
CC	FND207	Epidemiology	2	1	1	4	CC-9
SEC	SEC176	Dairy technology	1	0	1	2	SEC-3
Minor		To be chosen from a pool of minors	2	1	1	4	Minor4
VAC		To be chosen from subjects offered from University	2	0	0	2	VAC4
Semester						**20**	

COURSE NAME: Public Health Nutrition
COURSE CODE: FND205
CREDITS: 4

L	T	P	C
2	**1**	**1**	**4**

Course Outcome:

CO1. Students will develop effective communication skills to advocate for nutrition-related health policies and programs, and to educate communities about healthy eating and nutrition.

CO2. Students will develop the ability to apply epidemiological methods to study the relationship between nutrition and public health, including analyzing nutritional data and trends in different populations.

CO3. Students will be able to assess the nutritional needs of diverse populations, including vulnerable groups like children, pregnant women, and the elderly, and design appropriate interventions.

CO4. Students will be equipped to evaluate and contribute to public health nutrition policies, understanding the role of government and organizations in shaping nutrition-related health initiatives and programs.

CO5. Students will learn to design, implement, and evaluate nutrition-based public health programs and interventions that address malnutrition, obesity, and chronic diseases in various communities.

Course content:

Unit I: Introduction to Public Health **8 hours**

Definition and Scope of Public Health: Public health vs. clinical health, Key principles and functions of public health

Determinants of Health: Social, economic, environmental, and behavioral determinants, Health equity and disparities

Public Health Systems and Organizations: Role of WHO, CDC, and other public health agencies, Public health laws, policies, and regulations

Unit II: Epidemiology in Public Health **6 hours**

Introduction to Epidemiology: Definition, scope, and methods of epidemiology

Epidemiological Study Designs: Descriptive, analytical, and experimental study designs, Cohort, case-control, and cross-sectional studies.

Measures of Disease Frequency and Association: Incidence, prevalence, mortality rates, relative risk, and odds ratio

Outbreak Investigation: Steps in investigating an outbreak, Control measures and surveillance

Unit III: Environmental and Occupational Health 14 hours

Environmental Health: Impact of environmental factors (pollution, climate change) on health, Water, air, and food safety, Disparities in environmental exposure and health outcomes, Public health interventions for environmental health issues.

Occupational Health: Workplace hazards and their impact on worker health, Occupational diseases and Injury prevention

Global Environmental Health Issues: Emerging environmental health threats (e.g., climate change, pandemics)

Unit IV: Health Promotion and Disease Prevention 14 hours

Health Promotion Theories and Models: Social determinants of health and health behavior theories, Models of health behavior change (e.g., Health Belief Model, Social Cognitive Theory)

Disease Prevention Strategies: Primary, secondary, and tertiary prevention, Immunization programs, screenings, and early detection

Health Education and Communication: Principles of health education, Effective communication strategies in public health

Chronic Disease Prevention: Preventing cardiovascular diseases, diabetes, and cancer, Nutrition, physical activity, and lifestyle interventions

Unit V: Public Health Policy and Global Health 8 hours

Public Health Policy: Role of government in public health, Health policies, laws, and their impact on population health

Global Health Challenges: Infectious diseases (HIV, malaria, TB) and non-communicable diseases (NCDs), Global health initiatives and partnerships (e.g., SDGs, WHO)

Healthcare Systems and Public Health: Overview of healthcare systems globally (primary, secondary, tertiary care), The role of public health in strengthening healthcare systems

Emerging Public Health Issues: Mental health, substance abuse, and pandemic preparedness, Health disparities and the role of public health advocacy

Course Name: Public Health Nutrition-Practical
COURSE CODE: FND205
CREDITS: 1

Course outcomes:

CO1. Understanding the concept of health from the perspective of the community and the individual.

CO2. Understanding the causes, symptoms, treatment, and prevention of common nutritional problems in the community.

CO3: Learning about the schemes, programs, and policies of the Government of India to combat malnutrition.

CO4: Understanding modern methods of assessing the nutritional quality of food .

CO5: Ability to apply their skills to assess the health status of individuals by using ABCD methods of nutritional assessment

Course Content:

1. Assessment of nutritional status by direct methods such as height, weight, head circumference, chest and mid arm circumference.
2. Assessment of nutritional status by indirect methods including clinical and biochemical methods.
3. Identification of vulnerable groups as part of diet and nutrition surveys.
4. Preparation of visual aids.
5. Observation of the working of nutrition and health oriented programmes.
6. Visit to hospitals to observe nutritional deficiencies.
7. Plotting of growth charts, growth monitoring and promotion.
8. Understanding the different programs implemented by the government with respect to community health.
9. Determination of clinical parameters like blood glucose and haemoglobin to monitor the health status.

10. Study of different signs of nutrient deficiencies such as kwashiorkor, marasmus, vitamin A deficiencies, anaemia, rickets, B-Complex deficiencies and their clinical assessment.
11. Estimation of food and nutrient intake - Household food consumption data, adult consumption unit, 24 hours dietary recall, 24 hours record.

COURSE NAME: Nutrition for life span-Theory
COURSE CODE: FND206
CREDITS: 4

L	T	P	C
2	1	1	4

Course Outcomes:

CO1. Students will gain a comprehensive understanding of the unique nutritional requirements at various life stages, including pregnancy, infancy, childhood, adolescence, adulthood, and older adulthood.

CO2. Students will be able to design and implement nutrition strategies and interventions tailored to meet the specific needs of individuals at different life stages to promote health and prevent diseases and also able to plan menu as per the needs of different age groups.

CO3. Students will explore how nutrition influences growth, development, and health outcomes throughout life, particularly in critical windows such as infancy and adolescence.

CO4. Students will learn to recognize common nutritional deficiencies and imbalances at various life stages, as well as strategies to prevent or address them effectively.

CO5. Students will understand the role of nutrition in aging, including how diet can prevent or manage age-related conditions such as osteoporosis, cardiovascular disease, and cognitive decline.

Course content:

Unit I Meal Planning **4 hours**

Introduction to meal planning**,** objectives, principles and steps. Factors affecting meal planning.

Balanced diet- Definition and significance as per various age groups, guidelines for planning a balance diet, food pyramid.

Unit II Nutrition in Pregnancy and Lactation 14 hours

Nutrition in pregnancy- Nutritional requirements, physiological changes associated with pregnancy, stages of embryo development, complications associated with pregnancy. Meal planning for pregnant women.

Nutrition in lactation- Nutritional requirements, physiology associated with lactation, composition of breast milk, influence of hormones, effect of mother's diet on the quality and quantity of milk production, breastfeeding practices. Meal planning for lactating women.

Unit III Nutrition in Infancy and Childhood 15 hours

Nutrition in infancy- Nutritional requirements, breast feeding, weaning, types of weaning foods and supplementary foods, infant formula, changes in growth pattern - height and weight.Meal planning for infants.

Nutrition in preschool age – Nutritional requirements,eating habits and behaviour, growth, factors hindering increase in height and weight, nutritional associated problems.

Nutrition in school children-Nutritional requirements, factors influencing eating habits, significance of school lunch and mid-day meal program. Meal planning for children.

Unit IV Nutrition in Adolescence 7 hours

Nutritional requirements, physiological and psychological changes, puberty, menarche, changes in food choices and habits, factors influencing needs, nutritional disorders, psychological and peer group pressure on eating habits.Meal planning for adolescents.

Unit V Nutrition in Adulthood and Old Age 10 hours

Nutrition in adulthood- Nutritional requirements, physical, mental and social changes affecting meal patterns.Meal planning for adults.

Nutrition in oldage- Nutritional requirements, process of ageing, physical, physiological, biological and psychological changes affecting meal pattern. Dietary changes with special reference to consistency of food. Meal planning for old people.

REFERENCE BOOKS:

1.) Swaminathan, M. Advances text book on book on food and nutrition Vol 1 and 2 Bangalore printing publishing Co., Ltd., Bangalore, II ed., 1988.

2. Fox, B.A., and Cameron, A.G., Food science, nutrition and health, Edward Asnold, London, 1995, VI Edition.,
3. Nato, A.B and Heslin, J.A., Nutritional Care of the adult, Macmillan Publication Co., New York 1986.
4. Antia F.P Clinical Dietetics' and Nutrition, III Edition, Oxford University Press, Bombay 1989.
5. Srilakshmi. B., dietetics, willey Eastem Ltd., NewDelhi, 2003.
6. Robinson C.H., Lawer M.R., Chenowelth. WIC., and Garwich A.E., Normal and therapeutic nutrition, McMillan Publishers Co., Newyork, XVII Edition, 1986.
7. Suitor, C.J.W and Growely, M.F., Nutrition – Principles and application in Health promation, J.B, Lippincott Co., Philadelphia pb, II Edition, 1984.
8. Gopalan, C. and Ramasasthri, B.V., Nutritive Value of Indian foods. NIN (ICMR) 1996.

COURSE NAME: Nutrition for life span-Practical
COURSE CODE: FND206
CREDITS: 1

Course Outcomes:

CO1. Understand the physiology associated withdifferent age groups.

CO2. Understand the process of growth and development from birth till old age.

CO3.Get familiar with the nutritional needs of different age groups.

CO4 To plan menu as per the needs of different age groups.

CO5. Students will learn to recognize common nutritional deficiencies and imbalances at various life stages, as well as strategies to prevent or address them effectively.

Course content:

1. Planning, preparation and serving of a meal as per family income- low income, middle income and high income.
2. Planning, preparation and serving of a meal for an infant.
3. Planning, preparation and serving of an indigenous weaning mix.
4. Planning, preparation and serving of a meal for a pregnant woman.
5. Planning, preparation and serving of a meal for a lactating woman.
6. Planning, preparation and serving of a meal for a toddler.
7. Planning, preparation and serving of a meal for a school going child.
8. Planning, preparation and serving of a meal for an adolescent.

9. Planning, preparation and serving of a meal for an old aged person.
10. Planning and preparation of any five packed lunches.

REFERENCE BOOKS:

1.) Swaminathan, M. Advances text book on book on food and nutrition Vol 1 and 2 Bangalore printing publishing Co., Ltd., Bangalore, II ed., 1988.
2. Fox, B.A., and Cameron, A.G., Food science, nutrition and health, Edward Asnold, London, 1995, VI Edition.,
3. Nato, A.B and Heslin, J.A., Nutritional Care of the adult, Macmillan Publication Co., New York 1986.
4. Antia F.P Clinical Dietetics' and Nutrition, III Edition, Oxford University Press, Bombay 1989.
5. Srilakshmi. B., dietetics, willey Eastem Ltd., NewDelhi, 2003.
6. Robinson C.H., Lawer M.R., Chenowelth. WIC., and Garwich A.E., Normal and therapeutic nutrition, McMillan Publishers Co., Newyork, XVII Edition, 1986.
7. Suitor, C.J.W and Growely, M.F., Nutrition – Principles and application in Health promation, J.B, Lippincott Co., Philadelphia pb, II Edition, 1984.
8. Gopalan, C. and Ramasasthri, B.V., Nutritive Value of Indian foods. NIN (ICMR) 1996.

COURSE NAME: Epidemiology
COURSE CODE: FND207
CREDITS: 4

L	T	P	C
2	1	1	4

Course outcomes:

CO1. Students will gain a comprehensive understanding of the fundamental principles of epidemiology, including the concepts of disease distribution, determinants, and patterns in populations.

CO2. Students will be able to identify, compare, and apply various epidemiological study designs (cohort, case-control, cross-sectional, etc.) to investigate health issues and disease outbreaks.

CO3. Students will develop the skills to analyze epidemiological data, calculate key measures (e.g., incidence, prevalence, relative risk), and interpret findings using appropriate statistical methods.

CO4. Students will be able to evaluate public health interventions and programs based on epidemiological evidence, contributing to disease prevention and health promotion strategies.

CO5. Students will cultivate critical thinking skills to assess the strengths, weaknesses, and ethical implications of epidemiological studies and their application in real-world public health contexts

Course content:

Unit I. Definition of Health, Dimension of Health 8 hours

Positive health versus Absence of disease, Determinants of Health, Indicators of health – Mortality, Morbidity, Disability, Nutritional Status, Health care Delivery, Environmental, Socioeconomics, Health care Policy

Unit II. Epidemiology 7 hours

Definition, Aims, Tools of Measurement – Rates, Ratios and Proportions. Study designs in epidemiology, Descriptive epidemiology, Analytical epidemiology, Data collection and sources of data.

Unit III. Secondary Sources of Community Health data 6 hours

Sources of relevant vital statistics of infant, child & maternal mortality rates, Under- 5 mortality, Birth Rate, Crude death rate.

Unit IV. Immunization and Communicable and infective disease control 15 hours

Importance and Immunization schedule for children, adults and for foreign travellers. Nature of communicable and infectious diseases, infection, contamination, disinfections, decontamination, transmission-direct & indirect, vector borne disease infecting organisms and positive agents, environmental agents and epidemiological principles of disease control. Food borne infections and intoxications: symptoms, mode of transmission and methods of prevention, investigation and detection of food borne disease out-break

Unit V. Water and Waste Management 14 hours

Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water, potable water, waste and waste disposal, sewage disposal and treatment, solid waste and disposal, liquid waste disposal.

REFERENCE BOOKS:

1.Park K(2023): Textbook of Preventive and Social Medicine,27th Ed. BanarsidasBhanot Publishers

2.Mahajan BK, Roy RN , Saha I, Gupta, MC (2013):Text book of Preventive and Social Medicine, 4th Ed. Japee Brothers

3. Pandya R(2010):Community Health Education, Rawat Publications.

COURSE NAME: Epidemiology-Practical
COURSE CODE: FND207
CREDITS: 1

Course outcomes:

CO1. Students will gain a comprehensive understanding of the fundamental principles of epidemiology, including the concepts of disease distribution, determinants, and patterns in populations.

CO2. Students will be able to identify, compare, and apply various epidemiological study designs (cohort, case-control, cross-sectional, etc.) to investigate health issues and disease outbreaks.

CO3. Students will develop the skills to analyze epidemiological data, calculate key measures (e.g., incidence, prevalence, relative risk), and interpret findings using appropriate statistical methods.

CO4. Students will be able to evaluate public health interventions and programs based on epidemiological evidence, contributing to disease prevention and health promotion strategies.

CO5. Students will cultivate critical thinking skills to assess the strengths, weaknesses, and ethical implications of epidemiological studies and their application in real-world public health contexts

Course content:

1.Data Collection and Surveillance Techniques:

Hands-on experience in designing and conducting surveys, including case-control and cohort studies. Practical exercises in collecting epidemiological data using questionnaires, interviews, and fieldwork for tracking disease patterns in populations.

2.Disease Outbreak Investigation:

Simulated outbreak scenarios where students investigate and analyze an epidemic's source, spread, and control measures. This includes identifying affected populations, mapping disease distribution, and using epidemiological tools to propose control strategies.

