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SCHOOL OF SCIENCE
PROGRAMME OUTCOMES

PROGRAMME OUTCOMES(B.Sc.):

- **PO1. Scientific Knowledge.** Apply the knowledge of Science, Mathematics, Engineering& Technology fundamentals to solve the complex problems**.**
- **PO2**. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO3.Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4. Modern tool usage:** Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5. Environment and sustainability:** Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6.Individual and team work:** Function objectively as an individual and as a member in diverse teams.
- **PO7. Communication:** Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8. Life-long learning:** Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

DEPARTMENT OF B.Sc. Food Science, Nutrition and Dietetics
PROGRAMME SPECIFIC OUTCOMES

PROGRAMME SPECIFIC OUTCOME (DEPARTMENT WISE):

PSO1: Understand the concept of food science, nutrition and dietetics

PSO2: Analyse the relationships between various nutrients and physiological disorders and various diet therapies

PSO3: Apply the knowledge of processing and preservation techniques in increasing the shelf life of food products

PSO4: Combine the knowledge of food science, nutrition and dietetics to overcome food wastage, malnutrition and lifestyle disorders

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
B.Sc. FOOD SCIENCE, NUTRITION AND DIETITICS
FIRST SEMESTER

ACADEMIC YEAR 2026-27 BATCH 2026-29 (CBCS)

S.No.	Part	Course type	Course Code	Title Of the Course	Hours/ week	Credits	Marks		Total	Duration of Exam
							Int	Ext		
THEORY										
1.	I	AEC-1	EN26201	English-I	05	05	40	60	100	03
3.	I	AEC-2	VE26101	Value Education & Personality Development	02	02	40	60	100	02
4.	II	DSC	FS26101	Human anatomy and physiology	04	04	40	60	100	03
5.	II	DSC	FS21102	Basics Food Science	04	04	40	60	100	03
6.	II	DSC	FS21103	Fundamentals of Nutrition	04	04	40	60	100	03
7.	II	DSC	FS25104	Nutritional Biochemistry	04	04	40	60	100	03
PRACTICAL										
7.	II	DSC	FS21105	Basics Food Science	02	01	40	60	100	03
8.	II	DSC	FS21106	Fundamentals of Nutrition	02	01	40	60	100	03
9.	II	DSC	FS25107	Nutritional Biochemistry	02	01	40	60	100	03
TOTAL					30	26			900	

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GENERAL ENGLISH -I

Credits: 3 **Semester: I**
Subject Code: EN23101 **No of Lecture Hours: 45**
Objectives:

- Through an exposure to contemporary passages, the students would be able to have a grasp on the language of today, with specific emphasis on the Listening, Speaking, Reading and Writing skills.
- Through the components of a passage, vocabulary and grammar section, speaking component and writing segments, there is a holistic development for language proficiency and fluency.

Outcomes:

CO1: To distinguish between words which are either spelt or pronounced alike, yet render distinct meanings; imparting a sound clarity on everyday usage of language, and for developing the art of parallel listening and writing.

CO 2: To construct vocabulary and to gain understanding on the tense component, a pivotal constituent for language structuring and vocabulary building.

CO 3: To identify with economical word constructions, paying specific attention in constructing sound writing skills.

CO 4: To interpret functional grammar, the basic part involved in sentence constructing to improve linguistic skills.

CO 5: To develop communication skills to provide a platform for language efficiency for effective language deliver

UNIT- I **9Hrs**
FUNDAMENTALS OF COMMUNICATION-I

- **Short Story - The Mystery Story (source – teacherluke.co.uk)** 1Hr
- Present Tense 2Hrs
- Past Tense 2Hrs
- Future Tense 2Hrs
- Paragraph Writing 2Hrs

UNIT- II
LANGUAGE PROFICIENCY FOR EFFECTIVE WRITING
AND SPEAKING SKILLS-I **9Hrs**

- **Poem- Goodbye Party For Miss Pushpa T.S. by Nissim Ezekiel** 2Hrs
- Subject- Verb Agreement 3Hrs
- Punctuations 2Hrs
- Review Writing 2Hrs

UNIT-III **9Hrs**
WIT AND HUMOUR

- **From the text Atea Party by Ruth Prawer Jhabvala** 1Hr

- Explanation of the text 2Hrs
- Grammar -------Nouns, Articles 2Hrs
- Vocabulary --- Homonyms, Homophones, Homographs 2Hrs
- Writing Skill ------Note- Making 2Hrs

UNIT-IV **9Hrs**

HUMAN VALUES

- **From the text "India's Contribution to World Unity"** 1Hr
- Explanation of the text 2Hrs
- Grammar----adverbs 2Hrs
- Vocabulary----Adjective and Adverb Suffixes 2Hrs
- Writing Skill------Formal Letters and Curriculum Vitae 2Hrs

UNIT-V **9Hrs**

From the text "Sachin Tendulkar"

- Explanation of the text 1Hr
- Grammar----- Adjectives, Comparison of Adjectives 2Hrs
- Vocabulary-----Common Errors, Commonly Misspelt words, Commonly Confused Words 3Hrs
- Writing Skill-----References and Bibliographies 3Hrs

VALUE EDUCATION & PERSONALITY DEVELOPMENT

Credits: 2 **Semester: I**
Subject code : VE26101 **No. of Lecture hours: 30**

Objective: To produce intellectually competent, morally upright, socially committed, spiritually inspired citizens in the service of the Nation and the World.

Outcome: Students will be transformed in to conscientious citizens through holistic education and contribute Nation Building.

UNIT- I **6Hrs**
Introduction to Ethics

- Why Value Education? 2
- Reasons to have Ethics for Life 1
- Accepted Norms and Counter Values 1
- Dimensions of Human Development: Physical, Intellectual, Emotional, Moral, Spiritual and Social 2

UNIT-II **6Hrs**
Approach to Life

- Conscience and Pseudo-Conscience 1
- Happiness as Life-goal 1
- Values revealed and lived in Religions 1
- Experience of God 1
- Love: The three components of Love 1
- Some of the basic stages and issues of Life: Family, Love, Sex, Marriage 1

UNIT-III **6Hrs**
Concern For Others

- Self and Another 2
- Human Context 2
- Moral Problems of a Society / True Society : Social Desire, Social Fear, Social Silence, Social Indifferenc 2

UNIT-IV **6Hrs**
Transformation Of Self

- Definitions of personality 1
- Characteristics of personality 1
- Elements of personality 1
- Traits of good personality 1
- Self-Identity, self concept 1
- Self-Discovery, self-acceptance 1
  Self-Esteem

WORK SHEET (1): Self Estimation

UNIT-V **6Hrs**

Life Enrichment Skills

- Purpose of life - Goal setting
- Characteristics of Goals 1
- Building Relationships
- Time Management 1
- Stress Management
- Emotional Management 2
- Conflict Management 1
- Team Management (Group Dynamics) 1

WORK SHEETS (1) & (2): 1) Anger Management
2) Team Management

ESSENTIAL READING:

1. Human Values - Development Programme - AIACHE
2. In Harmony

HUMAN ANATOMY AND PHYSIOLOGY

Credits :4 **Semester: 1**

Subject code: FS26101 **No. of lecture hours: 60Hrs**

Objectives

*To familiarize students with specific terminology.
*To enable the students to learn structure and functions of organs.
*To prepare the students to understand the physiology of human body.

Outcomes

CO1: The students will be able to describe basic aspects of anatomy and physiology.
CO2: The students will be able to classify different functions of digestive and respiratory system of human body.
CO3: The students will be able to identify different blood groups, endocrine glands.
CO4: The students will be able to appraise the functions of nervous and musculo skeletal system.
CO5: The students will be able to describe the functions of lymphatic system, immunity and excretory system

COURSE CONTENT	HOURS ALLOTED	PEDAGOGY
Module 1: **CELL AND ITS ORGANELLES** • Cell as a unit of the body, cell organelles and their function, cell division. • Tissue level of organization, types of tissues, structure and functions • The integumentary system-skin-structure and function, hair, sebaceous gland and sweat glands • Blood – blood and its composition, blood groups and coagulation of blood	3Hrs. 3Hrs. 3Hrs. 3Hrs.	Power point presentation
Module II: **THE DIGESTIVE AND RESPIRATORY SYSTEM.** • Digestive system-Major organs of the digestive system, Anatomy of the alimentary canal, Functions of the organs of the digestive system, physiology of digestion. • Absorption and mechanism-Importance of Na+/CL-: glucose transporter, Elimination of unabsorbed food materials. Digestion and absorption of food and the role of enzymes and hormones. • Respiratory system-Major organs and their functions. • Physiology of exchange of gases, muscular exercise-tidal and vital volumes.	3 Hrs. 3 Hrs. 3 Hrs. 3Hrs.	Power point presentation
Module III: **CIRCULATORY SYSTEM AND GLANDS** • Circulatory system-Arterial system, venous System -afferent efferent vessels, circulation of blood, cardiac cycle	3 Hrs. 3 Hrs.	Power point presentation

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and purkinje fibres. • Structure and functions of heart, heart rate, cardiac output, blood pressure and its regulation. • Hormonal -Endocrine and exocrine glands- Pituitary gland, thyroid gland, parathyroid gland, pancreas. • Adrenal gland, sex glands, GI tract hormones.	3 Hrs. 3 Hrs.	
Module 1V: **NERVOUS AND MUSCULOSKELETAL SYSTEMS**. • Nervous system-Nerve cell structure and functions • Brain-major divisions and sensory motor neurons.(Central nervous system-Autonomic NS,parasymphatheticNS) • Musculoskeletal system-Types of muscles, functions • Skeletal system, formation of bone and teeth.	3 Hrs. 3 Hrs 3 Hrs. 3 Hrs.	Power point presentation
Module V: **LYMPHATIC SYSTEM, IMMUNITY AND EXCRETORY SYSTEM.** • Function of lymphatic vessels, lymphocytes, lymphoid tissues and organs. • Immune system:Bodys defence(non-specific and specific, innate immune system, immune response • Excretory system-structure and function of kidney, bladder, formation of urine. • Counter current mechanisms and regulation of body temperature.	3 Hrs. 3 Hrs. 3 Hrs. 3Hrs	Power point presentation

REFERENCES

1.Guyton and Hall Textbook of Medical Physiology
Hall, J. E. (2021). Guyton and Hall textbook of medical physiology (14th ed.). Elsevier.

2. Tortora and Derrickson's Principles of Anatomy and Physiology
Tortora, G. J., & Derrickson, B. H. (2021). Principles of anatomy and physiology (16th ed.). Wiley.

3. Human Anatomy and Physiology by Elaine N. Marieb and Katja Hoehn
Marieb, E. N., & Hoehn, K. (2018). Human anatomy and physiology (11th ed.). Pearson.

4.Ross and Wilson Anatomy and Physiology in Health and IllnessWaugh, A., & Grant, A. (2020). Ross and Wilson anatomy and
physiology in health and illness (14th ed.). Elsevier.

5. Gray's Anatomy for Students Drake, R. L., Vogl, A. W., & Mitchell, A. W. M. (2020). Gray's anatomy for students (4th ed.). Elsevier.

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BASIC FOOD SCIENCE

Credits : 4 **Semester : I**
Subject Code: FS21102 **No. of lecture hours: 60**

Objectives

- To study the various preparation methods of food
- To provide an understanding of gelatinisation concepts.
- To familiarize students with flour quality and fat compositions.
- To enable students to classify proteins and enzymes.
- To enable students understand physical and functional properties of meat products.

Outcome

CO1: Students will be able to understand various methods of food processing.
CO2: Students will be able to learn about sugars and sweeteners.
CO3: Students will be able to evaluate the roll of cereals and fats in food.
CO4: Students will be able to differentiate various chemical reactions occurring in proteins and enzymes.
CO5: Students will be able to explain role of meat products in health.

Course content	Hours allotted	pedagogy
Module i: **BASIC FOOD COMMODITIES** • Major food commodities and minor food commodities, Objectives of cooking, preliminary preparation of food. • Methods of food preparation. (Dry heat, Moist heat and combination methods) • Medium of food preparation(water, steam, oil / fat, air) • Microwave cooking and Solar cooking, nutrient losses during cooking.	12 hrs. 3 3 3 3	Lecture
Module ii **POLYSACCHARIDES, SUGARS AND SWEETENERS** • Starch: Structure, gelatinization, methods for following gelatinization changes. • Characteristic of some food starches. Gelatinization. Modified food starches. • Non-starch Polysaccharides: Cellulose, hemicelluloses, pectin's, gums, animal polysaccharides. • Sugar and Sweeteners: Sugar, Syrups, Natural and Synthetic sweeteners	12 hrs. 3 3 3 3	Case studies/review of research articles
Module iii. **CEREALS AND CEREAL PRODUCTS; FATS AND OIL** • Cereal grains: - (i) Structure and composition. (ii) Flours and flour quality. • Extruded foods • Cereal products-	12 hrs. 2 2 3 5	Assignments

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(i) Breakfast cereals, wheat germ burger, puffed and flaked cereals. • Fats, Oils and Related Products (i)Sources, composition, effects of composition on fat properties. (ii)Functional properties of fat and uses in food preparations. (iii)Fat substitutes. Fat deterioration and antioxidants.		
Module iv: **PROTEINS AND ENZYMES** • Proteins – Classification • composition, denaturation. • Enzymes: Nature of enzymes, stability and action. Proteolytic enzymes oxidizes, lipase • enzymes decomposing carbohydrates and application, Immobilized enzymes.	12 hrs. 2 2 4 4	Lectures
Module v : **MILK AND MEAT PRODUCTS** • Milk - Composition. Physical and functional properties. Effects of processing and storage • Dairy products- curd, yoghurt, butter, whey, cottage cheese, cheese, frozen desserts. • Poultry, Egg - composition and Nutritive value and changes during cooking • Meat and Fish – composition and Nutritive value and changes during cooking	12 hrs. 3 3 3 3	Assignment/Lectures

REFERENCES

1. Sharma, D. (2024). *Textbook on food science and human nutrition*. Daya Publishing House.
2. Sandhia, D. (2024). *A textbook of human nutrition and food science*. Academic Guru Publishing House.
3. Gajalakshmi, R. (2024). *Nutrition science* (2nd ed.). CBS Publishers & Distributors.
4. Srilakshmi, B. (2023). *Nutrition science* (8th ed.). New Age International Publishers.
5. Malik, D., Narayanasamy, N., Pratyusha, V. A., Thakur, J., & Sinha, N. (2023). *Textbook of nutritional biochemistry*. Springer.

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FUNDAMENTALS OF NUTRITION

Credits : 4 **Semester : I**
Subject Code: FS21103 **No. of lecture hours: 60**

Objectives

- To enable students understand various concepts of nutrients
- To make students understand about good groups and balanced diet
- To validate the knowledge of determining the energy expenditure.
- To promote basic knowledge of macro-nutrients
- To enable the students to know about micro-nutrients

Outcome:
CO1: Students will understand nutrient interrelationships and functions of food
CO2: Students will learn concepts of RDA by ICMR
CO3: Students will evaluate metabolism of energy
CO4: Students will classify and understand knowledge of Macro-nutrients
CO5: Students will classify and understand knowledge of and micro-nutrients

Course content	Hours allotted	pedagogy
Module i: **BASIC NUTRITION** • Definition of health , Nutrition, Food , Nutrients, Proximate principles, Adequate Nutrition, Nutritional Status, Malnutrition. • Functions OF Food : Physiological, Social and Psychological Functions, Classification of food based on origin, function and Nutritive value. • Functions OF nutrients, Interrelationship between Nutrition and Health Classification of Nutrients – Macro and Micro nutrients • Importance, Source, Requirements and Deficiency symptoms of Carbohydrates, Fats, Proteins, Vitamins, Minerals and Water	12 hrs. 3 3 3 3	Lecture
Module ii **HUMAN NUTRITION REQUIREMENTS** • Food Groups – based on source, based on functions, Basic • Five groups, Food Pyramid. • Definition of RDA, RDA for Indians by ICMR. Use and Limitations. • Balanced Diet and its importance.	12 hrs. 3 3 3 3	Case studies/review of research articles
Module iii.	12 hrs.	

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ENERGY METABOLISM • Determination of energy value of food by bomb calorimeter. • Measurement of energy by direct and indirect calorimetry- Benedicts oxy calorimeter, Thermic Effect of Food • Energy balance: Components of TEE (Total Energy Expenditure) - BMR, Physical Activity, SDA • Factors affecting Basal Metabolic Rate.	2 2 3 5	Assignments
Module iv: **MACRONUTRIENTS: CARBOHYDRATES, PROTEINS, FATS AND WATER** • Classification • Food sources • Physiological functions, Requirements • Deficiencies and Excess, Water balance	12 hrs. 2 2 4 4	Lectures
Module v : **MICRONUTRIENTS: VITAMINS AND MINERALS** • Fat soluble vitamins - Requirements, Sources, Functions, Deficiencies and Excess • Water soluble Vitamins- Requirements, Sources, Functions, Deficiencies and Excess • Macro minerals Requirements, Sources, Functions, Deficiencies and Excess • Micro Minerals- Requirements, Sources, Functions, Deficiencies and Excess	12 hrs. 3 3 3 3	Assignment/Lectures

REFERENCES

1.Indian Council of Medical Research (ICMR) – National Institute of Nutrition. (2024). Dietary guidelines for Indians-2024. ICMR-NIN.

2.Eck, D. (Ed.). (2025). Nutrition fundamentals and medical nutrition therapy (4th ed.). Association of Nutrition & Foodservice Professionals

3.Williams' basic nutrition & diet therapy (17th ed.). Elsevier.

4.American Association of Clinical Endocrinology. (2025)

5.Żurawski, T., & Bartosiewicz, A. (2026). Dietary and behavioral strategies for weight loss and weight loss maintenance: A narrative review. Nutrients, 18(1), 12

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NUTRITIONAL BIOCHEMISTRY

Credits: 4 **Semester: I**
Subject code: FS25104 **No. of lecture hours: 60**

Objectives

- To develop an understanding of the principles of biochemistry.
- To obtain an insight into the chemistry of carbohydrates
- To apply the knowledge in the field of lipids
- To enable students to gain practical knowledge regarding the basic methods involved in analysis of proteins and amino acids.
- To obtain knowledge on intermediary metabolism

Outcome

CO1: The students will be able to identify the importance of nutrient utilization

CO2: The students will be able to explain the carbohydrates chemistry and its metabolism.

CO4: The students will be able to explain lipid chemistry and its metabolism.

CO5: The students will be able to explain protein chemistry and its metabolism

CO5: The students will be able to identify the importance of bioenergetics and biological oxidation

Course content	Hours allotted	pedagogy
Module i: **ENZYMES AND UTILIZATION OF NUTRIENTS** • Enzymes: Definition, importance, nomenclature and classification of enzymes, factors affecting enzyme activity • Coenzymes, cofactors, enzyme inhibition and regulation. • Digestion, Absorption and utilization of Nutrients. • Nutrient Metabolism, Transport of metabolites across membranes	12 hrs. 3 3 3 3	Lecture
Module ii **CARBOHYDRATES** • Carbohydrate Chemistry and Metabolism • Importance, classification of carbohydrates • Metabolism of carbohydrates: Glycolysis, Citric Acid Cycle, Glycogenesis, Glycogenolysis, Gluconeogenesis • Hexose Monophosphate Shunt and Blood sugar regulation	12 hrs. 3 3 3 3	Case studies/review of research articles

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Module iii. **LIPIDS** • Importance, classification of lipids • properties of lipids • Metabolism of lipids: Oxidation of fatty acids, fatty acid synthesis, Metabolism of unsaturated fatty acids, • Types of lipoproteins and their functions	12 hrs. 2 2 3 5	Assignments
Module iv: **AMINO ACIDS AND PROTEINS** • Amino Acids and Proteins – Chemistry and Metabolism • Structure of proteins – primary, secondary, tertiary and quarternary structures and Functions of proteins • Classification of amino acids, biologically important peptides • Metabolism of amino acids: Transamination, deamination and decarboxylation, Reactions and Urea cycle	12 hrs. 2 2 4 4	Lectures
Module v : **INTERMEDIARY METABOLISM** • Methods to study metabolism • Bioenergetics and Importance of biological oxidation • Components of electron transport chain • Oxidative phosphorylation and ATP generation	12 hrs. 3 3 3 3	Assignment/Lectures

REFERENCES

1. Malik, D., Narayanasamy, N., Pratyusha, V. A., Thakur, J., & Sinha, N. (2023). *Textbook of nutritional biochemistry*
2. Malik, D., Narayanasamy, N., Pratyusha, V. A., Thakur, J., & Sinha, N. (2024). *Textbook of nutritional biochemistry* (Updated ed.).
3. Stipanuk, M. H., & Caudill, M. A. (2023). *Biochemical, physiological, and molecular aspects of human nutrition* (4th/updated ed.).
4. Kohlmeier, M. (2023). *Nutrient metabolism: Structures, functions, and genes* (3rd ed.). Academic Press.

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BASIC FOOD SCIENCE
PRACTICALS

Credits: 1 **Semester: I**
Subject code: FS21105 **No. of Practical hours: 30**

Objective: To analyse the constituents of foods

Outcome: Students will independently analyse the various constituents of foods**.**

1.	Identification of different non-perishable commodities-cereals, millets and their by-products.	3
2.	Gelatinization of starches	3
3.	Factors affecting gelatinization- Concentration of starch, Temperature, Sugar, salt, Acid, Alkali	4
4.	Stages of sugar cookery	3
5.	Recipes using egg as a leavening agent – Mayonnaise	2
6.	Foaming properties of egg	3
7.	Factors affecting stability of foam- using Egg white, Egg yolk, Salt, sugar	3
8.	Tenderization of meat using various tenderizing agents	4
9.	Effect of acid and alkali on milk proteins	3
10.	Effect of heat on the Alkaline phosphase enzyme in milk	2

SUGGESTED READING

1. Sharma, D. (2024). *Textbook on food science and human nutrition*. Daya Publishing House.
2. Sandhia, D. (2024). *A textbook of human nutrition and food science*. Academic Guru Publishing House.
3. Gajalakshmi, R. (2024). *Nutrition science* (2nd ed.). CBS Publishers & Distributors.
4. Srilakshmi, B. (2023). *Nutrition science* (8th ed.). New Age International Publishers.
5. Malik, D., Narayanasamy, N., Pratyusha, V. A., Thakur, J., & Sinha, N. (2023). *Textbook of nutritional biochemistry*. Springer.

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FUNDAMENTALS OF NUTRITION
PRACTICALS

Credits: 1 **Semester: I**
Subject code: FS21106 **No. of Practical hours: 30**

Objective: To analyse the proximate of foods

Outcome: Students will independently analyse the various proximate of foods**.**

1.	Identification of food sources for various nutrients	3
2.	Food standardization and preparation, understanding the principles involved, nutritional quality and portion size of dishes used in daily diet. i. Calorie dense dishes, - any two 2 ii. Protein rich dishes- any two iii. seasonal vegetable curry preparations- any two	6
3.	Use of Pedometer for physical activity	3
4.	Questionnaire to identify nutritional deficiencies among the vulnerable groups	3
5.	Estimation of Moisture	2
6.	Estimation of Ash	2
7.	Estimation of protein by micro Kjeldhal method	3
8.	Estimation of calcium by titrimetric method	3
9.	Estimation of Iron by colorimetry	3
10.	Estimation of Vitamin C by2, 6 dichloro indephenol method	2

REFERENCE:

1.Indian Council of Medical Research (ICMR) – National Institute of Nutrition. (2024). Dietary guidelines for Indians-2024. ICMR-NIN.

