



SNDT Women's University, Mumbai

**Undergraduate Degree / UG
Programme (Syllabus as Per NEP) -
Faculty of Science & Technology**

**Bachelor of Science
Home Science
(Nutrition And Dietetics)**

B.Sc. In H.Sc. – ND

As Per NEP – 2020

Semester – V & VI

**Syllabus
(W.E.F. Academic Year 2026-27)**

Terminologies

Vertical	Full-Form/Definition	Remarks	Related To Major And Minor Courses
Major (Core)	Subject Comprising Mandatory and Elective Courses, Major Specific IKS, Vocational Skill Courses, Internship/ Apprenticeship, Field Projects, Research Projects Connected to Major	Minimum 50% Of Total Credits Corresponding to Three/Four - Year UG Degree- Mandatory Courses	Related To The Major
Minor Course	Course From Same Or Different Faculty	Minimum 18-20 Credits to Be Completed in The First Three Years of UG Programme	Related To the Minor
OEC	Open Elective Courses/ Generic Courses	10-12 Credits to Be Offered in I And/Or II Year. Faculty-Wise Baskets of OEC To Be Prepared	OEC Is to Be Chosen Compulsorily from Faculty Other Than That of the Major
VSC	Vocational Skill Courses, Including Hands On Training Corresponding To The Major And/Or Minor Subject	8-10 Credits, To Be Offered in First Three Years, Wherever Applicable Vocational Courses Will Include Skills Based on Advanced Laboratory Practical's of Major	Related To the Major or Minor
SEC	Skill Enhancement Courses	06 Credits, To Be Offered in I And II Year, To Be Selected from The Basket of Skill Courses Approved by University	Related To the Major or Minor Any Relevant Skill
AEC	Ability Enhancement Courses	08 Credits, To Be Offered in I And II Year, English: 04 Credits to Be Earned in Sem - I, Modern Indian Language Of 04 Credits to Be Offered in II Year	NA
VEC	Value Education Courses	Understanding India, Environmental Science/Education, Digital and Technological Solutions, Health &	NA

		Wellness, Yoga Education, Sports, And Fitness	
IKS	Indian Knowledge System	Generic IKS Course: Basic Knowledge Of The IKS To Be Offered At First Year Level	Major-Specific IKS Courses: Advanced Information About the Major, Part of the Major Credit to Be Offered at Second- Or Third-Year Level
OJT	On-Job Training (Internship / Apprenticeship)	Corresponding To the Major Subject	Related To The Major
FP	Field Projects	Corresponding To the Major Subject	Related To the Major
CC	Co-Curricular Courses	Health And Wellness, Yoga Education Sports, And Fitness, Cultural Activities, NSS/NCC And Fine/ Applied/Visual/ Performing Arts	NA
CE	Community Engagement and Service		Related To Major
RP	Research Project	Corresponding To the Major Subject	Related To Major

Programme Template

Programme Degree		B.Sc.
Specialization Major		Food Science & Nutrition
Faculty		Science & Technology
Parenthesis if any minor (Specialization)		Nutrition and Dietetics
Preamble		<p>The Program lays a strong emphasis on a multidisciplinary, integrated approach that will enable students to build a variety of skills and a broad base of professional knowledge in the areas of food science, nutrition and dietetics. It encourages the development of scientific perspectives and a research attitude in students.</p> <p>The programme trains learners in exploring areas of human physiology, biochemistry, nutrition, and medical nutrition therapy and their relationships. At the end of the programme, learner will be able to work in varied sectors of food and nutrition, dietetics, nutrition education work government, non-government, research or learning organizations.</p>
Programme Specific Outcomes (PSOs)		<p>After completing this programme, Learner will -</p> <ol style="list-style-type: none"> 1. Analyze composition of various foods and their relation to therapeutic conditions. 2. Recognize the changes that take place due to food processing. 3. Comprehend the fundamentals of human physiology, biochemistry, nutrition, and medical nutrition therapy and their relationships. 4. Educate people of all ages, groups and plan healthy diets. 5. Design nutrition education material and provide nutrition counseling to healthy and disease conditions.
Eligibility Criteria for Programme		Any woman who has successfully cleared 10+2 with Science/Home Science subjects from the recognized Boards by the Government of India/respective state or have required credits as per the government norms to be able to join undergraduate programme.
Intake for affiliated Colleges		30 (Batch size for Practical 15)

Structure with Course Titles**B.Sc. In Home Science - Nutrition and Dietetics****Semester – V**

Sr. No.	Course	Type of Course	Credits	Marks	Int Marks	Ext Marks
	Semester – V					
50130211	Medical Nutrition Therapy-II (Th)	Major (Core)	4	100	50	50
50130222	Dietetics Applications (Pr)	Major (Core)	4	100	50	50
51030211	Indigenous Dietary Practices (Th)	IKS (Major Specific)	2	50	0	50
50230211	Research Methodology and Statistics (Th)	Major (Elective) (Any One)	4	100	50	50
50230212	Food Service Administration in Health Care Systems (Th)					
50330211	Biochemistry (Th+Pr) (2+2)	Minor Stream (Any One)	4	100	50	50
50330222	Introduction to Nutritional Assessment and Counselling (Pr)					
50630201	Food Product Modifications (Pr)	VSC-4	2	50	50	0
51330201	Field Project (Pr)	FP	2	50	50	0
			22	550	300	250

Semester – VI

Sr. No.	Course	Type of Course	Credits	Marks	Int Marks	Ext Marks
	Semester - VI					
60130211	Food Microbiology and Safety (Th+Pr) (2+2)	Major (Core)	4	100	50	50
60130212	Nutrition Exercise and Fitness (Th+Pr) (2+2)	Major (Core)	4	100	50	50
60230211	Pediatric and Geriatric Nutrition (Th)	Major (Elective) (Any One)	4	100	50	50
60230212	Nutrition Counseling and Communication Skills (Th+Pr) (2+2)					
60330221	Community Nutrition (Pr)	Minor Stream	2	50	0	50
60330212	Diet Therapy (2 Th+2 Pr)	Minor Stream	4	100	50	50
61230221	On the Job Training in Nutrition and Dietetics (Pr)	OJT	4	100	50	50
			22	550	250	300

Exit with Degree (3-year)

Course Syllabus

Semester – V

.5.1 Major (Core)

Course Titles	Medical Nutrition Therapy - II (Th)
Course Credits	4 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Explain the physiology and pathophysiology of major lifestyle disorders, particularly cardiovascular diseases, endocrine disorders and renal disorders.
	2. Describe the etiology, clinical manifestations, risk factors, and diagnostic criteria associated with cardiovascular diseases, diabetes mellitus, thyroid disorders and renal diseases.
	3. Interpret clinical, biochemical, and anthropometric parameters relevant to cardiovascular, endocrine and renal health.
	4. Apply principles of Medical Nutrition Therapy in the dietary management of cardiovascular diseases and renal diseases.
Module 1 (Credit 1 Th): Medical Nutrition Therapy in Cardio Vascular Diseases	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the physiology and functional aspects of the cardiovascular system.
	2. Describe the etiology, clinical features, and risk factors of major cardiovascular diseases.
	3. Interpret clinical and biochemical parameters related to CVD.
Content Outline	<ul style="list-style-type: none">• Review of Cardiovascular Physiology and Pathophysiology<ul style="list-style-type: none">○ Structure and function of the heart and blood vessels○ Cardiac cycle and regulation of blood pressure○ Lipid transport and metabolism in relation to atherosclerosis○ Pathogenesis of atherosclerosis• Clinical Terminology<ul style="list-style-type: none">○ Angina pectoris○ Myocardial infarction○ Stroke○ Arrhythmias○ Congestive cardiac failure (CCF)○ Compensated and decompensated cardiac conditions○ Deep vein thrombosis (DVT)

	<ul style="list-style-type: none"> ○ Cardiac cachexia ● Risk Factors and Assessment <ul style="list-style-type: none"> ○ Non-modifiable risk factors ○ Modifiable risk factors ○ Metabolic syndrome ○ Dietary and lifestyle determinants ○ Interpretation of lipid profile and cardiac biomarkers ● Hypertension <ul style="list-style-type: none"> ○ Classification and stages of hypertension ○ Pathophysiology and complications ○ Role of sodium, potassium, calcium, magnesium, and dietary fats ○ Dietary Approaches to Stop Hypertension (DASH) principles ● Medical Nutrition Therapy (MNT) in CVD <ul style="list-style-type: none"> ○ Hypertension ○ Coronary artery disease ○ Myocardial infarction ● Prevention and Lifestyle Modification <ul style="list-style-type: none"> ○ Role of diet, physical activity, weight management ○ Cardioprotective dietary patterns (Mediterranean diet, DASH diet)
Module 2 (Credit 1 Th): Medical Nutrition Therapy for Endocrine Disorders	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the etiology and classification of common endocrine disorders.
	2. Describe the metabolic alterations associated with diabetes mellitus and thyroid disorders.
	3. Apply principles of Medical Nutrition Therapy in the dietary management of endocrine disorders.
Content Outline	<ul style="list-style-type: none"> ● Diabetes Mellitus ● Overview and Classification <ul style="list-style-type: none"> ○ Glucose metabolism and the role of insulin ○ Type 1, Type 2, Gestational Diabetes Mellitus and other specific types ● Etiology and Clinical Features <ul style="list-style-type: none"> ○ Etiology and risk factors, pathophysiology

	<ul style="list-style-type: none"> ○ Signs, symptoms, and complications (acute and chronic) ○ Diagnostic criteria and interpretation of biochemical parameters (Fasting blood glucose, Post-prandial glucose, HbA1c) ● Pharmacological Management <ul style="list-style-type: none"> ○ Role of insulin therapy – types of insulin and basic principles of administration ○ Overview of oral hypoglycemic agents ● Medical Nutrition Therapy in Diabetes Mellitus <ul style="list-style-type: none"> ○ Goals and principles of nutrition therapy ● Thyroid Disorders <ul style="list-style-type: none"> ○ Structure and function of the thyroid gland ○ Regulation and metabolism of thyroid hormones ● Types of Thyroid Disorders <ul style="list-style-type: none"> ○ Hypothyroidism ○ Hyperthyroidism ○ Goitre and iodine deficiency disorders ● Etiology and Clinical Features <ul style="list-style-type: none"> ○ Causes and risk factors ○ Signs, symptoms, and metabolic changes ● Medical Nutrition Therapy for Thyroid Disorders <ul style="list-style-type: none"> ○ Nutritional management in hypothyroidism and hyperthyroidism
Module 3 (Credit 1 T.): Medical Nutrition Therapy in Renal Disorders	
Learning Outcomes	After learning the module, learners will be able to
	<ol style="list-style-type: none"> 1. Interpret biochemical and clinical reports relevant to renal disorders. 2. Apply the principles of medical nutrition therapy for the dietary management of renal disorders.
Content Outline	<ul style="list-style-type: none"> ● Nutritional Assessment of Renal Disorders <ul style="list-style-type: none"> ○ Interpretation of Clinical and Biochemical Parameters ● Therapeutic Diet Planning for: <ul style="list-style-type: none"> ○ ARF ○ CRF ○ Nephrotic syndrome ○ Renal calculi