3. Study Design and Sampling Methods:

Practical exercises in designing observational studies (cross-sectional, cohort, case-control) and experimental studies (randomized controlled trials). Emphasis on proper sampling techniques, randomization, and ensuring the study's validity and reliability.

4. Field Epidemiology and Reporting:

Students engage in field visits or case studies to observe real-world epidemiological practices, including outbreak response, health surveys, and intervention evaluations. They practice preparing reports, making presentations, and communicating findings to public health authorities or stakeholders.

COURSE NAME: Dairy Technology
COURSE CODE: SEC176
CREDITS: 4

L	T	P	C
1	0	1	2

Course outcomes:

CO1. Students will gain a comprehensive understanding of the principles of dairy science, including the composition of milk, its quality standards, and the various technologies involved in milk processing and the production of dairy products.

CO2. Students will be able to apply various milk processing techniques, such as pasteurization, homogenization, separation, and fermentation, to produce a range of dairy products, including cheese, butter, yogurt, and ice cream.

CO3. Students will develop skills in ensuring the quality and safety of dairy products through effective quality control measures, including microbiological, chemical, and sensory analysis, and adherence to hygiene standards and regulatory guidelines.

CO4. Students will acquire knowledge of the design, layout, and management of dairy processing plants, understanding the role of equipment, sanitation, and efficient production practices to maintain optimal product quality and operational efficiency.

CO5. Students will explore innovative and sustainable practices in dairy technology, including the utilization of dairy by-products, advancements in preservation techniques, and emerging trends in plant-based alternatives and environmental sustainability.

Course content:

Unit 1: Introduction to Dairy Technology

Importance of dairy in the global food system. Dairy production and consumption trends. Types of Dairy Products: Milk, cheese, butter, yogurt, ice cream, and other fermented products. Milk Composition and Quality: Nutritional components of milk (proteins, fats, carbohydrates, vitamins, minerals), Milk quality standards and grading. Milk Processing Basics: Pasteurization, homogenization, and sterilization, Role of milk processing in ensuring safety and quality

Unit 2: Dairy Product Manufacture

Cheese Production:Milk coagulation, curd formation, and processing techniques, Types of cheese (fresh, soft, hard, processed), Ripening and aging processes

Butter and Ghee Production: Butter churning process and types of butter, Ghee production techniques

Yogurt and Fermented Dairy Products: Principles of fermentation and yogurt making, Probiotic dairy products and their health benefits

Ice Cream Manufacture:Ingredients, formulation, and freezing techniques, Quality control and sensory evaluation of ice cream

Unit III: Dairy Plant Operations and Management

Dairy Plant Design and Layout: Design considerations for dairy processing plants, Equipment used in dairy processing

Packaging and Storage of Dairy Products: Packaging materials and techniques for various dairy products, Storage conditions and shelf-life management

Unit IV: Dairy by-Products and Advances in Dairy Technology

By-products of Dairy Processing: Utilization of whey, lactose, and other dairy by-products.

Emerging Technologies in Dairy Processing: Enzyme applications, biotechnology, and genetically modified microorganisms in dairy

Unit V: Sanitation and Hygiene in Dairy Processing

Importance of cleanliness and hygiene in dairy production, Cleaning-in-place (CIP) systems and sanitation protocols.

Quality Control and Assurance in Dairy Products: Methods for testing milk and dairy products (microbiological, chemical, sensory), Regulatory standards for dairy products

COURSE NAME: Dairy Technology- Practical
COURSE CODE: SEC176
CREDITS: 1

Course outcomes:

CO1. Students will gain a comprehensive understanding of the principles of dairy science, including the composition of milk, its quality standards, and the various technologies involved in milk processing and the production of dairy products.

CO2. Students will be able to apply various milk processing techniques, such as pasteurization, homogenization, separation, and fermentation, to produce a range of dairy products, including cheese, butter, yogurt, and ice cream.

CO3. Students will develop skills in ensuring the quality and safety of dairy products through effective quality control measures, including microbiological, chemical, and sensory analysis, and adherence to hygiene standards and regulatory guidelines.

CO4. Students will acquire knowledge of the design, layout, and management of dairy processing plants, understanding the role of equipment, sanitation, and efficient production practices to maintain optimal product quality and operational efficiency.

CO5. Students will explore innovative and sustainable practices in dairy technology, including the utilization of dairy by-products, advancements in preservation techniques, and emerging trends in plant-based alternatives and environmental sustainability.

Course Content:

1. **Milk Processing Techniques:**

Hands-on training in various milk processing methods, including pasteurization, homogenization, and sterilization. Students practice techniques for processing milk into different dairy products like butter, cheese, and yogurt.

2. **Dairy Product Manufacture:**

Practical sessions on the production of a range of dairy products, such as cheese, paneer, ice cream, and ghee.

3. **Quality Control and Milk Testing:**

Conducting tests to assess the quality and safety of milk and dairy products, such as the determination of fat content, protein content, acidity levels, and the detection of adulterants. Students also learn about microbiological testing for pathogens in dairy products.

4. **Dairy Plant Operations:**

Practical exposure to the operations of a dairy processing plant, including equipment handling, sanitation practices, packaging, and storage of dairy products. Emphasis on maintaining hygiene and quality during production processes.

5. **Milk Preservation Techniques:**

Training in various methods of preserving milk and dairy products, such as refrigeration, freezing, and the use of preservatives. Students learn about shelf-life testing, packaging innovations, and the impact of preservation methods on product quality.

Minor course

Course Name: Nutrition for life span
COURSE CODE: FND208
CREDITS:

L	T	P	C
2	1	1	4

Course Outcomes:

CO1. Students will gain a comprehensive understanding of the unique nutritional requirements at various life stages, including pregnancy, infancy, childhood, adolescence, adulthood, and older adulthood.

CO2. Students will be able to design and implement nutrition strategies and interventions tailored to meet the specific needs of individuals at different life stages to promote health and prevent diseases and also able to plan menu as per the needs of different age groups.

CO3. Students will explore how nutrition influences growth, development, and health outcomes throughout life, particularly in critical windows such as infancy and adolescence.

CO4. Students will learn to recognize common nutritional deficiencies and imbalances at various life stages, as well as strategies to prevent or address them effectively.

CO5. Students will understand the role of nutrition in aging, including how diet can prevent or manage age-related conditions such as osteoporosis, cardiovascular disease, and cognitive decline.

Course content:

Unit I Meal Planning **4 hours**

Introduction to meal planning**,** objectives, principles and steps. Factors affecting meal planning. Balanced diet- Definition and significance as per various age groups, guidelines for planning a balance diet, food pyramid.

Unit II Nutrition in Pregnancy and Lactation **14 hours**

Nutrition in pregnancy- Nutritional requirements, physiological changes associated with pregnancy, stages of embryo development, complications associated with pregnancy. Meal planning for pregnant women.

Nutrition in lactation- Nutritional requirements, physiology associated with lactation, composition of breast milk, influence of hormones, effect of mother's diet on the quality and quantity of milk production, breastfeeding practices. Meal planning for lactating women.

Unit III Nutrition in Infancy and Childhood 15 hours

Nutrition in infancy- Nutritional requirements, breast feeding, weaning, types of weaning foods and supplementary foods, infant formula, changes in growth pattern - height and weight.Meal planning for infants.

Nutrition in preschool age – Nutritional requirements,eating habits and behaviour, growth, factors hindering increase in height and weight, nutritional associated problems.

Nutrition in school children-Nutritional requirements, factors influencing eating habits, significance of school lunch and mid-day meal program. Meal planning for children.

Unit IV Nutrition in Adolescence 7 hours

Nutritional requirements, physiological and psychological changes, puberty, menarche, changes in food choices and habits, factors influencing needs, nutritional disorders, psychological and peer group pressure on eating habits.Meal planning for adolescents.

Unit V Nutrition in Adulthood and Old Age 10 hours

Nutrition in adulthood- Nutritional requirements, physical, mental and social changes affecting meal patterns.Meal planning for adults.

Nutrition in oldage- Nutritional requirements, process of ageing, physical, physiological, biological and psychological changes affecting meal pattern. Dietary changes with special reference to consistency of food. Meal planning for old people.

REFERENCE BOOKS:

1.) Swaminathan, M. Advances text book on book on food and nutrition Vol 1 and 2 Bangalore printing publishing Co., Ltd., Bangalore, II ed., 1988.

2. Fox, B.A., and Cameron, A.G., Food science, nutrition and health, Edward Asnold, London, 1995, VI Edition.,

3. Nato, A.B and Heslin, J.A., Nutritional Care of the adult, Macmillan Publication Co., New York 1986.

4. Antia F.P Clinical Dietetics' and Nutrition, III Edition, Oxford University Press, Bombay 1989.

5. Srilakshmi. B., dietetics, willey Eastem Ltd., NewDelhi, 2003.
6. Robinson C.H., Lawer M.R., Chenowelth. WIC., and Garwich A.E., Normal and therapeutic nutrition, McMillan Publishers Co., Newyork, XVII Edition, 1986.
7. Suitor, C.J.W and Growely, M.F., Nutrition – Principles and application in Health promation, J.B, Lippincott Co., Philadelphia pb, II Edition, 1984.
8. Gopalan, C. and Ramasasthri, B.V., Nutritive Value of Indian foods. NIN (ICMR) 1996.

Course Name: Public Health Nutrition-Practical
COURSE CODE: FND205
CREDITS: 1

Course outcomes:

CO1. Understanding the concept of health from the perspective of the community and the individual.

CO2. Understanding the causes, symptoms, treatment, and prevention of common nutritional problems in the community.

CO3: Learning about the schemes, programs, and policies of the Government of India to combat malnutrition.

CO4: Understanding modern methods of assessing the nutritional quality of food .

CO5: Ability to apply their skills to assess the health status of individuals by using ABCD methods of nutritional assessment

Course Content:

1. Assessment of nutritional status by direct methods such as height, weight, head circumference, chest and mid arm circumference.
2. Assessment of nutritional status by indirect methods including clinical and biochemical methods.
3. Identification of vulnerable groups as part of diet and nutrition surveys.
4. Preparation of visual aids.
5. Observation of the working of nutrition and health oriented programmes.
6. Visit to hospitals to observe nutritional deficiencies.
7. Plotting of growth charts, growth monitoring and promotion.
8. Understanding the different programs implemented by the government with respect to community health.
9. Determination of clinical parameters like blood glucose and haemoglobin to monitor the health status.
10. Study of different signs of nutrient deficiencies such as kwashiorkor, marasmus, vitamin A deficiencies, anaemia, rickets, B-Complex deficiencies and their clinical assessment.

11. Estimation of food and nutrient intake - Household food consumption data, adult consumption unit, 24 hours dietary recall, 24 hours record.

SEMESTER V								
S.No	**Type of Course**	**Code**	**Title of the Course**	**Contact Hours Per Week**				**Remarks**
				L	**T**	**P**	**C**	
1	CC	FND301	Elementary Dietetics	2	1	1	4	CC-10
2	CC	FND302	Diet therapy for lifestyle disorders	2	1	1	4	CC-11
3	CC	FND303	Sports Nutrition	2	1	1	4	CC-12
4	Minor		To be chosen from a pool of minors	2	1	1	4	Minor5
5	SEC	SEC177	Management and preservation of Food and beverage	1	0	1	2	SEC-4
6	INT		Internship	0	0	4	4	

COURSE NAME Elementary Dietetics - Theory

COURSE CODE - FND301

CONTACT – 3L+1P

CREDIT- 4

Course Outcomes:

After the completion of the course, students would be able to:

CO1: **Understand the Basics of Nutrition**: Students will develop a foundational knowledge of essential nutrients, their functions in the body, and how they contribute to overall health and wellness.

CO2: **Apply Dietary Guidelines**: Students will be able to interpret and apply national dietary guidelines and recommendations to create balanced, nutritious meal plans for individuals across various age groups and health conditions.

CO3: **Assess Nutritional Status**: Students will gain skills in assessing the nutritional status of individuals, recognizing signs of nutritional deficiencies, and suggesting appropriate dietary modifications for improvement.

CO4: **Evaluate Food Choices and Preparation**: Students will learn to evaluate and modify food choices based on cultural, ethical, and health considerations, and understand the importance of food safety and proper meal preparation techniques.

CO5: **Communicate Nutritional Information Effectively**: Students will develop the ability to communicate basic nutritional advice clearly to individuals and groups, using evidence-based information to promote healthy eating behaviors.

Unit 1: Introduction to Dietetics

Overview of Dietetics as a Profession- Definition and scope of dietetics, Role of dietitians in healthcare, Ethical considerations in dietetics practice, **Historical Development of Nutrition Science-** Early studies and advancements, Key contributors to nutrition and dietetics.**Basic Principles of Human Nutrition**

Nutrients and Their Functions- Macronutrients: Carbohydrates, Proteins, Fats. Micronutrients: Vitamins, Minerals. Water and Fiber. **Energy Balance and Metabolism**- Basal metabolic rate (BMR), Energy expenditure and requirements, Role of nutrients in metabolism.

Unit 2: Digestive System and Nutrient Absorption

Anatomy and Physiology of the Digestive System- Overview of the gastrointestinal tract, Mechanisms of digestion and absorption. **Factors Affecting Nutrient Absorption-** Enzyme function, Nutrient interactions.

Unit 3: Nutrition Assessment & Food Science and Safety

Methods of Nutritional Assessment- Anthropometric measurements, Dietary assessments (e.g., food diary, 24-hour recall), Biochemical and clinical assessments. **Interpretation of Nutritional Data-** Identifying nutrient deficiencies and excesses. Establishing nutritional status. **Food Composition and**

Labeling- Understanding food labels and nutritional claims, Nutrient content of common foods. **Food Preparation and Cooking Methods-** Effects of cooking on nutrient retention, Healthy cooking techniques. **Food Safety and Hygiene-** Safe food handling practices, Prevention of foodborne illnesses.

Unit 4: Nutrition Throughout the Lifecycle

Infancy and Childhood Nutrition- Nutritional needs during growth and development, Feeding practices for infants and children, **Adolescent Nutrition-** Nutritional challenges during adolescence, Dietary recommendations for teenagers, **Adult Nutrition-** Nutritional needs for adults, Impact of lifestyle factors on nutrition (e.g., activity, stress, and aging), **Geriatric Nutrition -** Dietary considerations for elderly individuals, Management of age-related nutritional concerns.

Unit 5: Nutrition and Health

Diet and Chronic Diseases- Obesity, diabetes, cardiovascular diseases, and cancer, Role of diet in disease prevention and management. **Public Health Nutrition-** Nutritional issues in populations (e.g., undernutrition, malnutrition, food insecurity). Government nutrition programs and policies.