2.Eck, D. (Ed.). (2025). Nutrition fundamentals and medical nutrition therapy (4th ed.). Association of Nutrition & Foodservice Professionals

3.Williams' basic nutrition & diet therapy (17th ed.). Elsevier.

4.American Association of Clinical Endocrinology. (2025)

5.Żurawski, T., & Bartosiewicz, A. (2026). Dietary and behavioral strategies for weight loss and weight loss

maintenance: A narrative review. Nutrients, 18(1), 12

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NUTRITIONAL BIOCHEMISTRY (PRACTICALS)

Credits: 1 **Semester: I**
Subject code: FS25107 **No. of Practical hours: 30**

Objectives

- To develop an understanding of the principles of biochemistry.
- To enable students to gain practical knowledge regarding the basic methods involved in analysis of different nutrients.

Outcome:

- The students will gain practical knowledge in analyzing different nutrients

I. Usage of different types of glasswares in clinical chemistry	1
II. Qualitative tests of carbohydrates	
1. Glucose	3
2. Fructose	3
3. Lactose	3
4. Xylose	3
5. Starch	3
Qualitative tests of amino acids	
6. Aromatic amino acids	1
7. Sulphur containing amino acids	3
8. Qualitative tests of proteins	2
9. Solubility, Coagulation by heat, Alcohol , pH and heavy metals	3
10. Estimation of proteins by Biurette method	2
11. Determination of rancidity parameters: acid value, peroxide value	3

REFERENCES:

1. Malik, D., Narayanasamy, N., Pratyusha, V. A., Thakur, J., & Sinha, N. (2023). *Textbook of nutritional biochemistry*.
2. Malik, D., Narayanasamy, N., Pratyusha, V. A., Thakur, J., & Sinha, N. (2024). *Textbook of nutritional biochemistry* (Updated ed.).
3. Stipanuk, M. H., & Caudill, M. A. (2023). *Biochemical, physiological, and molecular aspects of human nutrition*
4. Kohlmeier, M. (2023). *Nutrient metabolism: Structures, functions, and genes* (3rd ed.). Academic Press.

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YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
B.Sc. FOOD SCIENCE, NUTRITION AND DIETITICS
SECOND SEMESTER

ACADEMIC YEAR 2026-27 BATCH 2026-29 (CBCS)

S.No.	Part	Course type	Course Code	Title Of the Course	Hours/ week	Credits	Marks		Total	Duration of Exam
							Int	Ext		
THEORY										
1.	I	AEC-3	EN26201	English-II	05	05	40	60	100	03
3.	I	AEC-4	IC26201	Indian Heritage and Culture	02	02	40	60	100	02
4.	II	DSC	FS25201	Food Microbiology	04	04	40	60	100	03
5.	II	DSC	FS21202	Basic Dietetics	04	04	40	60	100	03
6.	II	DSC	FS21203	Family meal management	04	04	40	60	100	03
7.	II	DSC	FS21204	Principles of Food science	04	04	40	60	100	03
PRACTICAL										
8.	II	DSC	FS21205	Basic Dietetics	02	01	40	60	100	03
9.	II	DSC	FS21206	Family meal management	02	01	40	60	100	03
10.	II	DSC	FS21207	Principles of Food science	02	01	40	60	100	03
11	III	PL18001	PLANET* (Outreach)	-	-	-		-	1	
TOTAL					30	26			900	

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GENERAL ENGLISH -I

Credits: 3 **Semester: I**
Subject Code: EN23101 **No of Lecture Hours: 45**
Objectives:

- Through an exposure to contemporary passages, the students would be able to have a grasp on the language of today, with specific emphasis on the Listening, Speaking, Reading and Writing skills.
- Through the components of a passage, vocabulary and grammar section, speaking component and writing segments, there is a holistic development for language proficiency and fluency.

Outcomes:

CO1: To distinguish between words which are either spelt or pronounced alike, yet render distinct meanings; imparting a sound clarity on everyday usage of language, and for developing the art of parallel listening and writing.

CO 2: To construct vocabulary and to gain understanding on the tense component, a pivotal constituent for language structuring and vocabulary building.

CO 3: To identify with economical word constructions, paying specific attention in constructing sound writing skills.

CO 4: To interpret functional grammar, the basic part involved in sentence constructing to improve linguistic skills.

CO 5: To develop communication skills to provide a platform for language efficiency for effective language deliver

UNIT- I **9Hrs**
FUNDAMENTALS OF COMMUNICATION-I

- **Short Story - The Mystery Story (source – teacherluke.co.uk)** 1Hr
- Present Tense 2Hrs
- Past Tense 2Hrs
- Future Tense 2Hrs
- Paragraph Writing 2Hrs

UNIT- II
LANGUAGE PROFICIENCY FOR EFFECTIVE WRITING
AND SPEAKING SKILLS-I **9Hrs**

- **Poem- Goodbye Party For Miss Pushpa T.S. by Nissim Ezekiel** 2Hrs
- Subject- Verb Agreement 3Hrs
- Punctuations 2Hrs
- Review Writing 2Hrs

UNIT-III **9Hrs**
WIT AND HUMOUR

- **From the text Atea Party by Ruth Prawer Jhabvala** 1Hr

- Explanation of the text 2Hrs
- Grammar -------Nouns, Articles 2Hrs
- Vocabulary --- Homonyms, Homophones, Homographs 2Hrs
- Writing Skill ------Note- Making 2Hrs

UNIT-IV **9Hrs**

HUMAN VALUES

- **From the text "India's Contribution to World Unity"** 1Hr
- Explanation of the text 2Hrs
- Grammar----adverbs 2Hrs
- Vocabulary----Adjective and Adverb Suffixes 2Hrs
- Writing Skill------Formal Letters and Curriculum Vitae 2Hrs

UNIT-V **9Hrs**

From the text "Sachin Tendulkar"

- Explanation of the text 1Hr
- Grammar----- Adjectives, Comparison of Adjectives 2Hrs
- Vocabulary-----Common Errors, Commonly Misspelt words, Commonly Confused Words 3Hrs
- Writing Skill-----References and Bibliographies 3Hrs

INDIAN HERITAGE AND CULTURE

Credits: 2 **Semester: II**
Subject code: IC26201 **No. of lecture hours: 30**
Objectives:

- Understand the evolution of Indian culture from ancient to modern times
- Appreciate India's cultural diversity and unity
- Analyze the contributions of different civilizations, rulers, movements, and communities
- Develop critical awareness of social reform, subaltern struggles, and democratic values
- Recognize the importance of preserving cultural heritage and constitutional ideals

Course Outcome:

COI: Students will understand the foundations and characteristics of Indian culture, learn the contributions of ancient civilizations, rulers, and South Indian kingdoms, and recognize the impact of Buddhism and Jainism on Indian art and heritage.

CO2: Students will understand how Islamic culture influenced Indian society and shaped its social and cultural life. They will study cultural developments under the Delhi Sultanate, the Mughals, and regional kingdoms like the Kakatiyas and Qutubshahis. They will also appreciate the contributions of Sufi and Bhakti movements and the evolution of medieval art and architecture.

CO3: Students will understand the influence of Western culture on Indian society and the impact of 19th-century socio-religious reform movements. They will learn about the contributions of reformers and the struggles of marginalized communities through subaltern movements. They will also analyze the Moderate, Extremist, and Gandhian phases of the Indian National Movement to understand social change and nationalism.

CO4: Students will learn about Indian dance forms and their cultural and historical significance, explore important Indian monuments to understand their artistic and cultural value, and study key archaeological sites to learn how they reveal India's past.

CO5: Students will understand the beliefs and impact of India's major religions, learn about tribal cultures and the challenges they face, and explore the Indian Constitution to see how it ensures democracy and citizens' rights.

Course Content		Hours Allotted	Pedagogy
Module -I	**Module-I: Indian Culture, Civilization and Early kingdoms.** **1.Culture: -**Meaning and definition of culture-characteristics of Indian Culture. **2. Indus Valley Civilization & Aryan Culture:** Salient Features of the Indus Valley Civilization-Meaning and origin of Aryan Cuture-Vedic Culture-Ashram Dharmas-Social life and Varna system. **3.Mauryas and Guptas:** Sources of Mauryan History-Important kings-Mauryan Administration-Sources of Gupta's History-Important Rulers-Golden Age of the Guptas. **4.Ashoka the great and Harshavardhana: -** Sources of Ashoka's history-Kalinga war-Ashoka's Administration-Sources of Harshavardhana's history-Harsha's Administration. **5. Development of Art and Architecture-Contributions of Buddhism and Jainism-** Art and Architecture-Buddhist art and	6	Lecture Method using Board, and also using PPT method.

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	Architecture (Stupes, Viharas and Chaityas)-Jainism Art and Architecture (Cave Temples). **6.South Indian Kingdoms-**Sathavahanas, Pallavas, Cholas		
Module II	**Module-II: Islamic Influence and Cultural Development in Medieval India** **1. Influence of Islamic Culture on Indian Society: - Introduction to Islamic Culture in India-arrival and spread of Islam in India.** **2. Cultural Development under the Delhi Sultanate and the Mughal Empire: -** Brief Account of the Five Dynasties of the Delhi Sultanate-Cultural Development of the Delhi Sultanate Period-The Great Mughals-Cultural Development under the Mughal Empire. **3. The Sufi and Bhakti Movements during the Medieval Period: -** Origin and Meaning of Sufism-Main Principles of Sufism-Important Sufi Saints-Role of Sufis in Indian Society-Bhakti Movement-Origin and Meaning of the Bhakti Movement-Main Teachings of the Bhakti Movement-Important Bhakti Saints-Role of Bhakti Saints in Social Reform. **4. Cultural Achievements of the Kakatiyas and the Qutb Shahis: -**Historical Background of the Kakatiyas-Important Kings-Literature-Language-Art & Architecture. Historical Background of the Qutb Shahis-Important Kings-Literature & Language-Art & Architecture. **5. Development of Art and Architecture during Medieval India: -**Delhi Sultanate Art and Architecture-Mughals Art & Architecture-Kakatiya's Art & Architecture-Qutb Shahis art and architecture.	6	Lecture Method using Board, and using PPT method
Module III	**Module-III: Social and Political Movements in Modern India** **1.Influence of Western culture on Indian Society: -** Entry of western culture into India-reasons for the influence of the western culture on Indian Society. 2.**19th century Socio Religious Reform Movements: -**Raja Ram Mohan Roy, Ishwara Chandra Vidyasagar and Veerasalingam Panthulu. **3.Subaltern Movements in India-** Jyothirao Phule, Savitribai Phule, E. V Ramaswamy (Periyar) Naikar, Narayana Guru and Dr.B.R. Ambedkar. **4. Indian National Movement:** Moderate, Extremist and Gandhian phases.	6	Lecture Method using board and using PPT method
Module IV	**Module-IV: Indian Cultural Heritage: Dance, Art and Architecture**. **1.Indian dance: -** Classification of Indian dance- Classical dance forms (Bharatanatyam, Kathak, Kathakali, Kuchipudi, Odissi, Manipuri, Mohiniyattam, Sattriya-folk-dance forms (Bhangra, Garba, Yakshagana, Kolattam, Bihu, Perini Shivatandavam, Bonalu folk dance.	6	Lecture Method using Board and using PPT method

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	2.Indian Art and Architecture: - Temple Architecture in India (Nagara Style, Dravida Style, Vesara Style), Indian Sculpture (Ashokan Pillars, Nataraja Sculpture), Indian Paintings (Cave paintings, Mughal paintings, Rajput paintings) **3. Archaeological Sites of India:** Importance of archaeological sites-Indus valley civilization Sites-Buddhist and Jain sites-Mauryan and Gupta period sites.		
Module V	**Module-V: Religion, Tribal Life, and Governance in India** 1. **Major Religions of India-An Overview:** - Hinduism, Buddhism, Jainism, Sikhism, Islam, Christianity. **2.Tribal Culture and the Challenges faced by indigenous communities:** Salient Features of Tribal Culture, Major Challenges Faced by Tribal Communities. **3. Indian Constitution:** - Importance of the Indian Constitution-Fundamental Rights.	6	Lecture Method using board and using PPT method

Learning Resources

1.	Jha, Dr K.N. 2006. Studies in ancient & Medieval India. COSMOS Book hives Ltd: Gurgaon.
2.	Mahajan, V.D. 2008. Ancient India. S.Chand, New Delhi.
3.	Manasseh, Dr P. 2010. An Overview of Indian Culture. Gamaleil Publishers, Hyderabad.
4	Malpani, Madanlal & Malpani, Shamsunder. 2014. Indian Heritage and Culture. Kalyani Publishers, Ludhiana.
5.	A.L. Basham, The Wonder That Was India, Rupa Publications, 2013 (Reprint)
6	Kapila Vatsyayan, Indian Classical Dance, Publications Divisions, Govt of India, 2001.
7	R.S. Sharma, India's Ancient Past, Oxford University Press, 2017.
8	Romila Thapar, Ashoka and the Decline of the Mauryas, Oxford University Press, 2012.
9	Satish Chandra, History of Medieval India, Orient Black swan, 2018.
10	Irfan Habib, the Mughal Empire, Cambridge University press, 1997.
11	K.A. Nilakanta Sastri, A History of South India, Oxford University press, 2011.
12	Bipan Chandra, India's Struggle for Independence, Penguin India, 2016.
13	Sumit Sarkar, Modern India, Macmillan, 2014.
14	R.C. Majumdar, History of the Freedom Movement in India, Firma KLM, 2001.
15	Gail Omvedt, Sage Publications, 2011.
16	Dhananjay Keer, Dr. Ambedkar: Life and Mission, popular Prakashan, 2016.
17	Verrier Elwin, the Tribal World of India, Oxford University press, 2014.
18	D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2023.
19	B.R. Ambedkar, Constituent Assembly Debates, Govt of India publications, 1946-1949.

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FOOD MICROBIOLOGY

Credits: 4 **Semester: II**
Subject code: FS25201 **No. of lecture hours: 60**
Objective

- To study the various microorganisms associated with foods.
- To evaluate methods of detection of microorganisms
- To learn microbiology of food commodities
- To understand uses of microorganisms in various foods
- To validate various food borne illnesses

Outcome

CO1: The students will be able to identify different food microbes.

CO2: The students will be able to classify microorganism associated with food and water.

CO3: The students will be able to microorganisms in food .

CO4: The students will be able to compare different food borne illness.

CO5: The students will be able to explain microbial estimation.

Course content	Hours allotted	pedagogy
Module i: **FOOD MICROBES** • Types of microorganisms and their general characteristics -Bacteria, Viruses, Fungi (Yeasts and Moulds), Protozoa • Role of Microorganisms in food spoilage • Factors affecting growth of microbes (Intrinsic factors and Extrinsic factors) – Nutrition, redox potential, pH conditions, Carbon and Nitrogen Sources, temperature and himidity • Antimicrobial barriers and constituents.	12 hrs. 3 3 3 3	Lecture
Module ii **MICROORGANISMS ASSOCIATED WITH FOOD AND WATER** • Microbiology of Food commodities • Contamination and preservation of Cereals, Pulses, Nuts and Oilseeds, Fruits and Fruit products, Vegetables and Vegetable products, Meat, dairy and their products • Spoilage & beneficial role of microorganisms in Cereals, Pulses, Nuts and Oilseeds,, Fruits and Fruit products, Vegetables and Vegetable products, Meat, dairy and their products • Microbiology of water- Contamination and microbial standards	12 hrs. 3 3 3 3	Case studies/review of research articles

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Module iii. **APPLICATION OF MICROORGANISMS IN FOODS** • Fermented food products - Bread making, Alcoholic beverages – Beer, wines, other alcoholic beverages, Vinegars, cheese, other dairy products,other lactic acid fermented products • Microbial protein and vitamins • Acid fermented vegetables • Gums, Organic acids, Enzymes, antimicrobial agents, amino acids, fats and single cell proteins	12 hrs. 3 3 3 3	Assignments
Module iv: **FOOD BORNE ILLNESSES** • Food borne pathogens, Food borne infections - Escherichia coli, Salmonella, Staphylococcus aureus, vibrio, yersininia, Listeria) • Food poisoning /Food borne Intoxications - (Aeromonas hydrophila, Bacillus cereus, Brucella, Campylobacter, Clostridium botulinum, Clostridium perfringenes. • Hepatitis A and B • Gastroenteritis viruses	12 hrs. 3 3 3 3	Lectures
Module v : **MICROBIAL ESTIMATION** • Sources of microorganisms – Soil, water, plants and of animal origin, Useful microorganisms – Bacteria, Yeast, mold and fungi, Estimating number of microorganisms, sampling, sample size • Aseptic collection of samples, total cell counts and viable cell counts, plate counters. • Indicator organisms, Alternative and Rapid methods for detection of specific microbes and toxins, Dye-reduction tests, Electrical methods, ATP determination, Pure cultures-preparation, maintenance and preservation • Microbiological quality control and HACCP	12 hrs. 3 3 4 2	Assignment/Lectures

REFERENCES

1. Bhunia, A. K., & Ray, B. (2025). *Fundamental food microbiology* (6th ed.).
2. Adams, M. R., McClure, P. J., & Moss, M. O. (2024). *Food microbiology* (5th ed.). Royal Society of Chemistry.
3. Jafari, S. M., Harzevili, F. D., & Karaca, A. C. (Eds.). (2025). *Microbial production of food bioactive compounds*. Springer.
4. Kieliszek, M., & Kowalczewski, P. Ł. (Eds.). (2023). *Recent advances in applied microbiology and food sciences*.
5. Foster, W. M. (2023). *Food microbiology*. CBS Publishers & Distributors.

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BASIC DIETETICS

Credits: 4 **Semester: II**
Subject code: FS21202 **No. of lecture hours: 60**

Objective

- To understand the concept of a diet and the role of dietician
- To learn the assessment and complications of obesity
- To know the strategies and guidelines in planning weight managing diets.
- To understand various types of diets
- To validate the dietary modifications of diabetes and hypertension

Outcome

CO1: Students will gain knowledge regarding the practical aspects drug and diet interactions

CO2: Students will learn principles of diet and dietary modifications

CO3: Students will evaluate the strategies for menu planning

CO4: Students will identify the importance of intermittent fasting

CO5: Students will understand various deficiency disorders

Course content	Hours allotted	pedagogy
Module i: **DIET THERAPY** • Purpose, Diet therapy and types of Therapeutic Diets, Hospital diets and progressive modifications • Modifications in texture and consistency, Modifications in Nutrients, Drug and Diet interaction • Roles and responsibilities of a dietician in a hospital and in a community • Adjuncts to diet therapy Dietary supplement.	12 hrs. 3 3 3 3	Lecture
Module ii **DIET DURING ENERGY IMBALANCE** • Importance of weight regulation. • Underweight- Definition, Causes, Principles of the Diet, Dietary Modifications, Foods to Be Included and Foods to be Avoided • Obesity - Definition, Causes, Assessment (BMI, Body Weight, Brokas Index), Type (Grade I, II, II, Apple and Pear shape) • Complications, Principles of the Diet, Dietary Modifications, Foods to Be Included and Foods to Be Avoided.	12 hrs. 3 3 3 3	Case studies/review of research articles

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Module iii. **STRATEGIES FOR WEIGHT MANAGEMENT** • Concept of BMI, Determination of Energy needs, Translating RDA into Daily food intake • Factors affecting fuel utilization • Guidelines for planning weight managing diets • Strategies for weight loss and weight maintenance – Diet therapy, Physical exercise, stress management, Pharmacotherapy, Weight loss surgery	12 hrs. 3 3 3 3	Assignments
Module iv: **DIETS FOR WEIGHT LOSS** • Low Carbohydrate Diets: Atkins Diet, Ketogenic diet, The Zone Diet, Summer Bell et.al, Diet, Dukan Diet • The south beach Diet • General Motor's Weight loss program • Intermittent Fasting	12 hrs. 3 3 3 3	Lectures
Module v : **DEFICIENCY DISORDERS** • Diabetes - Definition, Causes, Types, T2DM- risk factors, Signs,Symptoms, Complications and Dietary Modifications • T1DM- risk factors, Signs, Symptoms, Complications and Dietary Modification • Hypertension- Definition, Causes, Types, risk factors, Signs, Symptoms, Complications and Dietary Modifications • Atherosclerosis - Definition, Causes, risk factors, Signs, Symptoms, Complications and Dietary Modifications	12 hrs. 3 3 4 2	Assignment/Lectures

REFERENCES

1. John, S. (2025). *Basic and applied biochemistry, nutrition and dietetics for nursing* (3rd ed.). Wolters Kluwer.
2. Mathur, P., & Verma, L. (2024). *Applied nutrition and dietetics for B.Sc. nursing.* Arya Publishing Company.
3. Clement, I. (2024). *Textbook of nutrition and dietetics for post basic B.Sc. nursing students*. Jaypee Brothers Medical Publishers.
4. Chauhan, D. (2024). *Applied nutrition and dietetics for B.Sc. and post basic nursing students*. Lotus Publishers.
5. Choudhary, D. (2023). *Applied nutrition and dietetics for nurses* (4th ed.). Paras Medical Books.

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FAMILY MEAL MANAGEMENT

Credits : 4 **Semester : II**
Subject Code: FS21203 **No. of lecture hours: 60**

Objective:

- To understand the concept of an adequate diet and the importance of meal planning
- To know the factors affecting the nutrient needs during the pregnancy and lactation
- To know the factors affecting the nutrient needs during the infancy and preschool children
- To know the factors affecting the nutrient needs during the school children and adolescents
- To know the factors affecting the nutrient needs during geriatrics

Outcome:

CO1: Students will be able to describe basic terms and principles of meal planning.

CO2: Students will be able to use nutritional knowledge to apply during pregnancy and lactation period.

CO3: Students will be able to identify nutrition related problems in infants and peaceful children.

CO4: Students will be able to construct knowledge on nutrition programs held by government.

