SNDT Women's University, Mumbai

Master of Science

(Home Science- Food Science & Nutrition)

M.Sc. (FSN)

As per NEP 2020

Syllabus

(w.e.f. Academic Year 2023-24)

SNDT Women's University, Mumbai

NEP Syllabus for Postgraduate Programme

M.Sc. (Food Science & Nutrition)

2023-24

Programme Degree		M.Sc.
Faculty		Science & Technology
Specialization		(Food Science and Nutrition)
Preamble		This programme is aimed at creating skilled and sensitized individuals who understand interrelationship of food science, human nutrition and methods of investigation for public health. It is design to obtain competencies and capabilities for learners to be able to contribute towards healthy human society. At the end of this Programme, the learners obtain skill sets to work in food industry/ food testing Labs/ R & D units, Food Science & Nutrition Research, and Academics.
Programme Specific Outcomes		After completing this programme, Learner will be able to:
	1.	Have updated knowledge and develop capacities in the areas of Human Nutrition and Food Science, Food Safety and Quality, Food Product Development.
	2.	Have obtained sound understanding of Food Science and Nutrition as well as various sciences and disciplines with understanding about the inter disciplinary nature of Food Science and Nutrition.
	3.	Develop abilities including analysis, critical reasoning and use their creativity to become professionals in these and related areas to work effectively and efficiently in academics, research, food industry, training, extension and community service.
	4.	Have the necessary capacities and abilities and enable them to Pursue higher education and research in Food Science and Human Nutrition.
	5.	Undertake state of the art, cutting edge research in their chosen fields.

	6.	Participate effectively as responsible and ethical professionals who can contribute substantially to national development and quality of life of citizens.
Eligibility Criteria for the Programme	Any student who has passed 12th Standard/H.Sc./10+2 with Science and successfully completed graduation in Nutrition related subjects with minimum 50%/B Grade from UGC/AICTE recognized institution is eligible to apply for this programme. Students having Graduation in Bio-Technology/Microbiology/Zoology/Botany and other Life Science subjects with 55% are eligible to apply provided they have studied minimum eight credits of nutrition/Physiology/bio-chemistry related subjects in their graduation. Students with Commerce/Arts/Pure Science, B.Sc. Composite Home Science/ BA Home Economics/ Home Science/ BSc. Hospitality/ Institutional/ Food Service Management are not eligible.	
Intake (For SNDTWU Departments and Conducted Colleges)	20	

RM: Research Methodology * OJT: On-Job Training * RP: Research Project

Structure for Four Semesters

M.Sc. (Food Science and Nutrition)

Semester I						
SN	***Courses***	***Type of Course***	***Credits***	***Marks***	***Int***	***Ext***
114311	Physiological Biochemistry (Th.)	Major (Core)	4	100	50	50
114312	Food Chemistry (Th.)	Major (Core)	4	100	50	50
114313	Human Nutrition I (Macro nutrients & water) (Th.)	Major (Core)	4	100	50	50
114324	Methods of Investigations in Foods & Nutrition (Pr.)	Major (Core)	2	50	50	0
124321 124312	Food Science & Chemistry (Pr.) OR Public Nutrition & Health (Th.)	Major (Elective)	4	100	50	50
134311	Research Methodology (Th.)	Minor Stream (RM)	4	100	50	50
End of Semester I			**22**	**550**	**300**	**250**
Semester II						
214311	Food Microbiology I (Th. & Pr.)	Major (Core)	4 (2 + 2)	100	50	50
214312	Human Nutrition II (Micro nutrients) (Th.)	Major (Core)	4	100	50	50
214313	Food Safety & Quality Control (Th. & Pr.)	Major (Core)	4 (1 + 3)	100	50	50
214324	Food Product Development, Modification & Sensory Evaluation (Pr.)	Major (Core)	2	50	0	50
224321 224312 224313 224314	Food Processing & Technology (Pr.) OR Food Quality Standards & Regulations (Th.) OR Functional Foods, Biodynamic Principles, Nutraceuticals OR Food Entrepreneurship	Major (Elective)	4	100	50	50
244341	Internship*	OJT	4	100	50	50
Exit with PG Diploma in Food Science Nutrition (FSN)			**22**	**550**	**250**	**300**

(* Internship at Research & Development Laboratory/Food Analysis Laboratory/ Nutrition Research)

SECOND YEAR

M.Sc. (Food Science & Nutrition)

Semester III						
Code	***Courses***	***Type of Course***	***Credits***	***Marks***	***Int***	***Ext***
314311	Statistical Application in Research	Major (Core)	4	100	50	50
314312	Maternal & Child Nutrition (Th.)	Major (Core)	4	100	50	50
314313	Food Microbiology II (Th. & Pr.)	Major (Core)	4 (2 +2)	100	50	50
314324	Assessment of Nutritional Status (Pr.)	Major (Core)	2	50	0	50
324321 324312 324313 324314 324315 324316	Food Product Development (Pr.) OR Genetics OR Research from Molecular Level to Human OR Recent Methods in Food Processing, Preservation and Packaging OR Understanding Metabolic and Cardiovascular Health OR Advances in Food Microbiology and Safety	Major (Elective)	4	100	50	50
354331	Research Project	RP	4	100	50	50
End of Semester III			**22**	**550**	**250**	**300**
Semester IV						
414311	Nutrigenetics & Nutrigenomics (Th.)	Major (Core)	4	100	50	50
414312	Nutrition Human Microbiome & Health (Th.)	Major (Core)	4	100	50	50
414323	Nutrition in Society (Pr.)	Major (Core)	4	100	50	50
424311 424312	Environment Sustainability, Food and Nutrition Security for Health OR Integrated Lifestyle Health Management OR	Major (Elective)	4	100	50	50

424313 424314 424315 424316 424317	Integrated Diet and Musculoskeletal Health OR Food Product Development for Special population OR Indian Knowledge Systems in Diet, Food & Health OR Nutritional Epidemiology					
454331	Dissertation	RP	6	150	100	50
End of Semester IV			**22**	**550**	**300**	**250**