Meal Planning and Dietary Modifications- Principles of Meal Planning- Balancing macronutrients and micronutrients, Cultural, economic, and social factors influencing meal planning. Dietary Modifications for Health Conditions- Modifying diets for special needs (e.g., diabetes, hypertension, allergies). Ethical and cultural considerations in dietary modifications

REFERNCE BOOKS:

1. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
2. Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.
3. Robinson,C.H;Lawler,M.R.Chenoweth,W.L;andGarwick,A.E(1986):Normal and Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
4. Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi..
5. Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
6. Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis.

COURSE NAME- Elementary Dietetics - Practical

COURSE CODE - FND301

CREDIT- 1

Course Outcomes:

After the completion of the course, students would be able to:

CO1: **Practical Application of Nutritional Knowledge**: Students will develop the ability to apply theoretical knowledge of nutrition and dietetics in real-life settings by preparing and analyzing balanced diets for individuals with varying health needs.

CO2: **Skill Development in Meal Planning and Preparation**: Students will gain hands-on experience in planning, preparing, and presenting nutritious meals, considering factors such as caloric requirements, portion sizes, and food preferences for different population groups.

CO3: **Understanding Dietary Modifications for Health Conditions**: Students will demonstrate the ability to modify diets for individuals with specific health conditions (e.g., diabetes, hypertension, and obesity) by understanding and applying dietary principles to enhance health and manage conditions.

CO4: **Assessment of Nutritional Status**: Students will acquire skills in conducting basic nutritional assessments, including anthropometric measurements, dietary recalls, and evaluating food intake, to recommend appropriate dietary interventions.

CO5: **Food Safety and Hygiene Practices**: Students will learn and apply fundamental food safety, sanitation, and hygiene practices to ensure safe food handling, preparation, and storage, adhering to professional standards in dietetics and nutrition.

UNIT I

Basic Cooking and Meal Preparation

- Prepare simple meals using different cooking techniques.
- Practice food preservation methods.

UNIT II

Therapeutic Diet Preparation

- Prepare diets tailored for specific conditions like diabetes, hypertension, and food allergies.
- Modify meals for texture requirements or other therapeutic needs (e.g., liquid diets, soft diets).

UNIT III

Menu Planning Exercise

- Develop a menu for a specific health condition or group (e.g., children, pregnant women).
- Plan meals that meet nutritional guidelines.

UNIT IV

Dietary Assessment

- Conduct a 24-hour recall or food diary assessment for an individual or group.
- Analyze dietary intake and suggest improvements.

UNIT V

Food Service Operations

- Plan and serve a meal in a simulated food service environment.
- Practice food safety measures (e.g., hand washing, proper storage, temperature control).

Reference Books:

- Mahan, L. K., & Escott-Stump, S. (2017). *Krause's Food & Nutrition Therapy*.
- Whitney, E., & Rolfes, S. R. (2018). *Understanding Nutrition*.
- American Dietetic Association. (2020). *The Complete Food and Nutrition Guide*.

COURSE NAME – Diet therapy for lifestyle disorders

COURSE CODE – FND302

CONTACT-3L +1P

CREDIT- 4

COURSE OUTCOME:

After the completion of the course, students would be able to:

CO1: **Understand the Impact of Diet on Lifestyle Disorders**: Students will gain a comprehensive understanding of how poor dietary choices contribute to the development and progression of lifestyle disorders such as obesity, diabetes, cardiovascular diseases, and metabolic syndrome.

CO2: **Apply Nutritional Principles in Managing Lifestyle Diseases**: Learners will be able to design personalized dietary plans aimed at preventing and managing lifestyle-related health conditions, integrating key principles of nutrition therapy for conditions like hypertension, diabetes, and hyperlipidemia.

CO3: **Assess Nutritional Needs in Disease Management**: Students will develop the ability to assess and analyze individual nutritional needs in the context of chronic diseases and create evidence-based dietary interventions to support patients' health.

CO4: **Promote Healthy Eating Habits for Disease Prevention**: Participants will be equipped to educate individuals and communities on making long-term, sustainable dietary changes that support overall health, improve quality of life, and prevent the onset of chronic lifestyle diseases.

CO5: **Evaluate the Role of Functional Foods and Supplements**: Students will learn how functional foods, nutraceuticals, and supplements can play a role in the management and prevention of lifestyle disorders, and understand how to incorporate them into a balanced therapeutic diet.

UNIT I: Introduction to Lifestyle Disorders 8 HOURS

Definition and Classification of Lifestyle Disorders: Overview of lifestyle-related diseases (Obesity, Diabetes, Cardiovascular Diseases, Hypertension, Metabolic Syndrome). Epidemiology and risk factors. The role of diet in the prevention and management of lifestyle disorders. Role of nutrition in disease prevention and therapy. General principles of diet therapy for chronic conditions. The impact of lifestyle modifications on health outcomes.

UNIT II: Obesity and Weight Management 9 HOURS

Etiology and Pathophysiology of Obesity: Causes of obesity (genetics, environment, behavior, and metabolic factors). Role of energy balance and metabolic rate. **Dietary Approaches to Weight Loss:** Caloric restriction and energy expenditure. Low-calorie diets, ketogenic diets, intermittent fasting. Nutritional support for weight maintenance. **Behavioral Modifications and Counseling:** Psychological aspects of weight management. Role of counseling and dietary education.

UNIT III: Diabetes Mellitus and Diet Therapy 10 HOURS

Types of Diabetes: Type 1 diabetes and Type 2 diabetes. Gestational diabetes and its implications. **Pathophysiology and Glycemic Control:** Blood sugar regulation and insulin function. Role of diet in glycemic control. **Dietary Guidelines for Diabetes:** Carbohydrate counting, glycemic index, and glycemic load. Role of fiber, fats, and protein in diabetes management. Meal planning and timing for blood sugar control.

UNIT IV: Cardiovascular Diseases and Diet Therapy 9 HOURS

Risk Factors for Cardiovascular Diseases: Hypertension, dyslipidemia, and obesity. Role of inflammation, oxidative stress, and endothelial dysfunction. **Dietary Guidelines for Heart Health:** The Mediterranean diet, DASH (Dietary Approaches to Stop Hypertension) diet. Role of fats (saturated vs. unsaturated), cholesterol, and omega-3 fatty acids. Sodium restriction and potassium intake. **Preventing and Managing Atherosclerosis:** The impact of antioxidants, fiber, and plant-based diets on heart health. **Diet in Post-Cardiac Events:** Post-myocardial infarction nutrition therapy. Rehabilitation and long-term dietary changes.

UNIT V: Hypertension, Metabolic Syndrome and Diet Therapy 14 HOURS

Understanding Hypertension: Mechanisms of blood pressure regulation. Primary vs. secondary hypertension. **Dietary Management of Hypertension:** Sodium reduction and potassium balance. The DASH diet and its effects on blood pressure. Role of calcium, magnesium, and other micronutrients. **Lifestyle Changes for Blood Pressure Control:** Exercise, weight management, and stress reduction. The role of alcohol and caffeine in hypertension.

Understanding Metabolic Syndrome: Definition, risk factors, and clinical criteria (central obesity, insulin resistance, hyperlipidemia, hypertension). **Dietary Approaches to Managing Metabolic Syndrome:** Low-glycemic diets and their role in insulin resistance. The impact of antioxidants, fiber, and healthy fats. The role of weight management in improving metabolic function. **Interventions for Long-Term Health:** Preventing type 2 diabetes and cardiovascular disease through diet. Integrating diet with other interventions like exercise and medication.

REFERENCES:

1. "Nutrition and Diet Therapy: Principles and Practice" by Judith E. Brown.
2. "Dietary Interventions in the Management of Lifestyle Disorders" by R. G. Givens.
3. "Clinical Nutrition" by R. S. Sizer & E. F. Whitney.

COURSE NAME – Diet therapy for lifestyle disorders- PRACTICAL

COURSE CODE – FND302

CREDIT- 1

1.) Planning, nutritive value calculation and diet preparation for insulin dependent diabetes mellitus.
2.) Planning, nutritive value calculation and diet preparation for non-insulin dependent diabetes mellitus.
3.) Planning, nutritive value calculation and diet preparation for hypertension.
4.) Planning, nutritive value calculation and diet preparation for gout.
5.) Planning, nutritive value calculation and diet preparation for renal failure.
6.) Planning, nutritive value calculation and diet preparation for atherosclerosis.
7.) Planning, nutritive value calculation and diet preparation for coronary heart disease.
8.) Planning, nutritive value calculation and diet preparation for osteoporosis.
9.) Planning, nutritive value calculation and diet preparation for nephritis.
10.) Identification of nutraceuticals and linking them to particular disorders.

REFERENCE BOOKS:

1.) Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
2.) Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W. B. Saunders Company, London.
3.) Robinson, C.H; Lawler, M.R. Chenoweth, W.L; and Garwick, A.E(1986): Normal and Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
4.) Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
5.) Srilakshmi, B. (2005): Dietetics, 5th edition, New Age International (P) Limited Publishers, New Delhi.
6.) Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St. Louis.

COURSE NAME – Sports Nutrition

COURSE CODE – FND303

CONTACT-3L+1P

CREDIT-4

Course Outcomes:

After the completion of the course, students would be able to:

1: Remember the nutritional guidelines for different sports and games.

2: Understanding the management of selected nutritional problems among sportsperson.
3: Apply the knowledge of dietary supplements for different sports persons .

4: Analyse the nutritional management of exercise injuries, nutrition for weight management in sports & disorders among sports persons .

5: Evaluate the energy expenditure in sports and exercise using various methods.

Unit I **5 hours**

Introduction, Nutritional considerations for sports / exercising person as compared to normal active person. Determination of energy expenditure in sports and exercise using various methods. Physiology of energy systems.

Unit II **5 hours**

Energy substrate for activities of different intensity and duration, aerobic and anaerobic activities

Unit III **10 hours**

Macro nutrients-Carbohydrate as an energy source for sport and exercise. Carbohydrate stores, Fuel for aerobic and anaerobic metabolism, Glycogen re-synthesis, CHO Loading, CHO composition for pre exercise, during and recovery period. Role of Fat as an energy source for sports and exercise. Fat stores, regulation of fat metabolism , factors affecting fat oxidation (intensity, duration , training status, CHO feeding) , effect of fasting and fat ingestion.

Unit IV **5 hours**

Protein and amino acid requirements, Factors affecting Protein turnover, Protein requirement and metabolism during endurance exercise, resistance exercise and recovery process. Protein supplement.

Unit V **5 hours**

Important micro nutrients for exercise. B complex vitamin and specific minerals. Exercise induced oxidative stress and role of antioxidants.Fluid balance in sports and exercise, importance, symptoms and prevention of dehydration, Sports drink

Unit VI **15 hours**

Nutritional guidelines for different sports and games: Nutritional requirements- carbohydrates, fats, proteins and micronutrients in different sports events: strength sport, weight class sport, racket sport, field sports, court sports. General training Diet. Meal planning (Pre & post-game) Management of selected nutritional problems among sportspersons: Anaemia - causes, consequences and role of nutrition in the prevention and management. Osteoporosis - Bone Physiology, Effect of Nutrition, age, sex and exercise on bone health, Disorders among sports persons, Types of Sports with weight restrictions -Need for weight loss and weight gain, Negative aspects of weight loss and recovery strategies -Dietary & Lifestyle Approaches for weight and fat loss and gain. Chronic dieting and eatingdisordersr. Female athletic triad. Dietary Supplements: Definition and regulations of dietary Supplements (country-specific).

Classification of Dietary or Nutritional supplements and its composition, Benefits and applications of nutritional supplements and macro nutrient supplements

TEXT BOOK(S):

1. Nutrients as Ergogenic Aids for Sports and Exercise,Bucci, L,Boca Raton, FL.:CRC Press,1993
.
2. Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition,Judy A Driskell , Ira Wolinsky,CRC Press,2000.

REFERENCE BOOK(S):

1. Recommended Dietary Intakes for Indian Sportsman and Women,
Satyanarayan, K; Nageshwar Rao. C; NarsingaRao,B.S.; Malhotra, M.S,Hyderabad, National Institute of Nutrition,1985.

2.Essentials of Sports Nutrition Study Guide,G. Gregory Haff,Humana Press,2008.

COURSE NAME – Sports Nutrition- Practical

COURSE CODE – FND303

CREDIT-1

WEEKLY 2 HOURS

Course Outcomes:

By the end of this practical course, students will be able to:

CO1: Assess nutritional needs for athletes based on their activity levels, body composition, and sport-specific requirements.

CO2: Apply the principles of macronutrient, micronutrient, and fluid intake to optimize performance.

CO3: Develop sports-specific meal plans and pre/post-exercise nutrition strategies.

CO4: Evaluate supplementation needs for athletes, including vitamins, minerals, and ergogenic aids.

CO5: Understand the role of hydration in performance and recovery.

Course Content:

1. Introduction to calculating Total Daily Energy Expenditure (TDEE) and Basal Metabolic Rate (BMR).
2. Planning macronutrient distributions for different athletes (e.g., endurance, strength, team sports).
3. Meal planning exercises based on activity levels.
4. Designing pre-competition meals and snacks.
5. Post-exercise recovery nutrition and timing.
6. Sample meal prep for training days and competitions.
7. Designing sport-specific nutrition plans for athletes.
8. Analyzing and comparing nutrition strategies for endurance vs. strength sports.
9. Designing anti-inflammatory meal plans.
10. Nutritional recommendations for recovery from injuries.

Reference Books:

- **Textbooks:**
  1. "Sports Nutrition: A Practice Manual for Professionals" by Christine A. Rosenbloom
  2. "Sports Nutrition: From Lab to Kitchen" by Asker Jeukendrup
  3. "Advanced Sports Nutrition" by Dan Benardot
- **Supplementary Resources:**
  1. Peer-reviewed journals like *The International Journal of Sport Nutrition and Exercise Metabolism*.
  2. Online resources like the Gatorade Sports Science Institute (GSSI) and the International Society of Sports Nutrition (ISSN).

COURSE NAME – MANAGEMENT AND PRSERVATION OF FOOD & BEVERAGE

COURSE CODE – SEC177

CONTACT-3L+1P

CREDIT-4

Course Outcomes:

After the completion of the course, students would be able to:

CO1: Identify different food and beverage management techniques used in the industry.

CO2: Demonstrate knowledge of food preservation methods and their practical applications.

CO3: Apply food safety standards and quality control systems in food management.

CO4: Manage food and beverage inventories effectively, using industry-standard tools and practices.

CO5: Assess and apply emerging technologies and sustainable practices in food and beverage preservation.

Module 1: Introduction to Food and Beverage Management

Definition and Scope of Food and Beverage Management- Role of food and beverage in the hospitality industry. Structure of food and beverage departments. Management functions in food and beverage operations (planning, organizing, controlling).

Principles of Food and Beverage Service- Service standards and quality control. Guest satisfaction and service excellence. Menu planning and pricing.

Organizational Structure in Food Service Operations- Different types of food service establishments (restaurants, hotels, catering). Roles of staff and their responsibilities.