CO5: Students will be able to identify the nutritional requirements, nutritional problems in adults and geriatrics

Course content	Hours allotted	pedagogy
Module i: **MEAL PLANNING FOR THE FAMILY** • Objectives in meal planning, Nutritional adequacy of a meal, factors affecting the food selection, family size and composition • Principles and Steps of meal planning. • Food Exchange Lists, Reference man and Reference Woman • Adulthood – Nutritional Requirements for an Adult Man and Adult Woman	12 hrs. 3 3 3 3	Lecture
Module ii **NUTRITION IN PREGNANCY AND LACTATION** • Nutrition in pregnancy- physiological stages of pregnancy, expected weight gain, preconceptual nutrition • Nutritional and food requirements, complications • Nutrition in lactation- role of hormones, Indian nursing mothers • Nutritional and food requirements	12 hrs. 3 3 3 3	Case studies/review of research articles

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Module iii. **NUTRITION IN INFANCY AND PRESCHOOL CHILDREN** • Nutrition in infancy- nutritional and food requirements • Preterm baby and weaning • Nutrition in preschool- nutritional and food requirements • Nutrition related problems	12 hrs. 3 3 3 3	Assignments
Module iv: **NUTRITION IN SCHOOL CHILDREN AND ADOLESCENCE** • Nutrition in school children- nutritional and food requirements • Packed lunches and school lunch programmes • Nutrition during adolescence – nutritional and food requirements Nutritional problems	12 hrs. 3 3 3 3	Lectures
Module v : **NUTRITION FOR GERIATRICS** • Nutrition in old age- process of ageing, • Nutritional and food requirements • Nutrition related problems • Degenerative diseases, exercise, drugs	12 hrs. 3 3 3 3	Assignment/Lectures

REFERENCES

1. Bamji MS, Krishnaswamy K, Brahmam GNV 2009. **Textbook of Human Nutrition**, 3rd edition. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.
2. Adler, T. (2023). *An everlasting meal cookbook: Leftovers A–Z*. Scribner.
3. Weinstein, E. (2023). *Easy weeknight dinners*. Ten Speed Press.
4. Truman, K. (2022). *Seriously good freezer meals*. Independently Published.

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PRINCIPLES OF FOOD SCIENCE

Credits: 4 **Semester: II**
Subject code: FS21204 **No. of lecture hours: 60**
Objectives

- To impart knowledge pertaining to the functional properties of nutrients
- To provide basic understanding of water and water activity
- To provide knowledge on the role of enzymes in food
- To understand the concept of various pigments
- To obtain insight about toxins and their effects

Outcome
CO1: Students will gain knowledge on the functional properties of nutrients in food.

CO2: Students will understand the properties of water

CO3: Students will learn occurrence of enzymes in various foods

CO4: Students will obtain insight about properties of pigments

CO5: Students will evaluate the toxicology of additives in food

Course content	Hours allotted	pedagogy
Module i: **FUNCTIONALITY OF PROTEIN AND CARBOHYDRATES AND LIPIDS** • Functionality of proteins - hydration and solubility, surface-active properties-emulsion and foaming, gelation, dough, texturization, flavour binding. • Functionality of carbohydrates - Resistant starch, complex carbohydrates, fibers, gums,pectin, modified starches bulking, gelation, viscosity modifiers, sweeteners- principles of sweetening, glazing, flavor fixatives • Functionality of lipid - emulsion, crystallinity, polymorphism, palatability. Physicochemical Properties- Melting point, Cloud point,Smoke Flash and Fire Points, Rheology.	12 hrs. 3 3 3 3	Lecture

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Module ii **WATER AND WATER ACTIVITY** • Water a.Properties of water-melting point, boiling point, surfacetension, specific heat, dielectric constant, latent heat of fusion, vaporisation and sublimation b. Structure of ice and effect of salts on aqueous solutions • Types of water – free and bound water, Relative humidity • Water activity and its significance • Functionality of water in foods: Principles and properties of colloidal systems, Emulsions, Emulsifiers, Viscosity, Surface tension and Surfactants.	12 hrs. 3 3 3 3	Case studies/review of research articles
Module iii. **ENZYMES IN FOODS** • Enzymes: Classification, Specificity, Catalysis and regulations. • Factors affecting enzyme activity. Occurrence of enzymes in foods and their role Enzyme inhibitors in foods, Immobilised enzymes • Enzymes in food processing – manufacture of cheese, cheese spreads and other indigenous products • Browning reactions in foods: enzymatic and non-enzymatic, Methods to prevent browning	12 hrs. 3 3 3 3	Assignments
Module iv: **PIGMENTS** • Structure, properties and effect of processing on plant and animal pigments • Haemoglobin, Myoglobin, • Chlorophyll, Carotenoids, anthocyanins and flavanoids. • Miscellaneous pigments	12 hrs. 3 3 3 3	Lectures
Module v : **FOOD TOXICOLOGY** • Naturally occurring toxicants – plant origin,	12 hrs. 3 3	

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• Naturally occurring toxicants - microbial and animal origin • Accidentally occurring toxicants • Intentionally added toxicants / Food additives	3 3	Assignment/Lectures

REFERENCES:

1.Sethi Mohini / Rao E. S. (2011). Food Science Experiments and Applications. Second edition .CBS Publishers, New Delhi.

2. M. Swaminathan (1979). Food Science and Experimental Foods. Ganesh and Co. Madras

3.Charley H (1982). Food Science. John Wiley and Sons, Inc., New York

4.Potter Norman and Hotchkiss JH (2007). Food Science. C.B.S. Publishers, New Delhi.

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BASIC DIETETICS
PRACTICALS

Credits: 1 **Semester: II**
Subject code: FS21205 **No. of lecture hours: 30**

Objective

- To understand the concept of an adequate diet and the importance of meal planning and calculate nutrients of various diets.

Outcome

- Students will gain knowledge regarding the practical aspects of meal planning and prepare nutritionally adequate diets in relation to age, activity levels, physiological state and socio-economic status.

1. Plan, calculate and prepare clear fluid diet	3
2. Plan, calculate and prepare full fluid diet	3
3. Plan, calculate and prepare soft diet	4
4. Plan, calculate and prepare a diet for underweight person	4
5. Plan, calculate and prepare a diet for obese person	4
6. Plan, calculate and prepare a diet for diabetes	4
7. Plan, calculate and prepare a diet for Hypertensive patient	4
8. Plan, calculate and prepare a diet for Atherosclerosis	4

REFERENCES

1. John, S. (2025). *Basic and applied biochemistry, nutrition and dietetics for nursing* (3rd ed.). Wolters Kluwer.
2. Mathur, P., & Verma, L. (2024). *Applied nutrition and dietetics for B.Sc. nursing*. Arya Publishing Company.
3. Clement, I. (2024). *Textbook of nutrition and dietetics for post basic B.Sc. nursing students*. Jaypee Brothers Medical Publishers.
4. Chauhan, D. (2024). *Applied nutrition and dietetics for B.Sc. and post basic nursing students*. Lotus Publishers. Choudhary, D. (2023). *Applied nutrition and dietetics for nurses* (4th ed.). Paras Medical Books

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FAMILY MEAL MANAGEMENT
PRACTICALS

Credits: 1 **Semester: II**
Subject code: FS21206 **No. of Practical hours: 30**

Objective

- **T**o understand the concept of an adequate diet and the importance of meal planning

Outcome

- Students will gain knowledge regarding the practical aspects of meal planning and prepare nutritionally adequate diets in relation to age, activity levels, physiological state and socio-economic status

1. Standardization of weights and measures Conversion of weights and volumes of raw foods to cooked foods	3
2. Food exchange system and its application	3
3. Plan and prepare Weaning food for infants	3
4. Plan and prepare Packed Lunch for School Going Child.	3
5. Plan and prepare Adolescent diet 13-15 years girl	3
6. Plan and prepare adolescent diet for 16-18 years	3
7. Plan and prepare diet for adult (Sedentary activity)	3
8. Plan and prepare diet for Pregnant woman	3
9. Plan and prepare diet during Lactation	3
10. Plan and prepare diet for Geriatrics	3

REFERENCE:

1. Adler, T. (2023). *An everlasting meal cookbook: Leftovers A–Z.* Scribner.
2. Clark, M. (2022). *Dinner in one: Exceptional & easy one-pan meals*
3. Roker, A., & Laga, C. R. (2024). *Al Roker's recipes to live by: Easy, memory-making family dishes for every occasion*.
4. Wu, Y., Miller, A. D., Chung, C.-F., & Kaziunas, E. (2024). *Family meal practices and management systems.*

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PRINCIPLES OF FOOD SCIENCE
PRACTICALS

Credits: 1 **Semester: II**
Subject code: FS21207 **No. of Practical hours: 30**

Objectives

- To impart knowledge on analyzing various constituents of food

Outcome

- The students will gain knowledge in analyzing the constituents of food

1.	Effect of mixing time on the rheological characteristics of dough;	3
2.	Estimation of gluten content.	3
3.	Estimation of Total solids in Jams and Jellies	3
4.	Estimation of sugars, TSS in Degree Brix	3
5.	Methods to prevent enzymatic browning using blanching (only Water, added different level salt in water, salt and Magnesium oxide) in fruits and vegetables	4
6.	Methods to prevent enzymatic browning using salt, sugar in fruits and vegetables	4
7.	Methods to prevent enzymatic browning using Ascorbic acid, lemon juice in fruits and vegetables	5
8.	Effects of Heat on pigments of fruits and vegetables	3
9.	Effect of acid, alkali and metals on pigments of vegetables	3
10.	Identification of food colours from textile colours using paper chromatography	3

REFERENCES

1. Sethi Mohini / Rao E. S. (2011). Food Science Experiments and Applications. Second edition .CBS Publishers, New Delhi.
2. Awasthi, R., Mane, S., Ram, P., & Kaur, P. (2023). *Principles of food science and nutrition*. Academic Guru Publishing House.
3. Rizvi, S. S. H. (2024). *Food engineering principles and practices: A one-semester course*. Springer.
4. Singh, R. P., Heldman, D. R., & Erdogdu, F. (2024). *Introduction to food engineering* (6th ed.). Academic Press.

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YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
B.Sc. FOOD SCIENCE, NUTRITION AND DIETITICS
THIRD SEMESTER
ACADEMIC YEAR 2026-27 BATCH 2025-28 (CBCS)

S. No	Part	Subject Code	Title of the Subject	Hours /Week	Credits	Marks			Duration of exam
						Internal	External	Total	
1	I	ES23301	Environmental studies and Gender sensitization AECC	3	3	40	60	100	3
2	11	G26FS1P	Functional Introduction to Ayurveda Food science and Nutrition (GE-1) (ID)	2	2	40	60	100	3
3	II	FS26301	Food Safety, quality control & sanitation (SEC-I)	1	1	20	30	50	2
6	II	FS26302	Carbonyl and carboxylic acid derivatives and electrochemistry DSC-9	5	4	40	60	100	3
4	II	FS22303	Clinical Nutrition DSC-10	5	4	40	60	100	3
5	II	FS22304	Therapeutic Dietetics DSC-11	4	4	40	60	100	3
PRACTICALS									
7	II	G26FS1P	Functional Introduction to Ayurveda Food science and Nutrition (GE-1) (ID)	2	1	40	60	100	3
8	II	FS26305	Food Safety Quality control and sanitation	2	1	40	60	100	3
8	II	FS22306	Clinical Nutrition DSC-10	2	1	40	60	100	3
9	II	FS22307	Therapeutic Dietetics DSC-11	2	1	40	60	100	3
10	II	FS26308	Quantitative analysis DSC-12	2	1	40	60	100	3
	TOTAL			30	23	420	630	1050	-

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ENVIRONMENTAL STUDIES & GENDER SENSITIZATION

Credits : 3 **Semester: III**
Course Code: ES23301 **No. of Lecture Hours: 45**
Objectives:

- To understand the importance of ecological balance for Sustainable Development
- To understand the impacts of developmental activities and mitigation measures
- To understand the environmental policies and regulations.
- To develop students sensibility with regard to issues of gender in contemporary India
- To provide a perspective on the socialization of men and women
- To expose the students to debate on the politics and economic works and on gender violence

Course Outcomes:
CO1: **Understand** the importance of Environmental education, conservation of natural resources & understand the importance of ecosystems and biodiversity.
CO2: Understand the pollution problems and apply the environmental science knowledge on solid waste management, disaster management.
CO3: **Apply** the environmental science knowledge to improve the resources and Evaluate and understand the sustainable environmental conditions and control methods.
CO4: **Identify** the interactions and intersections of identities (e.g., gender, race, ethnicity, class, sexuality, and so on) and assess the ways in which they contribute to instances of privilege and power dynamics across cultures, space, and time and their problems.
CO5: **Understand** the gender problems and ways of addressing them, including interactions across local to global scales in communities and overcome inequalities with legislations

Course content	Hours allotted	pedagogy
Module- I **NATURAL RESOURCES, ECOSYSTEMS, & BIODIVERSITY** • Definition, Scope and importance of environmental studies. Need for public awareness. • Renewable & non-renewable resources, Brief account on Forests, Water, Minerals and Energy (Solar, Wind, and Geo-thermal & Bio-energy). • Definition of Ecosystem, Structure and functions—food chains, food webs, ecological pyramids, producers, consumers and decomposers. Energy flow and example ecosystems--- Forest, Desert, Aquatic ecosystems. • Definition of Biodiversity, types (Genetic, Species, Ecosystem), India- mega diversity Nation. • Hotspots, Threats to biodiversity, Conservation of biodiversity (In-Situ and Ex-Situ).	**9 Hrs**	
Module-II **ENVIRONMENTAL POLLUTION** • Definition of Environmental pollution • Brief account of causes, effects, prevention and control measures of o Air pollution o Water Pollution o Soil pollution	**9 Hrs**	

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○ Noise pollution ○ Marine Pollution • Solid Waste Management: Causes, Effects & Control measures of urban and industrial wastes • Disaster Management: floods, Earth quakes, and Cyclones.		
Module-III **Social Issues and Environment** • Rain-Water Harvesting, Water-shed Management, and From Unsustainable to Sustainable Development. • Global Warming, Ozone depletion, and Acid rains • Environmental Legislation: Air Act, Water Act, Environmental Protection Act, Forest Act, Wildlife Act. • Environmental & Human Health---- HIV/AIDS • Welfare Programs---- Family, Women & Child Welfare, Population Explosion • Role of Information Technology in Environmental Studies.	**9 Hrs**	
Module-IV **Gender Studies** • Why should we study gender issues? • Socialization- Making women and making men • Being together as equals-Through the lens of gender • Missing women: Gender selection and its consequences • Health issues of Women	**9 Hrs**	
Module-V **Gender & Labour -Gender Violence & Law** 1. House work : The invisible labour- my mother doesn't work "share the load" 2. Women's Work: Role in Politics and Economics Fact and Fiction. Unrecognized and Unaccounted work. Wages and Conditions of Work. 3. Sexual harassment – say no eve teasing – the caste based violence –Nirbhaya Act 4. Domestic violence - Is home a safe place? - Blaming the victim.-Domestic violence Act 5. Forums of justice-Hindu Inheritance Act(2005)	**9 Hrs**	

SUGGESTED READING

1. A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu. 201. **Towards a World of Equals : A Bilingual Text on Gender**. Hyderabad: Telugu Akademi.
2. Rajagopalan R. 2015. **Environmental Studies-from Crisis to Cure.** Third Edition. Chennai: Oxford University Press.
3. Dr D K Asthana and Dr Meera Asthana. 2014. **A Text Book of Environmental Studies** Revised Edition. New Delhi: S. Chand & Company.
4. Anubha Kaushik and C.P. Kaushik Published. 2016. **Perspectives in Environmental Studies.** Fifth Edition. New Delhi: New Age International.

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(For Gender Sensitization)

5. Sen Amartya **More Than One Million Women Are Missing.** New York Review of Books 37.20 (20 December 1990). Print. **We Were Making History...Life Stories of Women in the Telangana People's Struggle**. New Delhi: Kali for Women. 1998.
6. Tripti Lahiri. **By the Numbers: Where Indian Women Work. Women's Studies Journal .** *(*14 November 2012). Available online at: <http://blogs.wsj.com/ India real time/2012/11/14/by – the numbers-where-Indian-women-work/>
7. K. Satyanarayana and Susie Tharu. Ed. **Steel Nibs Are Sprouting : New Dalit Writing From South India, Dossier 2: Telugu and Kanada** Code=3732.
8. Vimala. **Vantillu (The Kitchen)". Women Writing in India: 600 Bc to the Present. Volume II.** The 20th Century. Ed. Suise Tharu and K.Laltitha. Delhi: Oxford University Press, 1995.599-601.
9. Shatrughna, Veena. **Women's Work and its Impact on Child Health and Nutrition.** Hyderabad: National Institute of Nutrition, Indian Council of Medical Research .1993.

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FUNCTIONAL INTRODUCTION TO AYURVEDA FOOD SCIENCE AND NUTRITION

(GE-1)

Credits- 2 **Semester- III**
Subject Code: G26FS1T **No.of Lecture hours:30**
Objective:

- To introduce the Ayurvedic nutrition
- To gain knowledge about concepts of ayurveda
- To understand the concepts of ayurveda
- To introduce the basic principles of nutrition in ayurvedic
- To understand the contemporary food habits in everyday life

Outcomes:
CO1: The student will Understand Foundation of ayurveda and health
CO2: Student will classify tridosha and body composition
CO3: Student will be able learn the concepts of ayurveda of food
CO4: Students will be able to identify principles of food diet and digestion
CO5: Students will learn the principles of Ayurvedic Diet with Modern Nutrition

Course content	Hours allotted	pedagogy
Module i: **Foundations of Ayurveda and Health** 1.1 Basic Concepts of Ayurveda • Meaning and scope of Ayurveda • Historical development and relevance in modern health sciences • Relationship between Ayurveda and preventive healthcare 1.2 Concept of Health and Disease • Definition of health in Ayurveda • Balance between body, mind and environment • Factors influencing health: lifestyle, food, season and habits	**6 Hrs**	Lecture
Module ii: **Tridosha Theory and Body Constitution** 2.1 Tridoshas – Vata, Pitta and Kapha • Characteristics and functions of each dosha • Influence on digestion, metabolism and body functions • Signs of dosha imbalance 2.2 Prakriti (Body Constitution) • Concept of individual constitution • Types of prakriti (Vata, Pitta, Kapha dominant) • Influence of prakriti on dietary needs and Health	**6 Hrs**	Case studies/review of research articles

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Module iii: **Ayurvedic Classification of Foods** 3.1 Concept of Rasa (Taste) and Food Properties • Six tastes: sweet, sour, salty, bitter, pungent and astringent • Effect of tastes on digestion and metabolism • Examples from common foods 3.2 Satvik, Rajasic and Tamasic Foods • Characteristics of each category • Influence on physical health, behaviour and mental wellbeing • Examples from Indian dietary patterns	**6 Hrs**	Assignments
Module iv: **Ayurvedic Principles of Diet and Digestion** 4.1 Concept of Agni (Digestive Fire) • Role of Agni in digestion and nutrient absorption • Types of Agni and their influence on health • Signs of good and poor digestion 4.2 Pathya and Apathya (Wholesome and Unwholesome Foods) • Foods recommended and restricted in different conditions • Importance of compatibility of foods • Examples from everyday meals	**6 Hrs**	Lectures
Module v : **Integration of Ayurvedic Diet with Modern Nutrition** 5.1 Seasonal and Daily Dietary Practices • Concept of seasonal diet (Ritucharya) • Daily regimen related to food and health • Examples from Indian traditional practices 5.2 Ayurvedic Functional Foods • Role of herbs, spices and traditional foods in health promotion • Turmeric, ginger, garlic and fermented foods • Concept of food as medicine	**6 Hrs**	Assignment/Lectures

References:

1. Luharia, M., Sarise, S., Barsagade, R., & Luharia, A. (2024). *Diet and nutrition: An Ayurvedic approach*. IP Innovative Publication.Murthy SRK, Astanga Hrdayam, Chowkhambakrishnadas academy, Varaansi 2018
2. Sharma PV. History of medicine in India Chaukhamba orientelia, Varanasi

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FOOD SAFETY QUALITY CONTROL AND SANITATION(SEC-1)

Credits:1 **Semester: III**

Subject code: FS26301 **No. of lecture hours: 15**

Objectives

*To provide orientation towards basic concepts of food safety.
*To gain knowledge about various food laws and standards.
*To impart the knowledge of quality control and methods of sanitation and hygiene.
*To get information about various types of hazards and food adulteration.
*To understand the sensory evaluation and factors affecting sensory measurements.

Outcomes

CO1: The students will be able to understand the basic principle of food safety.
CO2: The students will be able to apply the knowledge of food laws.
CO3: The students will be able to explain Management of hazards in food services.
CO4: The students will be able to identify Food hazards and waste management.

CO5: The students will be able to identify quality of food and water management

Course content	Hours allotted	pedagogy
Module i: **Basics of food safety and quality** • Food safety, Definition and factors affecting food safety, safety of left over foods, control of food spoilage, signs of food spoilage. • Food borne infections and food poisoning • safety in food processing, food borne illness.	3 hrs	Lecture
Module ii **Food laws and standards** • National food regulation FSSAI,BIS,APEDA,ISI,CODEX,WHO,FAO,ISO HACCP, WTO. • Food testing labs in India. • Rights of food Inspector	3 hrs	Case studies/review of research articles
Module iii. **Management of hazards in food services.** • Need of controlling of critical parameters-Design of food plant, temperature danger zone and storage of food. • control of infestation, mosquitoes, houseflies, rats, rodents and cockroaches. • Principles of quality control, sanitation training, and education.	3 hrs	Assignments
Module iv: **Food hazards and waste management** • Food adulteration, definition, types of adulterants in food and its test,Types of hazards • Types of waste disposal of gaseous waste. • Types of pollution, causes and prevention.	3 hrs	Lectures

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Module v **Sensory quality of food and water management**. • Sensory evaluation, types of sensory evaluation, factors affecting sensory evaluation. • Uses and sources of water and prevention of water pollution. • Small- and large-scale purification.	3 hrs	Assignment/Lectures

References:

1. FSSAI. (2006) Manual of Food safety management System, FSS 2006
2. Fernandes M and Rose A. (2013) Persistent Organic Pollutants and Toxic Metals in Foods. Elsevier Publication.
3. Deshpande S. S. (2013) Handbook of Food Toxicology ebook (Free Down Load)
4. S. Roday 2005 Food Hygiene and Sanitation in Food Industry 7th Edition Published by Tata McGraw Hill Publishing Company New Delhi.
5. 2. Shubhangini A.Joshi.2015 Nutrition and Dietetics 4th Edition Published by McGraw Hill Education (India)Private Limited

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CLINICAL NUTRITION(DSC-9)

Credits: 4 **Semester: III**
Subject code: FS22303 **No. of Lecture hours: 60**

Objectives

- To gain knowledge about various types of hospitals diets and feeding methods
- To learn about nutritional counseling and role of dietitian in hospitals
- To attain knowledge about pathogenesis, metabolic changes and clinical diagnosis of various vitamins deficiencies
- To gain knowledge about pathogenesis, metabolic changes and clinical diagnosis of various life style diseases
- To learn about drug and nutrient interaction

Outcomes

CO1: The students will be able to understand the principles of nutrition in clinical setup
CO2: Students will understand diet and nutritional counseling.
CO3: Students will be able to create knowledge on clinical diagnosis in deficiency diseases.
CO4: Students will be able to identify various lifestyle diseases and their clinical diagnosis.
CO5: Students will be able to understand various drugs and their interaction with the foods.