Module 4 (Credit 1 Th.): Therapeutic Modifications in Metabolic Stress	
Learning Outcomes	After learning the module, learners will be able to
	1. Assess nutritional needs and metabolic stress in conditions such as HIV, cancer, burns, and surgery.
	2. Interpret relevant biochemical parameters in relation to nutritional status and disease conditions.
	3. Plan and prepare appropriate therapeutic diets and nutrient-specific recipes for clinical conditions.
Content Outline	<ul style="list-style-type: none"> • Nutritional Assessment of Metabolic Stress • Interpretation of Biochemical Parameters (relevant lab parameters) • Therapeutic Diet Planning / Modification • Planning and preparation of nutrient appropriate recipes for: <ul style="list-style-type: none"> ○ HIV ○ Cancers ○ Burns ○ Surgery

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

- Assignment on pathophysiology, lab reports, interpretation
- Assignment on special feeding methods
- Case study analysis
- Patient case presentation

References:

1. Mahan, L. K., Raymond, J. L., & Escott-Stump, S. (2020). Krause's Food & the Nutrition Care Process (15th ed.). Elsevier.
2. Nelms, M., Sucher, K. P., Lacey, K., & Roth, S. L. (2022). Nutrition Therapy and Pathophysiology (4th ed.). Cengage Learning.
3. Escott-Stump, S. (2011). Nutrition and Diagnosis-Related Care (7th ed.). Wolters Kluwer/Lippincott Williams & Wilkins.
4. Williams, S. R. (2016). Nutrition and Diet Therapy (7th ed.). Times Mirror/Mosby College Publishing.
5. Sharma, A. (2017). Principles of Therapeutic Nutrition and Dietetics. CBS Publishers.
6. Joshi, S. A. (2021). Nutrition and Dietetics (5th ed.). McGraw Hill.
7. Jatana, A. (Ed.). (2022). Apollo Clinical Nutrition Handbook. Jaypee Brothers Medical Publishers.

8. Indian Dietetic Association. (2018). Clinical Dietetics Manual (2018th ed.). Elite Publishing House.

Semester – V

.5.2 Major (Core)

Course Titles	Dietetics Applications (Pr)
Course Credits	4 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Interpret clinical, biochemical, and dietary parameters relevant to cardiovascular, endocrine, renal, and metabolic stress conditions.
	2. Assess nutritional and lifestyle risk factors associated with major lifestyle disorders.
	3. Apply the principles of Medical Nutrition Therapy (MNT) for the dietary management of selected diseases.
	4. Plan therapeutic diets for cardiovascular diseases and endocrine disorders based on disease condition and nutritional requirements.
	5. Explain the pathophysiology and metabolic alterations associated with renal disorders and metabolic stress conditions.
	6. Analyse clinical cases and recommend appropriate nutritional interventions and dietary modifications.
Module 1 (Credit 1 Pr.): Medical Nutrition Therapy in Cardiovascular Diseases	
Learning Outcomes	After learning the module, learners will be able to
	1. Assess nutritional and lifestyle risk factors associated with cardiovascular diseases.
	2. Interpret clinical and biochemical parameters related to cardiovascular health.
	3. Plan appropriate therapeutic diets for individuals with cardiovascular disorders.
Content Outline	<ul style="list-style-type: none"> • Nutritional Assessment of Cardiovascular Risk <ul style="list-style-type: none"> ○ Interpretation of Biochemical Parameters ○ Therapeutic Diet planning • Preparation of diet plans for: <ul style="list-style-type: none"> ○ Hyperlipidemia ○ Hypertension ○ Coronary artery disease
Module 2 (Credit 1 Pr.): Therapeutic Modifications in Diabetes and Thyroid Disorders	
Learning Outcomes	After learning the module, learners will be able to
	1. Nutritional assessment of individuals with endocrine disorders.

	2. Interpret relevant biochemical and clinical parameters related to endocrine health.
	3. Plan therapeutic diets for diabetes mellitus and thyroid disorders.
Content Outline	<ul style="list-style-type: none"> • Nutritional Assessment of Endocrine Disorders <ul style="list-style-type: none"> ○ Interpretation of Biochemical Parameters ○ Therapeutic Diet planning: Diabetes, Hypothyroidism and Hyperthyroidism.
Module 3 (Credit 1 Pr.): Medical Nutrition Therapy in Renal Disorders	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the pathophysiology and clinical features of major renal disorders.
	2. Describe the nutritional implications and metabolic alterations associated with different renal diseases
	3. Interpret clinical and biochemical parameters related to renal diseases.
Content Outline	<ul style="list-style-type: none"> • Overview of Renal Function and Nutritional Implications <ul style="list-style-type: none"> ○ Functions of the kidneys ○ Nutritional consequences of impaired renal function • Medical Nutrition Therapy in Acute Renal Failure <ul style="list-style-type: none"> ○ Etiology and pathophysiology ○ Nutritional requirements during different stages ○ Nutritional Management and Dietary modifications • Medical Nutrition Therapy in Chronic Renal Failure (Chronic Kidney Disease) <ul style="list-style-type: none"> ○ Stages and metabolic changes ○ Nutritional Management and Dietary modifications ○ Dietary management during dialysis • Medical Nutrition Therapy in Nephrotic Syndrome <ul style="list-style-type: none"> ○ Causes and clinical manifestations ○ Nutritional Management and Dietary modifications • Medical Nutrition Therapy in Renal Calculi (Kidney Stones) <ul style="list-style-type: none"> ○ Types and risk factors ○ Nutritional factors influencing stone formation ○ Dietary strategies for prevention and management
Module 4 (Credit 1 Pr.): Medical Nutrition Therapy in Metabolic Stress	

Learning Outcomes	After learning the module, learners will be able to
	1. Explain the concept of metabolic stress and the physiological response to trauma, infection, and surgery
	2. Describe the metabolic and nutritional alterations associated with conditions such as cancer, HIV/AIDS, burns, and surgery
	3. Identify the nutritional challenges and complications that arise during metabolic stress
	4. Discuss the principles of medical nutrition therapy in conditions associated with metabolic stress.
Content Outline	<ul style="list-style-type: none"> • Metabolic Stress <ul style="list-style-type: none"> ○ Definition and causes of metabolic stress ○ Nutritional implications of hypermetabolism and catabolism • Medical Nutrition Therapy in Cancer <ul style="list-style-type: none"> ○ Overview and nutritional implications ○ Introduction of terms like cancer cachexia and malnutrition ○ Nutritional problems during treatment (chemotherapy, radiotherapy) ○ Dietary management and nutrition support • Medical Nutrition Therapy in HIV/AIDS <ul style="list-style-type: none"> ○ Disease progression and nutritional implications ○ Increased nutrient requirements and common complications ○ Dietary management and role of nutrition in improving immunity • Medical Nutrition Therapy in Burns <ul style="list-style-type: none"> ○ Physiological response to burn injury ○ Role of macronutrients and micronutrients in burns injury ○ Nutritional management during recovery • Medical Nutrition Therapy in Surgical Conditions <ul style="list-style-type: none"> ○ Metabolic response to surgery ○ Pre-operative and post-operative nutritional considerations ○ Role of nutrition in wound healing and recovery

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

- Analysis of a sample biochemical report.
- Provide a case with lab values. Interpret the values. Plan dietary modifications based on the findings.
- Case study analysis

- Dietary modification exercise

References:

1. Mahan, L. K., Raymond, J. L., & Escott-Stump, S. (2020). *Krause's Food & the Nutrition Care Process* (15th ed.). Elsevier.
2. Nelms, M., Sucher, K. P., Lacey, K., & Roth, S. L. (2022). *Nutrition Therapy and Pathophysiology* (4th ed.). Cengage Learning.
3. Escott-Stump, S. (2011). *Nutrition and Diagnosis-Related Care* (7th ed.). Wolters Kluwer/Lippincott Williams & Wilkins.
4. Williams, S. R. (2016). *Nutrition and Diet Therapy* (7th ed.). Times Mirror/Mosby College Publishing.
5. Sharma, A. (2017). *Principles of Therapeutic Nutrition and Dietetics*. CBS Publishers.
6. Joshi, S. A. (2021). *Nutrition and Dietetics* (5th ed.). McGraw Hill.
7. Jatana, A. (Ed.). (2022). *Apollo Clinical Nutrition Handbook*. Jaypee Brothers Medical Publishers.
8. Indian Dietetic Association. (2018). *Clinical Dietetics Manual* (2018th ed.). Elite Publishing House.

Semester – V

.5.3 Indian Knowledge System (IKS) (Major Specific)

Course Titles	Indigenous Dietary Practices (Th)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Explain the concept and characteristics of indigenous dietary practices in India.
	2. Describe regional and community-based traditional food systems.
	3. Analyze the nutritional and therapeutic significance of indigenous foods.
	4. Evaluate indigenous diets in relation to sustainability and health.
	5. Integrate traditional dietary knowledge into modern nutrition and dietetics practice.
Module 1 (Credit 1 Th.): Foundations and Diversity of Indigenous Dietary Practices in India	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain philosophical and cultural foundations of Indian food traditions.
	2. Identify diversity in regional and community food practices.
Content Outline	<ul style="list-style-type: none">• Concept of Indigenous Dietary Practices<ul style="list-style-type: none">○ Meaning and features○ Indigenous knowledge and oral traditions○ Indigenous vs modern dietary patterns• Philosophical and Cultural Foundations<ul style="list-style-type: none">○ Concept of Ahara○ Sattvic, Rajasic and Tamasic foods○ Pathya and Apathya○ Seasonal eating (Ritucharya)○ Local and seasonal food principles• Regional and Community Food Diversity<ul style="list-style-type: none">○ Millet-based traditional diets○ Tribal and forest-based food systems○ Fermented foods of India○ Traditional food preservation techniques○ Religious and community-based dietary practices

Module 2 (Credit 1 Th.): Nutritional, Therapeutic, and Sustainability Aspects of Indigenous Diets	
Learning Outcomes	After learning the module, learners will be able to
	1. Evaluate nutritional value of indigenous foods.
	2. Explain therapeutic importance of traditional diets.
	3. Discuss sustainability aspects of indigenous food systems.
Content Outline	<ul style="list-style-type: none"> • Nutritional Significance of Indigenous Foods <ul style="list-style-type: none"> ○ Spices and herbs as functional foods ○ Traditional cooking methods and nutrient retention • Indigenous Diets and Health <ul style="list-style-type: none"> ○ Gut health and fermented foods ○ Traditional postpartum and complementary feeding practices ○ Fasting and therapeutic dietary traditions ○ Role in prevention of lifestyle disorders

Assignments / Continuous Comprehensive Evaluation (CCE)

- Profile of indigenous diet of one Indian state/community
- Nutritional evaluation of a traditional meal
- Develop a one-day indigenous balanced menu
- Short report on revival of millets or traditional foods

References

1. Achaya, K. T. (1998). Indian Food: A Historical Companion. Oxford University Press.
2. Gopalan, C., Rama Sastri, B. V., & Balasubramanian, S. C. Nutritive Value of Indian Foods. National Institute of Nutrition (ICMR).
3. Longvah, T., Anantan, I., Bhaskarachary, K., & Venkaiah, K. (2017). Indian Food Composition Tables. ICMR-NIN.
4. National Institute of Nutrition (ICMR). Dietary Guidelines for Indians (latest edition).
5. Ministry of AYUSH. Ayurvedic Dietary Principles.
6. FAO (2013). Indigenous Peoples' Food Systems and Well-being.
7. Nambiar, V. (2024). Festive Foods of India: A Textbook of Indian Knowledge System (as per NEP 2020). Manglam Publications.