Syllabus Contents

Semester I

1.1 Major (Core)

Course Title **Subject Code**	**Physiological Biochemistry** **114311**	
Course Credits	**4**	
Course Objective	This course enables students to: 1. Learn the anatomy of human body. 2. Understand the metabolism of nutrients in human body. 3. Comprehend the metabolism of genetic components, purine and pyrimidines.	
Course Outcomes	After going through the course, learners will be able to -	
	1.Understand the mechanisms adopted by the human body for regulation of metabolic pathways	
	2.Describe biochemical pathways relevant in nutrient metabolism.	
	3. Develop an insight into interrelationships between various metabolic pathways.	
	4.Understand integration of cellular level metabolic events to nutritional disorders and imbalances.	
	5. Review biochemical techniques that are relevant for the investigation of nutrient metabolism.	
Module 1		1 Credit
Learning Outcomes	After learning the module, learners will be able to -	
	1. Define and differentiate the structure, composition of membrane.	
	2. Recognize cell signaling pathways.	
Content Outline	• Membrane structure, composition and transport of metabolites across membranes • Acid base balance and its regulation • Enzymes • Kinetics of monosubstrate and bisubstrate catalysed reactions (including inhibition) • Enzyme specificity, regulation of enzyme activity and synthesis • Enzymes in clinical diagnosis. Detoxification in the body-metabolism of xenobiotics (Phase I and Phase II enzymes)	

	• Cell Signalling pathways- Overview of extracellular cell signalling, G protein couple receptors and their effectors, enzyme linked receptors and their effectors, second messengers, map kinase pathways • Free radicals, ROS and oxidative damage
Module 2	1 Credit
Learning Outcomes	After learning the module, learners will be able to - 1. Understand the metabolism of carbohydrates, lipids and protein
Content Outline	○ Carbohydrate Metabolism- a. Intestinal transport of carbohydrates, Transport of glucose across various cells, Cellular metabolism of carbohydrates Glycogen metabolism, Regulation of carbohydrate metabolism at substrate level, enzyme level, hormonal level and organ level, b. Disorders of carbohydrate metabolism. c. Definition, classification, structure and properties of glycoproteins and proteoglycans ○ Metabolism of Lipids- a. Metabolism is to be discussed with reference to: Intestinal transport of lipids, Cellular uptake and metabolism of lipids (beta-oxidation, de novo synthesis of fatty acids, synthesis and breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol) Lipoprotein metabolism, VLDL and LDL ('Forward' Cholesterol transport) VLDL and LDL (Endogenous TAG transport), HDL ('Reverse' Cholesterol transport), b. Regulation of lipid metabolism at substrate level, enzyme level, hormonal level and organ level, Disorders of lipid metabolism, Dyslipidaemias, Lipid storage diseases ○ Protein Metabolism- a. Metabolism of amino acids- biosynthesis and catabolism - energy, glucose and ketone bodies, protein amino acids, non-protein amino acids (including urea cycle, transamination, one-carbon metabolism), b. Creatine and creatinine, c. Plasma proteins – Nature, properties and functions, d. Biologically active peptides, polypeptides and transport proteins, Inborn errors of amino acid metabolism
Module 3	1 Credit
Learning Outcomes	After learning the module, learners will be able to - 1. Examine the intermediary metabolism of human body. 2. Define biological oxidation.

Content Outline	▪ Intermediary Metabolism- o Review of regulation of intermediary metabolism- equilibrium and non-equilibrium reactions, committed steps, allosteric modifications, covalent modulation, hormonal induction and repression, crossover theorem, starve-feed cycle, caloric homeostasis and futile cycles, Tricarboxylic acid cycle ▪ Biological Oxidation: Electron transport chain and oxidative phosphorylation
Module 4	1 Credit
Learning Outcomes	After learning the module, learners will be able to - 1. Define the metabolism of purine and pyrimidines. 2. Recognise the metabolism of DNA, RNA.
Content Outline	o Biochemical aspects of purine and pyrimidines- o Metabolism of purines o Metabolism of pyrimidines o Role of purine and pyrimidine nucleotides in metabolism. o Biochemistry of Nucleic Acids- o Metabolism of DNA o Metabolism of RNA o DNA replication, mutation, repair and recombination concepts o Disorders of nucleic acid metabolism o Protein Biosynthesis- o Gene expression and its regulation, transcription, translation, post- o translational modification o Inhibitors of protein biosynthesis o Gene expression in mitochondria o Systems Biology including Metabolomics and Proteomics
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Summarise the pathways of specific nutrient metabolism n human body. - Present a project on physical structure and composition of each nutrients.	

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- King, E.J. and Wootton, I.D.P. (1959). 3rd ed. Micro-Analysis in Medical Biochemistry. J and A Churchill Ltd.
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- Nelson, D.L. and Cox, M.M. (2017): 7th Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.3
- Plummer, D.T. (1987). 3rd ed. An Introduction to Practical Biochemistry. McGraw-Hill Book Co
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1.2 Major (Core)

Course Title **Subject Code**	**Food Chemistry** **114312**
Course Credits	**4**
Course Objective	This course enables students to: 1. Learn the basic concepts of nutrients that compose the food. 2. Understand the structure and role of nutrients in food. 3. Comprehend the effects of processing on food and its composing nutrients.
CourseOutcomes	Be familiar with composition of food stuffs
	Understand the properties and significance of various food constituents.
	Understand changes occurring in various food stuffs after harvest, during storage and transportation, as a result of processing and cooking.
	Apply this knowledge for food product development, food analysis and quality control.
Module	1 Credit
Learning Outcomes	After learning the module, learners will be able to -
	1. Define water and its properties. 2. Distinguish between classifications of carbohydrates.
Content Outline	○ Water, Ice and Food Dispersions a: Structure and properties of water and ice - types of water, solutions and colligative properties - Water activity and Food spoilage, Sorption phenomena - Phase transition of foods containing water - Relation between viscosity and temperature - WLF equation - Water-solute interactions -Heat transfer during processing b: Colloidal salts, stabilization of colloidal systems, Rheology of food dispersions c: Gels: Structure, formation, strength, types and permanence d: Foams: Structure, formation and stabilization
	○ Carbohydrates: Polysaccharides, Sugars and Sweeteners a. Reactions of mono and oligosaccharides b. Use of Polysaccharides in foods: Non-starch Polysaccharides: Cellulose, hemicelluloses, pectins, Gums(gum Arabic, guar gum, xanthan gum), animal polysaccharides, agar, alginates, carageenan. c. Starch: Structure, Properties of amylose and amylopectin, effect of processing -gelatinization, methods for following gelatinization. Characteristics of some food starches. Effects of ingredients and conditions on gelatinization. Retrogradation d: Polysaccharide hydrolysis