Module 2: Principles of Food Preservation

Food Spoilage and Contamination- Causes of food spoilage: Microbial, enzymatic, and chemical. Methods to prevent food contamination.

Methods of Food Preservation- Traditional methods: Drying, salting, pickling, fermenting, smoking. **Modern methods**: Canning, refrigeration, freezing, vacuum packing. **Emerging technologies**: High-pressure processing, irradiation, freeze-drying.

Role of Packaging in Food Preservation- Types of packaging materials. Vacuum sealing and Modified Atmosphere Packaging (MAP).

Module 3: Food Storage and Handling

Food Storage Principles- Temperature control (refrigeration and freezing). Humidity control and airflow. FIFO (First In, First Out) inventory method.

Guidelines for Safe Food Handling- Personal hygiene and sanitation. HACCP (Hazard Analysis Critical Control Point) system. Food safety standards and regulations (FDA, FSSAI, etc.).

Proper Storage Techniques for Different Types of Foods- Fresh produce, meat, dairy, dry goods, and frozen foods. Storage considerations for beverages: Alcoholic and non-alcoholic.

Module 4: Management of Food and Beverage Inventory

Inventory Management Systems- Types of inventory control systems: Perpetual, periodic, and just-in-time. Inventory turnover and stocktaking.

Waste Management and Cost Control- Techniques for minimizing food waste. Understanding food cost percentage. Menu engineering to optimize profit.

Purchasing and Supplier Management- Supplier relationships and sourcing quality ingredients. Purchase order and receiving goods.

Module 5: Health and Safety in Food and Beverage Operations & Innovations in Food and Beverage Preservation

Food Safety Regulations- National and international food safety standards. Risk assessment and compliance with regulations.

Foodborne Illnesses and Prevention- Common pathogens and their prevention. Signs and symptoms of foodborne illnesses. Ensuring safe food handling practices.

Creating a Safe Food Environment- Sanitation practices in the kitchen and dining areas. Pest control measures.

Advances in Food Preservation Technologies- Smart refrigeration, nanotechnology, and biotechnology. Sustainability in food preservation: Reducing food loss and waste.

New Trends in Beverage Preservation- Non-alcoholic beverage preservation. The role of preservatives in beverage production.

REFERENCE BOOKS:

1. Food Safety and Quality Management *by S. R. McCulloch.*
2. Principles of Food Science *by Ray B. Sorell.*
3. Food and Beverage Management *by Bernard Davis & David Lockwood.*
4. Introduction to Food Science *by Rick Parker.*

COURSE CODE – SEC177

CREDIT-1

COURSE OUTCOMES:

At the completion of the course, students will be able to-

CO1: Understand various methods of food and beverage preservation.

CO2: Apply management principles in food service and storage.

CO3: Learn about modern technologies used for food and beverage preservation.

CO4: Practice techniques for maintaining hygiene and safety in food handling.

CO5: Enhance practical skills in food & beverage preparation, service, and preservation.

COURSE CONTENT:

- Types of food and beverage preservation methods (refrigeration, freezing, canning, drying, salting, smoking, etc.).
- Personal hygiene and sanitation in food handling.
- **C**anning fruits, vegetables, and beverages.
- Freezing of perishable food items like meat, fruits, vegetables, and ready-to-eat meals.
- Techniques for drying fruits, herbs, and meats.
- Hands-on work in preparing pickles and fermented beverages.
- Demonstrating traditional and modern methods of preserving meats and fish.
- Understanding best practices for shelf life management and expiration date tracking.
- Managing buffet setups, portion control, and wastage minimization.
- Monitoring and ensuring proper serving temperatures.
- Introduction to packaging materials (glass, plastic, and vacuum-sealed bags).
- Practical demonstrations on packing food and beverages for long-term storage.
- Labeling standards for frozen, canned, or preserved foods and drinks.
- Sensory analysis: Evaluating texture, taste, and appearance of preserved foods.
- Methods of controlling color, flavor, and nutritional value during preservation.
- Practical exercises in quality assessments and defect identification.

- Environmental impact of food preservation methods.
- Sustainable practices such as reducing food waste and using biodegradable packaging.
- Preparation of a menu or product line with preserved foods and beverages, utilizing learned techniques.

References and Resources:

- **Books:**
    1. "Food Preservation Techniques" by George F. Stewart
    2. "Food and Beverage Management" by John Cousins
    3. "Principles of Food Sanitation" by Norman G. Marriott
- **Online Resources:**
    1. Websites on food safety guidelines (e.g., USDA, FAO).
    2. Video tutorials on food preservation techniques.

COURSE NAME: FOOD TECHNOLOGY - THEORY 50 HOURS
COURSE CODE: FND32104
CONTACT: 3L
CREDITS: 4

COURSE OBJECTIVES: This course will enable the students to
1.) Understand the basic concepts of food technology.
2.) Gain knowledge about processing of different food items.
3.) Analyze the preservation of foods.
4.) Evaluate packaging technology.
5.) Apply different techniques of food technology considering their physicochemical properties.

Unit I Concepts of Food Technology 10 hours
Introduction to the concept of food technology, physicochemical properties of food, classification of food groups, Ingredients of food, techniques and equipments for food preservation such as drying, refrigeration, thermal treatments.
Innovative techniques in food processing: Ready-to-eat (RTE), ready-to-serve (RTS), edible coatings, edible film, instant premixes.
Significance of packaging and its various requirements.

Unit II Cereals, Millets, Pulses and Legumes
10 hours
Processing of cereals and millets, malting, different types of browning, composition of rice obtained by different dehusking methods, milling of rice.
Pulses and legumes- Milling of legumes, processing of pulses, toxic constituents in pulses and its detoxification processes, latest technologies of processing legumes-canning, quick cooking legumes, instant legume powder, legume protein concentrates.

Unit III Fruits, Vegetables, Meat, Fish and Poultry
10 hours
Enzymatic browning, Post harvest changes occurring in fruits and vegetables – Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes occuring during the storage.

Ageing and tenderizing of meat, storage and preservation, cuts and grades of meat.
Preservation of fish by drying, curing, brining, fermentation.
Preservation of eggs, egg powder, frozen eggs.

Unit IV Food Processing and Preservation Techniques

15 hours

Introduction to refrigeration and freezing, principles of freezing, types of freezing, introduction to thawing, principles involved in thawing and its effect on food.
Introduction to drying and dehydrationas a means ofpreservation, factors affecting rate of drying, types of driers.
Introduction to food irradiation, kinds of ionizing radiations food irradiation, radiation processing in food industry, safety of irradiated foods, introduction to cold sterilization.
Processing of milk products- Pasteurization, homogenization, drying, packaging, standardization, recombination, reconstitution.

Unit V Packaging Technology

5 hours

Introduction to packaging technology, materials used in packaging, effects of packaging materials on nutritive value of foods.
Different types of additives used in foods and their advantages and disadvantages.

REFERENCE BOOKS:

3.) Food Technology, Prescott and Proctor.B.B.McGraw Hill Book Co., New York, 1937.
4.) Rahman, M.S., Handbook of Food Preservation. MARCEL DEKKER Inc. 1999.

COURSE NAME:FOOD TECHNOLOGY - PRACTICAL 2 HOURS/WEEK
COURSE CODE: FND32204
CONTACT: 2P
CREDITS: 1

COURSE OUTCOMES: At the completion of the course, the students will be able to-

CO1: **Application of Food Processing Techniques**
Students will demonstrate the ability to apply various food processing techniques, such as heat treatment, fermentation, and extrusion, in the preparation and preservation of food products.

CO2: **Laboratory Skill Development**
Students will gain hands-on experience in using laboratory equipment and tools to conduct food quality analysis, including testing for nutritional content, texture, color, and microbial contamination.

CO3: **Understanding Food Safety Protocols**
Students will develop an understanding of food safety standards and protocols, demonstrating the ability to follow hygienic practices during food preparation and ensuring compliance with food safety regulations.

CO4: **Formulation of Food Products**
Students will be able to formulate and modify food products by adjusting ingredients and processing methods to meet specific nutritional, sensory, and shelf-life requirements.

CO5: **Critical Analysis and Reporting**
Students will enhance their ability to analyze experimental results, interpret data, and prepare detailed reports on the outcomes of food technology experiments, including identifying potential improvements in product quality and production efficiency.

11.) Introduction to basic laboratory instruments and equipments related to food technology.
12.) Development of processed cereal products.
13.) Development of processed meat and fish products.
14.) Survey of processed foods available in market.
15.) Drying of food products.
16.) Freezing of food products.
17.) Study of various types of food packaging materials.
18.) To perform organoleptic testing of food products.
19.) Study of concept of shelf-life of processed and unprocessed food products.
20.) Visit to different food processing industries.

REFERENCE BOOKS:
3.) Food Technology, Prescott and Proctor.B.B.McGraw Hill Book Co., New York, 1937.
4.) Rahman, M.S., Handbook of Food Preservation. MARCEL DEKKER Inc. 1999.

SEMESTER VI

Type of Course	Code	Title of the Course	Contact Hours Per Week				Remarks
			L	T	P	C	
CC	FND305	Nutraceuticals, functional food	2	1	1	4	CC-13

		and nutrigenomics					
CC	FND306	Science of Bakery & confectionary	2	1	1	4	CC-14
CC	FND307	Space Nutrition	2	1	1	4	CC-15
Minor		To be chosen from a pool of minors	2	1	1	4	Minor6
SEC	SEC178	Therapeutic Food Product development	1	0	1	2	SEC-5
Project		Project Work on Food and nutrition	0	0	4	4	
Semester credits						**22**	

COURSE NAME: Nutraceuticals, functional food and nutrigenomics
COURSE CODE: FND305
CREDITS: 4

L	T	P	C
2	**1**	**1**	**4**

Course outcomes:

CO1. Students will learn the difference between nutraceuticals and functional foods, and their role in promoting health and preventing diseases.

CO2. Students will gain knowledge about bioactive compounds in foods, such as antioxidants, probiotics, and fibers, and their health benefits.

CO3: Students will understand how genetics influence an individual's response to diet and how nutrigenomics can personalize nutrition for better health outcomes.

CO4: Students will analyze the potential therapeutic effects of nutraceuticals and functional foods in managing chronic diseases like diabetes, cardiovascular disease, and obesity.

CO5: Students will critically evaluate scientific research and evidence on the efficacy of nutraceuticals and functional foods for health promotion and disease management.

Course Content:

Unit I: Introduction to Nutraceuticals and Functional Foods

- Definition and classification of nutraceuticals and functional foods
- Historical development and market trends of nutraceuticals
- Types of functional foods: Probiotics, prebiotics, and fortified foods
- Regulatory framework and guidelines (FDA, EFSA)
- The role of nutraceuticals and functional foods in health promotion

Unit II: Bioactive Compounds in Food

- Overview of bioactive compounds: antioxidants, polyphenols, flavonoids, omega-3 fatty acids, fiber
- Mechanisms of action and health benefits of bioactive compounds
- Sources of bioactive compounds in food (fruits, vegetables, grains, herbs)
- Functional foods with specific bioactive components (e.g., probiotic-rich foods, omega-3 enriched foods)
- Case studies of bioactive foods in disease prevention (e.g., heart disease, cancer)

Unit III: Nutrigenomics: The Science of Nutrition and Genes

- Introduction to nutrigenomics: definition and principles
- How genetic variations affect nutrient metabolism and health outcomes
- The role of epigenetics in diet and gene expression
- Personalized nutrition: tailoring diet based on genetic profile
- Nutritional genomics and its potential applications in disease prevention and management

Unit IV: Health Benefits of Nutraceuticals and Functional Foods

- Therapeutic effects of nutraceuticals and functional foods on chronic diseases (e.g., diabetes, obesity, hypertension)
- Functional foods in immunity and gut health (e.g., probiotics, prebiotics)
- Role of functional foods in weight management and metabolic disorders
- Scientific evidence and clinical trials supporting the health benefits of nutraceuticals

Unit 5: Applications and Future Trends

- Commercialization and production of functional foods and nutraceuticals
- Market trends and consumer acceptance of functional foods
- Nutritional labeling, claims, and regulations

- Emerging technologies in nutraceutical development (e.g., nanotechnology, bioengineering)
- Future directions in nutrigenomics and its impact on public health and personalized medicine

REFERENCE BOOKS:

1.Aluko, Rotimi,Functional Foods and Nutraceuticals,Springer-Verlag New York Inc.,2012

2. Satinder Kaur Brar, Surinder Kaur and Gurpreet Singh Dhillon,Nutraceuticals Functional Foods,2014.

3. Watson, David, H., 2013, Performance Functional Foods, CRC Press, Wood Head Publishing Ltd., England

4. Tamine, A., 2015, Probiotic Dairy Products, Blackwell Publishing Ltd., UK

5. Narasinga Rao, B.S., 2015, Nutrition Research in India – A Country Report, Published by INSA, New Delhi.

6. Webb, G.P., 2016, Dietary Supplementations and Functional Foods, Blackwell Publishing Ltd., New York.

7. Tai, E.S. and Gillies, P.J., 2007, Nutrigenomics – Opportunities in Asia, Karger, Singapore. 2013.

COURSE NAME: Nutraceuticals, functional food and nutrigenomics-Practical
COURSE CODE: FND305
CREDITS: 4

Course outcomes:

CO1. Students will gain hands-on experience in isolating and identifying bioactive compounds (e.g., antioxidants, polyphenols) from food sources.

CO2. Students will gain knowledge about bioactive compounds in foods, such as antioxidants, probiotics, and fibers, and their health benefits.

CO3: Students will learn to design and prepare functional food products (e.g., probiotic yogurt, omega-3 enriched foods) and evaluate their nutritional content.

CO4: Students will understand how genetics influence an individual's response to diet and how nutrigenomics can personalize nutrition for better health outcomes.

CO5: Students will conduct experiments to assess the health benefits of specific nutraceuticals, using models of disease prevention or management (e.g., antioxidants in cardiovascular health).

Course content:

1. Identification of Bioactive Compounds in Food

- Practical exercises on extracting and identifying bioactive compounds such as antioxidants, vitamins, and polyphenols from common food sources (e.g., fruits, vegetables, and grains).
- Simple tests to measure antioxidant activity (e.g., DPPH assay or Vitamin C content).

2. Preparation of Functional Foods

- Hands-on preparation of functional food items like fortified juices, probiotic yogurt, and omega-3 enriched foods.

3. Introduction to Nutrigenomics

- Simple experiments to demonstrate how genetics and diet interact, such as basic DNA extraction from fruits or vegetables.

4. Sensory Evaluation of Functional Foods

- Conduct sensory evaluations (taste, texture, smell) of functional foods and nutraceutical products to understand their appeal and effectiveness.
- Students learn to design and conduct taste tests to assess consumer acceptance.

5. Nutritional Labeling and Health Claims

- Analyzing the labels and health claims on commercially available nutraceuticals and functional foods.