Course content	Hours allotted	pedagogy
Module i: **PRINCIPLES OF NUTRITION IN CLINICAL SETUP** • Food acceptance in illness, Purpose and principles of hospital diets, • Nutritional assessment in clinical setting, planning of Therapeutic Diets • classification of therapeutic diets- Liquid diets and soft diet modification of normal diet during illness and convalescence-carbohydrate, protein and fat: type and content. Vitamins, minerals and electrolytes: content. • Special feeding methods: Basic concepts and methods of - (a) Oral feeding (b) Tube feeding (c) Parental nutrition (d) Intravenous feeding. Types of formulas. Pre and post operative diets	12 **hrs.** 2 2 3 5	Lecture
Module ii **DIET AND NUTRITIONAL COUNSELING** • Role of Dietician in the hospital. Inpatient Nutritional care process – Patients' checkup and dietary counseling, interpersonal relationship with patient, planning and implementation of dietary care • Team approach to nutritional care. • Tools for effective nutritional counseling - Teaching aids used by dietitians- charts, leaflets, posters etc	**12 hrs.** 3 1 4 4	Case studies/review of research articles

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• Factors affecting the dietary advice and counseling -- individual food choice, Communication, behavior modification, Motivation.		
Module iii. **CLINICAL DIAGNOSIS IN DEFICIENCY DISEASES** • Nutritional status and disease common. • Pathogenesis, Metabolic changes of nutritional deficiency disease - PEM, Anemia, IDD, Vitamin A Deficiency, Vitamin D, Vitamin B12. • Clinical diagnosis of nutritional deficiency disease - PEM, Anemia, IDD, Vitamin A Deficiency, Vitamin D, Vitamin B12. • Interpretation of report of blood and urine in - PEM, Anemia, IDD, Vitamin A Deficiency, Vitamin D, Vitamin B12.	**12 hrs.** 1 3 4 4	Assignments
Module iv: **CLINICAL DIAGNOSIS IN LIFESTYLE DISEASE** • Pathogenesis, Metabolic changes of life style diseases: Obesity, Hypertension, Diabetes and CVD- Atherosclerosis, Hyper cholesterolemia and Hyper triglyceridemia • Clinical diagnosis of life style diseases: Obesity, Hypertension, Diabetes and CVD- Atherosclerosis, Hyper cholesterolemia and Hyper triglyceridemia • Alteration in nutritional requirement. • Interpretation of report of blood and urine in lifestyle diseases: Obesity, Hypertension, Diabetes and CVD- Atherosclerosis, Hypercholesterolemia and Hyper triglyceridemia	**12 hrs.** 3 3 3 3	Lectures
Module v **DRUG AND NUTRIENT INTERACTION** • Effect of drugs on food intake and absorption: • Effect of food on absorption of drugs • Effect of various food and beverages on drug action, Drug effects on nutrients, Interaction of drugs and nutrient • Effect of food, nutrients and nutritional status on drug dosage and Efficacy.	**12 hrs.** 3 3 3 3	Assignment/Lectures

REFERENCES

1. Bergheim, I. (Ed.). (2022). *Clinical nutrition: Recent advances and remaining challenges*. MDPI.
2. Koletzko, B., Phillip, M., Turck, D., & Shamir, R. (Eds.). (2025). *Nutrition and growth: Yearbook 2025* (Vol. 128). Karger.
3. Attia, P., & Gifford, B. (2023). *Outlive: The science and art of longevity*. Harmony Books
4. Bergheim, I. (Ed.). (2022). *Clinical nutrition: Recent advances and remaining challenges*. MDPI

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THERAPEUTIC DIETETICS(DSC-10)

Credits: 4 **Semester: III**
Subject code: FS22304 **No. of Lecture hours: 60**

Objectives

- To provide knowledge on important aspects of therapeutic dietetics
- To get in detail information about diabetes and cardiovascular diseases and their diets
- To gain knowledge about various renal disorders and their diets
- To study in detail about different GI disorders and their dietary management
- To gain knowledge about various liver and biliary disorders and their management

Outcomes

CO1: The students will be able to understand diet for weight management
CO2: Students will identify various causes of diabetes mellitus and its diet
CO3: Students will be able to create knowledge on various renal diseases and their diets.
CO4: Students will be able to identify various GI diseases and their causes and types
CO5: Students will be able to construct various diet plans for liver and biliary disorders.

Course content	Hours allotted	pedagogy
Module i: **DIET FOR WEIGHT MANAGEMENT** • Underweight- Definition, Causes, Principles of the Diet, Dietary Modifications, Foods to Be Included and Foods to be Avoided • Obesity - Definition, Causes, Assessment (BMI, Body Weight, Brokas Index), Type (Grade I, II, II, Apple and Pear shape) • Complications, Principles of the Diet, Dietary Modifications, Foods to be Included And Foods to be Avoided • Eating disorders: Anorexia Nervosa and Bulimia Nervosa	12 **hrs.** 4 4 2 2	Lecture
Module ii **DIET IN DIABETES AND CARDIOVASCULAR DISEASES** • Diabetes - Definition, Causes, Types, T2DM- risk factors, Signs, Symptoms, Complications and Dietary Modifications • T1DM- risk factors, Signs, Symptoms, Complications and Dietary Modifications • Hypertension- Definition, Causes, Types, risk factors, Signs, Symptoms, Complications and Dietary Modifications • Atherosclerosis - Definition, Causes, risk factors, Signs, Symptoms, Complications and Dietary Modifications	**12 hrs.** 3 3 3 4	Case studies/review of research articles

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Module iii. **DIET IN RENAL DISEASES** • Nephritis, - Causes, Types, risk factors, Signs, Symptoms, Complications and Dietary Modification • Nephrosis: Causes, Types, risk factors, Signs, Symptoms,Complications and Dietary Modifications • Renal Calculi - Causes, Types risk factors, Signs, Symptoms, Complications and Dietary Modifications • Renal Failure - Causes, Types, risk factors, Signs, Symptoms, Complications and Dietary Modification	**12 hrs.** 3 3 3 3	Assignments
Module iv: **DIET IN GASTRO – INTESTINAL DISEASES** • Diarrhoea - Definition, causes, types, symptoms, complications and dietary Modifications, foods to be included and foods to be avoided • Constipation - Definition, causes, types, symptoms, complications and dietary modifications, foods to be included and foods to be avoided • Peptic Ulcer - Definition, causes, types, symptoms, complications and dietary modifications, foods to be included and foods to be avoided • Celiac disease, tropical sprue, irritable bowel syndrome, inflammatory bowel disease- Definition, Symptoms and dietary management	**12 hrs.** 3 3 3 3	Lectures
Module v **DIET IN LIVER AND BILLARY DISORDER** • Hepatitis - Definition, Causes, Types, Symptoms, Complications and Dietary Modifications, Foods to Be Included and Foods to Be Avoided • Cirrhosis - Definition, Causes, Symptoms, Complications and Dietary Modifications, Foods to Be Included and Foods to Be Avoided • Gall stones - Definition, Causes, Symptoms, Complications and DietaryModifications, Foods to Be Included and Foods to Be Avoided • Pancreatitis- Definition, Causes, Types, Symptoms, Complications and Dietary Modifications, Foods to Be Included and Foods to Be Avoided	**12 hrs.** 3 3 3 3	Assignment/Lectures

REFERENCES

1.Joshi, S. A. (2022). Nutrition and dietetics: With Indian case studies (5th ed.). McGraw Hill Education India

2.Srilakshmi, B. (2023). Dietetics (9th ed.). New Age International Publishers

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CHEMISTRY OF CARBONYL, CARBOXYLIC ACID ANALOGS AND ELECTROCHEMISTRY(DSC-11)

Credits: 4 **Semester: III**
Subject Code: FS26302 **No. of Lecture Hours: 60**
Objective:
To complete a Major Study in Organic, Inorganic & Physical Chemistry.
Outcome:
Students will develop the skills for multistep synthesis of organic compounds and can predict the reactivity from its structure and can study the electrochemical processes.

Course Outcomes:

CO1:	Understands and compares synthesis and properties of aldehydes and ketones.
CO2:	Acquires the knowledge about synthesis and properties of carboxylic acids, illustrate applications of carbanions.
CO3:	Gain knowledge about electrical conductivities of various conductors.
CO4:	Perceives the concept of cell potential, compare various electrodes.
CO5:	Understand the properties of *d*- and *f*-block elements.

MODULE-01: ALDEHYDES & KETONES	**12 Hrs**	**Pedagogy**
• Nomenclature, Isomerism (chain, position, functional)	1	Power point presentations / Lectures/Assignments
• Preparation from (i) acid chlorides, (ii) 1,3-Dithianes, (iii) nitriles, (iv) carboxylic acids, (v) gem dihalides	1	
• Preparation of (a)**Aromatic Aldehyde**-Benzaldehyde – (i) Oxidation of Arene, (ii) Rosenmund reduction, (iii) hydrolysis of benzal Chloride (iv) distillation of Calcium benzoate+ Calcium format.	1	
• Aromatic Ketones –Benzophenone- (i) Friedel Craft's Acylation, (ii) distillation of Calcium benzoate, (iii) from gem dihalides.	1	
• Acetophenone- (i) Friedel Craft's Acylation, (ii) from gem dihalides, (iii) distillation of Calcium benzoate + Calcium acetate • Physical Properties: absence of H-bonding.	1	
• Keto-enol Tautomerism, relative reactivity of aldehydes & ketones towards Nucleophilic addition reactions.	1	
• Nucleophilic Addition reactions: • (i) $NaHSO_3$, (ii) HCN, (iii) RMgX, (iv) NH_3, (v) RNH_2, (vi) NH_2OH, (vii) 2,4-DNP, (viii) Schiff's bases, (ix) Addition of alcohols-hemi acetal and acetal formation, (x) Oxidation, (xi) Reduction-(a) Catalytic reduction – Pt/H_2 (or) Pd/H_2 (or) $LiAlH_4$, (b) MPV reduction, (xii) reduction to alkanes (a) Clemmensen reduction **(Only equation)** (b)Wolf -Kishner reduction **(Only equation**)	2	Power point presentations / Lectures/Assignments
• Distinguishing Tests for Aldehydes & Ketones- 2,4-DNP Test, Tollen's test, Fehling's test, Schiff's test, haloform test (with equations)	1	
Base Catalyzed Reactions – (<u>Mechanisms)</u> • Aldol Condensation, (ii) Cannizaro reaction, (iii) Benzoin	3	

Condensation, (iv) Perkin Reaction, (v) Haloform Reaction, (vi) Knoevenagel Reaction.		
MODULE 02: CARBOXYLIC ACIDS & ITS DERIVATIVES / CARBANION SYNTHESIS	**12 Hrs**	**Pedagogy**
Carboxylic Acids:		Power point presentations / Lectures/Assignments
• Nomenclature, classification. • Preparation of Acetic acid-(i) Hydrolysis of (a) Nitriles, (b) Amides, (c) Esters, (ii) Carbonation of Grignard reagent.	1	
• Preparation of aromatic Carboxylic acid ex. Benzoic Acid – (i) Oxidation of side chain of Benzene (ii) Kolbe reaction, (iii) Hydrolysis of benzo trichloride	1	
• Physical Properties – Intermolecular hydrogen bonding (Solubility in water, BP), • Acidity-strength of acids with the examples of trimethyl acetic acid and trichloroacetic acid, relative differences in the acidity of aromatic, aliphatic acids, and phenols	1	
• Chemical Properties- (A) Reaction involving –H, OH and -COOH groups	1	
• Salt formation (ii) anhydride formation (iii) acid halide formation (iv) Esterification-**(Mechanism),** (v) amide formation, vi) degradation of carboxylic acids by Huns Diecker reaction, (vii) Schmidt Reaction (decarboxylation) (viii) Arndt-Eistert synthesis, (ix) Halogenation-Hell-Volhard-Zelensky Reaction. (only equations)	3	
Carboxylic acid derivatives- • Preparation and hydrolysis of Acid halides, acid anhydrides, Acid Amides and Esters: Hydrolysis – (i) Acid catalyzed, (ii) Base catalyzed **(MECHANISMS**	1	
Synthesis based on Carbanions. • Sources, generation, and structure of Carbanions **(Acidity** of Hydrogens of e^- withdrawing groups), Examples.	1	
• Ethylacetoester – Preparation – Claisen Condensation **(Mechanism),**	1	
• EAA Synthetic Applications – Acid Hydrolysis and Base hydrolysis- Synthesis of Ketones-butanone, 3-methyl-2-butanone Preparation of-mono carboxylic acids, dicarboxylic acids.	1	
• Diethyl Malonate: Preparation from acetic acid. • Synthetic Applications- (i) mono substituted Carboxylic acids, (ii) Di carboxylic acids	1	
MODULE 03: ELECTRO CHEMISTRY–I	**12 Hrs**	**Pedagogy**
• Conductance- Specific Conductance, Equivalent Conductance & Molar Conductance, experimental determination of Equivalent Conductance, k, & μ.	3	

Problems.		
• Conductometric Titrations – Definition- Explanation of Principle, procedure & graphs for (i) SA *vs* SB, (ii) SA *vs* WB, (iii) WA *vs* SB, (iv)WA *vs* WB, (v) [SA+WA] *vs* SB, (vi) $AgNO_3$ *vs* KCl.	3	
• Migration of Ions. Kohlrausch law of independent migration of ions applications. Problems.	2	
• Effect of dilution on Conductance; Strong &Weak electrolytes. • Transport Number – Definition – Hittorf Rule, Hittorf method to determine transport number of ions. Problems.	2	Power point presentations / Lectures/Assignments
• Debye Huckel Theory of Strong Electrolytes – Debye Huckel Onsager Equation (elementary treatment).	2	
MODULE 04: ELECTRO CHEMISTRY–II	**12 Hrs**	**Pedagogy**
• Common Ion Effect – Definition, application in Qualitative analysis Electro chemical cells-definition, construction.	2	
• Electro chemical cells-definition, construction. Representation of electro chemical cell	2	
• EMF, SEP, SRP/SOP. Features of Electro Chemical Series. Problems. • Nernst Equation – (i) Calculation of Half Electrode potential, ii) Calculation of cell potential. Problems.	2 3	Power point presentations / Lectures/Assignments
• Reference Electrodes – Definition, construction & working. of (i) SHE (ii) SCE.	2	
• Commercial cells-working of Pb-storage cells.	1	
MODULE: TRANSITION ELEMENTS & INNER TRANSITION ELEMENTS	**12 Hrs**	**Pedagogy**
Transition Elements (*d*-block elements)		
• Definition, Characteristics of d-block elements with special reference to Electronic Configuration	2	
• General Properties-Comparative study of 3d-block elements: (i) Atomic radii, (ii) Metallic character, (iii) SRP, (iv)Variable oxidation states and stability of it, (v)ability to form Complex, (vi) Magnetic Properties, (vii) Catalytic Properties, (viii) MP & BP, (ix) Color	4	
Inner Transition Elements (f-Block elements)		
• Lanthanides – Definition, position in periodic table, electronic configuration.	1	
• Oxidation states, Color (f-f transitions), Magnetic properties, Complex formation.	2	Power point presentations / Lectures/Assignments
• Ionic and atomic radii-Lanthanide Contraction-Cause, Consequences	1	

• Methods of Separation of 4*f*-block elements-(i) Solvent extraction, (ii) Fractional Precipitation, (iii) Ion Exchange method.	1	
• Actinides-Definition, electronic configuration, oxidation states; Comparison with lanthanides	1	

SUGGESTED TEXTBOOK

1.Agarwal O.P. -**Unified Course in Chemistry**- (Vol. II).

SUGGESTED READING:

1. Jerry March- **Advanced Organic Chemistry** 4th edition-Replica Press (P) Ltd.
1. Arun Bhal & Bhal-**Advanced Organic Chemistry**
2. Finar I.L -**Organic chemistry**
3. Bansal R.K -**Organic chemistry**
4. Morrison R.T. & Boyd R.N - **Organic chemistry** (2003) 6th edition-Replika Press (P) Ltd.
5. Lee J.D. **Concise inorganic chemistry** 5th edition-(Reprint-2010)
6. Madan Malik and Tuli- **Selected Topics in inorganic chemistry** (2010) S. Chand Company Ltd.
7. Kalsi P.S.- **Organic reactions to their Mechanisms** 2nd edition New Age International Publishers (2005).
8. Nasipuri D.- **Stereo Chemistry of Organic Compounds** 2009 edition. New Age International Publishers.
9. Agarwal O.P.- **Organic Reactions & Reagents** Krishna Prakash Media (P)Ltd-Goel Publishers.
10. Arun Bahl, B.S. Bahl, G. D. Tuli. 2012. Essentials **of physical chemistry** New Delhi: S.Chand& Company Ltd.

Puri Sharma & Pathania. 2016 **Principles of physical chemistry**. Jalandhar: Vishal Publishing

Functional Introduction to Ayurveda Food Science and Nutrition

Credits- 1 **Semester- III**

Subject Code: G26FS1P **No. of Lecture hours:30**

Objective: to impart the knowledge of Ayurveda in Nutrition

Outcome: the student will practically be understanding ayurvedic nutrition diets

1. Visit your local market and classify the available food items according to sattvic, Rajasi and tamasic Food 4
2. Planning of Sattvic Diet 2
3. Planning of Rajasi Diet 2
4. Planning of Tamasic Diet 1
5. Conduct a survey of 10-12 households in your locality: 6
   i. To study food behaviour and analyse them in light of ayurvedic dietary principles of sattvic, rajasi, Tamasic
   ii. To study the food consumption patterns and intake of incompatible food: viruddha ahara, pathya, Apathya, viprita ahaar
   iii. To know about their adopted lifestyle Dincharya and Ritucharya

References:

1.Charaka Samhitha, charaka(1998) in: Tripathi BN (ed) sutra stahan maharashitiya Adhyay, Chaukhamba orientelia, Varanasi

2.Murthy SRK, Astanga Hrdayam, Chowkhambakrishnadas academy, Varaansi 2018

3. Sharma PV. History of medicine in India Chaukhamba orientelia, Varanasi

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FOOD SAFETY QUALITY CONTROL AND SANITATION

Credits:1 **Semester: III**
Subject code: FS26305 **No. of lecture hours: 30**

Objective:
To procure information on quality and sanitation
Outcomes:
Students will learn techniques related to quality and sanitation

1. Development and pre testing of score card for evaluation of personal hygiene, hand washing and food service establishment. 3
2. Survey of scorecard with regard to personal hygiene. 4
3. Survey of scorecard with regard to hand washing. 4
4. Survey of scorecard with regard to food establishment hygiene. 4
5. Report on the survey conducted pertaining to personal hygiene, hand washing and food hygiene. 3

   Sensory Assessment:
6. Appearance of food visual perception, colour b. odour and smell c. flavour d. texture 5
7. Sensory testing of food : threshold test, Difference test, ranking test, scoring test hedonic test, triangle test 5
8. Factors affecting sensory evaluation 2

References:

1. FSSAI. (2006) Manual of Food safety management System, FSS 2006
2. Fernandes M and Rose A. (2013) Persistent Organic Pollutants and Toxic Metals in Foods. Elsevier Publication.
3. Deshpande S. S. (2013) Handbook of Food Toxicology ebook (Free Down Load)
4. S. Roday 2005 Food Hygiene and Sanitation in Food Industry 7th Edition Published by Tata McGraw Hill Publishing Company New Delhi.
5. 2. Shubhangini A.Joshi.2015 Nutrition and Dietetics 4th Edition Published by McGraw Hill Education (India)Private Limited

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CLINICAL NUTRITION

Credits: 1 **Semester: III**
Subject code: FS22306 **No. of Lecture hours: 30**

Objectives

- To provide basic understanding of principles involved in various diets

Outcome

- The students will gain knowledge planning, preparation of various diets.

PRACTICALS

1.	Standardization of common food preparations	3
2.	Planning, preparation and calculation of Normal diet	3
3.	Planning, preparation and calculation of Liquid diet	3
4.	Planning, preparation and calculation of soft diet	3
5.	Planning and preparation of Bland diet	3
6.	Planning and preparation of High protein diet and Low protein diet	3
7.	Planning and preparation of High Fiber and Low fiber diet	3
8.	Planning and preparation of Caloric-restricted	1
9.	Planning, Preparation and calculation of low and medium cost diets for PEM and Anemia	4
10.	Planning, Preparation and calculation of low and medium cost diets for Vitamin A deficiency and Iodine deficiency disorder	4

REFERENCES

1. Zaloga, G.P. (1994): Nutrition in Critical Care, Times Mirror/Mosby.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (Ed) (1999): Modern Nutrition in Health and Disease. 9th Edtion, Williams and Wilkins.
3. Shikora, S.A. and Blackburn, G.L. (Ed) (1999). Nutritional Support – Theory and Therapeutics, Chapman and Hall, ITP (International Thomson Publishing).
4. Mahan, L.K. and Escott – Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Ed. W.B. Saunders Ltd.
5. Phillips, G.D. and Lodgers C.L. (1986). Parenteral and Enteral Nutrition. A Practical Guide. Churchill Livingstone.
Kinney, J.M. and Borum, P. R. (editors) (1989) Perspectives in Clinical Nutrition. Urban and Schwarzenberg.
7. Torosian, M. H. (editor) (1995) Nutrition for the Hospitalized Patient. Basic Science & Principles of Practice.

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THERAPEUTIC DIETETICS

Credits: 1 **Semester: III**
Subject code: FS22307 **No. of Lecture hours: 30**

Objective

- To impart the knowledge of therapeutic dietetics.

Outcome

- The students will gain knowledge on planning and calculating diets for various diseases.

PRACTICALS

I. Planning, Calculation and Preparation of Diets for 1. Underweight 2. Obesity	3
II. Planning, Calculation and Preparation of Diets for 3. Diabetes- T2DM 4. Hypertension	3
III. Planning, Calculation and Preparation of Diets for gastro intestinal diseases 5. Diarrhea 6. Constipation 7. Peptic Ulcer	3
IV. Planning, Calculation and Preparation of Diets for Liver and Billary disorders 8. Hepatitis 9. Cirrhosis 10. Gall stones	3
V. Planning, Calculation and Preparation of Diets for renal disorders 11. Nephritis 12. Nephrosis 13. Renal calculi 14. Chronic renal failure	3

REFERENCES

1. Srilakshmi B – Dietetics, 5th edition, New Age International publishers, 2002.
2. Antia F.P - Clinical Dietetics and Nutrition, Oxford University Press, New Delhi, 2003.
3. Mahtab S. Bamji, N Prahlad Rao, Vinodini Reddy -Text book of Human Nutrition, 2nd edition, Oxford and IBH publishing Co. Pvt. Ltd, 2004.
4. Swaminathan, M - Essentials of Food and Nutrition, Vol 2, Bangalore Printing and Publisher . .

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CHEMISTRY –III PRACTICALS

[QUANTITATIVE ANALYSIS]

Credits: 1 **Semester: III**
Subject Code: FS26308 **No. of Practical Hours: 30**
Objective:
To estimate the substances / ions present in given unknown samples.

CO: Students will be able to estimate quantity/ amount of unknown substances in each sample using classical techniques such as quantitative analysis.

VOLUMETRIC ANALYSIS: **30 Hrs**

Laboratory Safety Rules and Regulations: 4
Calibration of fractional weights, Calibration glass ware–burette, pipette, standard flask. Normality or Molarity and specific gravity of concentrated acids. Preparation of dilute acids and bases. Preparation of standard solutions.