	e: Modified food starches: mechanically damaged starches, extruded starches, pre-gelatinized, thin boiling starch, cross-linked starches, starch ethers and esters, oxidized starches f: Sugars and Sweeteners: Sugars, syrups, sugar alcohols, potent sweeteners, sugar products, Caramelization. Confectionery, chocolates, jams and jellies, synthetic and natural beverages
Module 2	1.5 Credit
Learning Outcomes	After learning the module, learners will be able to
	1.Define Proteins and its properties. 2. Distinguish between classifications of Amino Acids.
Content Outline	**A: Chemistry of Amino acids, peptides, proteins and Science of Protein Foods** a: Review of structure, physicochemical properties, functional properties of amino acids, peptides and proteins b: Chemical and enzymatic modifications- denaturation, non-enzymatic browning, and other chemical changes c: Processing induced physical, chemical and nutritional changes d: Texturized proteins e: Protein isolates, concentrates f: Protein hydrolysate **B. Enzymes:** a. Review of nomenclature, properties and isolation Nature of enzymes, stability and action. b: Factors influencing enzymes- enzyme inactivation and control c: Enzymes in food processing and modification- Proteolytic enzymes, oxidases, lipases, enzymes decomposing carbohydrates and applications d: Immobilised enzymes in food processing. e. Enzymes in waste management f Enzymes and health/nutrition/food issues C. **Milk and Milk Products:** a. Composition. Physical and functional properties. b. Denaturation c. Effects of processing and storage. d. Cultured milk, yogurt, butter, whey, cheese, concentrated and dried products, frozen desserts, dairy product substitutes. **D. Meat and Poultry:** a. Muscle composition, characteristics and structure. b. Post mortem changes. c. Processing, preservation and their effects. Heat-induced changes in meat. d Variables in meat preparation. Tenderizers. e. Meat Products. **E. Eggs:** a. Structure and Composition. Changes during storage. b. Functional properties of eggs, use in cookery.

	c. Egg processing. d. Low cholesterol egg substitutes. **F.Fish and Sea Food:** a. Types and Composition b. Storage and changes during storage. Changes during processing. c. By-products and newer products. **G.Pulses and Legumes**: a. Structure, composition b. Processing. c. Toxic constituents.
Module 3	1 Credit
Learning Outcomes	After learning the module, learners will be able to -
	1.Define lipids and its properties and classifications. 2. Distinguish between aroma compounds.
Content Outline	**A. Lipids: Fats, Oils and Related Products** a. Review of nomenclature, classification, sources, composition, and properties b. Role of lipids in food flavour. Effects of processing on chemical structure and physical properties- Precursors of aroma compounds c: Functional properties of fat and uses in food preparations, inter-esterification of fats. d: Lipids exposed to frying conditions, hydrogenated fat and irradiated foods e: Lipid-protein complexes, emulsions: formation, stability, surfactants and emulsifiers f. Fat deterioration and antioxidants g. Fat substitutes **B. Nuts and Oilseeds:** Composition, Oil extraction and by-products **C. Flavors:** a: Individual aroma compounds- vegetable, fruit and spice/condiment flavors, flavors from lactic acid/ethanol fermentation, flavors volatiles from fats and oils, flavor volatiles in muscle foods and milk b. Composition, flavorings extracts – natural and synthetic c: Thermally induced process flavors d: Natural and synthetic flavors d: Interactions with other constituents
Module 4	0.5 Credit
Learning Outcomes	After learning the module, learners will be able to -
	1. Designing the processing of fruits and vegetable products.
Content Outline	**Fruits, Vegetables and Processed Products** a. Plant anatomy, gross composition, structural features and activities of living systems. b. Enzymes in fruits and vegetables. Flavour constituents. Plant phenolics. Pigments. c. Post-harvest changes. Texture of fruits and vegetables. d. Effects of storage, processing and preservation **Processed Foods:**

	Squashes, Pickles, fruit/vegetable–based, vinegar, pickles. b. Beverages: Synthetic and natural, alcoholic and non-alcoholic, carbonated and non-carbonated, coffee, tea, cocoa. Malted drinks. c., bakery products, dehydrated products.

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):

- Present a report on effect of industrial processing on food.
- Summarise the effects of transportation on nutrients in food.

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Journals:

- Advances in Food Research
- Journal of Agricultural and Food Chemistry
- Journal of Food Science
- Journal of Food Science and Technology

1.3 Major (Core)

Course Title **Subject Code**	**Human Nutrition I (Macro nutrients & water)** **114313**
Course Credits	**4**
Course Objective	This course enables students to: 1. Learn the basic principles of human nutritional requirements 2. Understand the composition of nutrients of food and its application in detail. 3. Calculate the estimated requirement of nutrients for humans
Course Outcomes	After going through the course, learners will be able to -
	1. Gain in-depth knowledge of the physiological and metabolic role of macronutrients and their importance in human nutrition.
	2. Enable the understanding of basis of human nutritional requirements and recommendations through the life cycle and translate the knowledge into practical guidelines for dietary needs.
	3. Familiarize with the recent advances in nutrition and apply this knowledge in planning for public health programmes.
Module 1	
Learning Outcomes	After learning the module, learners will be able to -
	1. Define RDA, EAR, etc,
	2. Understand the components of energy expenditure
Content Outline	• Human Nutritional Requirements – Development and Recent Concepts. a. Methods of determining human nutrient needs b. Description of basic terms and concepts in relation to human nutritional requirements. c. Guidelines and Recommendations - Development of International and National Nutritional Requirements - Translation of nutritional requirements into Dietary • Body Composition a. Significance of body composition and changes through the life cycle b. Methods for assessing body composition (both classical and recent) and their applications. • Nutrition in Special Conditions: Space Travel, High Altitudes, Low Temperature, Submarines. • Energy