Semester – V

.5.4 Major (Elective)

Course Titles	Research Methodology and Statistics (Th)
Course Credits	4 Credit's
Course Outcomes	After completing this course, learners will be able to:
	1. Explain the concept, characteristics, and importance of research.
	2. Identify research problems and formulate research objectives and simple hypotheses.
	3. Differentiate various types of research and research designs.
	4. Select appropriate sampling methods such as simple random, purposive, and convenience sampling for basic studies.
	5. Develop basic data collection tools such as questionnaires, interview schedules, and observation formats.
	6. Organize, analyze, and present research data using basic statistical methods and graphical techniques.
	7. Interpret research findings and prepare a simple scientific research report following standard research report structure.
Module 1 (Credit 1 Th.): Fundamentals of Research	
Learning Outcomes	After learning the module, learners will be able to -
	1. Explain meaning, purpose and importance of research.
	2. Describe the steps in research process.
	3. Identify and formulate research problems.
Content Outline	<ul style="list-style-type: none"> • Introduction to Research <ul style="list-style-type: none"> ○ Meaning and characteristics of research ○ Importance of research in Home Science • Types of Research <ul style="list-style-type: none"> ○ Basic and applied research ○ Qualitative and quantitative research ○ Survey method ○ Case study method
Module 2 (Credit 1 Th.): Types of Research and Research Design	
Learning Outcomes	After learning the module, learners will be able to -
	1. Differentiate types of research.
	2. Explain the components of a research design, including variables, objectives, and hypothesis.
	3. Select suitable research design for simple research studies.

Content Outline	<ul style="list-style-type: none"> • Research Process <ul style="list-style-type: none"> ○ Selection of topic ○ Identification of research problem ○ Review of literature – meaning and importance ○ Research objectives ○ Variables – meaning and types (independent, dependent, discrete, continuous) ○ Hypothesis – meaning ○ Ethics in research (plagiarism, consent, confidentiality) • Research Design <ul style="list-style-type: none"> ○ Meaning and importance ○ Components of research design ○ Research questions and assumptions ○ Scope of research in Home Science
Module 3 (Credit 1 Th.): Sampling and Tools of Data Collection	
Learning Outcomes	<p>After learning the module, learners will be able to -</p> <ol style="list-style-type: none"> 1. Explain the concepts of population, sample, and sampling techniques used in research. 2. Differentiate between probability and non-probability sampling methods. 3. Develop basic data collection tools, including questionnaires, interview schedules, and observation methods.
Content Outline	<ul style="list-style-type: none"> • Sampling <ul style="list-style-type: none"> ○ Meaning of population and sample ○ Need for sampling ○ Probability sampling – simple random sampling ○ Non-probability sampling – purposive and convenience sampling ○ Factors affecting sample size • Tools of Data Collection <ul style="list-style-type: none"> ○ Primary and secondary data ○ Questionnaire – types of questions ○ Interview schedule ○ Observation method
Module 4 (Credit 1 Th.): Basic Statistics for Research	
Learning	After learning the module, learners will be able to -

Outcomes	1. Explain the role and importance of statistics in research.
	2. Organize and present data using classification, tabulation, and graphical methods.
	3. Calculate and interpret measures of central tendency such as mean, median, and mode.
	4. Outline the structure of a scientific research report, including introduction, methodology, results, and conclusion.
Content Outline	<ul style="list-style-type: none"> • Introduction to Statistics <ul style="list-style-type: none"> ○ Meaning and importance of statistics in research ○ Types of data – qualitative and quantitative • Organization and Presentation of Data <ul style="list-style-type: none"> ○ Classification and tabulation ○ Frequency distribution ○ Graphical presentation – bar diagram, pie chart, histogram • Measures of Central Tendency <ul style="list-style-type: none"> ○ Mean ○ Median ○ Mode • Scientific Report Writing <ul style="list-style-type: none"> ○ Title page ○ Abstract ○ Introduction ○ Review of literature ○ Materials and methods / Methodology ○ Results and discussions ○ Summary and conclusion ○ Bibliographical details

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

- Frame research objectives
- Prepare questionnaire on selected topic
- Conduct mini survey and collect small dataset
- Calculate mean, median and mode from collected data
- Prepare graphs and tables from data
- Review and classify research papers
- Develop a research proposal

References:

1. Best, J. W., & Kahn, J. V. (2016). *Research in Education* (10th ed.). Pearson Education.
2. Bhaskaran, V. (2008). *Research Methods for Social Work*. Himalaya Publishing House.
3. Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). Sage Publications.
4. Gupta, S. C. (2014). *Fundamentals of Statistics*. Himalaya Publishing House.
5. Gupta, S. P. (2018). *Statistical Methods*. Sultan Chand & Sons.
6. Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of Behavioral Research* (4th ed.). Harcourt College Publishers.
7. Kothari, C. R., & Garg, G. (2019). *Research Methodology: Methods and Techniques* (4th ed.). New Age International Publishers.
8. Kumar, R. (2019). *Research Methodology: A Step-by-Step Guide for Beginners* (5th ed.). Sage Publications.
9. McBurney, D. H., & White, T. L. (2010). *Research Methods* (8th ed.). Cengage Learning.
10. Spiegel, M. R., Schiller, J., & Srinivasan, R. A. (2017). *Schaum's Outline of Statistics* (5th ed.). McGraw Hill Education.
11. Triola, M. F. (2018). *Elementary Statistics* (13th ed.). Pearson Education.

Semester – V

.5.4 B. Major (Elective)

Course Titles	Food Service Administration in Health Care Systems (Th)
Course Credits	4 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Understand the organization and functioning of hospital food service systems.
	2. Learn the basic principles of management applied to nutrition and food service departments.
	3. Develop knowledge of personnel management and administrative responsibilities in food service units.
	4. Gain awareness of financial management, food service operations, and relevant food and labour laws.
Module 1 (Credit 1 Th.): Hospital Organization and Food Service Systems	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the goals and functions of hospital food service systems and the role of the nutrition department in healthcare institutions.
	2. Describe the organizational structure of hospitals, including the roles of the healthcare team and dietitians.
	3. Explain the basic management functions such as planning, organizing, directing and controlling in food service administration.
	4. Recognize the importance of professional ethics and computer applications in hospital food service management
Content Outline	<ul style="list-style-type: none"> • Introduction to medical food service <ul style="list-style-type: none"> ○ Goals and objectives of hospital food services ○ Role of nutrition services in patient care • Hospital organization <ul style="list-style-type: none"> ○ Definition and types of organizations ○ Structure of healthcare institutions ○ Role of the healthcare team ○ Role and responsibilities of dietitians • Food service systems in hospitals <ul style="list-style-type: none"> ○ Types of food service systems ○ Overview of centralized and decentralized systems • Organizational structure

	<ul style="list-style-type: none"> ○ Organizational charts ○ Activity analysis ○ Decision analysis ○ Relationship analysis ● Management principles <ul style="list-style-type: none"> ○ Planning ○ Organizing ○ Directing ○ Controlling ○ Management by Objectives (MBO) ● Tools of management <ul style="list-style-type: none"> ○ Professional ethics in healthcare ○ Computer applications in food service management
Module 2 (Credit 1 Th.): Personnel Management and Labour Laws	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the processes involved in personnel management, including recruitment, selection, training, supervision, and performance appraisal in food service departments.
	2. Describe methods for motivating employees and managing staff performance through incentives, rewards, placement, and promotion.
	3. Apply basic decision-making and problem-solving approaches in food service administration and workplace situations.
	4. Explain the importance of time management and labour laws relevant to employees working in food service and healthcare institutions.
Content Outline	<ul style="list-style-type: none"> ● Personnel management in food service <ul style="list-style-type: none"> ○ Recruitment and selection ○ Orientation and training ○ Placement and promotion ○ Supervision and leadership ● Performance management <ul style="list-style-type: none"> ○ Performance appraisal ○ Motivation and incentive systems ○ Rewards for effective performance ● Decision making and problem solving

	<ul style="list-style-type: none"> ○ Types of decision making ○ Decision-making approaches ○ Problem-solving tools ● Time management in food service administration ● Labour laws and employee welfare <ul style="list-style-type: none"> ○ Overview of labour laws relevant to food service ○ Employee welfare schemes in India ○ Workplace policies and compliance ● Food laws and regulations relevant to institutional catering
Module 3 (Credit 1 Th.):	
Learning Outcomes	<p>After learning the module, learners will be able to</p> <ul style="list-style-type: none"> ● Describe different types of catering and food service systems used in healthcare institutions. ● Explain the principles and steps involved in menu planning for hospital food services. ● Plan menus for normal and modified therapeutic diets, including cycle menus. ● Identify and describe food production and service equipment used in hospitals and the factors involved in equipment selection and space allocation. ● Explain the importance of safety, maintenance, and energy management in the use of food service equipment.
Content Outline	<ul style="list-style-type: none"> ● Types of catering systems <ul style="list-style-type: none"> ○ Institutional catering ○ Hospital catering ○ Food service systems in healthcare ● Menu planning in hospitals <ul style="list-style-type: none"> ○ Principles of menu planning ○ Menu considerations in healthcare settings ○ Meal patterns and menu formats ○ Steps in menu planning ● Types of menu ● Food production and service systems ● Equipment <ul style="list-style-type: none"> ○ Types of equipment used in hospitals

	<ul style="list-style-type: none"> ○ Space allocation and kitchen layout ○ Equipment selection criteria ○ Safety, care and maintenance
Module 4 (Credit 1 Th.): Food Purchasing, Cost Control and Financial Management	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the principles of purchasing and store management in hospital food service systems.
	2. Describe inventory control, food specifications, and quality assurance practices in food procurement.
	3. Identify the elements of cost in food service operations and explain methods of food and labour cost control.
	4. Explain the basics of budgeting and financial management in institutional food service establishments.
	5. Recognize the importance of sanitation and hygiene practices in food storage, preparation, and service.
Content Outline	<ul style="list-style-type: none"> • Purchasing and Stores Management <ul style="list-style-type: none"> ○ Purchasing systems ○ Food specifications ○ Food requisition systems ○ Inventory management ○ Quality assurance in purchasing ○ Legal aspects related to food procurement • Financial Management <ul style="list-style-type: none"> ○ Elements of cost in food service ○ Food cost control ○ Cost analysis of menu items ○ Portion control and standardization • Cost Control Systems <ul style="list-style-type: none"> ○ Labour cost control ○ Energy cost control • Budgeting and Accounting <ul style="list-style-type: none"> ○ Budget systems in food service ○ Budget preparation ○ Relationship between cost, sales and profits in commercial