Preparation of Lab Reagents: 4
Preparation of indicators and usage of indicators in Volumetric analysis, Role of indicator in detecting end point (Phenolphthalein, Methyl orange, Methyl-red, Potassium Chromate, EBT, Murexide). Preparation of buffer P^H- 10, acetate buffer, DMG, Mohr's salt solution, Iodine solution, Starch solution[Minor Experiment]

Acidimetry& Alkalimetry: 2

1. Estimation of Na_2CO_3 & $NaHCO_3$ Using Standard HCl solution (HCl standardized by standard Na_2CO_3 solution).
2. Estimating the amount of acetic acid present in Commercial Vinegar using Standard NaOH. 2

Permanganometry: 2

3. Preparation of standard oxalic acid solution. Standardization of $KMnO_4$.
   Estimation of Calcium present in Chalk.

Dichrometry: 2

4. Preparation of a standard solution potassium dichromate, Estimation of ferrous and ferric.

Iodometry: 2

5. Preparation of a standard solution of Potassium dichromate, standardization of Hypo.
6. Estimation of Copper in Copper Sulphate 2

Complexometry: EDTA Titrations: 4

7. (i) Estimation of Ni^{2+}
   (i) Estimation of Mg^{2+}

Precipitation Titrations: 2

8. Estimation of Zn^{2+} Using Potassium ferrocyanide.

Viva Questions. 4

Essential Reading:

1. Mendham. J, Denney, Barnes. J and M. J. K. Thomas. **VOGEL'S Textbook of Quantitative Analysis.** 6th Edition. Pearson.

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YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
B.Sc. FOOD SCIENCE, NUTRITION AND DIETITICS
FOURTH SEMESTER
ACADEMIC YEAR 2026-27 BATCH 2025-28 (CBCS)

S. No	Part	Subject Code	Title of the Subject	Hours /Week	Credits	Marks			Duration of exam
						Internal	External	Total	
1	I	FS25401	Applied Statistics DSC-12	4	4	40	60	100	3
2	II	FS26402	Food Preservation And Processing SEC-2	1	1	20	30	50	2
3	II	FS22403	Diet Therapy DSC-13	4	4	40	60	100	3
4	II	FS26404	Catalysis, stereo and coordination chemistry DSC-14	4	4	40	60	100	3
5	II	FS22406	Basics of Research DSC-15	4	4	40	60	100	3
6	II	FS25405	Functional Foods and Nutraceuticals DSC-16	4	4	40	60	100	3
PRACTICALS									
7	II	FS26407	Food Preservation and processing SEC-2	2	1	40	60	100	3
8	II	FS22408	Diet Therapy DSC-13	2	1	40	60	100	3
9	II	FS26409	Qualitative analysis of organic compound DSC-14	2	1	40	60	100	3
	TOTAL			27	27	340	510	850	-

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APPLIED STATISTICS(DSC-12)

Credits:4 **Semester: IV**

Subject code: FS25401 **No.of Lecture hours: 60**

Objective: To study the basic statistical techniques in relation to food analysis

Course Content	Hours Allotted	Pedagogy
Module I: Title: • Measures of central tendency • Mean • Mode • Median for grouped and ungrouped data • Merits and demerits • Measures of dispersion-range, Standard deviation	**12 HRS**	Powerpoint presentations / Lectures
Module II: Title: • Correlation –types of correlation • Scatter diagram-Karl Pearson's coefficient of correlation • rank correlation-non- repeated and repeated ranks -simple problems • Regression lines-regression equations • Fitting of linear regression equation • Fitting of linear regression equation of Yon X and X on Y-Simple problems • (NOTE: Derivations not required. Applications/Problems only)	**12 HRS**	Case Studies / Review of research articles
Module III: Title: • Sampling – types ofsampling-purposivesampling • randomsamplingandstratifiedsampling • definitionofnull hypothesis-alternativehypothesis • type- Ierror-TypeIIerror-level of significance • Testof significanceforlargesamples • testsignificationforsingleproportion • testsignification for difference proportion • testsignificationforsinglemean-testsignificationfordifferenceofmeans test signification for difference of standard deviation- simple problems (NOTE: Derivations not required. Applications/ Problems only)	**12 HRS**	Assignments
Module IV: Title: • Chi-SquareTest:Chi–SquareTestforgoodnessof fit • chi-squaretestforindependenceof attributes • yate'scorrection • T-test:-t-testforsingle mean • t-test fortwo means • pairedt-Test • t-testforsignificanceof thecorrelationofcoefficient • (NOTE:Derivationsnotrequired.Applications/Problemsonly)	**12 HRS**	Lectures

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Module V: Title: • AnalysisofVariance • F-Test- analysisof variance-assumptions • ANOVAin oneway-classification • two– way of classification • simpleproblems • (NOTE:Derivationsnotrequired.Applications/Problemsonly)	**12 HRS**	Assignments / Lectures

References:

1.S.C.GupthaandV.K.Kapoor,"FundamentalsofMathematicalstatistics",sulthan/Chand&Sons,NewDelhi.2002.
2.S.C.GupthaandV.K.Kapoor,"StastisticalMethods",sulthan/Chand&Sons,NewDelhi.2000.

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FOOD PRESERVATION AND PROCESSING(SEC-2)

Credits: 1 **Semester: IV**
Subject code: FS26402 **No. of lecture: 15**

Objectives:

- To teach the students basics of food preservation and latest developments in the food preservation
- To prepare various food products using preservation techniques and gain knowledge on food packaging.
- To impart knowledge on principles involved in cooking of cereals, legumes and its processing methods
- To know in depth about processing and composition of milk and milk products, fruits and vegetables.
- To learn about processing of nuts and seeds, oils, fats and sugars-physical and functional properties

Outcomes:

CO1: The students will be able to understand the importance of food preservation and prepare various food products.
CO2: The students will be able to identify the latest developments in food preservation and appraise the role of packaging in food preservation
CO3: Students will be able to understand the principles involved in processing of various food grains.
CO4: Students will be able to identify various dairy processing method and create an understanding on changes occurring in fruits and vegetables during maturation.
CO5: Students will be able to evaluate various steps to eliminate antinutritional components in nuts and oil seeds and properties of sugars, oils.

Course Content	Hours Allotted	Pedagogy
Module I: **Concepts and methods of Food Preservation** • Definition, importance and principles of food preservation • Preservation of various food products- Fruit juices, squashes and cordials, Jams, jellies and marmalades, Ketchups, Chutneys and sauces. • Preservation by means of low temperature	**3 Hrs** 1 1 1	Powerpoint presentations / Lectures
Module II: **Other preservation Methods and packaging** • Preservation using irradiation, brining, syruping and carbonation • Preservation using chemical preservatives and fermentation • Role and importance of packaging, types of packaging	**3 Hrs** 1 1 1	Case Studies / Review of research articles

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Module III: **CEREALS, CEREAL PRODUCTS, SUGARS AND PULSES – PROCESSING** • Wheat & Rice- Composition, classification, milling, milled products • Millets- processing and Nutritive value • Legumes and Pulses- Types, composition, milling, toxic materials (antinutrients), germination, fermentation, digestibility.	**3 Hrs** **1** 1 1	Assignments
Module IV: **MILK AND MILK PRODUCTS – PROCESSING** • Milk-composition and Nutritive value of milk • Milk products • Processing, types of milk, uses in cookery.	**3 Hrs** 1 1 1	Lectures
Module V: **FATS, OILS NUTS AND OILSEEDS- PROCESSING** • Oil seeds and nuts: Types and composition • Oilseeds and Nuts: Processing and antinutrients • Fats & Oils- types, composition, Processing of fats	**3 Hrs** 1 1 1	Assignments / Lectures

REFERENCES

1. KaliaM. (2010),Food QualityManagement. PublishedbyAgrotech
2. ArtiSankhlaetal.(2011),FoodPreservation:PrinciplesandPractices.Publishedby Agrotech.
3. Kalaydzhiev, H., Goranova, Z., & Blesa, J. (Eds.). (2025). *Innovative technologies for food preservation and processing*.
4. Kapoor, S., Kaur, G., Dar, B. N., & Sharma, S. (2023). *Emerging techniques for food processing and preservation*. Taylor & Francis.
5. Goyal, M. R., Veena, N., & Watharkar, R. B. (Eds.). (2023). *Advances in food process engineering: Novel processing, preservation, and decontamination of foods*. Apple Academic Press.

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DIET THERAPY (DSC-13)

Credits: 4 **Semester: IV**
Subject code: FS22403 **No. of lecture hours: 60**

Objectives

- To provide knowledge and clinical information about various diseases that will be necessary for holistic management of these conditions
- To gain in detail knowledge about diets in various conditions like cancers,gout,arthritis and AIDS
- To learn in detail about pre and post operative diets
- To get information regarding food allergy and intolerance and genetic disorders
- To gain knowledge about nutrition and immune response

Outcomes

CO1: The students will be able to design different communication models.
CO2: The students will be able to apply the knowledge of diet in other conditions.
CO3: The students will be able to understand critical conditions.
CO4: The students will be able to assess the genetic disorders.
CO5: The students will be able to gain knowledge on Nutrition and immune response

Course Content	Hours Allotted	Pedagogy
Module I: **BASICS OF DIET THERAPY AND DIET IN INFECTIONS AND FEBRILE CONDITIONS** • Dietary supplements: types of supplements, Adjuncts to diet therapy • Defense mechanisms in the body, Effects of infection on body mechanisms effect of infection on nutrients, Role of nutrition in infections and dietary modification • Diet in Febrile conditions: metabolic changes in fever. Etiology, symptoms, and dietary management of Typhoid, Tuberculosis • Etiology, symptoms, and dietary management of Tuberculosis	**12 HRs** 3 3 3 3	PowerPoint presentations / Lectures
Module II: Title: DIET IN OTHER CONDITIONS • Arthritis - Definition, causes, types, symptoms, and dietary modifications, foods to be included and foods to be avoided • Gout - Definition, causes, symptoms, and dietary modifications, foods to be included and foods to be avoided • Cancer - Definition, Types, risk factors, Symptoms, Complications and Dietary Modifications, Foods to Be Included and Foods to Be Avoided • Acquired Immunodeficiency Syndrome - Definition, Causes, Transmission, Symptoms, Dietary Modifications and Prevention	**12 Hrs** 3 3 3 3	PowerPoint presentations / Lectures
Module III: **DIET IN CRITICAL CONDITIONS** • Dietary management in surgical conditions: Pre-operative- Nutritional assessment and dietary management • Post-operative- Nutritional assessment and dietary management • Etiology, symptoms, and dietary management of Sepsis, Trauma	**12 Hrs** 3 3 3 3	PowerPoint presentations / Lectures

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• Burns- Metabolic changes, nutrient requirement. Assessment of TBSA Burnt		
Module IV: Title: DIET IN GENETIC DISORDERS AND FOOD ALLERGY • Inborn Errors of Metabolism; Phenylketonuria – Definition, symptoms, Dietary Management • Galactosemia - Definition, symptoms, Dietary management • Lactose Intolerance- Definition, symptoms, Dietary management • Food Allergy–Definition, Classification, Clinical Signs and Symptoms, Food as Allergens	**12hrs** **3hrs** **3hrs** 3hrs 3hrs	Lectures
Module V: **NUTRITION AND IMMUNE RESPONSE** • Definition, Role of immune nutrients- Amino acids, Purine Nucleotides, Omega 3 fatty acids • Immunological components of Breast milk • Effect of undernutrition and overnutrition on immune function. • Immune enhancers, immunosuppressants, conditionally essential nutrients	**12 Hrs** 3 3 3 3	Assignments / Lectures

REFERENCES

1. Antia, F.P. (2010). Clinical Dietetics and Nutrition (4thed.). Pharmamed
2. Srilakshmi B (2011). Dietetics (6thed.). Wiley Eastern Limited.
3. Krause and Mahan (2008). Food, Nutrition, Diet Therapy (12thed.). WB Saunders Company, London
4. Sue Rodwell Williams (2009). Nutrition, Diet Therapy (9thed.). WB Saunders Company, London
5. Skipper A (2009). Advanced Medical Nutrition Therapy and Practice. Jone&Barlett Publishers
6. Nelms M (2007). Nutrition Therapy and Pathophysiology. Thomson publishers
7. Gropper S (2009). Advanced Nutrition and Human Metabolism (5thed). Cengage publishers
8. Shils M (2005). Modern Nutrition in Health & Disease (10thed). Lippincott publishers

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CATALYSIS, STERO AND COORDINATION CHEMISTRY(DSC-14)

Credits: 4 **Semester: IV**

Subject Code: FS26404 **No. of Lecture Hours: 60**

Objective: To develop an understanding of breadth & Concepts of Physical / Organic / Inorganic Chemistry which can be useful for further Studies.

Outcome: Students will be able to apply chemistry proficiency in all three disciplines of chemistry and to develop critical thinking and analytical reasoning.

Unit Specific Outcomes

CO1:	Compare synthesis and properties of Nitrogen compounds.
CO2:	Molecular 3-D projections and notation and separation of stereo isomers
CO3:	Basic concepts and geometries IUPAC nomenclature and isomerism of coordination compounds
CO4:	Analyze various nuclear processes and applications of radio isotopes and study various materials
CO5:	Evaluate order and molecularity of a reaction, and learning the Chromatographic Techniques, its significance

MODULE 1: NITROGEN COMPOUNDS	**12 Hrs**	**Pedagogy**
• **Nitro Alkanes**-Preparation methods, physical properties, chemical properties-Halogenation, reaction with HNO_2, reduction, Hydrolysis-NEF reaction.	1	
• **Aromatic Nitro Compound**-Preparation-Nitration of benzene, Physical properties,	1	
• Chemical properties-(i) Nitration, (ii) Reaction with (a) KOH, (b) NH_3, (iii) Reduction (Sn/HCl, Pt/H_2, $LiAlH_4$, Zn/NH_4Cl, Zn/NaOH, Selective reduction, Electrolytic Reduction. Conversion of TNT into TNB.	1	
• **Cyanides & Isocyanides**- Nomenclature (aliphatic & aromatic), structure, Preparation of Cyanides from (i) Alkyl halides, (ii) Amides	1	
• Properties-(i) Weakly basic character, (ii) Hydrolysis, (iii) Addition of NH_3, (iv) Addition of GR (v) Reduction	1	
Amines:		
• **Aliphatic Amines**- Nomenclature, Classification into 1^0, 2^0, 3^0 Amines and Quaternary ammonium compounds. Preparation methods- (i) Ammonolysis of alkyl halides, (ii) Hoffman's bromamide reaction **(MECHANISM)**, (iii) Gabriel Synthesis (iv) Reduction of Amides, (v) from GR	1	
• 2^0 Amines & 3^0 Amines -Preparation-(i) from Cyanides, (ii) Ammonolysis of RX, (iii) from GR.	1	
• **Separation methods of 1^0, 2^0,3^0 amines** by (i) Fractional Distillation, (ii) Hoffman Method, (iii) Hinsberg Method	2	

• Physical Properties, Chemical Properties- (i) Alkylation, (ii) Acylation, (iii) Carbylamine reaction (**MECHANISM**), (iv) Reaction with HNO_2 of 1^0,2^0, 3^0 amines, (v) Salt formation, (vi) Reaction with CS_2.		Presentations / Lectures/Assignments
• **Aromatic Amines** – Nomenclature, Preparation-(i) Reduction of Nitro Compounds, (ii) Reduction of Azo Compounds.	1	
• Physical Properties, Chemical Properties- (i) Salt formation, (ii) Alkylation, (iii) Acylation, (iv) Sulphonylation, (v) Reaction with HNO_2, (vi) Carbylamine reaction, (vii) Reaction with CS_2, (viii) Reaction with Aldehydes, (ix) ESR-Bromination, Nitration.	2	
• Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline, *N*-methylaniline, *N*,*N*-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects.	1	
MODULE 2: STEREO CHEMISTRY	**12 Hrs**	**Pedagogy**
• Projection of carbon compounds; Wedge, Fischer Projections-Ex: glyceraldehyde, Lactic acid, Alanine. • Newman projections & Sawhorse formulae-Ex: Ethane	2	Power point presentations / Lectures/Assignments
• **Optical Isomerism** –definition, wave nature of light, plane polarized light, optical and specific rotation, chiral centers, and chiral molecules-definition of criteria	1	
• Cause of optical activity–**absence of** plane, center, and S_n axis of symmetry, Asymmetric and Dissymmetric molecules (definitions), Examples of asymmetric molecules-glyceraldehyde, Lactic acid, Alanine. Dissymmetric molecules – *trans*-1,2-dichlorocyclopropane	1	
• Molecules with constitutionally symmetrical chiral carbons - Tartaric acid number of *enantiomers* and *mesomers*	1	
• Enantiomers – Definition, examples & characteristics.	1	
• Molecules with constitutionally unsymmetrical chiral carbons	1	
• Diastereomers–Definition & characteristics (2, 3-dibromopntane)	1	Power point presentations / Lectures/Assignments
• D-L & R-S Notation-Cahn-Ingold-Prelog rules-examples.	1	
• Racemic mixture, Racemization, and resolution methods.	1	
• Geometrical Isomerism-in alkenes –E-Z Notation, examples. • **Configuration and conformational analysis**	1	
• Conformations of *n*-butane – Newman projections-explanation of stability.	1	
• Cyclohexane- explanation of stability of • chair, twist boat, boat & half chair Conformations	1	
MODULE 3: COORDINATION CHEMISTRY-I	**12 Hrs**	**Pedagogy**

• Simple salt, double salt & coordination complex – definitions and examples, Coordination number, coordination geometries of metal ions, types of ligands with examples.	1	
• Nomenclature-IUPAC rules and examples	1	
• Review of Werner's Theory with examples-limitations	1	
• Sedgwick's electronic interpretation and EAN –Rule-limitations.	1	
• Isomerism – Structural & Stereo Isomerism. • Structural-Ionization, linkage, coordination, ligand isomerism definitions with examples	1	
• Stereo Isomerism-geometrical isomerism in (i) Square planar-$[MA_2B_2]$, $[MA_2BC]$ $[M(AB)_2]$ and [MABCD], (ii) Octahedral metals complexes-$[MA_4B_2]$, $[M(AA)_2B_2]$, $[MA_3B_3]$ with examples.	2	Power point presentations / Lectures/Assignments
• Optical Isomerism in (i)Tetrahedral complexes-[MABCD], • (ii) Octahedral complexes-$[M(AA)_2B_2]$, $[M(AA)_3]$ with examples.	1	
• Valence Bond Theory – Postulates, application to (i) Tetrahedral complexes ($[Ni(NH_3)_4]^{+2}$, $[Ni(Cl)_4]^{-2}$, $[Ni(CO)_4]$	1	
• (ii) Square Planar- ($[Ni(CN)_4]^{-2}$, $[Cu(NH_3)_4]^{+2}$	1	
• Octahedral Complexes-$[Fe(CN)_6]^{-3}$, $[Fe(CN)_6]^{-4}$, $[FeF_6]^{-4}$, $[Co(NH_3)_6]^{+3}$, $[CoF_6]^{-3}$. Limitations of VBT.	2	
MODULE 4: MATERIAL AND NUCLEAR CHEMISTRY	**12 Hrs**	**Pedagogy**
Material Chemistry • Classification of materials-classification of metals, ceramics, organic polymers, composites, biological materials.	2	
• Particle reinforced composites-large particle and dispersion-strengthened composite.	2	
• Fibre reinforced composites (continuous and discontinuous)	2	
Nuclear Chemistry • Review of factors affecting nuclear stability, Isobars, Isodiapheres, Isotones and Isotopes with definition and examples	1	Power point presentations / Lectures/Assignments
• Definition, Artificial Transmutation with suitable examples.	1	
• NUCLEAR FISSION –Definition, explanation, Nuclear Fission as source of energy- Nuclear Reactor and nuclear bomb (atom bomb).	2	
• Nuclear reaction Spallation-definition, explanation with an example, Difference from Nuclear fission.	1	

• Nuclear Fusion-Definition, explanation, • Applications-Energy of Sun, Hydrogen Bomb	1	Power point presentations / Lectures/Assignments
• Applications for Radio-Isotopes- • (i) Carbon Dating, Problems, (ii)Tracers Chemistry.	1	
MODULE 05: KINETICS & CATALYSIS	**12 Hrs**	**Pedagogy**
KINETICS • Definition, rate of reaction, factors affecting the rate, Rate Constant.	1	Power point presentations / Lectures/Assignments
• Order & Molecularity, differences between order and molecularity.	1	
• Zero order reactions, First order reactions- rate constant characteristics, Half-life period and examples, problems	1	
• Second order reactions -Rate Constant-(i) 2A-----→P, (ii) A+B-→P, (a)when [A]=[B] (b)[A] & [B] are not equal. Examples, Problems	2	
• Pseudo unimolecular reactions-rate constant, examples, • Methods of determination of order of reaction.	1	
• Effect of temperature on reaction rate-threshold energy, • activation energy, Arrhenious equation, problems.	1	
• Theories of reaction rates Transition state theory	1	
Catalysis • Definition, classification of catalysts with examples, types of catalysis-examples.	1	
• Characteristics of catalysis, Enzyme Catalysis	1	
• Factors affecting enzyme catalysis-Mechanism (M. M. Equation), Theories of Catalysis-(i)Theory of Homogenous Catalysis, (ii)Theory of Heterogenous Catalysis.	2	

Suggested Reading:

1. Jerry March- **Advanced organic chemistry** 4th edition-Replika Press (P) Ltd.
2. Arun Bahl & B.S. Bahl- **Advanced organic chemistry**
3. Cotton F. A, G. Wilkinson G -**Advanced Inorganic chemistry** (6thedition) Carlos A Marillo Manfred Bochmann-Wiley India Education
4. Madanmalik & Tuli- **Selected topics in inorganic chemistry** (Reprint-2010) S. Chand Company Ltd
5. Gopalan R, Ramalingam V - **Concise coordinate chemistry** Vikas Publishing House (P)Ltd
6. Banerjea D.-**Coordination Chemitry** (3rd edition) Asian Books (P) Ltd
   Arun Bhal & B.S. Bhal- **Essentials of physical chemistry**
7. Puri, Sharma & Pathania **Principles of physical chemistry** -41st edition-Vishal Publishing Co.
8. Nasipuri D-**Stereo Chemistry of Organic Compounds 2009** edition. New Age International Publishers.

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BASICS OF RESEARCH (DSC-15)

Credits: 4 **Semester: IV**
Subject code: FS22406 **No. of lecture hours: 60**

Objectives

- To gain knowledge on principles, tools, sampling designs of research.
- To get information about various sampling methods and their advantages and disadvantages
- To learn about principles purpose and features of research design
- To know more about methods of data collection and different research tools and methods
- To attain knowledge on data and report writing

Outcomes

CO1: Students will be able to understand the significance of research methodology in Home Science research.

CO2: Students will be able to understand the types of sampling and sampling designs.

CO3: Students will be able to learn the knowledge of principles and purpose of research designs.

CO4: Students will be able to know various research tools and methods of data collection.