	a.Components of energy requirements: BMR, RMR, thermic effect of feeding, physical activity. Factors affecting energy requirements, methods of measuring energy expenditure. b.Estimating energy requirements of individuals and groups. c.Regulation of energy metabolism and body weight: Control of food intake – role of leptin and other hormones.
Module 2	
Learning Outcomes	After learning the module, learners will be able to - 1. Define Glycemic index, glycemic load and differentiate between the types of dietary fiber and their mechanism of action. 2. Relate carbohydrates with gene expression.
Content Outline	○ Carbohydrates a.Review of nutritional significance of carbohydrates and changing trends in dietary intake of different types of carbohydrates and their implications b.Dietary fibre: Types, sources, role and mechanism of action c.Resistant starch, fructo-oligosaccharides, other oligosaccharides: Chemical composition and physiological significance d.Glycemic Index and glycemic load e.Carbohydrates and gene expression
Module 3	
Learning Outcomes	After learning the module, learners will be able to - 1. Understand the role of protein & its metabolism.
Content Outline	○ Proteins a.Overview of role of muscle, liver and G.I. tract in protein metabolism b.Amino acid and peptide transporters c.Therapeutic applications of specific amino acids d.Peptides of physiological significance e.Proteins, amino acids and gene expression.
Module 4	
Learning Outcomes	After learning the module, learners will be able to - 1. Understand the role and metabolism of lipids.
Content Outline	○ Lipids a.Nutritional significance of fatty acids – SFA, MUFA, PUFA: functions and deficiency b.Role of n-3 and n-6 fatty acids c.Prostaglandins d.Trans Fatty Acids

	e.Conjugated linoleic acid f.Nutritional Requirements and dietary guidelines (International & National) for visible and invisible fats in diets. g.Lipids and gene expression.
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Conduct a practical for estimation of nutrient requirement based on anthropometric assessments in the neighbourhood. - Present a report summarising role of specific nutrients in human body	

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- Indian Council of Medical Research. Recommended Dietary Intakes for Indians - Latest Recommendations.
- International Life Sciences InstitutePresent Knowledge in Nutrition – latest edition
- WHO Technical Report Series.
- World Reviews of Nutrition and Dietetics.

1.4 Major (Core)

Course Title **Subject Code**	**Methods of Investigation in Foods & Nutrition** **114324**
Course Credits	**2**
Course Outcomes	1. Examine the principals involved in different methods of investigation.
	2. Apply the principles of analytical techniques available for research in food science and nutrition.
	3. Classify the applications, strengths and limitations of different methods
	1. Recognise with the applications of the above techniques.
	2. Become efficient in the use of some of the most commonly used techniques and instruments in High quality research.
Module 1	
Learning Outcomes	After learning the module, learners will be able to
	1. Analyse basic physiochemical principles related to food. 2. Recognize colourimetric and spectrometric techniques.
Content Outline	1. Electrolytic dissociation – Acids, bases, salts, buffers, Hendersen- Hasselbach equation. Theory of indicators and principles of measurement of pH. Acid and Alkalis: Preparation of dilute solutions of common acids and alkalis and determining their exact normalities. Buffers: Preparation of phosphate, carbonate-bicarbonate, boric acid, acetate, chloride and pthalate buffers and determination of their pH by the use of indicators and pH meters. Bioassays – Animal studies, Human Studies, Microbiological assays. **Radiochemical Methods** Use of Isotopes – Radioactive and stable isotopes. **Basics of Instrumentation**– Physico-chemical principles and methodology – 1:Colorimetry, Spectrometry: Beer Lambert law, absorption maximum, Preparation of standard curve and nutrient estimations in UV and visible range 2:Photometry 3:Fluorimetry 4: flame photometry 5: Atomic absorptiometry. AAS, AES 6: Infrared spectrometry
Module 2	
Learning Outcomes	After learning the module, learners will be able to -
	1. Know the rheological properties of food items. 2. Apply varied separation techniques of food.
Content Outline	**Separation Techniques**

	Chromatography – Principles and application in chromatographic techniques: 1:Paper (circular, ascending and descending) 2:Ion-exchange 3: column 4:Thin layer 5:Gas liquid 6:high performance liquid chromatography 7: Supercritical fluid extraction Electrophoresis and Centrifugation Principle and applications in paper and gel electrophoresis. NMR and its applications Immunological Methods – RIA, ELISA. Viscosity and Consistency Measurements of Food. Unit 1. Measurements of Rheological properties Measurement of specific gravity, freezing point, melting point, refractive index, gel strength, Brix, Densitometry, Refractometry, Polarimetry, Measurement of Colour. Instrumental Measurement of Texture of Foods Dough, Pasta, Baked Products, Fruits and Vegetables, Dairy Products, Meat, Starch. Relative Humidity and Water Activity Aeration / Over run Measurement
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Demonstrate a visual representation for pathway of assessment of food. - Prepare a report on scope and applications of food assessment techniques.	