	<p style="text-align: center;">and non-commercial establishments</p> <ul style="list-style-type: none"> • Food Safety and Hygiene <ul style="list-style-type: none"> ○ Sanitation in food storage ○ Hygiene in food preparation and service ○ Food safety standards in hospitals
--	--

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

- Assignment on organization chart for a hospital food department
- Assignment on planning of cyclic menu for a hospital food service
- Assignment to develop a sanitation and hygiene checklist for a hospital kitchen

References:

1. Shepard, Donald & Hodgkin, Dominic & Anthony, Yvonne. Analysis of Hospital Costs: A Manual for Managers. Geneva: World Health Organization, 2000.
2. Food Supply Chain Management: Issues for the Hospitality and Retail Sectors. Edited by Jane F Eastham, Liz Sharples and Stephen D Ball. Oxford: Butterworth-Heinemann, 2001.
3. Hospitality Operations and Management. Edited by Krishan K Kamra, Robert C Mill, S Kaushil. New Delhi: A H Wheeler, 2000.
4. Lockwood, Andrew. Quality Management in Hospitality: Best Practice in Action. London: Cassell, 1996.
5. Jones, Ursula & Newton, Shirley & Dixon, Pauline. Hospitality and Catering: A Closer Look. London: Cassell Publ, 1997.
6. Thorner, Marvin Edwards & Manning, Peter Burnam. Quality Control in Food Service. Westport: AVI Publ, 1976.
7. Food Service Systems: Analysis, Design and Implementation. Edited by G E Livingston, Charlotte M Chang. New York: Academic Press, 1979.
8. Ross, Lynne Nannen. Work Simplification in Food Service: Individualized Instruction. Ames: The Iowa Press, 1972.
9. Andrews, Sudhir. Food and Beverage Service: Training Manual. New Delhi: Tata McGraw-Hill, 1980.
10. Powers, Thomas F & Powers, Jo Marie. Food Service Operations: Planning and Control. New York: John Wiley, 1984.

Semester – V

.5.5 Minor Stream

Course Titles	Biochemistry (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	After going through the course, learners will be able to
	1. Explain the structure, classification, and functions of major biomolecules and enzymes.
	2. Describe key metabolic pathways of carbohydrates, lipids, and proteins and their regulation.
	3. Apply knowledge of metabolism to explain energy production and physiological functions.
	4. Demonstrate basic laboratory skills for identification and estimation of biomolecules.
	5. Analyze enzyme activity and factors affecting enzyme function.
	6. Interpret biochemical findings to understand simple metabolic disorders.
Module 1 (Credit 1 Th.): Basics of Macronutrients	
Learning Outcomes	After learning the module, learners will be able to
	1. Define and describe carbohydrates, lipids, proteins, and nucleic acids.
	2. Explain the structure and functions of different classes of biomolecules.
	3. Differentiate between types of carbohydrates, lipids, and amino acids.
	4. Describe enzyme classification, mechanism, and factors affecting enzyme activity.
	5. Relate biomolecules to their biological roles in the human body.
Content Outline	<ul style="list-style-type: none"> • Carbohydrate <ul style="list-style-type: none"> ○ Definition, formula, classification, structures, physio-chemical reactions and uses of monosaccharide, disaccharide and polysaccharide • Lipids <ul style="list-style-type: none"> ○ Definition and introduction • Structural formula • Difference between saturated and unsaturated fatty acids • Purity of oils • TAG • Sterols – structure and function of cholesterol and 7-dehydro-

	<p>cholesterol</p> <ul style="list-style-type: none"> • Protein • Classification of amino acids with structure • Structure of proteins (primary, secondary, tertiary and quaternary structure) • Precipitation and denaturation of proteins • Nucleic acid structures and enzymes • Structures of nucleic acids • Enzymes definition, nomenclature, classification, specificity • Mechanism of enzyme action • Coenzymes and cofactors • Factors affecting enzyme activity • Enzyme inhibitors
Module 2 (Credit 1 Th.): Metabolism of Macronutrients	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain major metabolic pathways of carbohydrates, lipids, and proteins.
	2. Outline the steps involved in energy production processes such as glycolysis and TCA cycle.
	3. Describe the regulation of metabolic pathways.
	4. Analyze the role of metabolism in maintaining energy balance.
	5. Explain the metabolism of amino acids and non-protein nitrogenous compounds.
6. Relate metabolic pathways to common conditions such as ketosis and gout.	
Content Outline	<ul style="list-style-type: none"> • Carbohydrate metabolism • Glycolysis • TCA (Kreb's cycle) • Pentose phosphate pathway • Gluconeogenesis • Glycogenesis • Glycogenolysis • Biological oxidation and electron transport chain • Lipid metabolism • Oxidation of saturated, unsaturated, even, and odd chain fatty acids (β-oxidation), regulation, energetics

	<ul style="list-style-type: none"> • Ketosis and ketone body metabolism • Triglycerides synthesis • Introduction of cholesterol synthesis and degradation with its clinical significance • Protein, non-proteinous and nucleic acid metabolism • Transamination • Oxidative and non-oxidative deamination • Urea cycle – pathway with structures • Metabolism of non-protein nitrogenous compounds: purines, pyrimidines and uric acid • Uric acid and gout • One carbon transfer metabolism and transmethylation and its significance for CVD • Classification of amino acids – essential and non-essential amino acids with examples
Module 3 (Credit 1 Pr.): Practical Applications in Biomolecule Identification and Enzyme Activity	
Learning Outcomes	After learning the module, learners will be able to
	1. Perform qualitative tests for carbohydrates, proteins, and lipids.
	2. Estimate simple biomolecules using basic quantitative methods.
	3. Demonstrate proper laboratory techniques and procedures.
	4. Analyze the effect of temperature and pH on enzyme activity.
5. Record and interpret experimental observations accurately.	
Content Outline	<ul style="list-style-type: none"> • Identification of biomolecules • Qualitative analysis of carbohydrates • Glucose, fructose, sucrose, lactose, maltose, starch • Estimation of glucose/sucrose using Benedict’s quantitative method • Qualitative tests for proteins (color reactions and precipitation reactions) • Qualitative tests for fats
Module 4 (Credit 1 Pr.): Practical Applications in Metabolic Disorder Analysis	
Learning Outcomes	After learning the module, learners will be able to
	1. Perform qualitative tests for normal and abnormal constituents of urine.
	2. Estimate biochemical parameters such as urea and glucose.

	3. Interpret results to identify simple metabolic abnormalities.
	4. Relate biochemical findings to metabolic disorders.
	5. Present laboratory findings in a systematic manner.
Content Outline	<ul style="list-style-type: none"> • Analysis of simulated metabolic disorders • Qualitative estimation of normal constituents of urine • Qualitative estimation of abnormal constituents of urine • Quantitative estimation in urine • Urea • Glucose

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

- **Theory Assignments**
 - Clinical importance of enzymes
 - Disorders of nucleic acid metabolism
- **Practical-Based Assignments / Projects**
 - Alcohol metabolism presentation
 - Case study: lipid storage disorders
 - Oxidation of odd/unsaturated fatty acids
 - ETC inhibition and lactic acidosis scenario
 - Effects on enzyme activity

References:

1. Rastogi, S. C. (2003). Biochemistry (2nd ed.). Tata McGraw-Hill Publishing Co. Ltd.
2. Jain, J. L., Jain, S., & Jain, N. (2005). Fundamentals of Biochemistry (6th ed.). S. Chand Company Ltd.
3. Plummer, D. T. (1971). An Introduction to Practical Biochemistry (2nd ed.). McGraw-Hill Publishing Co. Ltd.
4. Apps, D. K., Cohen, B. B., & Steel, C. M. (1992). Biochemistry: A Concise Text for Medical Students. Bailliere Tindall.
5. Das, D. (1980). Biochemistry (2nd ed.). Academic Publishers.
6. Satyanarayana, U., & Chakrapani, U. (2008). Biochemistry (3rd ed.). Books & Allied Publishers.
7. Chatterjee, M. N., & Shinde, R. (2012). Textbook of Medical Biochemistry (8th ed.). Jaypee Brothers Medical Publishers.
8. Nelson, D. L., & Cox, M. M. (2017). Lehninger's Principles of Biochemistry (7th ed.). Freeman and Co.
9. Berg, J. M., Tymoczko, J. L., & Stryer, L. (2015). Biochemistry (8th ed.). W. H. Freeman.
10. Vasudevan, D. M., & Sreekumari, S. (2007). Textbook of Biochemistry for Medical Students (5th ed.). Jaypee Brothers Medical Publishers.

11. Murray, R. K., & Granner, D. K. (2017–18). Harper's Illustrated Biochemistry (31st ed.). Prentice Hall International.
12. Voet, D., & Voet, J. G. (2018). Biochemistry (5th ed.). John Wiley & Sons.

Semester – V

.5.5 B. Minor Stream

Course Titles	Introduction to Nutritional Assessment and Counselling (Pr)
Course Credits	4 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Demonstrate techniques of nutritional assessment using anthropometric, clinical, biochemical, and dietary methods.
	2. Interpret nutritional assessment data to identify individual and community nutrition status.
	3. Apply principles of nutrition counselling in real-life situations.
	4. Demonstrate effective communication and interpersonal skills during counselling sessions.
	5. Develop nutrition education materials and counselling aids for individuals and groups.
	6. Evaluate dietary behaviors and suggest appropriate nutrition interventions.
Module 1 (Credit 1 Pr.): Direct Methods of Nutritional Assessment (ABCD Method)	
Learning Outcomes	After learning the module, learners will be able to
	1. Perform anthropometric measurements using standardized procedures.
	2. Identify clinical signs of nutritional deficiencies.
	3. Interpret basic biochemical parameters using reports.
	4. Conduct dietary assessment using standard methods.
Content Outline	<ul style="list-style-type: none">• Anthropometric assessment• Measurement of height, weight, BMI, MUAC, waist-hip ratio• Use of standard equipment and growth charts (WHO / Indian standards)• Clinical assessment• Identification of visible signs of nutrient deficiencies (PEM, anaemia, vitamin deficiencies)• Biochemical assessment• Interpretation of haemoglobin, blood glucose, lipid profile (using available reports)• Dietary assessment• 24-hour recall• Food frequency questionnaire