CO5: Students will be able to provide knowledge on coding and classification of data

Course Content	Hours Allotted	Pedagogy
Module I: **INTRODUCTION TO RESEARCH** • Research meaning and objective and Types- historical, descriptive, experimental, case study • Significance of researchand Measurement scales – nominal, ordinal, interval, ratio • Variables – independent, dependent, intervening and Identification of a research problem • Formulation of research questions, hypothesis and Objective	12 Hrs 4 3 2 2	Powerpoint presentations / Lectures
Module II: **SAMPLING AND SAMPLING DESIGN** • Population and sample, Sampling types- probability sampling (simple random, systematic random sampling), purposive sampling, stratified sampling, cluster sampling- advantages and disadvantages. • Sampling bias and error, selection of adequate sample size • Census and sample survey, steps in sampling design • Criteria of selecting a sample procedure and characteristics of a good sample design	**12Hrs** 4Hrs 2Hrs 2Hr 4Hrs	Assignments / Group discussion
Module III: **RESEARCH DESIGNS** • Basic principles of research design	**12Hrs** 2Hrs 4Hrs	Powerpoint presentations / Lectures

• Purposes of research design: fundamental, applied and action, exploratory and descriptive, experimental, ex-post facto, longitudinal and cross-sectional, co-relational. • Features of a good research design and true experimental design • Quasi experimental design	4Hrs 2Hrs	
Module IV: **RESEARCH TOOLS AND METHODS OF DATA COLLECTION** • Quantitative research tools- mean, median and mode • Qualitative research tools- focus group discussions, case studies, observations- direct and spot observations, in-depth interview • Methods of data collection- observation, questionnaire- guidelines for constructing questionnaire, interview- guidelines for successful interview, scaling method, case study, home visits, advantages and disadvantages • Reliability and validity of measuring instruments	**12Hrs** 2Hrs 4Hrs 4Hrs 2Hrs	Assignments / Group discussion
Module V: TitleANALYSIS AND REPORT WRITING • Coding of data • Classification and tabulation of data • Diagrammatic representation of data • Analysis and interpretation of data; preparation of data	**12Hrs** 3Hrs 3Hrs 3Hrs 3Hrs	Lectures/ Powerpoint presentations

REFERENCES

1.R. K. (2024). Case study research and applications: Design and methods (7th ed.). Sage.
2.Kothari, C. R., & Garg, G. (2024). Research methodology: Methods and techniques (5th ed.). New Age International
3.Dubey, U. K. B., & Kothari, D. P. (2022). Research methodology: Techniques and trends (1st ed.). Chapman and Hall/CRC.
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FUNCTIONAL FOODS AND NUTRACEUTICALS (DSC-16)

Credits: 4 **Semester: IV**
Subject code: FS25405 **No. of lecture hours: 60**

Objectives

- To provide knowledge on functional foods and nutraceuticals.
- To gain knowledge about sources and functions of nutraceutical ingredients
- To get in depth information about pre and probiotics and their quality assurance and safety
- To learn more about phytochemicals and their classification
- To gain knowledge about role of antioxidants as nutraceuticals

Outcomes

CO1: The students will be able to understand basics of functional foods and nutraceuticals.
CO2: The students will be able to apply the knowledge of functions of nutraceuticals.
CO3: The students will be able to understand sources and metabolism of prebiotics and probiotics.
CO4: The students will be able to assess phytochemicals as nutraceuticals.
CO5: The students will be able to gain knowledge on sources and role of antioxidants as nutraceuticals.

Course Content	Hours Allotted	Pedagogy
Module I: **FUNCTIONAL FOOD AND NUTRACEUTICALS** • Definition, history, types and classification: based on chemical nature • Benefits of functional foods and nutraceuticals and Mechanism of action of nutraceuticals • Marketing and regulatory issues of functional foods and Nutraceuticals and Legal status in different countries and safety and regulatory aspects of functional foods and nutraceuticals • Development of biomarkers to indicate efficacy of functional ingredients, Relation of functional foods and nutraceutical to foods and drugs	**12Hrs** 2 2 4 4	Powerpoint presentations / Lectures
Module II: **SOURCES AND FUNCTIONS OF NUTRACEUTICAL INGREDIENTS** • Food sources-Different foods as functional food: cereal products (oats, wheat bran, rice bran, etc.), fruits and vegetables, milk and milk products, legumes, nuts, oil seeds and sea foods, herbs, spices and medicinal plants. Coffee, tea and other beverages as functional foods/drinks and their protective effects. • Complex carbohydrates: oligosaccharides, dietary fibers and resistant starch as functional food ingredients • Proteins- novel proteins, SCP. Leaf Protein • Fats: omega 3 fatty acids and conjugated linoleic acid	**12 Hrs** 5 3 2 2	Case Studies / Review of research articles
Module III:		

PROBIOTICS AND PREBIOTICS • Definition, types and important features of probiotic micro-organisms, Health effects of probiotics including mechanism of action GI health, cancer and other diseases, Probiotics in various foods: fermented milk products, non-milk products, Quality Assurance of probiotics and safety. • Definition, chemistry, sources of prebiotics, Metabolism and bioavailability of prebiotics, Health benefits of prebiotics, prebiotics ingredients in food – galacto oligosaccahrides, functional disaccharides (laculose, lactitol and lactose,resistant starch) • Perspective for food applications for the following: non-digestible carbohydrates/oligosaccharides: Dietary fiber, Resistant starch, Gum • Perspective for food applications for the – Polyphenols: Flavonoids, catechins, isoflavones, tannins, Phytoestrogens, Phytosterols, Glucosinolates, Organo Sulphur compounds, other components – Phytates, Protease.	**12 Hrs** 3 3 3 3	Assignments
Module IV: **PHYTOCHEMICALS AS NUTRACEUTICALS** • Phytochemicals: definition, mode of action • Classification of phytochemicals: a) terpenoids b) carotenoids: carotene, lutein, zeaxanthin, lycopene • Polyphenols: a) non flavonoid polyphenols b) flavonoids: flavanols, flavanol (catechin) flavan-3- ol, flavones, flavanones, anthocyanidins, phytoestrogens c) other poly phenols: curcumin, tannins, lignin, resveratrol • Sulphur containing compounds: sulphides and glucosinolate	**12 Hrs** 3 3 3 3	Lectures
Module V: **SOURCE AND ROLE OF ANTIOXIDANTS AS NUTRACEUTICALS** • Antioxidants – definition; Free Radicals and Reactive oxygen Species - Sources • Mechanism of action • Role of endogenous antioxidants: super oxide dismutase, catalases, glutathione reductase, peroxidases- glutathione peroxidase in protecting cells • Role of exogenous antioxidants: retinol, beta carotene, ascorbic acid and tocopherol in prevention of cancer, CVD, ageing and inflammation.	**12 Hrs** 2 2 4 4	Assignments / Lectures

REFERENCES

1. Gupta, R. C. (Ed.). (2016). *Nutraceuticals: Efficacy, safety and toxicity*. Academic Press.
2. Bagchi, D. (Ed.). (2014). *Nutraceutical and functional food regulations in the United States and around the world* (2nd ed.). Academic Press.
3.Wildman, R. E. C., & Kelley, M. (2016). *Handbook of nutraceuticals and functional foods* (2nd ed.). CRC Press.

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FOOD PRESERVATION AND PROCESSING PRACTICALS

Credits: 1 **Semester: IV**
Subject code: FS26407 **No. of Lecture hours: 30**

Objectives

- To teach the students basics of food preservation and processing

Outcome:

- The students will gain knowledge on the latest developments in food preservation and processing

1. Preparation of Lemon squash and Orange squash 3
2. Preparation of Papaya and apple jam 3
3. Preparation of guava jelly and Orange marmalade 3
4. Preparation of pickles (red chilli, tomato and lemon) 3
5. Other processing methods for food preservation 3
   a. Freezing of fruits and vegetables
   b. Drying of vegetables
   c. Reconstitution of dried vegetables
6. Determination of gluten content from wheat flour 3
7. Determination of pH of various fruit juices 3
8. Preparation of hard-boiled confectionery 3
9. Measurement of specific gravity of milk. 3
10. Determination of fat content in milk by Gerbers's centrifuge 3

REFERENCES

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2. 2.B. Srilakshmi, 2001 **Food Science**, 2nd Edition, New Delhi: New Age International.
3. KulshresthaSK(1994).Food preservation.PublishedbyVikasPublishingHouse Pvt Ltd,New Delhi
4. Girdharilal, SiddhapaGB and Tandon BL (1986). Preservation of fruits and vegetables.ICAR, NewDelhi
5. KukadeSandBhaveNandMehtaA(1994).Food preservationManual.Deptof food and Nutrition, SNDT CollegeofHomeScience, Pune
6. KaliaM (2008).Food Preservation and Processing, Kalyani Nanjunda,India

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DIET THERAPY PRACTICALS

Credits: 1 **Semester: IV**
Subject code: FS22408 **No. of Lecture hours: 30**

Objectives

- To teach the students basics principles of diet therapy

Outcome:

- The students will gain knowledge on the planning and calculating diets of various diseases.

1. Planning, Calculation and Preparation of Diets for

• Typhoid	3
• Tuberculosis	3
• Cancer	4
• AIDS	4
• Arthritis	4
• Gout	3
• Preoperative diet	3
• post operative diet	3
• Burns	3

REFERENCES

1. Zaloga, G.P. (1994): Nutrition in Critical Care, Times Mirror/Mosby.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (Ed) (1999): Modern Nutrition in Health and Disease. 9th Edtion, Williams and Wilkins.
3. Shikora, S.A. and Blackburn, G.L. (Ed) (1999). Nutritional Support – Theory and Therapeutics, Chapman and Hall, ITP (International Thomson Publishing).
4. Mahan, L.K. and Escott – Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Ed. W.B. Saunders Ltd.
5. Phillips, G.D. and Lodgers C.L. (1986). Parenteral and Enteral Nutrition. A Practical Guide. Churchill Livingstone.
Kinney, J.M. and Borum, P. R. (editors) (1989) Perspectives in Clinical Nutrition. Urban and Schwarzenberg.
6.Torosian, M. H. (editor) (1995) Nutrition for the Hospitalised Patient. Basic Science & Principles of Practice.

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YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
B.Sc. FOOD SCIENCE, NUTRITION AND DIETITICS
FIFTH SEMESTER
ACADEMIC YEAR 2026-27 BATCH 2024-27 (CBCS)

S. No	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs)	Marks			Credits
						Internal	External	Total	
1	I	FS23501	Food Service Management (GE-5)	4	3	40	60	100	3
2	II	FS23502	Sports Nutrition (SEC-III)	4	3	40	60	100	4
3	II	FS23503	Food hygiene and Sanitation (Core-14)	4	3	40	60	100	4
4	II	FS23504	Medical Nutrition therapy (Core-15)	4	3	40	60	100	4
5	II	FS23505A / FS23505B	Quantity food production and service (DSE - 1) Food Product Development and Entrepreneurship (DSE - 1)	4	3	40	60	100	4
6	II	FS23506A / FS23506B	Maternal and Child Nutrition (DSE-2) / Geriatric Nutrition (DSE-2)	4	3	40	60	100	4
PRACTICALS									
7	II	FS23507	Sports Nutrition (SEC-III)	2	3	40	60	100	1
8	II	FS23508	Food Hygiene and Sanitation (Core-16)	2	3	40	60	100	1
9	II	FS23509	Medical Nutrition therapy (Core-17)	2	3	40	60	100	1
10	III	FS22410	Summer Internship			40	60	100	2
	TOTAL			30	-	360	540	900	26

* Skill Enhancement Course (SEC) *Generic Elective (GE)* Discipline-Specific (DS)
*Discipline-Specific Elective (DSE)

FOOD SERVICE MANAGEMENT (GE)

Credits: 4 **Semesters: V**
Subject code: FS23501 **No. of lecture hours: 60**

Objectives

- To gain knowledge of the types of food services institutions in India
- To get familiarized with the principles and tools of management.
- To acquire details pertaining to organization of space and equipments of food services.
- To understand the quality and purchasing of food.
- To gain knowledge pertaining to formulation and standardization of recipes.

Outcomes

CO1: The students will be able to be identifying different types of menus, food service institutes.
CO2:Students will be able to learn about functions & tools of management, catering principles of catering management of & resources.
CO3:Students will be able to understand the importance. Kitchen designs, types of storage and equipment Selection.
CO4:Students will be to evaluate the characteristics and quality of food.
CO5:Students will be able to appraise the labelling of food product and evaluate the various steps involved in formal and standardization of recipes.

Course Content	Hours Allotted	Pedagogy
Module I: Title: FOOD SERVICE INSTITUTIONS • Classification of food service institutions according to function: Profit oriented, service oriented and public health facility oriented. • Types of menus- Al a carte, table d'hôte, cyclic and combination; Types of food service - Self-service, tray service and waiter-waitress service. • Management of personnel in food services organization- Recruitment, Induction, Employee facilities and benefits, Evaluation of performance. • Methods of food purchasing; Food cost – components and behaviour of cost, factors affecting cost.	**12Hrs** 3Hrs 3Hrs 3Hrs 3Hrs	Assignments / Lectures/Group discussion
Module II: Title: MANAGEMENT OF FOOD SERVICE ESTABLISHMENTS • Function of management: Managing, Planning, Organizing, Directing, Coordinating, Controlling and Evaluating • Catering Management – Principles (basic guidelines) • Tools of management – Tangible Tools and Intangible tools	**12Hrs** 4Hrs 3Hrs	Powerpoint presentations / Lectures

• Management of resources – Natural environment, Work environment	3Hrs 2Hrs	
Module III: Title: ORGANISATION OF SPACE AND EQUIPMENT IN FOOD SERVICES ESTABLISHMENT • Planning a layout for food service institutions, features to be considered in kitchen designing Kitchens. • Storage Space – Types of storage. • Factors to be considered while planning, Service Area – Location.Structural designing and planning storage spaces Equipment–Classification of equipment. • Selection of equipment, Factors involved in selection of equipments, care and maintenance of equipment.	**12Hrs** 3Hrs 1Hrs 4Hrs 4Hrs	Assignments / Group discussion
Module IV: Title FOOD PURCHASE AND STORAGE • Characteristics of food – Types of food • Quality of food –Sensory quality and nutritional quality· • Food purchasing – Importance, Types – open market, formal, negotiated and wholesale. • Receiving and Food storage – Delivery methods, General guidelines for storing perishable and non-perishable foods.	**12Hrs** 2Hrs 2Hrs 4Hrs 4Hrs	Lectures/ Powerpoint presntations
Module V: Title STANDARDISATION OF FOOD AND PATENT REGULATIONS • Formulation and standardization of recipes. • Steps involved in formulation and standardization of recipes, Significance of food standardization. • Patent laws- Definition, Evolution of IPR Patent rights in India. • Food product labelling - purpose and types, Food product labelling regulations.	**12Hrs** 2Hrs 4Hrs 2Hrs 4Hrs	Lectures/Group discussion

REFERENCES

1. Catering Management – An Integrated Approach – MohiniSethi, SurjeetMalhan, 2nd edition, New Age International Publishers.
2. Food Hygiene and Sanitation – S Roday, Tata McGraw Hill Publishing Co. Ltd., 3rd reprint.
3. Institutional Food Management –Mohini Sethi

SPORTS NUTRITION (SEC)

Credits: 4 **Semester: V**
Subject code: FS23502 **No. of lecture hours: 60**

Objectives

- To understand the concept of sports nutrition
- To gain knowledge on the effects of exercise
- To get familiarized with the dietary intake and optimal exercise performance
- To acquire knowledge about sports specific nutrient requirement
- To procure information on challenges among athletes

Outcomes

CO1: The students will be able to learn about physical activity exercise and sports
CO2: The students will be able to understand the sports physiology, type's exercises and its impact.
CO3: The students will be able to identify the nutritional requirement of sports person and fluid balance
CO4: The students will be able to acquire knowledge about special nutrition for female athletes
CO5: The students will be able to study about chronic diseases and alcohol effect on athletes

Course Content	Hours Allotted	Pedagogy
Module I: Title: **CONCEPTS OF SPORTS NUTRITION** • Introduction to physical activity, exercise and sports. • The paradigm- physical activity and health. • Physical activity pyramid. • Bioenergetics in exercise.	**(12HRS)** 4Hrs 4Hrs 2Hrs 2Hrs	Powerpoint presentations / Lectures
Module II: Title: EFFECTS OF EXERCISE • Sports physiology, types of exercises and its impact on fitness, effect of exercise on musculo skeletal system, muscle fatigue- prevention and recovery. • Effect of exercise on cardiac cycle, cardiac output, blood pressure, athlete heart, index of training, importance of heart rate monitoring. • Effect of exercise on respiratory system, hypoxia and hypercapnia. • Effect of training on heart and lung performance, chronic and acute adaptation.	**(12Hrs)** 4Hrs 4Hrs 2Hrs 2Hrs	Case Studies / Review of research articles
Module III: Title: DIETARY INTAKE AND OPTIMAL EXERCISE PERFORMANCE	**(12Hrs)**	Lectures

• Nutritional requirement of sports person as compared to normal active person, factors affecting fuel utilization. • Carbohydrate as a energy source for sports and exercise, role of fat as energy source for sports and exercise. • Protein and amino acid requirements for sports and exercise, important micronutrients for exercise, B complex vitamin, specific minerals and antioxidant • Fluid balance in sports: importance, symptoms and prevention of dehydration, sports drink – hypo, iso and hypertonic drink for hydration/energy and recovery drink.	4Hrs 4Hrs 4Hrs 4Hrs	
Module IV: Title: SPORT SPECIFIC NUTRIENT REQUIREMENT • Sport specific requirements of nutrients for athletes. • Pre- game and post game regime. • Special nutrition for female athlete, role of nutrition in stress, fracture and injury. • Nutrition education to athlete and coach.	**(12Hrs)** 3Hrs 3Hrs 3Hrs 3Hrs	Assignments
Module V: Title: CHALLENGES AMONG ATHLETES • Menstrual problem of female athlete, athlete triad and Chronic dieting and eating disorder- sports anemia. • Nutrition of athlete in hot, cold and high altitude. • Alcohol influence on athlete • Doping test	**(12Hrs)** 4Hrs 3Hrs 2Hrs 1Hrs	Assignments / Lectures

REFERENCES

1. Bamji S.M.,RaoNP and Reddy V.1998.Text book of Human Nutrition.Oxford and IBH publishing C. New delhi.
2. Fink H.H.,Mikesky E.A and Burgoon A.L.2012.Practical Applications in sports Nutrition.3 rd ed.Jones and Barlett Learning.USA.
3. Burke Louse and DeakinVicky(2006) Clinical sports Nutrition.
4. Ira Wolinsky(Ed)(1998): Nutrition in Exercise and Spots,3rd Edition,CRC Press.
5. Nutritional guidelines for sports persons, Geetanjali Bhide and Subhadra Mandalika

FOOD HYGIENE AND SANITATION (CORE)

Credits: 4 **Semester: V**
Subject code: FS23503 **No. of lecture hours: 60**

Objectives

- To get familiarized with Food Safety and Quality
- To gain knowledge on Indian and International food safety regulations
- To procure information on hygiene and food safety practices
- To acquire knowledge on water and waste management
- To understand the concept of waste disposal

Outcomes

CO1: The students will be able to gain knowledge about food spoilage and food borne diseases
CO2: The students will be able to differentiate food safety regulation and international standards
CO3: The students will be able to understand faults in food preparation
CO4: The students will be able to know the concept of purification of water
CO5: The students will be able to identify different types of disposal wastes

Course Content	Hours Allotted	Pedagogy
Module I: FOOD SAFETY AND QUALITY	**12 HRS**	Lectures
• Sources of food spoilage.	3 HRS	
• Signs of food spoilage in various foods.	3 HRS	
• Food borne infections**:** incubation period, symptoms, Mode of transmission, control of food borne illnesses.	3 HRS	
• Food borne poisoning**:** incubation period, symptoms, Mode of transmission, control of food borne illnesses.	3 HRS	
Module II: INDIAN AND INTERNATIONAL FOOD SAFETY REGULATIONS	**12 HRS**	Case Studies / Review of research articles
• Food safety regulations: Prevention of food adulteration Act, Essential Commodities Act, BIS, AGMARK, Standards of weights and measures Act, Export quality control inspection Act, Consumer Protection Act, certification marks, Food Safety Standard Authority In India.	4 HRS	
• International Standards**:** WTO, CODEX ALIMENTARIUS, HACCP	2 HRS	
• Food testing laboratories in India**:** Municipal labs, FDA labs, central food testing labs, labs of export inspections council, central grain analysis lab, quality control labs of companies, Quality control labs of consumer co – operatives and private testing labs.	4 HRS	
• Rights of food inspectors.	2 HRS	

Module III: HYGIENE AND SAFETY PRACTICES IN FOOD SERVICE INSTITUTIONS • Definition of hygiene, food hygiene and sanitation, Basic aspects of personal hygiene, Hygienic Food Handling-Procedures to minimize microbial load, common faults in food preparation. • Layout and premises- Ventilation and lighting of premises, General guidelines of cleaning equipment and preparation area. • Importance of pest control in Food Service Institutions-Control of household pest with special reference to---Mosquito, Housefly, Rats and rodents, cockroaches. • Sanitation training and education, Steps in planning and implementing training programme, Types of accidents at workplace, accidents and their effects, Safety instructions to kitchen staff.	**12 HRS** 3 HRS 3 HRS 3 HRS 3 HRS	Assignments
Module IV: WATER MANAGEMENT • Uses and sources of water. • Causes and Prevention of water pollution. • Large scale purification of water and Small scale purification of water. • Chlorination and methods of chlorination.	**12 HRS** 3 HRS 3 HRS 3 HRS 3 HRS	Lectures
Module V: WASTE MANAGEMENT • Disposal of solid waste. • Disposal of liquid waste or sewage. • Disposal of gaseous waste. • Causes and Prevention of air pollution, soil pollution-pollution by pesticide residue.	**12 HRS** 3 HRS 3 HRS 3 HRS 3 HRS	Assignments / Lectures

REFERENCES

1. S. Roday 2005 Food Hygiene and Sanitation in Food Industry 7th Edition Published by Tata McGraw Hill Publishing Company New Delhi .
2. Shubhangini A.Joshi.2015 Nutrition and Dietetics 4th Edition Published by McGraw Hill Education (India)Private Limited

MEDICAL NUTRITION THERAPY (CORE)

Credits: 4 **Semester: V**
Subject code: FS23504 **No. of lecture hours: 60**

Objectives:

- To prepare students for understanding the management of various disease conditions
- To make student aware of various nutritional goals and methods of assessments
- To understand the role of diets in various medical conditions
- To gain knowledge about pediatric critical care
- To know the types of care given in critical or terminally ill conditions

Outcomes

CO1: Students will be able to understand about nutritional screening and nutritional assessment
CO2: Students will acquire knowledge on planning of diets for various medical conditions.
CO3: Students will be able to identify special nutritional requirements, nutritional goals.
CO4: Students will get knowledge about critical illnesses and their management
CO5: Students will learn about pediatric critical care and their RDAs