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1.5.1 Major (Elective)

Course Title **Subject Code**	**Food Science and chemistry (Practical)** **124321**
Course Credits	**4**
Course Objective	This course enables students to: 1. Learn the basic principles of food science. 2. Understand the applications and techniques of different food groups in cooking. 3. Understand the scope of food production for commercial purposes.
Course Outcomes	1. To understand principles of food science involved in bringing changes in foods.
	2. To observe and identify physical and chemical changes underlying the preparation of diverse foods.
Module 1	1 credit
Learning Outcomes	After learning the module, learners will be able to -
	1. Understand the process of sugar cookery. 2. Able to make formulation of candies.
Content Outline	**A. Solutions and Ice crystallization**: a) Effect of formula and procedure on crystal size of frozen desserts **B. Sugar cookery** a) Tests for stages of sugar cookery b) Effect of dry heat on sucrose. c) Crystalline and Non crystalline candies
Module 2	1.5 credit
Learning Outcomes	After learning the module, learners will be able to -
	1. Know applications of processing of cereals and flours. 2. Examine sensorial characteristics related food items.
Content Outline	**A. Cereals and Flours** a) Gelatinization of Starch (different types) b) Comparison of different cereals for water absorption and consistency c) Comparison of - different methods of cooking rice, different varieties of rice d) Starches as thickening agents (potato, corn and other) **B. Temporary and Permanent emulsions** a) Salad Dressings b) Effect of Stabilizers and Emulsifiers in salad dressings c) Comparisons of low fat and high fat French dressing d) Preparation and Comparison of Mayonnaise with variations (with and without egg) **C. Principles that maintain high quality fried foods** a) Smoke point of different fats and oils b) Effect of Temperature on fat absorption c) Effect of Formulation on fat absorption

	d) Effect of Coating and binding agents on fat absorption e) Comparison of Texture, flavor and mouth-feel of food products using fat substitutes.
Module 3	1.5 credit
Learning Outcomes	After learning the module, learners will be able to
	1. Understand role of protein in food processing. 2. Able to examine properties of various food items.
Content Outline	**. Effect of different conditions on properties of proteins e.g milk** a) Effect of acids (citric acid, lactic acid and acetic acid) on coagulation of milk proteins b) Effect of gums on gelation c) Effect of fat content, pH stabilizers in cream and whipped toppings d) Difference between natural and processed Cheese **B. Examination of properties of egg/meat** a) Denaturation and Coagulation b) Egg white foams – volume and stability c) Effect of acid and alkalies on meat/poultry **C. Factors affecting Gelatin gel** a) Temperature of liquid b) Proteolytic enzymes c) Whipping **D. Factors affecting vegetable pigments** a) Temperature b) Acid, c) Alkalies **E. Pectin gel** a) Determination of pectin content, development of a fruit jam, using natural and commercial pectin.
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Relate the principles of food science and preparation of different recipes.	

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1.5.2 Major (Elective)

Course Title **Subject Code**	**Public Nutrition and Health** **124312**
Course Credits	**4**
Course Objective	This course enables students to: 1. Learn the basic principles of public nutrition. 2. Understand the major nutritional concerns in community. 3. Understand the application of nutritional intervention at a community level.
Course Outcomes	Develop a holistic knowledge base and understanding of the nature of important nutritional problems and their prevention and control for the disadvantaged and upper socio-economic strata in society
	Understand the causes /determinants and consequences of nutritional problems in society
	Be familiar with various approaches to nutrition and health interventions, programmes and policies.
Module 1	1 credit
Learning Outcomes	After learning the module, learners will be able to -
	1. Know the concepts associated with public health and nutrition. 2. Understand the concepts of food and nutrition security.
Content Outline	**Concept of public nutrition** a. Relationship between health and nutrition b. Role of public nutritionists in the health care delivery **Sectors and Public Policies relevant to nutrition and health.** **Primary Health Care of the Community** a. National Health Care Delivery System b. Determinants of Health Status c. Indicators of Health **Population Dynamics** a. Demographic transition b. Population structure c. Fertility behavior d. Population policy e. Fertility f. Interrelationship between Nutrition and Quality of Life **Food and Nutrition Security** a. Food production ❖ Access ❖ Distribution ❖ Availability

	❖ Losses ❖ Consumption b. Food Security c. Socio-cultural aspects and Dietary Patterns: Their implications for Nutrition and Health
Module 2	1 credit
Learning Outcomes	After learning the module, learners will be able to -
	1. Understand influence of determinates of nutritional status. 2. Critically examine relationship of nutrient deficiencies amongst population.
Content Outline	**Nutritional Status** a. Determinants of nutritional status of individual and populations b. Nutrition and Non-nutritional indicators ❖ Socio-cultural ❖ Biologic ❖ Environmental ❖ Economic c. Assessment of nutritional status of individuals of different ages- MUAC, Weight for age, Height for age, Weight for Height, Ponderal index, BMI Applications and limitations in different field situations- choice of an indicator **Major Nutritional Problems** – etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: a. Macro and micro nutrient deficiencies b. Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis. c. Overweight, obesity and chronic degenerative diseases
Module 3	2 credits
Learning Outcomes	After learning the module, learners will be able to -
	1. Able to implement approaches and strategies for community nutrition. 2. Design interventions for improving malnutrition and public health.
Content Outline	**Approaches and Strategies for improving nutritional status and health:** a. National Food, Nutrition and Health Policies - Plan of action and programmes b. Programmatic options- their advantages and demerits. Feasibility Political support Available resources (human, financial, infrastructural) c. Case studies of selected strategies and programmes: their rationale and context, how to select interventions from a range of possible options: d. Health-based interventions, Food-based interventions including fortification and genetic improvement of foods, supplementary feeding, Nutrition education for behaviour change.

	Health economics and economics of malnutrition a. Its impact on productivity and national development b. Cost-Benefit Cost effectiveness Cost efficiency

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):

- Demonstrate a working principle of a health and nutrition based non-profit organisation.
- Conduct a community survey for health assessment techniques

BIBLIOGRAPHY:

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1.6. Minor Stream

Course Title **Subject Code**	**Research Methodology (Th.)** **134311**
Course Credits	**4**
Course Objective	This course enables students to: 1. Learn the basic principles of clinical research and its types. 2. Understand the scientific process of conducting research. 3. Understand the tools and systems available for collecting data for research purposes.
Course Outcomes	After learning the module, learners will be able to -
	1. Develop a scientific approach and know the processes of research
	2. Develop the competence for selecting methods and tools appropriate for research topics
	3. Understand concepts of statistical measures of central tendency, dispersion, variability and probability
Module 1	1 Credit
Learning Outcomes	After learning the module, learners will be able to -
	1. Understand process of research and its relationship to knowledge and science. 2. Identify research process based on actual researches conducted. 3. Recognise process of research problem formulation.
Content Outline	**The Research Process** a. Scientific approach to enquiry in comparison to native, common sense approach b. Knowledge, theory and research c. Role, need and scope of research in the discipline of Home Science **Steps in Research Process and Elements of Research** a. Identifying interest areas and prioritizing Selection of topic and considerations in selection b. Review of related literature and research c.Variables- types of variables including discrete and continuous variables Conceptual definitions and operational definitions d. Concepts, hypotheses and theories e Hypothesis- meaning, attributes of a sound hypothesis, Stating the hypothesis and types of hypothesis Hypothesis testing**-** null hypothesis, sample distribution, level of significance, critical regions, Type I and Type II errors f. Research Design Research questions, objectives and assumptions **Ethics in Research**
Module 2	1 Credit
	After learning the module, learners will be able to -