	<ul style="list-style-type: none"> • Diet history method
Module 2 (Credit 1 Pr.): Indirect Methods and Nutrition Diagnosis	
Learning Outcomes	After learning the module, learners will be able to
	1. Interpret indirect indicators of nutritional status.
	2. Identify high-risk individuals or groups
Content Outline	<ul style="list-style-type: none"> • Indirect methods • Use of secondary data such as vital statistics, demographic, socioeconomic data • National nutrition surveys (overview and interpretation of NNMB, NFHS, CNNS and NSSO data)
Module 3 (Credit 1 Pr.): Communication Skills and Nutrition Counselling	
Learning Outcomes	After learning the module, learners will be able to
	1. Demonstrate effective communication skills in counselling.
	2. Use appropriate counselling techniques and responses.
	3. Interpret verbal and non-verbal communication cues.
	4. Identify barriers to effective communication
Content Outline	<ul style="list-style-type: none"> • Basics of communication in counselling • Verbal and non-verbal communication • Listening and interviewing skills • Building counsellor–client relationship • Barriers in communication
Module 4 (Credit 1 Pr.): Counselling Practice and Educational Interventions	
Learning Outcomes	After learning the module, learners will be able to
	1. Conduct group nutrition counselling sessions.
	2. Develop counselling aids and educational materials.
	3. Apply behaviour change strategies in counselling.
	4. Evaluate counselling sessions and outcomes
Content Outline	<ul style="list-style-type: none"> • Planning and conducting counselling sessions (group) • Development of IEC materials (charts, posters, pamphlets, AV aids) • Goal setting and behaviour change techniques • Mock counselling and case-based practice

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE)

- Anthropometric assessment practical: measurement and interpretation of BMI, MUAC, WHR
- Dietary assessment assignment: 24-hour recall / food frequency survey and analysis
- Case-based nutritional assessment: identification of nutrition problems and diagnosis
- Development of counselling aids: preparation of posters, charts, pamphlets
- Mock counselling sessions: group counselling practice

Assessment Scheme: Internal Assessment – 100 Marks

- Practical work (assessment techniques): 30 marks
- Assignments and project: 30 marks
- Counselling practice and aids: 20 marks
- Viva / presentation: 20 marks

References

1. Gibson, R. S. (2005). *Principles of Nutritional Assessment* (2nd ed.). Oxford University Press.
2. Holli, B. B., & Beto, J. A. (2012). *Nutrition Counseling and Education Skills for Dietetics Professionals*. Wolters Kluwer.
3. Bauer, K. D., & Liou, D. (2015). *Nutrition Counseling and Education Skill Development* (5th ed.). Cengage Learning.
4. Contento, I. R. (2016). *Nutrition Education: Linking Research, Theory, and Practice* (3rd ed.). Jones & Bartlett Learning.
5. World Health Organization. (2011). *Waist Circumference and Waist–Hip Ratio: Report of a WHO Expert Consultation*. WHO.
6. Indian Council of Medical Research. (2020). *Nutrient Requirements for Indians: Recommended Dietary Allowances and Estimated Average Requirements*. National Institute of Nutrition.
7. Longvah, T., Ananthan, R., Bhaskarachary, K., & Venkaiah, K. (2017). *Indian Food Composition Tables*. National Institute of Nutrition.
8. Khadilkar, V., Khadilkar, A., Lohiya, N., & Karguppikar, M. (2021). Growth Charts for Indian Children. *Journal of Pediatric Endocrinology and Metabolism*, 34(3), 357–362.

Semester – V

.5.6 Vocational Skill Courses (VSC-4)

Course Titles	Food Product Modifications (Pr)	
Course Credits	2 Credit's	
Course Outcomes	After going through the course, learners will be able to	
	1. Explain principles of sensory evaluation and food modification in food product development.	
	2. Apply sensory evaluation techniques to assess the acceptability and quality of food products.	
	3. Modify traditional and commonly consumed foods to improve nutritional quality and therapeutic suitability.	
	4. Develop and evaluate innovative therapeutic or functional food products considering nutrient composition, texture, and acceptability.	
Module 1 (Credit 1 Pr.): Sensory Evaluation and Food Product Assessment		
Learning Outcomes	After learning the module, learners will be able to	
	1. Explain the principles and importance of sensory evaluation in food product development.	
	2. Prepare and present food samples appropriately for sensory testing.	
	3. Conduct sensory evaluation tests to assess food product acceptability.	
	4. Analyze and interpret sensory evaluation results for product improvement.	
Content Outline	<ul style="list-style-type: none"> • Principles and importance of sensory evaluation • Selection and training of sensory panel members • Preparation and presentation of food samples for testing • Types of sensory evaluation tests • Hedonic rating test • Ranking test • Paired comparison test • Reducing panel response errors • Product matching and product mapping • Shelf-life observation studies • Taint investigation and prevention in food products 	
	Module 2 (Credit 1 Pr.): Food Product Modifications and Therapeutic Food Development	

Learning Outcomes	After learning the module, learners will be able to
	1. Modify food texture, viscosity, and nutrient density for therapeutic dietary needs.
	2. Apply food processing techniques such as fermentation, germination, and malting to improve nutrient availability.
	3. Develop food products suitable for therapeutic diets such as diabetic, low-fat, high-protein, or soft diets.
	4. Evaluate the nutritional and sensory quality of modified food products.
Content Outline	<ul style="list-style-type: none"> • Modification of texture and viscosity for special dietary needs • Development of energy-dense and nutrient-dense foods • Preparation of therapeutic diets (liquid, semi-solid, and soft diets) • Application of food processing techniques • Fermentation • Germination • Malting • Use of functional ingredients in therapeutic foods • Natural or artificial sweeteners for diabetic foods • Fat replacers for low-fat foods • Fibre enrichment for digestive health • Low sodium formulations • Protein concentrates and whey proteins • Functional ingredients such as prebiotics, probiotics, millets, and plant proteins • Modification of recipes for therapeutic diets • Nutritional analysis and sensory evaluation of developed products

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

- Recipe modification assignment
- Sensory evaluation record
- Sensory evaluation report
- Functional ingredient product development
- Development of food product
- Report writing on food product development

References:

1. Meilgaard, Morten, Gail Vance Civille and B. Thomas Carr. (2016). Sensory Evaluation Techniques (5th ed.). CRC Press, Boca Raton, Florida.
2. Harry T. Lawless and Hildegarde Heymann. (2010). Sensory Evaluation of Food: Principles and Practices (2nd ed.). Springer, New York.
3. Steven S. Fuller. (2011). Food Product Development: From Concept to Marketplace (3rd ed.). CRC Press, Boca Raton, Florida.
4. B. Srilakshmi. (2018). Food Science (6th ed.). New Age International Publishers, New Delhi.
5. B. Srilakshmi. (2015). Food Processing and Preservation. New Age International Publishers, New Delhi.
6. Sunetra Roday. (2017). Food Science and Nutrition (2nd ed.). Oxford University Press, New Delhi.
7. Robert E. C. Wildman and Richard S. Bruno. (2016). Handbook of Nutraceuticals and Functional Foods (2nd ed.). CRC Press, Boca Raton, Florida.

Semester – V

.5.7 Field Project (FP)

Course Titles	Nutrition Assessment in Community (Pr.)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Conduct comprehensive nutritional assessment using direct and indirect methods in community settings.
	2. Compile and interpret anthropometric, clinical, biochemical and dietary data.
	3. Interpret indirect indicators such as vital statistics and national survey data.
	4. Identify nutrition risk and formulate community-level nutrition diagnosis.
	5. Prepare and present a structured field-based community nutrition assessment report.
Module 1 (Credit 1 Pr.): Direct Methods of Nutritional Assessment (ABCD Method)	
Learning Outcomes	After learning the module, learners will be able to
	1. Perform anthropometric measurements using standardized procedures.
	2. Identify clinical signs of nutritional deficiencies.
	3. Interpret basic biochemical indicators using available reports.
	4. Conduct dietary assessment at community level.
Content Outline	<ul style="list-style-type: none"> • Anthropometric Assessment <ul style="list-style-type: none"> ○ Standardization of tools and techniques ○ Weight, height, BMI ○ MUAC, waist-hip ratio ○ Use of WHO/Indian growth standards • Clinical Assessment <ul style="list-style-type: none"> ○ Identification of signs of undernutrition and overnutrition ○ Screening for anemia, vitamin A deficiency, PEM • Biochemical Assessment <ul style="list-style-type: none"> ○ Hemoglobin levels ○ Random blood glucose ○ Lipid profile interpretation • D. Dietary Assessment

Module 2 Indirect Methods, Risk Screening and Community Nutrition Diagnosis	
Learning Outcomes	After learning the module, learners will be able to
	1. Interpret community-level nutrition indicators.
	2. Identify high-risk population groups.
	3. Develop assessment-based practical recommendations.
Content Outline	<ul style="list-style-type: none"> • Indirect Methods of Nutritional Assessment using secondary data <ul style="list-style-type: none"> ○ Vital statistics and health data ○ National nutrition surveys (NNMB, NFHS, CNNS, NSSO) ○ Demographic and socioeconomic data ○ Food availability and consumption data

Assignments / Continuous Comprehensive Evaluation (CCE)

- Community selection – selection of defined population group (children, adolescents, elderly, women, etc.)
- Data collection – anthropometric, clinical and dietary assessment; review of available biochemical reports
- Indirect data review – collection of vital statistics and national survey data
- Data analysis – tabulation, graphical presentation and interpretation
- Nutrition diagnosis – identification of priority community nutrition problems
- Report and presentation – submission of structured field report and viva/presentation

References

1. FAO Expert Consultation. (2011). Dietary Protein Quality Evaluation in Human Nutrition. FAO Food and Nutrition Paper No. 92. Rome: Food and Agriculture Organization.
2. Escott-Stump, S. (2008). Nutrition and Diagnosis-Related Care. Philadelphia: Lippincott Williams & Wilkins.
3. Frisancho, A. R. (2008). Anthropometric Standards: An Interactive Nutritional Reference of Body Size and Body Composition for Children and Adults. University of Michigan Press.
4. Gibson, R. S. (2005). Principles of Nutritional Assessment (2nd ed.). Oxford University Press.
5. Khadilkar, V., Khadilkar, A. V., Lohiya, N. N., & Karguppikar, M. B. (2021). Extended growth charts for Indian children. *Journal of Pediatric Endocrinology and Metabolism*, 34(3), 357–362.
6. Lohman, T. G., Wang, Z., & Going, S. B. (2005). Human Body Composition. Human Kinetics.

7. Longvah, T., Anantan, I., Bhaskarachary, K., & Venkaiah, K. (2017). Indian Food Composition Tables. National Institute of Nutrition, ICMR.
8. Ramachandran, P. (2015). The Assessment of Nutritional Status in India During the Dual Nutrition Burden Era.
9. World Health Organization. (2011). Waist Circumference and Waist–Hip Ratio: Report of a WHO Expert Consultation. WHO.

Course Syllabus

Semester – VI

.6.1 Major (Core)

Course Titles	Food Microbiology and Safety (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	After going through the course, learners will be able to
	1. Identify and characterize microorganisms important in food microbiology, including bacteria, yeasts, and molds.
	2. Understand the sources of microbial contamination (water, air, sewage) and their impact on food safety.
	3. Differentiate between food infections and food poisoning while identifying key pathogenic organisms.
	4. Explain the role of beneficial microbes in food fermentation and industrial applications.
5. Apply principles of food safety management (HACCP) and sanitation in food service environments.	
Module 1 (Credit 1 Th.): Microbiology Fundamentals & Environmental Sources, Food Spoilage, Pathogenesis, and Preservation	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe microorganisms important in food microbiology and their characteristics.
	2. Explain sources and types of microbial contamination and food spoilage.
3. Identify environmental sources of microorganisms affecting food safety.	
Content Outline	<ul style="list-style-type: none">• Introduction: History and scope of food microbiology.• General Characteristics: Morphology, reproduction, and physiological traits of molds, yeasts, and bacteria.• Non-Bacterial Agents: Brief introduction to viruses, algae, and parasites.• Environmental Sources of Contamination: Water includes purification, microbial examination, and indicator organisms for water-borne illnesses. Sewage includes risks and brief overview of treatment. Air includes microflora and its impact on food processing.• Other Sources: Humans, pests, animals, and inanimate objects.• Microbial Growth & Hazards: Basic concepts of physical, chemical, and biological hazards.