Course Content	Hours Allotted	Pedagogy
Module I: Title: NUTRITIONAL SCREENING OF CRITICALLY ILL PATIENT • Importance of Nutrition for critically ill patient. • Role and methods of nutritional assessment: History and physical examination – Physical findings in nutritional deficiencies and Subjective Global Assessment in brief, Prognostic Indices – Valid markers or indices, Instant Nutritional Assessment, Prognostic Nutrition Index, Index of Under nutrition and Hospital Prognostic Index • Role and methods of nutritional assessment: Laboratory tests – Visceral Protein (albumin), Nitrogen Excretion (Creatinine and Height Index), Catabolic Index, nitrogen balance. Body composition – Body Mass Index, Anthropometry, Arm Muscle Measurement, Chemical analysis- Total Body Weight, Total Body Potassium. • Role and methods of nutritional assessment: Functional tests- Immune response, Muscle strength, Metabolic cart– Estimation of protein and energy needs, Basal Energy Expenditure, Harris-Benedict Equation. Monitoring therapy and Nutritional goals.	**12hrs** 1hr 3hrs 4hrs 4hrs	PowerPoint presentations / Lectures
Module II: Title: PEDIATRIC CRITICAL CARE • Recommended Dietary Allowances for premature babies.	**12hrs** 2hrs 2hrs	PowerPoint presentations / Lectures

• Assessment of nutritional status and requirements of hospitalized children • Nutrition for SAM, Nutritional Care in Diarrheal diseases – path physiological changes, dietary management in acute and persistent diarrhea, need of Vitamin A and Zinc supplementation • Nutritional Care in Respiratory diseases, Hepatic diseases, Diabetes, Heart diseases and Pancreatitis	4hrs 4 hrs	
Module III: Title: MEDICAL NUTRITION THERAPY IN CRITICAL ILLNESSES AND ETHICAL CARE IN TERMINALLY ILL PATIENTS12Hrs • Path physiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals, rehabilitation and monitoring the therapy in critical illnesses like Diabetes Mellitus, Heart failure, Cardiac surgery and transplant • Path physiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals, rehabilitation and monitoring the therapy in critical illnesses like Respiratory failure and Neurosurgery – head injury, spinal cord injury • Path physiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals, rehabilitation and monitoring the therapy in critical illnesses like Diarrhoea – causes of diarrhoea in the critically ill patients, Causes of malnutrition in hospitalized older persons and Wound healing – nutrients involved in wound healing • Ethical issues, application of ethical principles to artificial nutritional support.	**12hrs** 2hrs 2hrs 2hrs 6hrs	PowerPoint presentations / Lectures
Module IV: Title: CRITICAL GI DISEASES • Pathophysiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals, rehabilitation and monitoring the therapy in critical illnesses like Gastro Intestinal tract surgery, Gastro-Esophageal Reflux, Gastrointestinal strictures and obstruction, intestinal surgery, rectal Surgery. • Pathophysiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals, rehabilitation and monitoring the therapy in	**12hrs** 3hrs 3hrs	Lectures

critical illnesses like Hepatic failure, liver transplantation, pre and post liver transplant Nutrition • Pathophysiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals, rehabilitation and monitoring the therapy in critical illnesses like Pancreatitis – Pancreatic Surgery • Pathophysiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals, rehabilitation and monitoring the therapy in critical illnesses like End - Stage Renal Disease, dialysis and transplant.	3hrs 3hrs	
Module V: Title: OTHER CRITICAL ILLNESSES • Cancer – Breast Cancer, Colon Cancer • Acquired Immune Deficiency Syndrome • Stress and Trauma, Sepsis • Multiple Organ Failure	**12 hrs** 3 hrs 3 hrs 3hrs 3hrs	Assignments / Lectures

REFERENCES

1. Zaloga G.P (1994) nutrition in critical care, times mirror/mosby.
2. Mahan l.k and Escott – stump, S (2000) Krause's Food nutrition and Diet therapy, 10th edition, W. B Saunders ltd.
3. Charlette R, Gallagher- Allied.(2005).Nutrition care of the terminally ill.
4. KE Elizabeth (2007) Nutrition and Child Development, Paras Medical Publishers.
5. Michael J Gibney, Maris Elia, Olle Ljungquist and Julie Dowsett (2005) Blackwell Publishing Company.
6. Shils, M.E., Olsen J.A, Shike M and Ross A.C (1999) Modern Nutrition in Health and Disease, 9th edition, Baltimore, Lippincott Willams and Wilkins publishers.

QUANTITY FOOD PRODUCTION AND SERVICE (DSE-1)

Credits: 4 **Semester: V**
Subject code: FS23505 (A) **No. of lecture hours: 60**

Objectives

- To gain Knowledge about Food processing, types and equipment.
- To understand menu selection and safety measurements in production.
- To gain knowledge about principles involved in purchasing and marketing.
- To understand uses of storage methods and importance of food service.
- To gain knowledge about management of finance in production.

Outcomes

CO1: The students will be able to identify different equipment and types of industries.
CO2: The students will be able to learn selection of menus and production management.
CO3: The students will be able to understand the principles in purchasing, storage and Marketing.
CO4: The students will be able to identify storage methods and food service system.
CO5: The students will be able to manage financial resources.

Course Content	Hours Allotted	Pedagogy
Module I: Title: QUANTITY FOOD PRODUCTION • General procedures used in institutional and commercial food production • Flow chart of processes of food production • Types of equipment's – cooking and non- cooking equipment's • Types of industrial, welfare and transport catering.	**12 hrs** 3 hrs 3 hrs 3 hrs 3 hrs	PowerPoint presentations / Lectures
Module II: Title: FOOD PRODUCTION SYSTEM MANAGEMENT • Selection of menus and ingredient control. • Production forecasting • Production scheduling and Production control. • Safeguard in food production.	**12hrs** 3hrs 3hrs 3hrs 3hrs	PowerPoint presentations / Lectures
Module III: Title: FOOD PRODUCTION PRINCIPLES • Principles, purchase and storage in traditional, commissary, ready prepared and assembly services. • Schematic representation of purchasing activity, the market and the buyer, the vendor or the supplier. • Mode of purchasing: centralized and group. • Methods of purchasing- informal/ open market buying, formal/ competitive big buying and other types of purchasing.	**12hrs** 3hrs 3hrs 3hrs 3hrs	PowerPoint presentations / Lectures

Module IV: Title: STORAGE AND FOOD SERVICE • Storage- storage space: dry and low temperature, storage room management- organization of storage and store room records. • Delivery and service of foods- goals and issues; components of food service systems. • Significance of food service systems. • Methods of delivery/service- centralized and decentralized, types of services- table/ counter, tray and self.	**12hrs** 3hrs 3hrs 2hrs 4hrs	Lectures
Module V: Title: FINANCIAL MANAGEMENT • Cost concepts. • Food cost control. • Book keeping • Books of account	**12hrs** 3hrs 3hrs 3hrs 3hrs	Assignments / Lectures

REFERENCES

1. Catering Management – An Integrated Approach – MohiniSethi, SurjeetMalhan, 2nd edition, New Age International Publishers.
2. Food Hygiene and Sanitation – S Roday, Tata McGraw Hill Publishing Co. Ltd., 3rd reprint.
3. Institutional Food Management –Mohini Sethi

FOOD PRODUCT DEVELOPMENT AND ENTREPRENEURSHIP (DSE-1)

Credits: 4 **Semester: V**
Subject code: FS23505 (B) **No. of lecture hours: 60**

Objectives

- To gain knowledge of new food product development.
- To understand precautions to be taken in product development.
- To get familiarize about labelling of the product.
- T gain knowledge about marketing strategies.
- To gain knowledge of implementing new ides in the form of Small business.

Outcomes

CO1: The students will be able to develop a new food product.
CO2: The students will be able to identify the actions which are important in new product Development.
CO3: The students will be able to understand the labelling information.
CO4: The students will be able to understand the marketing and promoting strategies.
CO5: The students will be able to implement new ideas in the form of small business.

Course Content	Hours Allotted	Pedagogy
Module I: NEW PRODUCT DEVELOPMENT • Introduction to product development. • Product life cycle. • Factors affecting development of new product. • Process of new product development.	12 HRS 3 HRS 3 HRS 3 HRS 3 HRS	Powerpoint presentations / Lectures
Module II: STEPS IN NEW PRODUCT DEVELOPMENT • Basic principles and concepts of food product development. • Standardization methods involved in product development. • Portion size and portion control, calculation of nutritive value and cost of production. • Shelf life and storage stability evaluation procedure of developed food products.	**12 HRS** 3 HRS 3 HRS 3 HRS 3 HRS	Case Studies / Review of research articles
Module III: PRODUCT LABELLING • Product labeling: purposes, types and regulations. • Nutrition labeling. • Grading of foods, specifications of grading of rice, wheat and eggs.	**12 HRS** 2 HRS 2 HRS 4 HRS	Assignments

• Emblems and names (prevention of improper use) Act, 1950.	4 HRS	
Module IV: FOOD MARKETING • Marketing characteristics- packaging, price, advertisements, distribution and regulations. • Food marketing ethics. • Challenges of marketing. • Role of government in promoting agricultural marketing	**12 HRS** 4 HRS 2 HRS 2HRS 4 HRS	Lectures
Module V: ENTREPRENUERSHIP • Concept and definition of entrepreneurship, determinants of entrepreneurship. • Dimensions of entrepreneurship- rural, social, women and cultural. • Small business: definition and composition of small business- economic contribution of small business. • Strategic planning for small business- steps in strategic planning.	**12 HRS** 3 HRS 3 HRS 3 HRS 3 HRS	Assignments / Lectures

REFERENCES

1. Orientation for Food Professionals, A Hand book – P V Suryaprakasa Rao.
2. Indian Patents Law - Legal and Business Implications, Eds Ajith Parulekar, Saritha D'Souza.
3. The law of Intellectual Property Rights – Ed Shiv Sahai Singh.

MATERNAL AND CHILD NUTRITION (DSE-2)

Credits: 4 **Semester: V**
Subject code: FS23506 (A) **No. of lecture hours: 60**

Objectives
To Train students to understand various medical conditions and their management
To provide knowledge on important aspects of maternal health
To make students aware of the types of feedings, and role of mammary tissues and hormones
To understand the physiology growth and development during infancy
To provide information about various health care systems
To know the importance of breast feeding

Outcomes
CO1: Students will perceive the concepts about maternal nutrition care and in detail about Pregnancy
CO2: Students will validate the role of food requirements and nutritional care during lactation,infancy, adolescent stages
CO3: Students will learn about the physiology and endocrinology of different medical conditions
CO4: Students will get to know about different types of health care programs
CO5: Students will gain knowledge about different feeding methods

Course Content	Hours Allotted	Pedagogy
Module I:IMPORTANCE OF MATERNAL NUTRITION • Meaning and objectives of maternal and child health. • Main health problems of mother and child in India. • Current scenario of maternal and child nutrition in India. Vital statistics related with mother and child. • Management and importance of ante natal care, Complications of pregnancy.	**12Hrs** 2Hrs 2Hrs 4Hrs 4Hrs	Powerpoint presentations / Lectures
Module II: LACTATION • Development of mammary tissues and role of hormones, Physiology and endocrinology of lactation. • Composition of human milk, Lactation amenorrhea and effects of breast feeding on maternal health. • Effect of nutritional status of mother on quantity and quality of breast milk. • Recent guidelines in infant feeding and complimentary feeding, Factors affecting breast feeding and Breast feeding vs. Bottle feeding.	**12Hrs** 3Hrs 3Hrs 3Hrs 3Hrs	Case Studies / Review of research articles
Module III:INFANCY • Infant physiology, Growth and development during infancy.	**12Hrs**	Assignments

• Immunization schedule, Nutritional requirements of infants. • Food requirements and modification of foods for infants. • Weaning and principles in preparing complementary food supplements.	3Hrs 3Hrs 3Hrs 3Hrs	
Module IV:PRE SCHOOL CHILDREN • Growth and development of children, Growth Chart. • Nutritional requirement of Preschool and school going children. • Nutritional challenges and nutrition for child with special need. • Childhood Obesity.	**12Hrs** 3Hrs 3Hrs 3Hrs 3Hrs	Lectures
Module V:ADOLESCENCE • Nutritional requirement during adolescence, Adolescence pregnancy, weight control, anorexia nervosa. • Influence of life style on eating pattern duringadolescence, Maternal and child health Programs in India. • ANP o Supplementary Feeding Programs o Special Nutrition Programs o Balwadi Nutrition Programs o Mid-day Meal Programs o Prophylactic doses (vitamin A and iron) o ICDS • The world Breast Feeding Week and the role of BPNI in promotion of breast feeding in India.	**12Hrs** 2Hrs 3Hrs 5Hrs 2Hrs	Assignments

REFERENCES:

1. Park, K, (2000): Park's Textbook of preventive and social medicine 18th edition.
2. Modern Nutrition In health & Disease –Eds A Catherine Ross, Benjamin Cabellaro, Robert j. Cousins, Katherine L. Tucker, Thomas R. Zeegler,11th edition, Williams &Wilkins Publicatio
3. Food Nutrition And Diet Therapy –Kathelene Mahan & Krause, SlviaEscott Stump.
4. Bamji MS, Rao NP & Reddy V.1999.Text book of Human Nutrition. Oxford & IBH

GERIATRIC NUTRITION (DSE-2)

Credits: 4 **Semester: V**
Subject code: FS23506 (B) **No. of lecture hours: 60**
Objectives

- To gain knowledge about the aging process and mechanism
- To understanding problems / challenges faced by geriatrics
- To complete study regarding geriatrics food / nutrient requirement
- To understand their pattern of life / life pattern
- To learning how geriatric services function

Outcomes
CO1: Students get to understand the life pattern of a geriatric
CO2: Students get to prepare diets by understanding the requirement of the aged person
CO3: Students will understand about the challenges faced by geriatric
CO4: Students will be able to help/ volunteer in geriatric care services
CO5: Students will understand a lot more about geriatrics and their activities

Course Content	Hours Allotted	Pedagogy
Module I: Title: INTRODUCTION TO AGEING • Introduction to geriatric care- concept of gerontology, Ageing - Biology of ageing • Interaction between biological and psychological aspects in ageing, Interaction between physiological and social processes in ageing. • Dietetics of Geriatric care-Nutritional requirement. • Food requirement, dietary modification.	**(12Hrs)** 4Hrs 4Hrs 2Hrs 2Hrs	Powerpoint presentations / Lectures
Module II: Title: ISSUES AND CHALLENGES OF AGEING • Issues and challenges of ageing – economic dependence/ poverty, elderly in rural/ urban area. • Abuse, neglect, abandonment, physical, health and sensory problems. • Crime against elderly, retirement and related issues. • Ageing sensory system and issues with falling, common complaints during ageing.	**(12Hrs)** 3Hrs 3Hrs 3Hrs 3Hrs	Case Studies / Review of research articles
Module III: Title: CLINICAL GERIATRIC • Nutritional related problems of old age-osteoporosis ,obesity, neurological Dysfunction. • Anaemia, Malnutrition and constipation, Infection and Immunity.	**(12Hrs)** 3Hrs 3Hrs	Assignments

• Degenerative disorders in elderly-Dementia, Alzheimer, Parkinson's disease • Disorders of upper GIT, lower GIT, Liver, Billiary system and pancreas, Infection of Respiratory system and Coronary heart disease.	3Hrs 3Hrs	
Module IV: Title: SOCIAL GERIATRIC • Types of family – Joint family System, Role of Elders and Younger generation. • Isolation, Loneliness and Dependency – Dependency Ratio – Generational equality. • Financial aspects – Sources of income, Old age pension. • Role of Govt. and NGOs in Socio – economic status of the elderly, Geriatric service for the elderly in western countries and India.	**(12Hrs)** 3Hrs 2Hrs 4Hrs	Lectures
Module V: Title: GERIATRIC SERVICES • Structure of geriatric service, family as basic unit- models of geriatric service • Day hospital, day care centre, long stay care institution. • Home for the aged, function of the day hospital staff and patients of day hospital. • Ethical issues in geriatric medicine- age limits on health care, Life sustaining measures.	**(12Hrs)** 3Hrs 3Hrs 3Hrs 3Hrs	Assignments / Lectures

SPORTS NUTRITION PRACTICALS

Credits: 2 **Semester: V**
Subject code: FS23507 **No. of lecture hours: 30**

Objective

- To learn and get familiarized with nutritional assessment of athletes**.**

Outcomes

- Students will be able to identify the nutritional requirement of sports person and fluid balance.

1. Menu planning for athletes in pre competition phase.
2. Menu planning for athletes in competition recovery phase.
3. Menu planning for athletes in recovery phase.
4. Development of nutritious bars for athletes.
5. Formulation of isotonic, hypotonic and hypertonic beverages for athletes.
6. Methods of measuring dietary recalls: food diary, weighed food record, 24 hr recall.
7. Measuring height, body mass, MUAC and girths.
8. Measuring body composition using various techniques: skin fold technique, DEXA and in body
9. Measuring body composition using various techniques: BOD, POD.
10. Interpretation of nutritional status and dietary counseling for athletes

REFERENCES

1. Burke Louse and DeakinVicky(2006) Clinical sports Nutrition.
2. Ira Wolinsky(Ed)(1998): Nutrition in Exercise and Spots,3rd Edition,CRC Press.
3. Nutritional guidelines for sports persons, Geetanjali Bhide and Subhadra Mandalika

FOOD HYGIENE AND SANITATION PRACTICALS

Credits: 2 **Semester: V**
Subject code: FS23508 **No. of lecture hours: 30**

Objective

- To procure information on hygiene and food safety practices

Outcomes

- Students will learn various techniques related to food hygiene and sanitation.

1. Development and pre testing of score card for evaluation of personal hygiene, hand washing and food service establishment.	3
2. Survey of scorecard with regard to personal hygiene.	3
3. Survey of scorecard with regard to hand washing.	3
4. Survey of scorecard with regard to food establishment hygiene.	3
5. Report on the survey conducted pertaining to personal hygiene, hand washing and food hygiene.	3
6. Purification of water using small scale techniques- boiling, filtration using alum, chlorination or use of chlorine tablets.	3
7. Determination of hardness of water- temporary and permanent.	3
8. Separation and disposal of various wastes: wet (composting) and dry (burning)	3
9. Measurement of BOD in water	3
10. Development of personal training aids for food services.	3

REFERENCES

1. S. Roday 2005 Food Hygiene and Sanitation in Food Industry 7th Edition Published by Tata McGraw Hill Publishing Company New Delhi .
2. Shubhangini A.Joshi.2015 Nutrition and Dietetics 4th Edition Published by McGraw Hill Education (India)Private Limited

MEDICAL NUTRITION THERAPY PRACTICALS

Credits: 2 **Semester: V**
Subject code: FS23509 **No. of lecture hours: 30**

Objective:
Outcomes

I. Derive the RDA, plan and calculate a day's diet for the following conditions

1. Child with juvenile jaundice diabetes (insulin based)
2. Child suffering from jaundice
3. Patient with T1DM with atherosclerosis
4. Patient with T1DM with dialysis
5. Malnourished adult who underwent cardiac surgery (CABG)
6. Hypertensive patient who underwent post liver transplant (recovery phase)
7. Patient with diabetes mellitus and pancreatitis
8. Patient suffering with AIDS and diarrhoea
9. Diet in colon cancer
10. Diet for a patient who underwent GI surgery.

REFERENCES

1. Zaloga G.P (1994) nutrition in critical care, times mirror/mosby.
2. Mahan l.k and Escott – stump, S (2000) Krause's Food nutrition and Diet therapy, 10th edition, W. B Saunders ltd.
3. Charlette R, Gallagher- Allied.(2005).Nutrition care of the terminally ill.
4. KE Elizabeth (2007) Nutrition and Child Development, Paras Medical Publishers.

INTERNSHIP

Credits: 2 **Semester: V**
Subject code: FS22410
Objectives of the internship:

1. To provide students with practical exposure to professional practices in hospitals and food industries.
2. To bridge the gap between theoretical knowledge and real-world application in nutrition, dietetics, food science, and food processing.
3. To develop clinical skills in nutritional assessment, diet planning, patient counselling, and therapeutic nutrition under the guidance of qualified professionals.

Course Outcomes:

1.Apply the theoretical knowledge of food science, nutrition, dietetics, and food safety in real hospital and food industry settings.

2. Demonstrate skills in nutritional assessment, diet planning, patient counselling, and therapeutic nutrition under professional supervision.

3. Perform food quality assurance and quality control activities by following standard operating procedures and food safety regulations.

4.Analyze operational procedures in hospitals and food industries, identify practical challenges, and recommend appropriate evidence-based solutions.

Duration and timing

Duration- 1 Months

Timing- During summer holidays after the completion of IV semester examinations

Working Horms- As per the host organisation norms

Assessment and evaluation:

Evaluation will be based on:

1.Internship performance and work quality

2. Supervisors evaluation from the organisation

3.Internship report and documentation

4.Presentation and viva

Internal assessment 40 Marks

External assessment 60 Marks

The weightage of each component will be as per institutional norms.

Internal assessment 40 Marks

Evaluation criteria	**Marks allotted**
Project work	15
Daily observation	5
Internal presentation	10
Q&A session	5
Attendance	5

External assessment 60 Marks

Evaluation criteria	**Marks allotted**
Project Report	30
Presentation	20
Viva voce	10

General Guidelines:

1.Students shall undertake the internship after successful completion of the IV semester examinations.