Learning Outcomes	1. Understand and apply different types of research procedures. 2. Able to design research studies by knowing methods of research.
Content Outline	**Types of Research** a. Basic and Applied research, Qualitative and Quantitative research (brief review of differences) b. Historical research c. Descriptive research methods – survey, case study, correlational study, content analysis, causal-comparative research d. Analytic studies- pre-experimental, experimental research, quasi experimental research e. Qualitative research, Ethnography f. Evaluative research- general characteristics, use of qualitative methods in enquiry Scope and importance in Home Science.
Module 3	1 Credit
Learning Outcomes	After learning the module, learners will be able to - 1. Understand different techniques of sampling. 2. Apply sampling procedures for specific research problems.
Content Outline	**Sampling** a. Rationale, characteristics- meaning, concept of population and sample, and utility b. Types of sampling and generalizability of results c. Probability sampling - simple random sample, systematic random sample, stratified random sampling etc - random and non-random samples, random numbers and use d. non-probability sampling - purposive samples, incidental samples, quota samples, snowball samples e. General consideration in determination of sample size
Module 4	1 Credit
Learning Outcomes	After learning the module, learners will be able to - 3. Know different tools of data collection. 4. Design different tools of data collection.
Content Outline	**Tools for Data Collection** a. Primary and secondary methods of data collection b. Different types of questionnaires, rating scales, check lists, schedules, attitude scales, inventories, standardized tests, interviews, observation c. Development of tools, estimation of reliability and validity of tools d. Procedure for preparation of the tool, administration of tools for data collection e. Procedure for data collection f. Planning for data analysis-coding of responses
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): ● Recognize different Types of variables. ● Hypothesis formations and research questions from Research readings –students identify hypothesis/research questions – Discussion ● Construction of tools for data collection a) types of questions b) Questionnaire c) interview schedule d) observation d) scales	

- For a given topic, student to frame and discuss the different possibilities of methods and tools
- Differentiate between (a) basic and applied research (Exercise to be based on actual research papers published in accredited journals) (b) qualitative and quantitative research
- Based on Journal contents undertake a critical appraisal of studies/research papers and discuss types of Research with examples.

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END OF SEMESTER 1

Syllabus Contents

Semester Two

2.1 Major (Core)

Course Title **Subject Code**	**Food Microbiology** **214311**
Course Credits	**4**
Course Objective	This course enables students to: 1. Learn the basic principles of food microbiology. 2. Understand the factors affecting microbial growth in foods. 3. Comprehend the techniques used for food preservation.
Course Outcomes	After going through the course, learners will be able to
	1. Distinguish the role of micro-organisms in humans and environment.
	2. Analyse the importance of micro-organisms in food spoilage and to learn advanced techniques used in food preservation.
	3. Explore the recent procedures adopted in various food operations to prevent food- borne disorders and legal aspects involved in these areas.
Module 1	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Recognize the importance of food microbiology, spoilage, preservation & fermentation.
	2. Explore the factors affecting the survival & growth of micro-organisms.
Content Outline	**A)** History, scope, and importance of food microbiology **B)** Food spoilage, food preservation, fermentation, QA/QC **C) Micro-organisms and food**: a. Their primary sources in foods, morphology, cultural characteristics, and biochemical activities. b. Airborne bacteria, fungi c. Microorganisms found in soil d. Microorganisms in water e. Normal flora of skin, nose, throat, GI tract **D) Factors affecting the survival and growth of microorganisms in food.** a. Intrinsic and Extrinsic parameters that affect microbial growth.

	b. Intrinsic factors required for growth- Overview, Nutrient effect, pH, Buffer, Anaerobic/aerobic conditions, Moisture content, Temperature, Gaseous atmosphere c. Implicit factors- properties of microorganisms, its response to external conditions. **E) Food Preservation techniques and its application to different types of foods:** a. Physical methods – Drying, freeze-drying cold storage, heat treatments (pasteurization), TDT, TDP Irradiation (UV, microwave, ionization), high pressure processing, Aseptic packaging, modified atmosphere b. Chemical preservatives and Natural antimicrobial compounds. c. Biologically based preservation systems and Probiotic bacteria. **F) Beneficial Uses of Microorganisms**: a. Fermented foods, (Yeast, lactobacillus) b. Fermented milk, Cheese, vegetables, beer, vinegar c. Genetically modified foods, marine foods
Module 2	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Recognise various methods of microbial examinations
	2. Analyse the spoilage of different food groups
Content Outline	**A) Microbiological examination -Methods of Isolation and detection of microorganisms or their products in food.** a. Conventional methods b. Rapid methods (Newer techniques) c. Immunological methods: Fluorescent, antibody, Radio immunoassay, ELISA etc. d. Chemical methods: Thermostable nuclear, ATP measurement and PCR (Polymers chain reactions) - only principles in brief. **B) Spoilage of different food groups:** a. Cereal and cereal products b. Vegetables & fruits c. Meat & meat products d. Eggs and poultry e. Fish and other seafoods f. Milk and milk products g. Canned food
Course Title	**Food Microbiology (Pr)**
Course Outcomes	After going through the course, learners will be able to
	1. Formulate common laboratory media & special media for cultivation of micro-organisms.
	2.Undertake bacteriological analysis of food
Module 3	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1.Isolate micro-organisms.