COURSE NAME: Science of Bakery & confectionary-Theory
COURSE CODE: FND306
CREDITS: 4

L	T	P	C
2	1	1	4

Course outcomes:

CO1. Students will understand the principles and techniques involved in bakery

CO2. Students will gain knowledge about significance of bakery and confectionary.

CO3: Improved knowledge on principles of baking and appropriate sanitation, hygiene and safety practices during baking

CO4: Students will gain skills for setting up of a bakery and confectionary unit.

CO5: Increased knowledge on the complete process of baking and presentation of baked products

Course Content:

Unit I Bakery **6 hours**

Introduction and principles of baking, overview of baking industry in India, raw materials including the essential and optional ingredients required in baking, structure and composition of wheat kernel, wheat milling, types of wheat flour, ideal features of good quality, enrichment of flour and bread, methods of making batters and doughs, classification of baked foods.

Unit II Baking Ingredients **6 hours**

Various ingredients and their role in baking- Flour, water, yeast, sugar, shortening, milk, eggs, moisturising agents,butter, salt, spices, flavourings, fruits and nuts, food colours, setting materials, cocoa and chocolate,

Recipe balance in baking, methods of storage of baked products,selection of packaging materials.

Leavening agents-Introduction, different leavening agents-physical, chemical and biological and their role in baking.

Unit III Setting up a Bakery Unit **4 hours**

Consideration of factors for setting up a bakery unit, different types of ovens used in bakery, construction and working of conventional and modern ovens, equipments needed for starting a small bakery unit, classification of equipments and their description, types, materials, usage, maintenance.

Unit IV Preparation and Decoration of Baked Foods **8 hours**

Steps and procedures involved in break making, function of differentingredients, types of breads, ideal qualities of a good loaf, identification and remedying of bread faults, bread improvers.
Ingredients of cake making and their functions, methods of cake mixing, types of cakes, cake judging, preparation of cakes, cake faults and remedies.
Ingredients involved in biscuit, pastry and cookie making. Nutritive value, procedure of preparation, essentials in making good biscuits and pastries.
Icing- Types and techniques, frosting and fillings. Evaluation of baked products- objective and subjective methods.

Unit V Confectionary **4 hours**

Processing of cocoa and chocolate, making of toffee, chocolates, fruit drops, hard boiled candies, soft candies, bars, chewing gums.
Special confectionery foods, functions of major components, factors influencing the quality of the product.

REFERENCE BOOKS:

1.) Dubey, S.C. (2002), Basic Baking IV Edition, The Society of Indian Bakers, New Delhi.

2.) Bakers Handbook on Practical Baking (1998) Compiled and Published by US Wheat Associates, New Delhi.

3.) NIR Board, The Complete Technology Book on Bakery Products, National Institute of Industrial Research, New Delhi.

4.) Fellows, J.P. (1998), Food Processing Technology – Principles and Practice, Ellis Horword Limited, London.

5.) Avantina Sharma, (2006), Text Book of Food Science and Technology, International Book Distributing Co., Chaman Studio Building, Charbagh, Lucknow, UP.

COURSE NAME: Science of Bakery & confectionary-Practical
COURSE CODE: FND306
CREDITS: 1

Course outcomes:

CO1: Improved knowledge on principles of baking and appropriate sanitation, hygiene and safety practices during baking

CO2: Understanding the role of ingredients in baking quality.

CO3: Gain knowledge to set up a bakery unit.

CO4: Increased knowledge on the complete process of baking and presentation of baked products

CO5: Gain knowledge on the processing and preparation of confectionary products Course **Course Content:**

1. Introduction of tools and equipment's of bakery products.
2. Preparation of rich yeast fermented breads
3. Preparation of biscuits and cookies.
4. Preparation of pizza.
5. Preparation of cakes.

6. Preparation of filling and icings.

7. Visit to a Professional Bakery

REFERENCE BOOKS:

1. Potter, N. Food Science, The AVI Publishing Co., Inc., West Port, Connecticut, 1975.

2. Baker's Handbook on practical Baking. Wheat Associates, USA, New Delhi.

3. Dubey, SC, Basic Baking Science and Craft, Jwalmukhi Job Press, Bangalore, 1979.

4. Modern Pastry Chab, Vol.I and II, A VI Publishing Co., Inc., West Port, Connecticut, **1977.**

COURSE NAME: Space Nutrition Theory
COURSE CODE: FND307
CREDITS: 4

L	T	P	C
2	1	1	4

Course outcomes:

CO1. Understanding the Importance of Nutrition in Space

CO2. Students will explore the different types of space foods, including freeze-dried, dehydrated, and packaged foods, and understand how these foods are developed to meet astronauts' nutritional needs during space missions.

CO3: Students will gain knowledge on designing balanced and nutrient-rich meals for space missions

CO4: Students will learn about ongoing research in space food technology, including innovations in food packaging, nutrition supplementation, and future possibilities for sustainable food sources in space exploration.

CO5: Students will gain knowledge on impact of the Space Environment on Human Physiology

Course Content:

Unit 1: Introduction to Space Nutrition **10 hours**

- Importance of nutrition in space missions
- Overview of the challenges in space environment: microgravity, radiation, and isolation
- Key nutritional requirements for astronauts (energy, protein, vitamins, minerals)
- The role of food in maintaining astronaut health during long-duration space missions

Unit 2: Space Food Systems **10 hours**

- Types of space foods: freeze-dried, dehydrated, and specially packaged foods
- Food preservation techniques for space (freeze-drying, vacuum sealing)
- Space food packaging and its impact on shelf life and nutrient retention
- Understanding the International Space Station (ISS) food system

Unit 3: Nutritional Needs and Adaptations in Space **10 hours**

- How microgravity affects digestion, metabolism, and nutrient absorption
- Nutritional adjustments for preventing muscle loss, bone density reduction, and immune system support
- Special focus on fluids, electrolytes, and hydration in space

Unit 4: Designing Space Meals **10 hours**

- Principles of meal planning for astronauts: balanced meals and nutrient density
- Creating meals that are compact, lightweight, and easy to prepare
- Handling food safety in space (temperature control, contamination prevention)
- Importance of taste, texture, and variety in space food to improve astronaut morale

Unit 5: Future of Space Nutrition and Research **10 hours**

- Advances in space food research: bio-regenerative life support systems and growing food in space
- Emerging technologies in food production (e.g., 3D printing of food, space farming)
- The potential for sustainable, self-sufficient food systems for long-term space missions (e.g., Mars)
- Ethical and practical challenges in space nutrition for future deep-space exploration

COURSE NAME: Space Nutrition- Practical
COURSE CODE: FND307
CREDITS: 1

Course outcomes:

CO1. Understanding the Importance of Nutrition in Space

CO2. Students will explore the different types of space foods, including freeze-dried, dehydrated, and packaged foods, and understand how these foods are developed to meet astronauts' nutritional needs during space missions.

CO3: Students will gain knowledge on designing balanced and nutrient-rich meals for space missions

CO4: Students will learn about ongoing research in space food technology, including innovations in food packaging, nutrition supplementation, and future possibilities for sustainable food sources in space exploration.

CO5: Students will gain knowledge on impact of the Space Environment on Human Physiology

Course Content:

1.**Food Preservation Techniques for Space**:

- Practical demonstrations on freeze-drying, vacuum sealing, and dehydrating food items to simulate space food preparation.

2. **Designing a Space Meal Plan**:

- Design balanced space meal plans, considering nutrient requirements (proteins, vitamins, minerals) and food preferences.
- Focus on creating compact, lightweight, and easy-to-prepare meals for long-duration space missions.

3.Space Food Sensory Evaluation:

- Hands-on activities to assess the taste, texture, and appearance of various space food samples.

4.Testing Space Food Safety:

- Experiments to test food safety, focusing on hygiene, contamination prevention, and maintaining nutrient quality during space missions.
- Practical sessions on food packaging and storage techniques to prevent spoilage and ensure safety in a space environment.

COURSE NAME: Therapeutic Food Product- Theory
COURSE CODE: SEC178
CREDITS: 2

L	T	P	C
1	0	1	2

Course outcomes:

CO1. Students will learn the principles and importance of therapeutic foods in managing and treating specific health conditions, such as diabetes, malnutrition, and cardiovascular diseases.

CO2. Students will gain practical skills in formulating and developing therapeutic food products that address the nutritional needs of individuals with specific health conditions.

CO3: Students will understand how the nutritional composition of therapeutic foods (e.g., high-protein, low-sugar, fortified) contributes to disease management and overall health improvement.

CO4:. Students will become familiar with the regulatory frameworks, quality standards, and safety protocols for the development, production, and commercialization of therapeutic foods.

CO5: Students will critically evaluate scientific research and clinical trials related to therapeutic foods, assessing their efficacy in managing diseases and improving the quality of life for patients.

Course Content:

Unit 1: Introduction to Therapeutic Foods

- Definition and scope of therapeutic foods
- Classification of therapeutic foods (e.g., functional foods, medical foods, fortified foods)
- Nutritional needs for disease management (e.g., malnutrition, diabetes, heart disease)

Unit 2: Nutritional Composition of Therapeutic Foods

- Key nutrients in therapeutic foods (proteins, carbohydrates, fats, vitamins, minerals)
- Special dietary requirements for chronic diseases (e.g., high-protein diets for wound healing, low-sugar foods for diabetics)
- Development of fortified foods: micronutrient fortification for preventing deficiencies
- Role of fiber, probiotics, and antioxidants in therapeutic food formulations

Unit 3: Design and Development of Therapeutic Foods

- Principles of formulating therapeutic foods tailored to specific health conditions
- The process of developing therapeutic food products (selection of ingredients, processing, preservation)
- Modifications in texture, flavor, and appearance to make therapeutic foods more acceptable
- Techniques in fortification and enrichment of foods (e.g., iron-fortified foods, omega-3 enrichment)

Unit 4: Regulatory Standards and Quality Control

- Overview of regulations governing the production of therapeutic foods (FDA, EFSA)
- Labelling, claims, and consumer protection standards for therapeutic foods
- Good Manufacturing Practices (GMP) and Food Safety Standards (HACCP)

Unit 5: Clinical Applications and Evaluation

- Role of therapeutic foods in managing chronic diseases like diabetes, obesity, cardiovascular diseases, and cancer

COURSE NAME: Therapeutic Food Product- Practical
COURSE CODE: SEC178
CREDITS: 1

Course outcomes:

CO1. Students will learn the principles and importance of therapeutic foods in managing and treating specific health conditions, such as diabetes, malnutrition, and cardiovascular diseases.

CO2. Students will gain practical skills in formulating and developing therapeutic food products that address the nutritional needs of individuals with specific health conditions.

CO3: Students will understand how the nutritional composition of therapeutic foods (e.g., high-protein, low-sugar, fortified) contributes to disease management and overall health improvement.

CO4:. Students will become familiar with the regulatory frameworks, quality standards, and safety protocols for the development, production, and commercialization of therapeutic foods.

CO5: Students will critically evaluate scientific research and clinical trials related to therapeutic foods, assessing their efficacy in managing diseases and improving the quality of life for patients.

Course content:

1.Formulation of Therapeutic Foods:

- Hands-on formulation of therapeutic food products targeting specific health conditions (e.g., high-protein, low-sugar, or fortified foods for malnutrition, diabetes, etc.).

2. **Fortification and Enrichment Techniques**:

- Practical exercises on fortifying food products with essential nutrients (e.g., vitamins, minerals, or omega-3 fatty acids) to meet therapeutic needs.

3. **Sensory Evaluation and Acceptability Testing**:

- Conducting sensory evaluations (taste, texture, appearance) to assess consumer acceptability of therapeutic food products and modifications for better palatability.

Minor course

Course Name: Food safety and quality control
COURSE CODE: FND308
CREDITS:4

L	T	P	C
2	1	1	4

Course outcomes:

CO1. Provide a basic understanding of quality concepts and practices in food companies

CO2. Provide approaches to the planning and organization of a quality control system

CO3: Students will understand the principles and concepts of food product development.

CO4:. Students will become aware about the quality control of food products and common standards associated therewith.

CO5: Students will gain a basic acquaintance with standards and specifications

Course content:

Unit I- Introduction to food safety **10 hours**

Definition, types of hazard-physical, chemical and biological, factors affecting Food Safety. Quality Control Concepts as applied to the food industry. General Concepts of quality control and quality control. Major quality control functions

Unit II Product Development **10 hours**

Phases in new food product development, product management and planning. Standardization methods. Portion size and portion control.Methods of calculation of nutritive value and production cost. Shelf life and storage, stability testing methods.

Unit III Product Evaluation and Packaging **10 hours**

Development of score card and data analysis. Selection and training of judges.

Suitability of packaging, development of packages and labelling.

Unit IV Food Quality Control and Quality Assurance **10 hours**

Objectives of quality control, significance, functions, different stages of quality control in food industry. Objectives of quality assurance, design of quality assurance program of a company and microbiological issues. Maintaining supply chain quality and marketing of food products.

Unit V Government Regulations in Quality Control **10 hours**

Detailed study of FAO/WHO Codex Alimentarious Commission, PFA, AGMARK, BIS, FPO, Fair Average Quality (FAQ), specifications for food grains, ISO 9000 series.

Hazard Analysis and Critical Control Point (HACCP) –Background and introduction, principles, advantages and limitations. Consumer Protection Act (CPA) . Introduction to food adulteration, common adulterants, tests for the identification of common adulterants.

REFERENCE BOOKS:

1.) A.Y.Sathe, A first course in food analysis –New Age Publications, 1999.

2.) Norman. N. Potter & Joseph. H. Hotchkiss, Food Science –CBS Publishers, 1996.

3.) M. Swaminathan, Food science, Chemistry & Experimental Foods –Bappco Publishers.

4.) BIS standards.

5.) Desrosier And Desrosier, Technology of food preservation –CBS Publishers, Fourth edition, 1999.

Course Name: Food safety and quality control-Practical
COURSE CODE: FND308
CREDITS:1

Course outcomes:

CO1. Provide a basic understanding of quality concepts and practices in food companies

CO2. Provide approaches to the planning and organization of a quality control system

CO3: Students will understand the principles and concepts of food product development.

CO4:. Students will become aware about the quality control of food products and common standards associated therewith.

CO5: Students will gain a basic acquaintance with standards and specifications

Course content:

1.Microbiological Testing of Food

2.Chemical Testing for Food Adulteration:

3.Food Preservation Methods

4.Hygiene and Sanitation Practices during food handling, storage to prevent contamination.