	<ul style="list-style-type: none"> • Food Spoilage: Contamination and spoilage of specific food groups including cereals, grains, and cereal products, as well as meat, milk, and their respective products. • Food-Borne Diseases: Definitions and differentiation between food poisoning and food infections. Study of key pathogens including <i>Salmonella</i>, <i>Clostridium botulinum</i> (Botulism), <i>Escherichia coli</i>, and <i>Staphylococcus aureus</i>.
Module 2 (Credit 1 Th.): Beneficial Microbes & Industrial Applications, Food Safety & Sanitation	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain beneficial effects of microorganisms in food production
	2. Describe the use of microorganisms in fermentation and food industry
	3. Analyse the nutritional and technological importance of fermented foods
Content Outline	<ul style="list-style-type: none"> • Microbial Fermentation: Role of microorganisms in the production of beer, wine, bread, and vinegar. • Traditional Fermented Foods: Production and nutritional significance of idli, dhokla, khaman, and Indian pickles. • Dairy Microbiology: Curd, yoghurt, and cheese. Commercial production includes introduction to industrial production of vitamins, enzymes, amino acids, and antibiotics. • Sanitation: Cleansing agents, disinfectants, and sanitizers for food service establishments. • Personal Hygiene: The role of the food handler including hand hygiene, working attire, and health status. • HACCP Principles: Need, benefits, and implementation of Hazard Analysis and Critical Control Points.
Module 3 (Credit 1 Pr.): Isolation and Identification of Microorganisms	
Learning Outcomes	After learning the module, learners will be able to
	1. Study the operation of a microscope and observe various microbial structures like bacteria, yeasts, and molds.
	2. Use staining techniques to identify and classify bacterial samples.
	3. Assess air quality in food processing unit
	4. Evaluate surface hygiene by performing swab testing on kitchen counters or food handlers' hands.
Content Outline	<ul style="list-style-type: none"> • Staining of Bacteria: Simple staining, Gram's staining, spore, capsule and flagellar staining, motility of bacteria, staining of yeast and molds. Cultivation and identification of important

	<p>molds and yeasts (slides and mold culture).</p> <ul style="list-style-type: none"> Study of the environment around us as sources of transmission of microorganisms in foods (soil, air). Assessment of surface sanitation of food preparation units - swab and rinse techniques.
Module 4 (Credit 1 Pr.): Water and Milk Analysis – MPN, MBRT	
Learning Outcomes	After learning the module, learners will be able to
	1. Learn the specific principles behind the MBRT and the MPN method.
	2. Explain the significance of indicator organisms coliforms in determining the sanitary quality of water and milk.
	3. Demonstrate the correct procedure for isolation of microorganisms using streak plate, pour plate, or spread plate methods.
	4. Interpret results of a total plate count to determine if a food or water sample meets regulatory safety standards.
Content Outline	<ul style="list-style-type: none"> Bacteriological analysis of water and milk, Total count, MPN Coliform (Count) and MBRT Isolation of microorganisms: Different methods and maintenance of cultures of microorganisms.

Assignments / Activities towards Comprehensive Continuous Evaluation (CCE)

- Studying the microbial benefits of idli or dhokla batter and comparing their probiotic value to Western supplements like Greek yogurt
- Assignment on HACCP plan of any processing industry or unit
- Assignment on probiotics

References

- Frazier, W. C., & Westhoff, D. C. (2013). Food Microbiology (5th ed.). Tata McGraw-Hill Education.
- Guthrie, R. K. (Ed.). (1995). Food Sanitation (3rd ed.). Van Nostrand Reinhold Company.
- Jay, J. M., Loessner, M. J., & Golden, D. A. (2005). Modern Food Microbiology (7th ed.). Springer Science + Business Media.
- Marriott, N. G., Schilling, M. W., & Gravani, R. B. (2018). Principles of Food Sanitation (6th ed.). Springer.
- Pelczar, M. J., Chan, E. C. S., & Krieg, N. R. (1993). Microbiology (5th ed.). McGraw-Hill Book Company.
- Reed, G. (Ed.). (1982). Prescott and Dunn's Industrial Microbiology (4th ed.). AVI Publishing Co., Inc.

7. Stanier, R. Y., Adelberg, E. A., & Ingraham, J. L. (1986). *The Microbial World* (5th ed.). Prentice Hall.

Semester – VI

.6.2 Major (Core)

Course Titles	Nutrition Exercise and Fitness (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	After going through the course, learners will be able to
	1. Explain the concepts of wellness, physical fitness, principles of training.
	2. Describe the role of macro- and micronutrients, hydration in supporting physical activity and sports performance.
	3. Assess components of physical fitness using standard fitness tests and demonstrate appropriate exercises for improving fitness.
	4. Plan nutritionally adequate diets, sports meals and hydration strategies for individuals engaged in different types of physical activity
Module 1(Credit 1 Th.): Foundations of Physical Fitness and Exercise Training	
Learning Outcomes	After learning the module, learners will be able to
	1. Define the concepts of wellness, health and physical fitness.
	2. Describe the components of physical fitness and their significance in health promotion.
	3. Explain the principles of physical training and exercise prescription.
	4. Recommend basic exercise guidelines for healthy adults.
	5. Explain the concept of stress and stress management techniques.
Content Outline	<ul style="list-style-type: none"> • Concept of wellness and health • Physical fitness: meaning and components <ul style="list-style-type: none"> ○ Cardiorespiratory endurance ○ Muscular strength and endurance ○ Flexibility ○ Body composition • Principles of physical training <ul style="list-style-type: none"> ○ Overload ○ Specificity ○ Progression ○ Reversibility ○ Individualization

	<ul style="list-style-type: none"> ○ Exercise guidelines for healthy adults ○ Stress: causes, physiological effects and management techniques
Module 2(Credit 1 Th.): Nutrition for Physical Activity and Sports Performance	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the relationship between nutrition and physical performance.
	2. Describe macronutrient requirements for physically active individuals.
	3. Discuss the role of micronutrients in exercise performance.
	4. Explain fluid balance, dehydration and rehydration strategies.
	5. Evaluate the use, benefits and risks of ergogenic aids.
Content Outline	<ul style="list-style-type: none"> ● Relationship between nutrition and physical activity ● Macronutrient requirements for athletes <ul style="list-style-type: none"> ○ Carbohydrates ○ Protein ○ Fat ● Micronutrients importance for exercise performance ● Hydration strategies during exercise <ul style="list-style-type: none"> ○ Fluid balance ○ Electrolyte replacement ○ Rehydration guidelines ● Ergogenic aids <ul style="list-style-type: none"> ○ Nutritional ergogenic aids ○ Physiological and pharmacological aids ○ Safety and ethical considerations
Module 3(Credit 1 Pr.): Assessment of Physical Fitness	
Learning Outcomes	After learning the module, learners will be able to
	1. Conduct basic fitness assessment tests.
	2. Measure and interpret body composition indicators.
	3. Evaluate flexibility, muscular strength and endurance.
	4. Assess cardiorespiratory fitness using standard methods.
	5. Demonstrate exercises for improving different components of fitness.
Content Outline	<ul style="list-style-type: none"> ● Body composition

	<ul style="list-style-type: none"> ○ Anthropometry ○ Assessment of Body fat ● Flexibility assessment <ul style="list-style-type: none"> ○ Sit and reach test ○ Shoulder Girdle Flexibility ● Muscular strength and endurance tests <ul style="list-style-type: none"> ○ Curl up Test ○ Squat Test ○ Grip Strength ○ Vertical Jump ● Cardiorespiratory fitness assessment <ul style="list-style-type: none"> ○ Queen's Step test ○ 12 min. walk test ● Demonstration of exercises for improving <ul style="list-style-type: none"> ○ Flexibility ○ Strength ○ Endurance ○ Cardiorespiratory fitness
Module 4(Credit 1Pr.): Diet Planning for Physically Active Individuals	
Learning Outcomes	After learning the module, learners will be able to
	1. Plan nutritionally balanced pre-exercise and post-exercise meals.
	2. Develop hydration and sports drink formulations.
	3. Plan diets for athletes engaged in different types of sports
Content Outline	<ul style="list-style-type: none"> ● Meal planning for athletes <ul style="list-style-type: none"> ○ Pre-game meals ○ Post-game recovery meals ○ Preparation of sports drinks ● Planning a day's diet for: <ul style="list-style-type: none"> ○ Long distance runner ○ Basketball player ○ Gymnast ○ Body builder

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):

- Assignment on exercise guidelines for adults
 - Assignment on preparation on a stress management plan
 - Assignment on Ergogenic aids and their applications (survey).
 - Fitness testing, interpretation and preparation of report
 - Planning for different sports

References:

1. Burke, L., & Deakin, V. (2021). Clinical sports nutrition (6th ed.). McGraw-Hill Education
2. Bhide, G., & Mandalika, S. (2018). Nutritional guidelines for sportspersons. Jaypee Brothers Medical Publishers.
3. Dunford, M., & Doyle, J. (2022). Nutrition for sport and exercise (5th ed.). Cengage Learning.
4. Jeukendrup, A., & Gleeson, M. (2019). Sport nutrition: An introduction to energy production and performance (3rd ed.). Human Kinetics.
5. Katch, V. L., McArdle, W. D., & Katch, F. I. (2021). Exercise physiology: Nutrition, energy, and human performance (9th ed.). Wolters Kluwer.
6. Maughan, R. J., & Burke, L. M. (2018). Sports nutrition (2nd ed.). Wiley-Blackwell.
7. McArdle, W. D., Katch, F. I., & Katch, V. L. (2022). Exercise physiology: Nutrition, energy, and human performance (9th ed.). Wolters Kluwer.
8. Sharkey, B. J., & Gaskill, S. E. (2013). Fitness and health (7th ed.). Human Kinetics.
9. Srilakshmi, B. (2016). Exercise physiology, fitness and sport nutrition. New Age International Publishers.
10. Whitney, E., & Rolfes, S. R. (2022). Understanding nutrition (16th ed.). Cengage Learning.
11. Fahey, T. D., Insel, P. M., & Roth, W. T. (2023). Fit & well: Core concepts and labs in physical fitness and wellness (15th ed.). McGraw-Hill Education.
12. Wolinsky I. (1998), Nutrition in Exercise and Sport, 3rd ed. C R C Press.