Content Outline	**Preparation of common laboratory media and special media for cultivation of bacteria, yeast & Molds.** **Staining of Bacteria**: Gram's staining, acid-fast, spore, capsule and flagellar staining, Motility of bacteria, Staining of yeast and molds. **Cultivation and Identification of important molds and yeasts.** (slides and mold culture). **Study of environment around us as sources of transmission of microorganisms in foods.Assessment of surface sanitation of food preparation units - swab and rinse techniques**. **Isolation of microorganisms:** Different methods and maintenance of cultures of microorganisms.
Module 4	1 Credit
Learning Outcomes	After learning the module, learners will be able to 1.Analyse various foods bacteriologically.
Content Outline	**Bacteriological analysis of Foods**: Both processed and unprocessed like vegetables and fruits, cereals, spices, and canned foods, using conventional methods, yeast, and mold count in foods. Bacteriological analysis of water and milk, Total count, MPN Coliform (Count) and MBRT, IMVIC etc.
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Demonstrate the growth of microbes on specified media and list the factors affecting its growth. - Summarise/ Present a report on various food preservation techniques employed at the industrial level.	

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2.2 Major (Core)

Course Title **Subject Code**	**Human Nutrition II (Micronutrients) (Th)** **214312**
Course Credits	**4**
Course Objective	This course enables students to: 1. Learn the basic principles of Vitamins and Minerals in the human body. 2. Understand the factors affecting requirements and availability of vitamins and minerals. 3. Comprehend the implications of deficiency of micronutrients on human body.
Course Outcomes	After going through the course, learners will be able to
	1. Recognize the physiological and metabolic role of vitamins and minerals in human nutrition.
	2. Evaluate the pharmacological actions of various vitamins & minerals along with their implications.
Module 1	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Acknowledge the metabolism of fat-soluble vitamins
	2. Explore the pharmacological & therapeutic role of fat-soluble vitamins.
Content Outline	For each vitamin & mineral, the following will be discussed: ❖ Historical background ❖ Structure and chemistry ❖ Food sources ❖ Metabolism (digestion, absorption, transport, storage, and elimination), Bioavailability and factors affecting bioavailability. ❖ Biochemical and physiological functions ❖ Assessment of status ❖ Interaction with other nutrients, regulation of gene expression (wherever applicable) ❖ Pharmacological and therapeutic effects ❖ Requirements, methods for estimating requirements and recommended daily allowance. ❖ Deficiency, overload, and toxicity. **Fat Soluble Vitamins** • Vitamin A and Beta Carotene • Vitamin D • Vitamin E • Vitamin K

Module 2	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Acknowledge the metabolism of water-soluble vitamins
	2. Explore the pharmacological & therapeutic role of water-soluble vitamins.
Content Outline	**Water Soluble Vitamins** • Ascorbic acid • Thiamin • Riboflavin • Niacin • Pyridoxine • Folic acid • Vitamin B_{12} • Biotin
Module 3	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Acknowledge the metabolism of macro-minerals
	2. Explore the pharmacological & therapeutic role of macro-minerals.
Content Outline	**Macro-minerals** • Calcium and Phosphorus • Magnesium • Sodium, Potassium, Chloride
Module 4	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Acknowledge the metabolism of micro-minerals
	2. Explore the pharmacological & therapeutic role of micro-minerals
Content Outline	**Microminerals** • Iron • Copper • Manganese • Iodine • Fluoride • Zinc • Selenium • Cobalt • Chromium • Molybdenum
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Demonstrate the role of each micronutrient for human health and relate its deficiency with its physical representation. - Summarise the effect of supplementation of vitamins and minerals in non-communicable disease.	

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- Journal of Nutrition
- American Journal of Clinical Nutrition
- British Journal of Nutrition
- European Journal of Clinical Nutrition
- International Journal of Vitamin and Nutrition Research
- International Journal of Food Science and Nutrition
- Nutrition Research
- Annual Nutrition Metabolism

2.3 Major (Core)

Course Title **Subject Code**	**Food Safety and Quality Control (Pr.)** **214313**
Course Credits	**4**
Course Objectives	This course enables students to: 1. Learn the basic principles of food safety in industrial food production. 2. Understand the importance and methods of quality control in food production unit. 3.Comprehend the principles and techniques used in product analysis.
Course Outcomes	After going through the course, learners will be able to
	1. Recognize the importance of quality assurance in food industry.
	2. Execute various tests and assess quality, using standards for quality assessment and food safety.
	3. Conduct various tests used to detect food adulterants
Module 1	0.5 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Conduct quality assurance programmes
Content Outline	**Introduction to quality assurance and food safety. Current concepts of quality control.** **Quality Assurance Programme:** Quality plan, documentation of records, product standards, product and purchase specifications, process control and HACCP, hygiene and housekeeping, corrective action, quality and programme and total quality process.
Module 2	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Evaluate Product analysis
	2. Assess purity & quality of food additives & contaminants.
Content Outline	**Product Evaluation**: - Sampling for product evaluation and line control. - Statistical quality and process control - Specifications and food standards. International, National – Mandatory, Voluntary. - Sample preparation - Reporting results and reliability of analysis. **Assessment of purity and quality using appropriate standard tests and Detection / Estimation of Food Additives and Contaminants- qualitative and quantitativemethods for**: - Water including mineral water. - Cereals and cereal products

	- Pulses and legumes - Flesh foods
Module 3	1.5 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Evaluate Product analysis
	2. Assess purity & quality of food additives & contaminants.
Content Outline	- Milk and milk products - Ice creams and sherbets - Confectionery - Fats and oils including butter, ghee, and hydrogenated fat - Fried snacks and high fat foods
Module 4	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Evaluate Product analysis
	2. Assess purity & quality of food additives & contaminants.
Content Outline	- Spices and condiments and salt, pickles, sauces, and chutneys. - Tea and coffee - Canned, dehydrated, frozen and bottled fruit/vegetable products - Specific food ingredients such as glycerine, vinegar - Fruit juices, concentrates and beverages.
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Demonstrate the working principle of Quality control employed by indicated food production companies/ units. - Prepare a report on possible adulterations in each category of food products.	