SEMESTER VII

Type of Course	Code	Title of the Course	Contact Hours Per Week				Remarks
			L	T	P	C	
CC	FND401	Food safety and quality control	2	1	1	4	CC-16
CC	FND402	Sports Nutrition	2	1	1	4	CC-17
CC	FND403	Food Processing and Technology	2	1	1	4	CC-18
CC (For With research)	FND404	Research Methodology for Food and nutrition & biostatistics (should start working on dissertation topic)	3	1	0	4	CC-19 (Research)
CC (For With research)	FND405	Modern techniques and bio instrumentation	3	1	0	4	CC-19(without Research)
Minor		To be chosen from a pool of minors	2	1	1	4	Minor7
Semester credits						**20**	

COURSE NAME: Food Safety and quality control
COURSE CODE: FND401
CREDITS: 4

L	T	P	C
2	1	1	4

Course outcomes:

CO1. Provide a basic understanding of quality concepts and practices in food companies

CO2. Provide approaches to the planning and organization of a quality control system

CO3: Students will understand the principles and concepts of food product development.

CO4:. Students will become aware about the quality control of food products and common standards associated therewith.

CO5: Students will gain a basic acquaintance with standards and specifications

Course content:

Unit I- Introduction to food safety **10 hours**

Definition, types of hazard-physical, chemical and biological, factors affecting Food Safety. Quality Control Concepts as applied to the food industry. General Concepts of quality control and quality control. Major quality control functions

Unit II Product Development **10 hours**

Phases in new food product development, product management and planning. Standardization methods. Portion size and portion control.Methods of calculation of nutritive value and production cost. Shelf life and storage, stability testing methods.

Unit III Product Evaluation and Packaging **10 hours**

Development of score card and data analysis. Selection and training of judges.

Suitability of packaging, development of packages and labelling.

Unit IV Food Quality Control and Quality Assurance **10 hours**

Objectives of quality control, significance, functions, different stages of quality control in food industry. Objectives of quality assurance, design of quality assurance program of a company and microbiological issues. Maintaining supply chain quality and marketing of food products.

Unit V Government Regulations in Quality Control **10 hours**

Detailed study of FAO/WHO Codex Alimentarious Commission, PFA, AGMARK, BIS, FPO, Fair Average Quality (FAQ), specifications for food grains, ISO 9000 series.

Hazard Analysis and Critical Control Point (HACCP) –Background and introduction, principles, advantages and limitations. Consumer Protection Act (CPA) . Introduction to food adulteration, common adulterants, tests for the identification of common adulterants.

REFERENCE BOOKS:

1.) A.Y.Sathe, A first course in food analysis –New Age Publications, 1999.

2.) Norman. N. Potter & Joseph. H. Hotchkiss, Food Science –CBS Publishers, 1996.

3.) M. Swaminathan, Food science, Chemistry & Experimental Foods –Bappco Publishers.

4.) BIS standards.

5.) Desrosier And Desrosier, Technology of food preservation –CBS Publishers, Fourth edition, 1999.

Course Name: Food safety and quality control-Practical
COURSE CODE: FND308
CREDITS:1

Course outcomes:

CO1. Provide a basic understanding of quality concepts and practices in food companies

CO2. Provide approaches to the planning and organization of a quality control system

CO3: Students will understand the principles and concepts of food product development.

CO4:. Students will become aware about the quality control of food products and common standards associated therewith.

CO5: Students will gain a basic acquaintance with standards and specifications

Course content:

1.Microbiological Testing of Food

2.Chemical Testing for Food Adulteration:

3.Food Preservation Methods

4.Hygiene and Sanitation Practices during food handling, storage to prevent contamination.

COURSE NAME: Sports Nutrition-theory
COURSE CODE: FND402
CREDITS: 4

L	T	P	C
2	1	1	4

Course outcomes:

CO1. Remember the nutritional guidelines for different sports and games.

CO2. Understanding the management of selected nutritional problems among sportsperson

CO3: Apply the knowledge of dietary supplements for different sports persons .

CO4:. Analyse the nutritional management of exercise injuries, nutrition for weight management in sports & disorders among sports persons.

CO5: Evaluate the energy expenditure in sports and exercise using various methods .

Course content:

Unit I- Introduction to Sports Nutrition **10 hours**

Introduction, Nutritional considerations for sports / exercising person as compared to normal active person. Determination of energy expenditure in sports and exercise using various methods. Physiology of energy systems. Energy substrate for activities of different intensity and duration, aerobic and anaerobic activities

Unit II- Nutritional guideline for different types of sports **15 hours**

Nutritional guidelines for different sports and games: Nutritional requirements- carbohydrates, fats, proteins and micronutrients in different sports events: strength sport, weight class sport, racket sport, field sports, court sports. General training Diet. Meal planning (Pre & post-game).
Dietary Supplements: Definition and regulations of dietary Supplements (country-specific). Classification of Dietary or Nutritional supplements and its composition, Benefits and applications of nutritional supplements and macro nutrient supplements

Unit III- Athletes and their nutritional Requirement 15 hours

Importance of micro nutrients:

Carbohydrate as an energy source for sport and exercise. Carbohydrate stores, Fuel for aerobic and anaerobic metabolism, Glycogen re-synthesis, CHO Loading, CHO composition for pre exercise, during and recovery period.

Role of Fat as an energy source for sports and exercise. Fat stores, regulation of fat metabolism , factors affecting fat oxidation (intensity, duration , training status, CHO feeding) , effect of fasting and fat ingestion.

Protein and amino acid requirements, Factors affecting Protein turnover, Protein requirement and metabolism during endurance exercise, resistance exercise and recovery process. Protein supplement.

Important micro nutrients for exercise: B complex vitamin and specific minerals

Fluid balance in sports and exercise, importance, symptoms and prevention of dehydration, Sports drink

Unit IV- Athletes with Nutrition-related disorders 6 hours

Anaemia - causes, consequences and role of nutrition in the prevention and management. Osteoporosis - Bone Physiology, Effect of Nutrition, age, sex and exercise on bone health, Disorders among sports persons

Exercise-induced oxidative stress and role of antioxidants

Chronic dieting and eating disorders. Female athletic triad

Unit V- Sports and weight management **4 hours**

Types of Sports with weight restrictions -Need for weight loss and weight gain, Negative aspects of weight loss and recovery strategies -Dietary & Lifestyle Approaches for weight and fat loss and gain.

REFERENCE BOOK(S):

2. Recommended Dietary Intakes for Indian Sportsman and Women, Satyanarayan, K; Nageshwar Rao. C; NarsingaRao,B.S.; Malhotra, M.S,Hyderabad, National Institute of Nutrition,1985.

2.Essentials of Sports Nutrition Study Guide,G. Gregory Haff,Humana Press,2008.

3. Nutrients as Ergogenic Aids for Sports and Exercise,Bucci, L,Boca Raton, FL.:CRC Press,1993 .

4. Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition,Judy A Driskell , Ira Wolinsky,CRC Press,2000.

COURSE NAME: Sports Nutrition-Practical
COURSE CODE: FND402
CREDITS: 1

Course outcomes:

CO1. Understand the role of macronutrients in athletic performance and recovery.

CO2. Learn how to develop personalized nutrition plans for different sports.

CO3. Gain practical experience in hydration strategies for athletes.

CO4. Apply knowledge of supplements to enhance performance and prevent deficiencies.

CO5. Assess the impact of nutrition timing on training and competition outcomes.

CO6. Develop skills in monitoring and adjusting nutrition plans based on athlete needs.

Course content:

1.**Macronutrient Assessment**: Analyze and calculate the energy needs of athletes based on their sport and activity level.

2. **Meal Planning**: Design personalized meal plans tailored to an athlete's performance and recovery needs.

3. **Hydration Techniques**: Implement effective hydration strategies for athletes before, during, and after exercise.

4. **Supplementation Guidelines**: Evaluate the use of sports supplements and their role in enhancing performance and recovery.

5. **Nutrition Timing**: Study the optimal timing of nutrients around training and competitions for maximum performance.

6. **Practical Case Studies**: Work with real athletes to assess and adjust their nutrition plans for improved outcomes.

COURSE NAME: Food Processing and Technology -Theory
COURSE CODE: FND403
CREDITS: 4

L	T	P	C
2	1	1	4

Course outcomes:

CO1. Comprehend the nature and properties of food and its processing.

CO2. Understand the principles of the various processing methods for cereals, millets, legumes and oil seeds.

CO3. Gain knowledge on processing methods used in animal based foods.

CO4. Adapting conventional practices and modern technology for preservation of fruits and vegetables.

CO5. To discuss and apply the principles and methods involved in the processing of different food groups

CO6. Acquire knowledge on the fermented food products

Course content:

Unit I - Introduction to food processing **10 hours**

Nature and properties of food, fluid and visco elastic behavior of foods, Principles of different food processing

such as membrane filtration (ultra, osmosis and reverse osmosis, dialysis), pulsed electric, irradiation, high

pressure processing and hurdle technology. Effect of food processing on the nutritional properties of food.

Unit II - Processing of cereals and millets **10 hours**

Milling products and by products of wheat, rice, corn, barley, oats, sorghum and other millets, whole wheat

atta, blended flour, fortified flour, flaked, puffed and popped cereals, malted cereals, processed foods - bakery

products, pasta products and value-added products.

Unit III - Processing of legumes and oil seeds **10hours**

Milling, processing for anti-nutritional factors, processing for production of edible oil, meal, flour, protein

concentrates and isolates, extrusion cooking technology, snack foods, development of low-cost protein foods.

Unit IV - Processing of Dairy and animal foods **10hours**

Dairy – Manufacture of different types of milk, drying of whole and skim milk, cream separation, churning of

butter, processing of different types of cheese, Probiotic milk products - yoghurt, dahi and ice-cream,

indigenous milk products - khoa, burfi, kalakhand, gulab jamun, rasagola, srikhand, channa, paneer, ghee,

lassi.

Animal Foods: Canning, cooking, drying, pickling, curing and smoking, salami, kebabs, sausages, sliced,

minced, corned, whole egg powder, egg yolk powder, fish protein concentrate and fish oil

Unit V Processing of Fruits and Vegetables 12 hours

Introduction to ripening of fruits and vegetables, processing and preservation of various fruits and vegetables,

fruit juices concentrates and powders, purees, pastes, sugar and salt preserves, dehydrated fruits and vegetables.

REFERENCE BOOKS:

1. Fellow, P., Food Processing Technology (2016)– Principles and Practices, 3rd Edition, CRC Press. Woodland Publishers, England.

2. Adams, M.R. and Moss, M.O., Food Microbiology, (2015) New Age International (P) Ltd., New Delhi.

3. Sommers, C.H. and Xveteng Fan, (2016) Food Irradiation Research and Technology, 2nd Edition, Blackwell Publishing, New Delhi.

4. Manual of methods of Analysis of foods, fruit and vegetable Processing, FSSAI, 2016.

6. Shakuntala Manay, N. and Shadaksharaswamy, M., (2008) Foods – Facts and Principles, 3rd Edition, New Age International (P) Limited Publishers, New Delhi, 2013.

7. S. Ranganna, Handbook of Analysis and Quality Control for Fruit and Vegetable Products, McGraw Hill Education, 2017.

8. G.Subbulakshmi and Shoba A Udipi Food Processing and preservation, New Age International Publishers, New Delhi, 2008.

9. Sivasankar B, (2004) Food Preservation and Processing, 1st Edition, Prentice – Hall of India Private Ltd., New Delhi, 2012.

10. Bawa AS, Raju PS, Chauhan OP, (2013) Food Science, New India Publishing Agency, New Delhi, 2013.

COURSE NAME: Food Processing and Technology -Practical
COURSE CODE: FND403
CREDITS: 1

Course outcomes:

CO1. Gain hands-on experience in various food preservation techniques like canning, freezing, and drying.

CO2. Learn to operate food processing equipment and understand its maintenance.

CO3. Gain knowledge on processing methods used in foods.

CO4. Analyze the sensory properties of processed foods through taste, texture, and appearance testing.

CO5. To discuss and apply the principles and methods involved in the processing of different food groups

CO6. Implement food safety standards and quality control measures in food processing operations.

Course content:

1.Food Preservation Methods: Practice techniques like drying, freezing, and fermentation to preserve food.

2. Processing methods involved in the preparation of different food groups

- Cereals
- Pulses
- Dairy product
- Vegetables
- Fruits
- Animal-based product

3.Food Quality Evaluation: Conduct sensory analysis (taste, texture, color) of processed foods.

4. Food Safety Practices: Implement food safety standards and quality control procedures during processing.

COURSE NAME: Research Methodology for Food and nutrition & biostatistics
COURSE CODE: FND404
CREDITS: 4

L	T	P	C
2	1	0	4

Course outcomes:

CO1. Remember the objectives and Significance of research

CO2. Understanding the definition and identification of a research problem .

CO3. Apply the different research designs.

CO4. Analyse graphical presentation techniques of research.

CO5. Evaluate the research methodology.

CO6.

Course content:

Unit I **10hours**

Meaning, objectives, and Significance of research. Types of research, research approaches and scientific methods, Research process, Criteria of good research, how to write a good research paper, Qualitative vs quantitative research.

Unit II **10hours**

Definition and identification of a research problem, Selection of research problem. Technique Involved in Defining a Problem.

Unit III **15hours**

Meaning and needs of design, important concepts relating to research design, variables, experimental and control groups. (Use examples from epidemiology and clinical trials). Different research designs are exploratory, descriptive, analytical, and diagnostic (epidemiology and clinical trials). Pilot studies.

Unit IV **15hours**

Variable, parameter, statistics. Frequency distribution. Cumulative frequency. Graphical presentation techniques including Histogram, Bar diagrams, Column diagrams, Pie charts along with the concepts of frequency polygon. Mean, median, mode, Standard Deviation, and Standard Error of mean. Probability. Normal distribution. Student's t-distribution. Testing of hypothesis

- Null hypothesis, Z Scores, errors of inference, levels of significance, Degrees of freedom. Graphical and diagrammatic presentation. Interpretation of – Meaning of interpretation, Technique of interpretation, Precaution in interpretation- Interpretation of tables and figures. Report writing – Significance of report writing, Steps in writing report, Types of reports.

Unit V **10hours**

Concept of a Statistic and Sampling Distribution, Point and Interval Estimate of a Parameter, Standard errors, Null and Alternative Hypotheses, Statistical Tests and Distributions, Concepts of Type I & II Errors, p- values, Chi-square tests, t – test, Z-test and F-test.

REFERENCE BOOK(S):

1. Research Fundamentals in Home Economics / Human Ecology,Marjory L. Joseph, William D Joseph,Plycon Press,1996.

2. Methods in Social Research,Goode, WJ and Hatt, PK, McGraw Hill International Editions, Sociology Series,1981.

3.Research Methodology, Methods & Techniques,Kothari,CR,New Age International Publishers,2nd Ed,2004.

4.Research in Education,Best, JW and Kahn, JV,New Delhi, Prentice Hall of India Pvt. Ltd, 6th Ed,1992.

COURSE NAME: Modern techniques and bio instrumentation
COURSE CODE: FND405
CREDITS: 4

L	T	P	C
2	1	0	4

Course outcomes:

CO1. Understand the principles of modern bioinstrumentation techniques used in medical diagnostics.