Semester – VI

.6.3 A. Major (Elective)

Course Titles	Pediatric and Geriatric Nutrition (Th)
Course Credits	4 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Understand growth, development and nutritional requirements during infancy, childhood, adolescence and old age.
	2. Recognize the impact of physiological and pathological conditions on nutritional status across these life stages.
	3. Identify nutrition-related disorders common in children and the elderly.
	4. Develop the ability to recommend appropriate dietary care for promoting health and managing diseases in paediatric and geriatric populations.
Module 1(Credit 1 Th.): Infant and Child Nutrition	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the recommended infant and young child feeding practices.
	2. Describe growth and developmental changes from infancy to adolescence.
	3. Identify nutritional requirements and factors affecting food intake in children.
	4. Recognize common forms of undernutrition and overnutrition in childhood.
Content Outline	<ul style="list-style-type: none"> • Breastfeeding <ul style="list-style-type: none"> ○ Composition of human milk ○ Benefits of breastfeeding ○ Exclusive breastfeeding and duration ○ Pre-lacteal feeds and contraindications ○ Infant formulas • Complementary feeding <ul style="list-style-type: none"> ○ Introduction of complementary foods ○ Feeding practices and challenges • Growth and development <ul style="list-style-type: none"> ○ Growth patterns from infancy to adolescence ○ Body composition changes ○ Nutritional requirements at different stages

	<ul style="list-style-type: none"> • Factors influencing food intake in children <ul style="list-style-type: none"> ○ Packed lunch and school feeding practices • Nutritional assessment <ul style="list-style-type: none"> ○ Growth charts and growth monitoring ○ Developmental milestones • Nutrition issues in infancy <ul style="list-style-type: none"> ○ Preterm and VLBW infants ○ Role of enteral and parenteral nutrition • Childhood malnutrition <ul style="list-style-type: none"> ○ Undernutrition (PEM, SAM, FTT, micronutrient deficiencies) ○ Overnutrition and childhood obesity
Module 2(Credit 1 Th.):Nutritional Management of Pediatric Disorders	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe nutritional challenges in selected pediatric diseases.
	2. Explain dietary management of common childhood metabolic and gastrointestinal disorders.
	3. Discuss the role of diet in neurological and developmental disorders.
	4. Outline nutrition care strategies for endocrine and renal disorders in children.
Content Outline	<ul style="list-style-type: none"> • Biomarkers of selected inborn errors of metabolism: Phenylketonuria (PKU), Maple syrup urine disease, Homocystinuria, Tyrosinemia, Galactosemia, Glycogen storage diseases, and Hereditary fructose intolerance, with emphasis on biochemical markers and basic dietary management. • Gastrointestinal disorders: Diarrhea, Constipation • Neurological and developmental conditions: Epilepsy and ketogenic diet; Autism spectrum disorders • Endocrine and renal disorders: Type 1 Diabetes Mellitus; Nephrotic syndrome and CKD in children • Food allergies and intolerance in children
Module 3(Credit 1 Th.):Ageing and Nutritional Requirements	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the demographic and biological aspects of ageing.
	2. Describe physiological changes during ageing and their nutritional implications.
	3. Identify factors influencing nutritional requirements in older

	adults.
	4. Plan basic dietary strategies to promote healthy ageing.
Content Outline	<ul style="list-style-type: none"> • Demography of ageing <ul style="list-style-type: none"> ○ Global and Indian ageing trends ○ Life expectancy and lifespan ○ Successful ageing • Physiological changes during ageing <ul style="list-style-type: none"> ○ Changes in body composition ○ Introduction to physiological changes in major body systems: gastrointestinal, cardiovascular, renal, respiratory, endocrine, neurological, and musculoskeletal systems • Functional manifestations of ageing <ul style="list-style-type: none"> ○ Constipation ○ Fluid and electrolyte imbalance ○ Sleep disturbances ○ Thermoregulation changes • Introduction to theories of ageing Factors influencing ageing (genetic, environmental, lifestyle) • Nutritional requirements of the elderly Importance of calorie restriction and physical activity Dietary planning for senior citizens
Module 4(Credit 1 Th.):Nutrition and Health in the Elderly	
Learning Outcomes	After learning the module, learners will be able to
	1. Assess nutritional status of elderly individuals using basic tools.
	2. Identify nutrition-related risk factors for common geriatric diseases.
	3. Explain the role of nutrition in prevention and management of age-related conditions.
	4. Describe national programmes and strategies that support healthy ageing.
Content Outline	<ul style="list-style-type: none"> • Nutritional status of elderly populations • Factors affecting food intake and nutrition in older adults • Undernutrition in the elderly <ul style="list-style-type: none"> ○ Risk factors and consequences • Common diseases in the elderly <ul style="list-style-type: none"> ○ Gastrointestinal disorders

	<ul style="list-style-type: none"> ○ Cardiovascular diseases ○ Renal and respiratory disorders ○ Mental health conditions (depression, dementia) ○ Neurodegenerative disorders (Parkinson's, Alzheimer's) ● Musculoskeletal problems (osteoporosis, sarcopenia, frailty) ● Role of nutrition in prevention and management of age-related diseases ● Nutritional assessment <ul style="list-style-type: none"> ○ Mini Nutritional Assessment (MNA) ○ Frailty assessment ● Nutrient–drug interactions ● Policies and programmes for the elderly (government and NGOs) ● Strategies to promote healthy ageing <ul style="list-style-type: none"> ○ Physical activity ○ Lifestyle and traditional approaches
--	--

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

- Assignment as growth monitoring exercise
- Assignment on Interviewing elderly on diet patterns and making a brief report
- Case study analysis

References:

1. Antia, F. P., & Abraham, P. (2019). Clinical dietetics and nutrition (5th ed.). Oxford University Press.
2. Bamji, M. S., Rao, N. P., & Reddy, V. (2017). Textbook of human nutrition (4th ed.). Oxford & IBH Publishing.
3. Brown, J. E. (2017). Nutrition through the life cycle (6th ed.). Cengage Learning.
4. Gibney, M. J., Lanham-New, S. A., Cassidy, A., & Vorster, H. H. (2020). Introduction to human nutrition (3rd ed.). Wiley-Blackwell.
5. Goday, P. S., & Walia, C. (Eds.). (2022). Pediatric nutrition for dietitians. CRC Press.
6. Greer, F. R., & Abrams, S. A. (Eds.). (2025). Pediatric nutrition (9th ed.). American Academy of Pediatrics.
7. Gupte, S. (2020). Recent advances in pediatrics: Child nutrition in practice (Vol. 28). Jaypee Brothers Medical Publishers.
8. Srilakshmi, B. (2018). Dietetics (8th ed.). New Age International Publishers.
9. Srilakshmi, B. (2022). Nutrition science (7th ed.). New Age International Publishers.
10. Watson, R. R. (Ed.). (2019). Handbook of nutrition in the aged (5th ed.). Academic Press.

11. World Health Organization. (2009). Infant and young child feeding: Model chapter for textbooks for medical students and allied health professionals. World Health Organization.
12. Indian Council of Medical Research – National Institute of Nutrition. (2020). Nutrient requirements for Indians: Recommended dietary allowances and estimated average requirements. ICMR-NIN.
13. National Institute of Nutrition. (2024). Dietary guidelines for Indians (2nd ed.). ICMR-NIN.

Semester – VI

.6.3 B. Major (Elective)

Course Titles	Nutrition Counseling and Communication Skills (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	After going through the course, learners will be able to
	1. Understand the principles and importance of nutrition counselling in dietetic practice.
	2. Develop effective communication and interpersonal skills for counselling clients.
	3. Apply counselling models and behaviour change strategies in nutrition interventions.
	4. Conduct individual and group counselling sessions using appropriate tools and educational aids.
Module 1(Credit 1 Th.): Foundations of Nutrition Counseling	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the concept and significance of nutrition counselling.
	2. Describe the role and responsibilities of a nutrition counsellor.
	3. Understand counselling theories and models used in nutrition practice.
	4. Assess client readiness for dietary behaviour change.
Content Outline	<ul style="list-style-type: none"> • Concept and importance of nutrition counselling • Role of a nutrition counsellor in health care • Goals of nutrition counselling • Theoretical approaches to counselling • Nutrition counselling models • Counselling protocols and steps in counselling process • Client assessment and readiness-to-change tools
Module 2(Credit 1 Th.): Communication Skills in Nutrition Counseling	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the role of communication in effective counselling.
	2. Demonstrate basic counselling responses and listening skills.
	3. Interpret non-verbal communication and body language.
	4. Identify barriers and roadblocks to communication.
Content Outline	<ul style="list-style-type: none"> • Stages of skill development in counselling • Models of communication

	<ul style="list-style-type: none"> • Building an effective counsellor–client relationship • Verbal and non-verbal communication in counselling • Counselling responses and interviewing skills • Respondent driven interview techniques • Communication barriers in counselling
Module 3(Credit 1 Pr.): Group Counseling and Behavior Change	
Learning Outcomes	After learning the module, learners will be able to
	1. Organize and conduct group counselling sessions.
	2. Evaluate advantages and limitations of group counselling.
	3. Implement educational interventions for behaviour change.
	4. Apply relapse prevention strategies in dietary counselling.
Content Outline	<ul style="list-style-type: none"> • Planning and conducting group counselling sessions • Group process and management techniques • Evaluation of group interaction and feedback • Demonstration of behaviour change communication strategies
Module 4 (Credit 1 Pr.): Counseling Practice and Educational Tools	
Learning Outcomes	After learning the module, learners will be able to
	1. Apply counselling procedures in mock counselling situations.
	2. Use goal-setting techniques in nutrition counselling.
	3. Develop counselling aids and educational materials.
	4. Conduct mock counselling sessions.
Content Outline	<ul style="list-style-type: none"> • Preparation of questionnaires for dietary assessment surveys • Development of counselling aids (charts, posters, pamphlets, flip charts, digital aids) • Preparation of audio-visual materials for nutrition education • Conducting mock nutrition counselling sessions • Case-based counselling practice

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):

- Preparation of questionnaire for survey
- Development of counselling aids
- Conducting group counselling sessions
- Conducting mock counselling sessions

References:

1. Holli, B. B., & Beto, J. A. (2012). Nutrition counseling and education skills for dietetics professionals. Wolters Kluwer.
2. Beto, J. A., Holli, B. B., & Nutrition and Dietetic Educators and Preceptors. (2023). Nutrition counseling and education skills: A practical guide (8th ed.). Jones & Bartlett Learning.
3. Bauer, K. D., & Liou, D. (2015). Nutrition counseling and education skill development (5th ed.). Cengage Learning.
4. Contento, I. R. (2016). Nutrition education: Linking research, theory, and practice (3rd ed.). Jones & Bartlett Learning.