2.Internahip shall be approved by the Department before commencement

3.Student shall maintain a daily work diary/logbook

4.The internship report shall be certified by both the industry supervisor and faculty guide

5.Students shall submit the internship report and appear for the seminar presentation and viva voce

Nature of the Internship:

1.Hospital

2.Industry

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
B.Sc. FOOD SCIENCE, NUTRITION AND DIETITICS
SIXTH SEMESTER
ACADEMIC YEAR 2026-27 BATCH 2024-27 (CBCS)

S. No	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs)	Marks			Credits
						Internal	External	Total	
1	I	FS23601A / FS23601B	Community Nutrition (DSE- 3) / Public Heath Nutrition (DSE-3)	4	3	40	60	100	4
1	I	FS23602A / FS23602B	Diet Counseling and Patient Care / Nutrition communication and counseling	4	3	40	60	100	4
PRACTICALS									
1	II	FS23603	Project Work	21	-	40	60	100	6
Total				**29**	-	120	180	300	14

COMMUNITY NUTRITION (DSE-3)

Credits: 4 **Semester: VI**
Subject code: FS23601 (A) **No. of lecture hours: 60**
Objectives:

- To understand the causes / determinants and consequences of nutritional problems in community.
- To familiarize students with various approaches to nutrition and health interventions, programmes and policies.
- To gain the knowledge tools and technique of health education
- To understand the concept of malnutrition in India
- To gain knowledge about programmes to combat malnutrition

Outcomes
CO1: Students will be able to understand the concept of community nutrition
CO2: Students will acquire knowledge regarding the assessment of nutritional status
CO3: Students will be able to understand about nutrition education and health administration
CO4: Students will get knowledge on nutrition and health intervention
CO5: Students will learn about the difference between national and international organizations

Course Content	Hours Allotted	Pedagogy
Module I: CONCEPTS OF COMMUNITY NUTRITION • Definition and concepts of community, Vital statistics: Mortality, Morbidity, Nutrition policies, Health policies. • Occupational hazards: Physical, chemical and Biological. • Protection of health and nutritional status of workers: Women employees in industries and establishments, Medical measures. • Infrastructure measures and legislation.	**12 HRS** 4 HRS 2 HRS 4 HRS 2 HRS	Powerpoint presentations / Lectures
Module II: ASSESSMENT OF NUTRITIONAL STATUS Anthropometry: • Weight, height, mid arm circumference, head and chest circumference, Skin fold thickness, BMI – uses and limitations, Weight / Height, Weight / Age, Height / Age – ICMR, NCHS standards, Gomez and Waterloo's Classification. Diet Surveys: • Individual, Institutional and National, Uses and limitations of diet surveys. • Biochemical methods: uses and limitations, Clinical assessment: uses and Limitations. • Biomarkers – Definition, Classification – Genetic and biochemical, Examples of biomarkers – RBC, folate, calcium, LDL receptors in CVD, vitamin A.	**12 HRS** 4 HRS 2 HRS 2 HRS	Case Studies / Review of research articles

	4 HRS	
Module III: NUTRITION EDUCATION AND HEALTH ADMINISTRATION • Importance of Nutrition and Health Education, Tools and techniques of health education: Audio aids, Visual aids, Audiovisual aids, advantages and disadvantages. • Types of approaches: personal, group and mass, advantages and disadvantages. • Responsibilities of nutritional counselor at community level. • Health administration: Central level, State level, Village level, Primary Health Care.	**12 HRS** 4 HRS 2 HRS 2 HRS 4 HRS	Assignments
Module IV: NUTRITION AND HEALTH INTERVENTIONS • Magnitude of malnutrition in India. • Consequences of malnutrition in India. • Nutritional problems in India: PEM, Anemia. • Iodine Deficiency Disorder and Vitamin A Deficiency, Dental caries, Fluorosis.	**12 HRS** 3 HRS 3 HRS 3 HRS 3 HRS	Lectures
Module V: MEASURES TO COMBAT MALNUTRITION • ICDS, IDDCP. • Vitamin A Prophylaxis Programme, Anemia Prophylaxis Programme. • Role of National organizations in combating malnutrition: ICMR, ICAR, NIN. • Role of International organizations in combating malnutrition: CARE, UNICEF, WHO, FAO, ICRISAT.	**12 HRS** 2 HRS 2 HRS 4 HRS 4 HRS	Assignments / Lectures

REFERENCES

- Public Health Nutrition – Michale J. Gibney, Barrie M. Margetts, John M. Kearney and Lenore Arab (Eds.) – Nutrition Society Textbook Series, Blackwell Publishing.
- Nutritional Science – B. Sri Lakshmi, New Age International Publ;ishers, 2nd edition.
- Text Book of Human Nutrition – Mahtab S Bamji, N PrahladRao, Vinodini Reddy,2nd editon, Oxford & IBH Publishing Co. Pvt. Ltd.
- Social and Preventive Medicine – Part & Park.
- Goyet, Fish.V.Seaman,J and Geijer.U.(1978) The management of Nutrition Emergencies in Large Population, WHO, Geneva.
- The Management of Nutrition in Major emergencies, WHO in collaboration with UNHCR, International Federation of Red Cross and Red Crescent societies and WFP.
- Owen. A. Y. and Frankle, R. T. (1986) Nutrition in the Community. The Art of delivering Services, 2nded. Times Mirror/ Mosby.

PUBLIC HEALTH NUTRITION (DSE-3)

Credits: 4 **Semester: VI**
Subject code: FS23601 (B) **No. of lecture hours: 60**
Objectives:

- To gain knowledge about the concepts of public health
- To increase knowledge in the aspects of various vector borne diseases
- To understand the concepts of epidemiology of zoonal disease
- To acquire knowledge various food borne diseases
- To familiarize with various types of fevers and objectives of vaccinations

Outcomes
CO1: Students will be able to understand in detail about public health and ecology of health
CO2: Students will gain knowledge regarding various vector borne diseases like malaria, filariasis and dengue
CO3: Students will be familiarized with the concepts of epidemiology of zoonal disease
CO4: Students will get to the information about various types of fevers and types of vaccinations
CO5: Students will know in detail about the epidemiology of food borne diseases and food poisoning.

Course Content	Hours Allotted	Pedagogy
Module I: Title: CONCEPTS OF PUBLIC HEALTH AND DISEASE EPIDEMIOLOGY • Public health –Rise , Changing concepts; Ecology of Health , Responsibility for health. • Concept of Disease, Concept of causation: Germ theory of disease; Epidemiological triad; Web of Causation. • Natural history of disease, Concepts of Disease control, Concepts of prevention, Modes of intervention. • Factors that influence the epidemiology of a disease and re-emergence of a disease; Association and Causation.	**(12Hrs)** 3Hrs 3Hrs 3Hrs 3Hrs	Powerpoint presentations / Lectures
Module II: Title: EPIDEMIOLOGY OF VECTOR BORNE DISEASES • Malaria: Prevalent major epidemiological types of malaria. Factors responsible for malaria transmission. • Filariasis: Factors responsible for the transmission of lymphatic filariasis. Infection and infectivity. • Dengue: Agent factors and environmental factors for Dengue transmission. Epidemiology and risk factors of Classical dengue fever, Dengue haemorrhagic fever (DHF) and Dengue shock syndrome.	**(12Hrs)** 3Hrs 3Hrs 6Hrs	Case Studies / Review of research articles

Module III: Title: EPIDEMIOLOGY OF ZOONAL DISEASES • Epidemiology of Ascariasis, Taeniasis and Schistosomiasis. • Amoebiasis: Agent factors (agent, reservoir of infection, period of communicability), host factors and environmental factors of amoebiasis. • Primary prevention (sanitation, water supply, food hygiene and health education). • Secondary prevention (early diagnosis and treatment) of amoebiasis.	**(12Hrs)** 2Hrs 4Hrs 4Hrs 2Hrs	Assignments / Lectures
Module IV: Title: EPIDEMIOLOGY OF FEVERS • Tuberculosis: Epidemiological indices of tuberculosis (Agent factors, host factors, social factors of tuberculosis • Risk factors (malnutrition and tuberculosis, HIV and tuberculosis, diabetes and tuberculosis, drug resistance). • Aims and objectives of RNTCP, BCG vaccination, DOTS strategy. • Typhoid: Epidemiological determinants and social factors of typhoid, Management of typhoid (control of reservoir, control of sanitation and immunization).	**(12Hrs)** 3Hrs 3Hrs 3Hrs 3Hrs	Lectures
Module V: Title: EPIDEMIOLOGY OF FOOD BORNE DISEASES • Bacterial food infections-Salmonellosis, Shigellosis and Listeriosis. • Food poisoning: (Staphylococcal & Botulism)-Symptoms, mode of transmission and prevention. • Viral Hepatitis: Epidemiological determinants of Hepatitis A, B & C (agent factors, host factors and environmental factors, High risk groups).	**(12Hrs)** 3Hrs 4Hrs 5Hrs	Assignments / Lectures

REFERENCES

- Public Health Nutrition – Michale J. Gibney, Barrie M. Margetts, John M. Kearney and Lenore Arab (Eds.) – Nutrition Society Textbook Series, Blackwell Publishing.
- Nutritional Science – B. Sri Lakshmi, New Age International Publ;ishers, 2nd edition.

- Text Book of Human Nutrition – Mahtab S Bamji, N PrahladRao, Vinodini Reddy,2nd editon, Oxford & IBH Publishing Co. Pvt. Ltd.
- Social and Preventive Medicine – Part & Park.
- The Management of Nutrition in Major emergencies, WHO in collaboration with UNHCR, International Federation of Red Cross and Red Crescent societies and WFP.
- Owen. A. Y. and Frankle, R. T. (1986) Nutrition in the Community. The Art of delivering Services, 2nded. Times Mirror/ Mosby.

DIET COUNSELLING AND PATIENT CARE (DSE-4)

Credits: 4 **Semester: VI**
Subject code: FS23602 (A) **No. of lecture hours: 60**
Objectives:

- To understand what diet counseling and patient care is
- To Learn the fundamentals of nutrition communication
- To validate Patient care process administration
- To analyze tools required for effective nutrition counseling
- To understand hospital and community level counseling

Outcomes
CO1: Students will gain basic knowledge on counseling
CO2: Students will be able to understand different types of counseling for different conditions
CO3: Students will get to learn about organizing the health camps.
CO4: Students get to learn different techniques and tools required for nutrition counseling
CO5: Students get proper knowledge about patient care in hospital and community level

Course Content	Hours Allotted	Pedagogy
Module I: BASICS OF DIET COUNSELING • Diet Counseling-meaning, significance, process,types, Goals of counseling. • Types of Counseling - individuals, group and familycounseling. • Basic sequence in Diet counseling. • Materials needed for counseling –models, charts, posters, AV aids, Hand outsetc.	**12Hrs** 3Hrs 3Hrs 3Hrs 3Hrs	Powerpoint presentations / Lectures
Module II: BASICS OF NUTRITION COMMUNICATION • Communication process in counseling. • Linguistics in clinical dietary practices, problems in communication,tools, Role of Counselor &Counselee. • Techniques of obtaining relevant information- 24 Hour Dietary recall, List of food likes and dislikes,Lifestyle. • Impact of counseling on health and disease of individuals – discussion of hospital casestudies.	**12Hrs** 3Hrs 3Hrs 3Hrs 3Hrs	Powerpoint presentations / Lectures
Module III: PATIENT CARE PROCESS • Introduction to Nutrition Care Process: Definition of	**12Hrs**	Assignments

Nutrition Care Process, Steps of Nutrition Care Process. • Tools for effective Nutritional counseling. • Organizing health camps and patient feedback – at hospitallevel and at communitylevel. • Diet counselling for kidney disorders.	3Hrs 3Hrs 3Hrs 3Hrs	
Module IV: DIET COUNCELLING AT HOSPITAL AND COMMUNITY LEVEL • Role of counseling inhospital and community. • Diet counseling for mother and childcare. • Diet counseling for PEM,marasmus, kwashiorkor. • Diet counseling for GIT infections in children	**12Hrs** 3Hrs 3Hrs 3Hrs 3Hrs	Powerpoint presentations / Lectures
Module V: DIET COUNSELING AT HOSPITAL AND COMMUNITY LEVEL • Diet counseling for obesepeople. • Diet counseling forDiabetics. • Diet counseling forCVD and kidney disorders. • Diet counseling for liver disorders, gout, hypothyroidism and hyperthyroidism	**12Hrs** 3Hrs 3Hrs 3Hrs 3Hrs	Powerpoint presentations / Lectures

REFERENCES

1. Gibney M.J., Margetts, B.M., Kearney, J.M., Arab, L. (Eds) (2004) Public Health Nutrition.NS Blackwell Publishing.
2. Prochaska, K.L., The Transtheoretical Model of Behavioural Change, Shumaker SA(Eds).
3. Public Health Communication: Evidence for Behavior Change by Robert C. Hornik © 2002 by Lawrence Erlbaum Associates, Inc.
4. Communication and Health: Systems and Applications. Edited by Eileen Berlin Ray and Lewis Donohew © 1990 by Lawrence Erlbaum Associates, Inc.
5. Designing health messages: Approaches from Communication Theory and Public Health Practice. Editors: Edward Maibach and Roxanne Louiselle Parrott © 1995 by Sage Publications, Inc.
6. Community Nutrition in Action: An Entrepreneurial Approach. Fourth Edition. Marie A. Boyle and David H. Holben. © 2006 Thomson Wadsworth.

NUTRITION COMMUNICATION AND COUNSELLING (DSE-4)

Credits: 4 **Semester: VI**
Subject code: FS23602 (B) **No. of lecture hours: 60**
Objectives:

- To gain knowledge about basic components in communication
- To understand communication channels and to design messages
- To learn Patient care process administration
- To analyze tools required for effective nutrition counseling
- To understand hospital and community level counseling

Outcomes
CO1: Students will gain the potential to understand the basics of communication
CO2: Students will be able to design messages for communication
CO3: Students will get to understand different modes of communication
CO4: Students will learn different techniques and tools required for nutrition counseling
CO5: Students will get proper knowledge about patient care in hospital and community level

Course Content	Hours Allotted	Pedagogy
Module I: BASICS OF COMMUNICATION • Setting objectives of a nutrition education communication programme. • Nutrition objective and educational objectives. • Communication objectives. • Identifying target audience.	**12Hrs** **3Hrs** **3Hrs** **3Hrs** **3Hrs**	Powerpoint presentations / Lectures
Module II: COMMUNICATION CHANNELS AND DESIGN MESSAGES • Essential elements of a message design. • Media for communication • Advantages and disadvantages. • Development of a communication strategy- components.	**12Hrs** **3Hrs** **3Hrs** **3Hrs** **3Hrs**	Powerpoint presentations / Lectures
Module III: PATIENT CARE PROCESS • Introduction to Nutrition Care Process. • Definition of Nutrition Care Process, Steps of Nutrition Care Process. • Tools for effective Nutritional counseling. • Organizing health camps and patient feedback – at communitylevel.	**12Hrs** **3Hrs** **3Hrs** **3Hrs** **3Hrs**	Assignments

Module IV: DIET COUNCELLING AT HOSPITAL AND COMMUNITY LEVEL • Role of counseling in hospital and community. • Diet counseling for mother and childcare. • Diet counseling for PEM, marasmus, kwashiorkor. • Diet counseling for GIT infections in children	**12Hrs** **3Hrs** **3Hrs** **3Hrs** **3Hrs**	Powerpoint presentations / Lectures
Module V: DIET COUNSELING AT HOSPITAL AND COMMUNITY LEVEL • Diet counseling for obese people. • Diet counseling for Diabetics. • Diet counseling forCVD and kidney disorders. • Diet counseling for liver disorders, gout, hypothyroidism and hyperthyroidism	**12Hrs** **3Hrs** **3Hrs** **3Hrs** **3Hrs**	Powerpoint presentations / Lectures

REFERENCES

1. Gibney M.J., Margetts, B.M., Kearney, J.M., Arab, L. (Eds) (2004) Public Health Nutrition.NS Blackwell Publishing.
2. Prochaska, K.L., The Transtheoretical Model of Behavioural Change, Shumaker SA(Eds).
3. Public Health Communication: Evidence for Behavior Change by Robert C. Hornik © 2002 by Lawrence Erlbaum Associates, Inc.
4. Communication and Health: Systems and Applications. Edited by Eileen Berlin Ray and Lewis Donohew © 1990 by Lawrence Erlbaum Associates, Inc.
5. Designing health messages: Approaches from Communication Theory and Public Health Practice. Editors: Edward Maibach and Roxanne Louiselle Parrott © 1995 by Sage Publications, Inc.
6. Community Nutrition in Action: An Entrepreneurial Approach. Fourth Edition. Marie A. Boyle and David H. Holben. © 2006 Thomson Wadsworth.

PROJECT

Credits: 2 **Semester: VI**
Subject code: FS23603

Objectives of the internship:

1. To provide students with practical exposure to professional practices in hospitals and food industries.
2. To bridge the gap between theoretical knowledge and real-world application in nutrition, dietetics, food science, and food processing.
3. To develop clinical skills in nutritional assessment, diet planning, patient counselling, and therapeutic nutrition under the guidance of qualified professionals.

Course Outcomes:

1.Apply the theoretical knowledge of food science, nutrition, dietetics, and food safety in real hospital and food industry settings.

2. Demonstrate skills in nutritional assessment, diet planning, patient counselling, and therapeutic nutrition under professional supervision.

3. Perform food quality assurance and quality control activities by following standard operating procedures and food safety regulations.

4.Analyze operational procedures in hospitals and food industries, identify practical challenges, and recommend appropriate evidence-based solutions.

Duration and timing

Duration- 3 Months

Timing- January, February and March

Working Horms- As per the host organisation norms

Assessment and evaluation:

Evaluation will be based on:

1.Internship performance and work quality

2. Supervisors evaluation from the organisation

3.Internship report and documentation

4.Presentation and viva

Internal assessment 40 Marks

External assessment 60 Marks

The weightage of each component will be as per institutional norms.

Internal assessment 40 Marks

Evaluation criteria	**Marks allotted**
Project work	15
Daily observation	5
Internal presentation	10
Q&A session	5
Attendance	5

External assessment 60 Marks

Evaluation criteria	**Marks allotted**
Project Report	30
Presentation	20
Viva voce	10

General Guidelines:

1.Students shall undertake the internship in the 6th semester as a part of their curriculum

2.Internahip shall be approved by the Department before commencement

3.Student shall maintain a daily work diary/logbook

4.The internship report shall be certified by both the industry supervisor and faculty guide

5.Students shall submit the internship report and appear for the seminar presentation and viva voce

Nature of the Internship:

1.Hospital

2.Industry

BASICS OF MEAL PLANNING (Bridge course)

Credits: **Semester: I/II**

Subject code: **No. lecture hours: 15Hrs**

Objectives

- To gain knowledge of the concepts of food
- To get familiarized with the safety aspects of food.
- To acquire details pertaining to spoilage of food.
- To understand the various methods of cooking food.
- To gain knowledge pertaining to basics of menu planning

Outcomes

CO1: The students will be able to be identifying RDA, its uses and translation
CO2: Students will be able to learn about perishability, selection and storage of food
CO3: Students will be able to understand the hazards caused by microorganisms, rodents and Insects.
CO4: Students will be to learn various preparation methods and loss of nutrients.
CO5: Students will be able to appraise the nutritional status and nutritive value.

UNIT I
CONCEPTS OF FOOD

- Food, functions of food
- inter-relationship of food, nutrition and health
- RDA its uses determining energy needs
- Translating RDA into daily food intake

UNIT II
SAFETY ASPECTS OF FOOD

- Perishability of foods
- classification
- Quality indicators
- Selection, purchase and storage of food

UNIT III
SPOILAGE OF FOOD

- Food spoilage, their cause And hazards by:
- Microorganisms

- Enzymes
- Insects and rodents

UNIT IV
COOKING METHODS

- Need for cooking
- Preparation methods of food
- Various methods of cooking
- Loss of nutrients

UNIT V
BASICS OF MENU PLANNING

- Signs of good nutritional status
- poor nutritional status
- Guidelines for good health
- Enhancement of nutritive value

REFERENCES

1. B. Srilakshmi, 2001 **Food Science**, 2nd Edition, New Delhi: New Age International.
2. Swaminathan M (2000). Advanced Textbook on Foods and Nutrition, Vol I (2 nd ed.). Published by Bangalore Printing and Publishing Ltd, Bangalore.
3. ICMR (1989) Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.
4. ICMR (2011) Dietary Guidelines for Indians – A Manual. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad

FOOD AS MEDICINE (self-learning course)

Credits: **Semester: III/IV**

Subject code: **No. lecture hours: 10Hrs**

Objectives:

1. To introduce the concepts of Ayurveda.

2. To impart knowledge on history and evolution of diets and raw foodism.

3. To understand the strategies of fasting and detoxification.

4. To learn various components of dietary treatment.

5. To know the review of various spices and herbs.

Outcomes

CO1: Students will be able to be understand flavours, seasons and climate in ayurveda
CO2: Students will be able to learn about various diets, cookware and preparation methods.
CO3: Students will be able to understand the theory and practice of fasting and detoxification.
CO4: Students will be to learn various strategic eating and food allergies.
CO5: Students will be able to learn about herbs, masalas and marinades.

UNIT-I

INTRODUCTION TO AYURVEDA

- Introduction to ayurveda- What is food? Concept of quality
- The three doshas
- Six flavours, seasons and climate
- Food quantity, timing and food combination

UNIT -II

HISTORY AND EVOLUTION OF DIETS

- Practice of food- evolution and history of diet
- Paleolithic diet, ayurvedic diet, vegetarian diet and vegan diet
- Raw foodism and modern diets
- Cookware and preparation methods

UNIT-III

FASTING AND DETOXIFICATION

- Fasting and detoxification
- Theory and practice
- Methods and strategies
- Medicinal herbs as adjuncts

UNIT-IV

DIETARY TREATMENT

- Meal plans and strategic eating
- Food allergies

- Elimination of challenge diet
- Review of health issues and dietary treatment

UNIT-V

HERBS AND SPICES

- Review of 50 different herbs and spices
- Use of masalas
- Rubs and marinades

BAKING SCIENCE (add on course)

Credits: **Semester: V/VI**
Subject code: **No. of lecture hours: 30Hrs**

Objectives:

1. To know the common ingredients used in baking
2. To understand the various methods used to prepare breads.
3. To learn the procedure and packaging of biscuits.
4. To understand the cake mixing objectives and methods
5. To learn various aspects in preparation of wafers, frozen dough products.

Outcomes

- **CO1**: Students will be able to be understand major and minor ingredients in bakery.
- **CO2**: Students will be able to learn about bread making process.
- **CO3**: Students will be able to understand the preparation, packing and storage of biscuits.
- **CO4**: Students will be to learn about formulation and mixing of cakes.
- **CO5**: Students will be able to learn about frozen dough products.

UNIT-I
GENERAL INGREDIENTS FOR BAKERY PRODUCTS

- Ingredients: sources, functions, types of wheat flour, miscellaneous flours
- sources, functions, types of Shortenings
- sources, functions, types of Sweeteners and yeast
- Minor ingredients- oxidizing agents, salt, dairy and egg products, mold inhibitors, dough strengtheners/softeners and enrichment

UNIT-II
BREAD

- Bread making methods- straight and emergency dough methods
- Mixing and dough processing- functions of mixing and mixer types
- Thermal reactions keeping properties of bread and related products
- Bread spoilage and staling, factors and control measures

UNIT-III
BISCUITS, COOKIES AND CRACKERS

- Ingredients and their functions
- Preparation of biscuits- short dough biscuits, fermented dough biscuits, hard dough biscuits
- Biscuit baking, heat transfer mechanism, changes during baking
- Cooling, packaging and storage

UNIT-IV

CAKES

- Cake varieties, ingredients and their functions
- Formulations and formula balance
- Cake mixing objectives and methods
- Batter specific gravity, temperature, pH and baking reactions

UNIT-V

WAFERS

- Ingredients and their functions
- Frozen dough products
- Flat bread technology'
- Starches- sources, composition, properties, modification methods and applications in bakery industry

REFERENCES

1. Dubey, S.C. 2007. Basic baking 5th Ed. New Delhi: Chanakya Mudrak Pvt Ltd.
2. Raina 2003. Basic Food Preparation- A Complete Manual. 3rd Ed. Mumbai: Orient Longman Pvt Ltd.
3. Manay, S and Shadaskaraswami, M. 2004. Food Facts and Principles. New Delhi: New Age Publishers.
4. Barndt, R. L. 1993. Fat and Calorie – Modified Bakery Products. US: Springer
5. Faridi Faubin, 1997. Dough Rheology and Baked Product Texture. New Delhi: CBS Publications.