CO2. Gain practical knowledge in the operation of bioelectrical and biosignal monitoring devices.

CO3. Learn to analyze and interpret data from bioinstrumentation systems.

CO4. Explore the integration of modern technologies in medical and healthcare applications.

CO5 Develop skills in troubleshooting and maintaining bioinstrumentation equipment.

CO6. Understand the ethical and safety considerations in the use of bioinstrumentation in healthcare.

Course content:

Unit I:

Introduction to Bioinstrumentation.Overview of bioinstrumentation, its applications in healthcare, and basic principles of bioelectric signals.

Unit II:

Biosignals and Measurement Techniques. Study of bioelectrical signals (ECG, EEG, EMG), their measurement, and processing techniques.

Unit III:

Sensors and Transducers in Bioinstrumentation. Types of sensors and transducers used for physiological signal measurement and their working principles.

Unit IV:

Medical Instrumentation and Devices. Detailed study of modern medical instruments like ECG, MRI, and ultrasound, and their operation in diagnostics.

Unit V:

Data Analysis and Signal Processing.Techniques for processing, analyzing, and interpreting bioelectrical data using modern software tools.

COURSE NAME: Introduction to nutraceuticals
COURSE CODE: FND406
CREDITS: 4

L	T	P	C
2	1	1	4

Course outcomes:

CO1. Understand the definition and classification of nutraceuticals and their role in health and wellness.

CO2. Learn the benefits and potential risks of using nutraceuticals for disease prevention and treatment.

CO3. Gain knowledge of various types of nutraceuticals, including vitamins, minerals, and herbal supplements.

CO4. Develop skills in evaluating the quality and safety of nutraceutical products.

CO5 Explore the regulatory framework surrounding the production and marketing of nutraceuticals.

CO6. Understand the role of nutraceuticals in promoting health, preventing diseases, and supporting overall well-being.

Course content:

Unit I **6 hours**

Introduction to Nutraceuticals. Overview of nutraceuticals, their definition, classification, and role in health promotion.

Unit II **6 hours**

Types of Nutraceuticals. Study of various types, including vitamins, minerals, probiotics, herbal supplements, and functional foods.

Unit III **6 hours**

Health Benefits of Nutraceuticals. Explore the therapeutic effects of nutraceuticals in preventing chronic diseases, improving immunity, and enhancing overall wellness.

Unit IV **6 hours**

Safety, Quality, and Regulation of Nutraceuticals. Examine the safety standards, quality control, and regulatory frameworks for nutraceuticals in different countries.

Unit V **6 hours**

Emerging Trends in Nutraceuticals. Investigate current research, innovations, and future trends in the nutraceutical industry, including personalized nutrition.

COURSE NAME: Introduction to nutraceuticals-Practical

COURSE CODE: FND406
CREDITS: 1

Course outcomes:

CO1. Understand the definition and classification of nutraceuticals and their role in health and wellness.

CO2. Learn the benefits and potential risks of using nutraceuticals for disease prevention and treatment.

CO3. Gain knowledge of various types of nutraceuticals, including vitamins, minerals, and herbal supplements.

CO4. Develop skills in evaluating the quality and safety of nutraceutical products.

CO5 Explore the regulatory framework surrounding the production and marketing of nutraceuticals.

CO6. Understand the role of nutraceuticals in promoting health, preventing diseases, and supporting overall well-being.

Course content:

Unit I

Identification and Classification of Nutraceuticals

Hands-on experience in identifying various nutraceuticals, including herbs, vitamins, minerals, and functional foods.

Unit II

Nutraceutical Formulation and Preparation

Learn to prepare nutraceutical products like herbal teas, supplements, and functional foods through practical formulation techniques.

Unit III

Quality Control and Safety Testing

Conduct quality control tests for purity, potency, and safety of nutraceutical products in laboratory settings.

Unit IV

Nutraceuticals in Disease Prevention

Perform experiments to assess the effects of specific nutraceuticals on health markers related to chronic diseases.

Unit V

Regulatory Guidelines and Labeling Practices

Practical understanding of labeling, packaging, and compliance with regulatory standards for nutraceutical products.

SEMESTER VIII								
S.No	**Type of Course**	**Code**	**Title of the Course**	**Contact Hours Per Week**				**Remarks**
				L	**T**	**P**	**C**	
1	CC	FND407	Space Nutrition	2	1	1	4	CC-20
2	CC (For Without research)	FND408	Drug food interaction	2	1	1	4	CC-21 (without Research)
3	CC (For Without Research)	FND409	Nutritional Pharmacology	2	1	1	4	CC-22(without Research)
4	Minor (For without research)		To be chosen from a pool of minors				4	Minor8
5	Minor(For With /without research)		To be chosen from a pool of minors				4	Minor8
6	Dissertation (For With research)		Dissertation on Food and nutrition	0	0	12	12	

COURSE NAME: SPACE NUTRITION
COURSE CODE: FND407
CONTACT: 3T+1P
CREDITS: 4

COURSE OUTCOMES:

By the end of this course, students will be able to:

CO1: Understand the basic principles of human nutrition and how they are adapted for space environments.

CO2: Analyze the effects of microgravity on human physiology, including metabolism, digestion, and fluid balance.

CO3: Identify key nutritional challenges faced by astronauts on space missions.

CO4: Evaluate the role of space food technology and its impact on astronaut health and performance.

CO5: Discuss the dietary needs for long-term missions to the Moon, Mars, and beyond.

Course Outline:

UNIT 1: Introduction to Space Nutrition & Basic Principles of Human Nutrition 10 HOURS

- Overview of space missions and the importance of nutrition in space.

- Human physiology in space: key challenges.
- History of space food and nutrition research.
- Macronutrients: Carbohydrates, proteins, fats.
- Micronutrients: Vitamins and minerals.
- Water, hydration, and electrolyte balance.

UNIT- II: The Effects of Microgravity on Human Physiology & Nutritional Requirements for Astronauts

10 HOURS

- Alterations in metabolism, digestion, and absorption.
- Muscle and bone health in space.
- Fluid distribution and cardiovascular adaptations.
- Daily caloric needs and macronutrient distribution.
- Micronutrient requirements: vitamins and minerals in space.
- Meeting energy demands during space activities and exercise.

UNIT- III: Space Food Systems 8 HOURS

- Types of space food: rehydratable, thermostabilized, freeze-dried, and snacks.
- Challenges in food preservation for space.
- Packaging, shelf-life, and safety considerations.

UNIT- IV: Food and Dietary Modifications for Microgravity 12 HOURS

- Adaptations in food preparation and consumption.
- Impact of microgravity on taste, smell, and appetite.
- Solutions for improving food palatability and astronaut satisfaction.

- Dehydration risk and fluid loss in microgravity.
- Strategies for maintaining proper hydration and electrolyte balance.
- Special considerations for long-duration space missions.

UNIT –V: Nutritional Countermeasures for Space Health 10 HOURS

- Counteracting the effects of microgravity on bone density and muscle mass.
- Supplements and vitamins for space health.
- Preventing space-related conditions (e.g., spaceflight-associated neuro-ocular syndrome).
- The ethics of food production and consumption in space.
- Sustainability of space food systems.
- Environmental impact of space food production and waste management.

REFERNCE:

1. NASA’s Space Food Systems - A Guide (NASA Technical Reports)

2. "Nutrition for Space Travelers" by William J. Hurley
3. "Space Nutrition and the International Space Station" (NASA Study)
4. Selected scientific articles and research papers on space food technology, human physiology in space, and related topics.

COURSE NAME: SPACE NUTRITION- PRACTICAL
COURSE CODE: FND407
CREDITS: 1

COURSE OUTCOMES:

By the end of this course, students should be able to:

CO1: Understand the impact of microgravity and space conditions on human nutrition.

CO2: Develop space food items and analyze their nutritional content.

CO3: Prepare and test space food prototypes for texture, stability, and nutrition.

CO4: Perform tests and experiments to simulate space food conditions.

CO5: Analyze and monitor the effects of space nutrition on physical and cognitive performance.

COURSE CONTENT:

- Review and evaluate current space food products.
- Calculate the daily nutritional intake requirements for astronauts and assess food labels.
- Hands-on food preservation techniques (freeze-drying, dehydration, vacuum sealing).
- Store and analyze different food items for stability and shelf life.
- Design a sustainable space food system for long-term space missions.
- Conduct mock nutritional assessments based on simulated astronaut health data.

References:

1. **NASA's Space Food Systems** – Official guidelines and research on food for space missions.
2. **Space Nutrition: From Earth to Space** – Textbook on nutrition for astronauts.
3. **The NASA Food Technology Commercial Space Food Program** – Research reports and findings on space food.

COURSE NAME: DRUG FOOD INTERACTION
COURSE CODE: FND408
CONTACT: 3T+1P
CREDITS: 4

COURSE OUTCOMES:

By the end of this course, students will be able to:

CO1: Understand the mechanisms of drug-food interactions.

CO2: Recognize the clinical significance of these interactions in various therapeutic contexts.

CO3: Analyze how different types of food and beverages can influence pharmacokinetics (absorption, distribution, metabolism, and excretion).

CO4: Identify common drug-food interactions and their implications on drug therapy.

CO5: Develop strategies for managing drug-food interactions in clinical practice.

COURSE CONTENT:

UNIT I: Introduction to Drug-Food Interactions & Mechanisms of Drug-Food Interactions

Definition of Drug-Food Interactions. Types of Interactions: Pharmacokinetic vs. Pharmacodynamic. Factors Influencing Drug-Food Interactions: Age, genetics, diet, health status, Importance of Understanding Drug-Food Interactions in Clinical Practice. Absorption: Impact of food on drug absorption (e.g., delayed or reduced absorption). Metabolism: Enzyme induction and inhibition (e.g., cytochrome P450 system). Distribution: Influence of food on drug plasma proteins and tissue distribution. Excretion: Impact of food on renal drug excretion

UNIT II: Absorption and Food Interactions & Drug Metabolism and Food Interactions

Effects of food on gastric pH and gastrointestinal motility. Examples of drugs with altered absorption due to food (e.g., tetracyclines, bisphosphonates). Case studies of food that enhance or reduce absorption (e.g., high-fat meals, fiber-rich foods). Enzyme systems involved in drug metabolism: CYP450, phase I, and phase II enzymes. Impact of specific foods on drug metabolism (e.g., grapefruit juice, cruciferous vegetables). Genetic variations influencing metabolism (e.g., polymorphisms in cytochrome P450 enzymes). Clinical relevance of altered metabolism in drug efficacy and toxicity.

UNIT III: Drug-Food Interactions in the Context of Nutritional Deficiencies & Clinical Examples of Drug-Food Interactions I

Impact of nutrient deficiencies on drug absorption and metabolism. Common interactions related to vitamins, minerals, and trace elements (e.g., calcium and iron with antibiotics). Managing nutritional deficiencies in patients on long-term drug therapies. Case studies: Interaction between warfarin and vitamin K-containing foods. Effects of high-protein diets on drug clearance (e.g., anticonvulsants). The role of alcohol in modifying drug effects and increasing toxicity (e.g., acetaminophen)

UNIT IV: Clinical Examples of Drug-Food Interactions II & Pharmacodynamics and Food Interactions

Interaction between MAO inhibitors and tyramine-containing foods (e.g., cheese, red wine). The effect of dairy products on antibiotic therapy (e.g., doxycycline and tetracycline). Folic acid supplementation and its effects on methotrexate therapy. Influence of food on drug receptors and efficacy. Examples of foods enhancing or reducing drug potency (e.g., caffeine and stimulants). Impact on drug-receptor binding (e.g., levodopa and protein-rich meals).

UNIT V: Role of Dietary Supplements in Drug Interactions & Food, Drugs, and the Gut Microbiome & Drug-Food Interactions in Chronic Disease Management

Common dietary supplements and their interaction with prescription drugs (e.g., St. John's Wort, garlic). Herb-drug interactions and their clinical significance. Safety concerns with unregulated dietary supplements. Impact of gut microbiota on drug metabolism and absorption. Role of probiotics and prebiotics in modifying drug effects. The gut-liver axis and implications for drug-food interactions. Drug-food interactions in diabetes management (e.g., insulin and carbohydrate intake). Cardiovascular diseases: Interactions between antihypertensives and dietary salt or potassium. Interactions in cancer therapy: Chemotherapy and food recommendations.

REFERNCE:

- **"Basic and Clinical Pharmacology"** by Bertram Katzung
- **"Goodman & Gilman: The Pharmacological Basis of Therapeutics"** (13th Edition)
- **"Pharmacology: Drug Actions and Reactions"** by M. A. Rang, et al.
- **"Food, Drug, and Chemical Interactions"** by R. G. K. Singh

COURSE NAME: DRUG FOOD INTERACTION- PRACTICAL
COURSE CODE: FND408
CREDITS: 1

COURSE OUTCOMES:

By the end of this practical course, students should be able to:

CO1: Identify common drug-food interactions and understand their mechanisms.

CO2: Analyze and interpret experimental data related to drug-food interactions.

CO3: Assess the impact of food on drug absorption, distribution, metabolism, and elimination.

CO4: Understand the clinical relevance of various drug-food interactions.

CO5: Communicate effectively with patients regarding drug-food interactions to prevent potential adverse effects.

COURSE CONTENT:

- Conduct experiments with drugs such as tetracycline and grapefruit juice, investigating changes in absorption when taken with food.
- Compare the bioavailability of a drug taken on an empty stomach versus after a meal.

- Study the effect of grapefruit juice on the metabolism of drugs like warfarin, statins, and cyclosporine.
- Examine the role of alcohol and certain foods in inhibiting or inducing liver enzymes that affect drug metabolism.

- Measure the plasma protein binding of drugs (e.g., diazepam) in the presence of certain foods.
- Analyze the effect of high-protein meals on the drug distribution phase.

- Study the effect of food on the renal clearance of specific drugs (e.g., penicillin) by conducting urine collection and analysis.
- Investigate the interaction of foods like high-sodium diets on drug excretion.

- Study how food affects the action of certain drugs (e.g., antihypertensive drugs, insulin) and their clinical effectiveness.
- Investigate the influence of high-fat meals on the therapeutic action of lipophilic drugs.

- Investigate the effect of high-fiber foods on the bioavailability of certain drugs (e.g., digoxin).
- Study the interaction between calcium-rich foods and drugs like tetracycline and iron supplements.

- Analyze the potential effects of herbal supplements (e.g., ginseng, garlic) on drug efficacy and safety.