Semester – VI

.6.4 Minor Stream

Course Titles	Community Nutrition (Pr)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Identify and evaluate the dietary habits of the community.
	2. Design and conduct nutrition education for the community.
	3. Use behavioral change models, culturally appropriate messaging, and interactive methods to engage the community.
Module 1(Credit 1 Pr.): Understanding Community Nutrition & Outreach Strategies	
Learning Outcomes	After learning the module, learners will be able to
	1. Conduct a preliminary community nutrition needs assessment.
	2. Design educational materials (posters, pamphlets, digital content).
	3. Practice communication techniques through role-play and group discussions.
Content Outline	<ul style="list-style-type: none"> • Introduction to Community Nutrition • Definition, scope, and importance in public health • Common nutritional deficiencies and diet-related diseases • Principles of Community Engagement • Understanding community dynamics and cultural considerations • Role of students in promoting nutrition awareness • Planning & Designing Nutrition Awareness Programs • Identifying target groups (children, pregnant women, elderly, etc.) • Developing culturally appropriate messages and educational materials • Behavior Change Communication (BCC) techniques for effective outreach
Module 2(Credit 1 Pr.): Implementing & Evaluating Community-Based Nutrition Initiatives	
Learning Outcomes	After learning the module, learners will be able to
	1. Implement nutrition awareness activities in real-world community settings.
	2. Assess the impact of nutrition education on community behavior.

	3. Develop strategies to sustain nutrition awareness efforts in communities.
Content Outline	<ul style="list-style-type: none"> • Executing Community-Based Nutrition Awareness Activities • Conducting nutrition education sessions in schools, anganwadis, and community centers • Organizing interactive workshops such as healthy cooking demonstration, quizzes, storytelling • Sustaining Community Nutrition Awareness • Encouraging local participation and leadership

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):

- Conducting dietary survey
- Planning and conducting nutrition education program in the community

References:

1. Boyle, M. A., & Holben, D. H. (2017). Community nutrition in action: An entrepreneurial approach (7th ed.). Cengage Learning.
2. Nnakwe, N. (2018). Community nutrition: Planning health promotion and disease prevention (3rd ed.). Jones & Bartlett Learning.
3. American Public Health Association. (2020). Strategic skills for public health practice: Community engagement. American Public Health Association Press.
4. Pinstrip-Andersen, P., Pelletier, D., & Alderman, H. (Eds.). (1995). Child growth and nutrition in developing countries: Priorities for action. Cornell University Press.
5. Khanapurkar, U., & Khanapurkar, A. (2020). Community nutrition, hygiene and public health. Amazon Digital Services LLC.
6. Vyas, S. (2021). Nutrition Education and Program Planning: A Reference Book. Nitya Publications.
7. Ministry of Women and Child Development. (2017). Training Manual on Food Safety & Nutrition Awareness Raising.
8. SPRING. (2016). India Maternal, Infant, and Young Child Community Nutrition Training Package.

Semester – VI

.6.5 Minor Stream

Course Titles	Diet Therapy (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	After going through the course, learners will be able to
	1. Explain the basic principles and concepts of diet therapy and their application in modifying normal diets.
	2. Describe the etiology, symptoms, and nutritional management of selected infectious and lifestyle-related diseases.
	3. Apply dietary modifications for common clinical conditions using evidence-based dietary guidelines.
	4. Plan and prepare therapeutic diets considering nutritional adequacy, cost, and food availability.
	5. Interpret basic diet prescriptions and demonstrate practical skills in therapeutic meal planning.
Module 1(Credit 1 Th.): Principles of Diet Therapy and Management of Clinical Conditions	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the concept and principles of therapeutic diet planning.
	2. Identify physiological changes during illness and their nutritional implications.
	3. Discuss the dietary management of selected infectious and gastrointestinal disorders.
	4. Explain the nutritional management of common liver disorders.
Content Outline	<ul style="list-style-type: none"> • Basic Concepts of Diet Therapy <ul style="list-style-type: none"> ○ Definition and objectives of diet therapy ○ Principles of planning therapeutic diets ○ Modification of the normal diet <ul style="list-style-type: none"> Consistency (liquid, soft, normal) Nutrient modifications • Diet in Fever and Infection <ul style="list-style-type: none"> ○ Fever: definition, causes and classification ○ Metabolic changes during fever ○ General dietary guidelines in fever ○ Nutritional management in Tuberculosis and Typhoid • Pre-operative and Post-operative Diets <ul style="list-style-type: none"> ○ Objectives of nutritional care during surgery

	<ul style="list-style-type: none"> ○ Dietary progression during recovery ○ General dietary guidelines ● Diet in Gastrointestinal Disorders <ul style="list-style-type: none"> ○ Etiology, symptoms and nutritional management of: <ul style="list-style-type: none"> ✓ Diarrhea, ✓ Constipation, ✓ Peptic Ulcers ○ Terminology: Achlorhydria, Dumping syndrome, Steatorrhea ○ Diet in Liver Disorders ○ Etiology, symptoms and dietary management of : <ul style="list-style-type: none"> ✓ Infective hepatitis ✓ Cirrhosis of liver
Module 2(Credit 1 Th.): Diet Therapy in Lifestyle Disorders	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain the risk factors and pathophysiology of common lifestyle disorders.
	2. Describe the dietary management of obesity, hypertension, diabetes and renal disorders.
	3. Apply the principles of dietary modification for prevention and management of NCDs.
Content Outline	<ul style="list-style-type: none"> ● Weight Management ● Overweight and Obesity <ul style="list-style-type: none"> ○ Definition and classification ○ Types and grades of obesity ○ Causes and theories of obesity ○ Methods of assessment (BMI, waist circumference etc.) ○ Dietary and lifestyle management ○ Behaviour modification strategies ○ Limitations of fad diets and extreme calorie restriction ● Underweight <ul style="list-style-type: none"> ○ Definition and causes ○ Nutritional assessment ○ Dietary management

	<ul style="list-style-type: none"> • Diet in Hypertension <ul style="list-style-type: none"> ○ Definition and classification ○ Blood pressure regulation (Renin–Angiotensin System overview) ○ Risk factors and complications ○ Dietary management: sodium restriction, DASH-type dietary principles, salt substitutes and potassium-rich foods ○ Clinical Terms: Ischemia, Hyperproteinemia, P:S ratio, Thrombus, Infarct, Atherosclerosis, Myocardial infarction, Stroke, Coronary artery disease, Rheumatic heart disease, Salt-sensitive hypertension • Diet in Diabetes Mellitus <ul style="list-style-type: none"> ○ Classification of diabetes ○ Causes, symptoms and diagnosis ○ Metabolic changes in Type 2 Diabetes ○ Principles of dietary management • Diet in Renal Disorders <ul style="list-style-type: none"> ○ Structure and functions of kidney ○ Causes of renal disorders (overview) ○ ARF and CRF (introduction) ○ Renal calculi ○ Types of stones ○ Etiology and symptoms ○ Principles of dietary management ○ Concept of acid ash and alkaline ash diets
Module 3 (Credit 1 Pr.): Basic Therapeutic Diet Planning	
Learning Outcomes	After learning the module, learners will be able to
	1. Apply the principles of therapeutic diet planning.
	2. Modify diets according to consistency and nutrient requirements.
Content Outline	<ul style="list-style-type: none"> • Planning and preparation of normal balanced diet <ul style="list-style-type: none"> ○ Adult sedentary man/woman • Planning and preparation of progressive hospital diets <ul style="list-style-type: none"> ○ Clear liquid diets ○ Full liquid diets ○ Soft diet recipes • Planning and preparation of High Calorie, High Protein

Diets	
Module 4 (Credit 1 Pr.): Therapeutic Diets for Lifestyle Disorders	
Learning Outcomes	After learning the module, learners will be able to
	1. Plan therapeutic diets for selected lifestyle diseases.
	2. Modify recipes based on nutrient restrictions.
Content Outline	<ul style="list-style-type: none"> • Low calorie diet planning • Diet for Hypertension • Diet for Renal Disorders • Diet for Diabetes Mellitus

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):

- Assignment on pathophysiology
- Assignment on special feeding methods
- Analysis of a sample biochemical report (interpret lab values and plan dietary modifications)
- Case study analysis

References:

1. Mahan, L. K., Raymond, J. L., & Escott-Stump, S. (2020). Krause's food & the nutrition care process (15th ed.). Elsevier.
2. Nelms, M., Sucher, K. P., Lacey, K., & Roth, S. L. (2022). Nutrition therapy and pathophysiology (4th ed.). Cengage Learning.
3. Escott-Stump, S. (2011). Nutrition and diagnosis-related care (7th ed.). Wolters Kluwer.
4. Williams, S. R. (2016). Nutrition and Diet Therapy (7th ed.). Times Mirror/Mosby College Publishing.
5. Sharma, A. (2017). Principles of therapeutic nutrition and dietetics. CBS Publishers.
6. Joshi, S. A. (2021). Nutrition and dietetics (5th ed.). McGraw Hill.
7. Jatana, A. (Ed.). (2022). Apollo clinical nutrition handbook. Jaypee Brothers Medical Publishers.
8. Indian Dietetic Association. (2018). Clinical dietetics manual. Elite Publishing House.

Semester – VI

.6.6 On the Job Training (OJT)

Course Titles	On the Job Training in Nutrition and Dietetics (Pr)
Course Credits	2 Credit's
Course Outcomes	After going through the course, learners will be able to
	1. Apply principles of clinical nutrition and dietetics in real-world healthcare set ups.
	2. Demonstrate practical skills in therapeutic diet planning, patient care, and nutrition counselling.
	3. Analyze clinical cases and relate dietary management to disease conditions.
	4. Evaluate hospital dietetics services including food service systems and patient care practices.
	5. Exhibit professional behaviour, communication skills, and ethical practices in clinical settings.
	6. Document and present internship experiences through reports, case studies, and presentations.
INTERNSHIP	
Learning Outcomes	1. Demonstrate professional conduct, hygiene, and safety practices in hospital settings.
	2. Apply knowledge of clinical nutrition in patient care and therapeutic diet planning.
	3. Assist in dietary assessment, diet planning, and nutrition counselling under supervision.
	4. Evaluate hospital food service systems and patient diet management processes.
	5. Record and document clinical observations, diet plans, and patient responses systematically.
	6. Reflect on internship experiences and suggest improvements in dietetics practice.
Content Outline	<ul style="list-style-type: none"> • Internship Structure & Training Areas <ul style="list-style-type: none"> ○ Suggested Placement Areas: Hospitals and healthcare institutions (clinical dietetics departments) Clinics and nutrition counselling centres Community health centres • Internship Activities <ul style="list-style-type: none"> ○ Orientation to hospital dietetics department ○ Observing roles and responsibilities of clinical dietitians

	<ul style="list-style-type: none"> ○ Participation in hospital food service and diet distribution systems ○ Assisting in therapeutic diet planning for patients ○ Monitoring patient dietary intake and maintaining records ○ Observing and assisting in nutrition counselling sessions ○ Interaction with healthcare professionals (doctors, nurses, dieticians) ○ Participation in case study preparation and diet chart formulation
--	--

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

- Maintain daily internship diary / work log
- Participate in assigned hospital tasks
- Collect patient data and dietary observations
- Prepare minimum 2 case studies
- Prepare and submit internship report
- Deliver presentation/viva on learning experience

Assessment Scheme

Internal Assessment – 50 Marks

- Internship report
- Case studies presentation
- Daily diary
- Presentation / viva

External Assessment – 50 Marks

- Performance evaluation by hospital/clinical dietician (30 days internship)
- Evaluation based on professional conduct, skills and participation, learning and application
- Assessment form (provided by college)