REFERENCES:

- Basic and Clinical Pharmacology by Bertram Katzung
- Food-Drug Interactions: Clinical Aspects and Mechanisms by M. L. Goodwin
- Pharmacology and Therapeutics for Dentistry by Stephen F. Hoag
- Online databases (e.g., PubMed, Micromedex) for research on drug-food interactions

COURSE NAME: NUTRITIONAL PHARMACOLOGY
COURSE CODE: FND409
CONTACT:3T+1P
CREDITS: 4

COURSE OUTCOMES:

CO1: **Understand the Relationship between Nutrition and Pharmacology**

CO2: **Analyze the Impact of Diet on Drug Action**

CO3: **Assess Drug-Nutrient Interactions**

CO4: **Evaluate Clinical Implications of Nutritional Support in Drug Therapy**

CO5: **Critically Appraise Research in Nutritional Pharmacology**

UNIT 1: Introduction to Nutritional Pharmacology

- Definition of Nutritional Pharmacology
- Scope and importance of nutrition in drug action
- Relationship between nutrition, pharmacology, and drug metabolism
- Physiological and biochemical principles underlying the effect of nutrients on drug absorption, distribution, metabolism, and excretion (ADME)

- The concept of bioavailability and nutrient-drug interactions
- Metabolism of nutrients and their effects on drug actions
- Pharmacokinetics and pharmacodynamics in the context of nutrition
- Role of vitamins, minerals, and other nutrients in drug efficacy

UNIT 2: Nutrients and Drug Absorption

- How food affects the absorption of pharmaceuticals
- The impact of different foods on drug bioavailability
- Mechanisms of nutrient-drug absorption interactions

- The role of gastrointestinal (GI) tract in nutrient-drug interactions
- Nutrient-induced changes in gastric pH, enzyme activity, and transporters
- Influence of food on first-pass metabolism of drugs
- Food-drug interactions affecting drug absorption

UNIT 3: Nutritional Factors in Drug Metabolism

- How nutrients can alter drug metabolism in the liver and other tissues
- Cytochrome P450 enzymes and their role in drug metabolism
- The influence of diet on drug metabolism and detoxification pathways

- Impact of macronutrients (proteins, fats, carbohydrates) on drug metabolism
- Role of micronutrients (vitamins and minerals) in enzymatic drug processing
- Dietary patterns and their effect on Phase I and Phase II drug metabolism
- Genetic variations in drug-metabolizing enzymes and nutritional considerations

UNIT 4: Drug-Nutrient Interactions and Clinical Implications

- Examples of food and drug interactions (e.g., grapefruit, dairy, alcohol)
- Drug interference with nutrient absorption, metabolism, and excretion
- Clinical strategies to manage drug-nutrient interactions
- Impact of these interactions on patient care, including elderly and pediatric populations

UNIT 5: Therapeutic Applications of Nutritional Pharmacology

- Role of nutrition in managing chronic diseases (e.g., diabetes, cardiovascular diseases, cancer)
- Pharmacological treatment of nutritional deficiencies
- Complementary and alternative therapies: Food as medicine
- Nutritional support in drug therapy for infectious diseases, cancer treatment, and more.

REFERNCES:

1. "Nutritional Pharmacology" **by** Jeffrey B. Blumberg.
2. "Nutritional Medicine" **by** Alan R. Gaby.
3. "Pharmacology and Therapeutics for Dentistry" **(for a specialized focus in dentistry) by** Frank L. M. Lee, Joel D. Berg.
4. "Herbal Medicine: Biomolecular and Clinical Aspects" **edited by** I. F. F. Benzie & S. Wachtel-Galor.
5. "Textbook of Nutritional Medicine" **edited by** Richard A. H. Ades.

COURSE NAME: NUTRITIONAL PHARMACOLOGY- PRACTICAL
COURSE CODE: FND409
CREDITS: 1

COURSE CONTENT:

- Conduct experiments to evaluate how specific nutrients affect drug absorption
- Identify and quantify active ingredients in nutritional supplements using chromatography or other analytical methods.
- Measure the effect of dietary nutrients on specific enzyme activities (e.g., lipase, amylase).
- Perform experiments assessing the pharmacokinetics of drugs with and without food intake.
- Investigate how antioxidants or other nutrients modulate the toxicity of specific drugs.

REFERENCE:

- Guyton, A.C., Hall, J.E. **Textbook of Medical Physiology**.
- Gropper, S. S., Smith, J. L., & Carr, T. P. **Advanced Nutrition and Human Metabolism**.
- Koda-Kimble, M.A., Young, L.Y., Alldredge, B.K. **Applied Therapeutics: The Clinical Use of Drugs**.
- Finkelstein, J. A., & O'Neil, M. **Nutritional Influences on Drug Action**.

COURSE NAME: FUNDAMENTALS OF DIET THERAPY- THEORY
COURSE CODE: FND410
CONTACT:3T+1P
CREDITS: 4

COURSE OBJECTIVES: The course will enable the students to

1.) Gather knowledge regarding the foundation sciences which underpin therapeutic dietetic practice, the principles of disease prevention and health promotion, the principles of therapeutic intervention practice.

2.) Understand the organization, management and provision of healthcare both in the hospital and in primary care.

3.) Remember the principles of nutrition for weight management.

4.) Analyse the nutritional requirements of different physiological disorders considering the mechanisms associated with it.

5.) Evaluate the standard dietary therapeutic approaches for different disorders.

Unit I Diet Therapy

12 hours

Basic Concepts of Diet Therapy, Nutrition Care Process: Definition of MNT, Nutritional Assessment (ABCD), Nutritional Diagnosis, Nutrition Intervention, Monitoring & Evaluation of Nutritional Care.

Modifications of the Normal Diet- General or Regular, Adequate or House Diet, Soft Diet, Liquid Diets- Clear Liquid Diet, Full Liquid Diet.

Mode of Feeding- Enteral or Oral Route- Enteral (via) tube feeding Parenteral – Peripheral Vein Feeding, Total Parental Nutrition (TPN).

Unit II Nutrition During Febrile Disorders

5 hours

Classification of fevers, Metabolism, General Dietary Considerations

Acute & chronic fevers -Typhoid &Tuberculosis

Unit III Nutrition for Weight Management **8 hours**

Assessment of obesity – BMI, Waist Hip-Ratios, Skin folds Thickness.

Etiology – Genetic Factors, Physiological Factors, Behavioral factors.

Metabolism in obesity – Basal Metabolism.

Treatment – Dietary Management, Fad diets and their consequences.

Underweight – Etiology, Health hazards, Treatments.

Unit IV Nutrition in Gastrointestinal Disorders

12 hours

General Dietary Considerations for healthy gut Peptic Ulcer Disease – Etiology, Symptoms, Dietary Management Intestinal Diseases – irritable bowel syndrome (IBS), Constipation, Diarrhea Diseases of the Small Intestine – Celiac Disease – Gluten Sensitive Enteropathy, Tropical Sprue, Lactose Intolerance Inflammatory Bowel Disease - Crohn's Disease, Ulcerative Colitis

Unit V Nutrition in Diseases of the Liver

13 hours

Hepatitis- Types, Etiology, Symptoms, Treatment.

Cirrhosis- Etiology, Clinical Symptoms, Treatment.

Hepatic Encephalopathy- Etiology, Clinical Symptoms, Treatment.

Diseases of the Gall Bladder- Cholecystitis and Cholelithiasis

REFERENCE BOOKS:

1. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
2. Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.
3. Robinson,C.H;Lawler,M.R.Chenoweth,W.L;andGarwick,A.E(1986):Normal and Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
4. Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi..
5. Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
6. Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis.

COURSE NAME: DIETETICS – I – PRACTICAL 2 HOURS/WEEK
COURSE CODE: FND410
CONTACT: 2P
CREDITS: 1

COURSE OBJECTIVES: The course will enable the students to

1. Demonstrate Practical Knowledge of Nutritional Assessment Techniques
2. Apply Clinical Dietetic Skills in Patient Care
3. Prepare and Deliver Educational Materials on Nutrition
4. Implement Food Service Management Principles
5. Analyze and Interpret Nutritional Research Data
6. Enhance Communication and Interpersonal Skills in Dietetics Practice

COURSE CONTENT:

1.) Planning and preparing diets for diarrhea, constipation.
2.) Planning and preparing diets for febrile conditions -Typhoid and Tuberculosis.
3.) Planning and preparing diets for obese and underweight patients.
4.) Planning and preparing diet for Peptic Ulcer patients.
5.) Planning and preparing diets for viral hepatitis and cirrhosis of liver.
6.) Planning and preparing diets for hyper cholestrolemia.
7.) Planning and preparing diets for hypertensive patients.

REFERENCE BOOKS:

1. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.

2. Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.
3. Robinson,C.H;Lawler,M.R.Chenoweth,W.L;andGarwick,A.E(1986):Normal and Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
4. Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi..
5. Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
6. Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis.

COURSE NAME Elementary Dietetics - Theory

COURSE CODE - FND411

CONTACT – 3L+1P

CREDIT- 4

Course Outcomes:

After the completion of the course, students would be able to:

CO1: **Understand the Basics of Nutrition**: Students will develop a foundational knowledge of essential nutrients, their functions in the body, and how they contribute to overall health and wellness.

CO2: **Apply Dietary Guidelines**: Students will be able to interpret and apply national dietary guidelines and recommendations to create balanced, nutritious meal plans for individuals across various age groups and health conditions.

CO3: **Assess Nutritional Status**: Students will gain skills in assessing the nutritional status of individuals, recognizing signs of nutritional deficiencies, and suggesting appropriate dietary modifications for improvement.

CO4: **Evaluate Food Choices and Preparation**: Students will learn to evaluate and modify food choices based on cultural, ethical, and health considerations, and understand the importance of food safety and proper meal preparation techniques.

CO5: **Communicate Nutritional Information Effectively**: Students will develop the ability to communicate basic nutritional advice clearly to individuals and groups, using evidence-based information to promote healthy eating behaviors.

Unit 1: Introduction to Dietetics

Overview of Dietetics as a Profession- Definition and scope of dietetics, Role of dietitians in healthcare, Ethical considerations in dietetics practice, **Historical Development of Nutrition Science-** Early studies and advancements, Key contributors to nutrition and dietetics.**Basic Principles of Human Nutrition**

Nutrients and Their Functions- Macronutrients: Carbohydrates, Proteins, Fats. Micronutrients: Vitamins, Minerals. Water and Fiber. **Energy Balance and Metabolism**- Basal metabolic rate (BMR), Energy expenditure and requirements, Role of nutrients in metabolism.

Unit 2: Digestive System and Nutrient Absorption

Anatomy and Physiology of the Digestive System- Overview of the gastrointestinal tract, Mechanisms of digestion and absorption. **Factors Affecting Nutrient Absorption-** Enzyme function, Nutrient interactions.

Unit 3: Nutrition Assessment & Food Science and Safety

Methods of Nutritional Assessment- Anthropometric measurements, Dietary assessments (e.g., food diary, 24-hour recall), Biochemical and clinical assessments. **Interpretation of Nutritional Data-** Identifying nutrient deficiencies and excesses. Establishing nutritional status. **Food Composition and Labeling-** Understanding food labels and nutritional claims, Nutrient content of common foods. **Food Preparation and Cooking Methods-** Effects of cooking on nutrient retention, Healthy cooking techniques. **Food Safety and Hygiene-** Safe food handling practices, Prevention of foodborne illnesses.

Unit 4: Nutrition Throughout the Lifecycle

Infancy and Childhood Nutrition- Nutritional needs during growth and development, Feeding practices for infants and children, **Adolescent Nutrition-** Nutritional challenges during adolescence, Dietary recommendations for teenagers, **Adult Nutrition-** Nutritional needs for adults, Impact of lifestyle factors on nutrition (e.g., activity, stress, and aging), **Geriatric Nutrition -** Dietary considerations for elderly individuals, Management of age-related nutritional concerns.

Unit 5: Nutrition and Health

Diet and Chronic Diseases- Obesity, diabetes, cardiovascular diseases, and cancer, Role of diet in disease prevention and management. **Public Health Nutrition-** Nutritional issues in populations (e.g., undernutrition, malnutrition, food insecurity). Government nutrition programs and policies.

Meal Planning and Dietary Modifications- Principles of Meal Planning- Balancing macronutrients and micronutrients, Cultural, economic, and social factors influencing meal planning. Dietary Modifications for Health Conditions- Modifying diets for special needs (e.g., diabetes, hypertension, allergies). Ethical and cultural considerations in dietary modifications

REFERNCE BOOKS:

7. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
8. Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London.
9. Robinson,C.H;Lawler,M.R.Chenoweth,W.L;andGarwick,A.E(1986):Normal and Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
10. Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi..
11. Therapeutic Nutrition,17th Ed., Mac Millan Publishing Co.
12. Williams's (1989): Nutrition and diet Therapy.6th edition. Times Mirror/Mosby College Publishing, St.Louis.

COURSE NAME- Elementary Dietetics - Practical

COURSE CODE – FND411

CREDIT- 1

Course Outcomes:

After the completion of the course, students would be able to:

CO1: **Practical Application of Nutritional Knowledge**: Students will develop the ability to apply theoretical knowledge of nutrition and dietetics in real-life settings by preparing and analyzing balanced diets for individuals with varying health needs.

CO2: **Skill Development in Meal Planning and Preparation**: Students will gain hands-on experience in planning, preparing, and presenting nutritious meals, considering factors such as caloric requirements, portion sizes, and food preferences for different population groups.

CO3: **Understanding Dietary Modifications for Health Conditions**: Students will demonstrate the ability to modify diets for individuals with specific health conditions (e.g., diabetes, hypertension, and obesity) by understanding and applying dietary principles to enhance health and manage conditions.

CO4: **Assessment of Nutritional Status**: Students will acquire skills in conducting basic nutritional assessments, including anthropometric measurements, dietary recalls, and evaluating food intake, to recommend appropriate dietary interventions.

CO5: **Food Safety and Hygiene Practices**: Students will learn and apply fundamental food safety, sanitation, and hygiene practices to ensure safe food handling, preparation, and storage, adhering to professional standards in dietetics and nutrition.

UNIT I

Basic Cooking and Meal Preparation

- Prepare simple meals using different cooking techniques.
- Practice food preservation methods.

UNIT II

Therapeutic Diet Preparation

- Prepare diets tailored for specific conditions like diabetes, hypertension, and food allergies.
- Modify meals for texture requirements or other therapeutic needs (e.g., liquid diets, soft diets).

UNIT III

Menu Planning Exercise

- Develop a menu for a specific health condition or group (e.g., children, pregnant women).
- Plan meals that meet nutritional guidelines.

UNIT IV

Dietary Assessment

- Conduct a 24-hour recall or food diary assessment for an individual or group.
- Analyze dietary intake and suggest improvements.

UNIT V

Food Service Operations

- Plan and serve a meal in a simulated food service environment.
- Practice food safety measures (e.g., hand washing, proper storage, temperature control).

Reference Books:

- Mahan, L. K., & Escott-Stump, S. (2017). *Krause's Food & Nutrition Therapy*.
- Whitney, E., & Rolfes, S. R. (2018). *Understanding Nutrition*.
- American Dietetic Association. (2020). *The Complete Food and Nutrition Guide*.