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2.4 Major Core

Course Title **Subject Code**	**Food Product Development, Modifications & Sensory Evaluation (Practical)** **214324**
Course Credits	**2**
Course Objective	This course enables students to: 1. Learn the basic principles of food product development. 2. Understand the application of varied techniques for sensory analysis. 3.Comprehend the current trends of food sale in the market
Course Outcomes	After going through the course, learners will be able to
	Acknowledge the concepts about sensory evaluation of food, also analyse and interpret the data.
	Implement different sensory methods for evaluating variety of foods
Module 1	1 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Establish sensory panels
	2. Organise an experiment for sensory evaluation
Content Outline	**A. Introduction to sensory analysis and uses of sensory tests.** General testing conditions. **B. Establishing sensory panels:** a. Selecting and recruiting panelists, orienting, screening for trained panels, training panelists, monitoring performance. b. **Recognition tests** for 4 basic tastes, odour, and aroma. c. Tests with other senses. d. Threshold tests. **C. Analytical tests**: (i) Difference, (ii) Ranking, (iii) Descriptive, (iv) Scoring and (v) Rating **D. Planning an Experiment for Sensory Evaluation:** (i) Designing the questionnaire and score card, (ii) Identifying descriptors (iii) Designing Sensory Testing Facilities: Permanent and Temporary **E. Conducting the Test:** a. Preparing samples - Presenting samples - Using reference samples - Reducing panel response error b. Consumer oriented tests - Product oriented tests c. Shelf-life studies d. Product matching - Product mapping e. Taint Investigation and Prevention

	F. Collecting and analysing sensory data, statistical analysis, interpretations. Report Writing
Module 2	0.5 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Define & classify food products.
	2. Conduct market & consumer survey to identify new food products.
Content Outline	**ANew Food Products** a. Definition, Classification b. Characterization Factors shaping new product development- Social concerns, health concerns impact of technology and market place influence. **B. Market Survey, Consumer survey to identify new products in terms of** - Line Extension - Repositioning Existing Products - New form/Reformulation - New packaging of existing products - Innovative products - Creative Products. **C. Tapp**ing **traditional foods and unconventional sources of foods.** a. Minimizing post-harvest losses. b. Identification of concept & product for development c. Market research for the concept and selected product
Module 3	0.5 Credit
Learning Outcomes	After learning the module, learners will be able to
	1. Develop new food product.
	2. Standardize new food product.
Content Outline	Identification of product, selection of one product and its standardization
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Conduct food product surveys in whole sale and retail markets. - Conduct sensory evaluation for food product available in the market and their healthier, home-made alternatives.	

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Journals:

- International Journal of Food Science and Technology
- Food Technology

- Journal of Food Technology
- Trends in Food Science and Technology
- Critical Reviews in Food Science and Nutrition

2.5 Major Elective

Semester II		
224313	**Functional Foods, Biodynamic principles, Nutraceuticals (Th.)**	4
Course Objective	This course enables students to: 1. Learn the basic principles and regulations in relation to the functional food. 2. Understand the application of functional food in various disease conditions. 3.Comprehend the current trends of research in the field of nutraceuticals.	
Course Outcomes	After going through the course, learners will be able to	
	Define & classify functional foods & nutraceuticals	
	Apply the usage of functional foods & nutraceuticals	
Module 1		1 Credit
Learning Outcomes	After learning the module, learners will be able to	
	Define probiotics, prebiotics &synbiotics	
Content Outline	**Introduction:** Definition, history, classification – Type of classification (Probiotics, prebiotics and synbiotics; Nutrient vs. Non-nutrient; according to target organ; according to source or origin). Metabolism of xenobiotics (review) **Probiotics** a. Taxonomy and important features of probiotic micro-organisms. b. Health effects of probiotics including mechanism of action. c. Probiotics in various foods: fermented milk products, non-milk products etc. d. Quality Assurance of probiotics and safety. **Prebiotics** Unit 1. Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following: • Non-digestible carbohydrates/oligosaccharides: • Dietary fibre • Resistant starch • Gums	
Module 2		2 Credit
Learning Outcomes	After learning the module, learners will be able to	
	1. Analyse the potential health benefits of functional foods	
Content Outline	**Potential health benefits of the following biodynamic principles:** Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health	

	and potential applications in risk reduction of diseases, perspective for food applications for: • Polyphenols: Flavonoids, catechins, isoflavones, tannins Curcumin, Resveratrol • Phytoestrogens/ Isoflavones • Phytosterols • Glucosinolates • Pigments: Lycopene, Carotenoids • Organo sulphur compounds • Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins	
Module 3		1 Credit
Learning Outcomes	After learning the module, learners will be able to	
	2. Identify the non-nutrient effects of specific nutrients	
Content Outline	**Non- nutrient effect of specific nutrients:** Proteins, Peptides, and nucleotides, Conjugated linoleic acid and non-fatty acids, Vitamins and Minerals. **Active biodynamic principles in spices, condiments and other plant materials and their evidence-based effects**	
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): - Conduct literature search and summarise the current trend in the usage of functional foods for therapeutic purposes. - List the functional foods available in the market.		

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2.6 Research project

Course Title **Subject Code**	**INTERNSHIP (On the Job Training)** **244341**
Course Credits	**4**
	Internship is to help the student explore world outside classroom. A student can do internship in any government, non-government or corporate organization which is engaged in food science related activities and /or research activities. She may work with Organization/programme/agency/institution involved in food related work.
Course Objectives:	Internship will enable the students to: 1. Apply knowledge gained during the programme to work situations. 2. Comprehend the current trends in the market 3. Gain hands-on experience of working in the field through an organizational interface and become job ready.
Course Outcomes:	At the end of Internship, the student will be able to: ● Comprehend modalities of professional practice by being at work space. ● Recognize concepts of a professional work environment and become part of one. ● Conduct one in line with deliverable outcomes for given organization. ● Apply their theoretical learnings into practical work environment. ● Able to reflect her work and learnings and be able to articulate them at the end of the OJT- on the job training. ● Apply skills gained in the classroom in work life spaces.
Duration	One month or 240 hours
Sectors	Students are required to work in Research & Development Laboratory/Food Analysis Laboratory/ Nutrition Research areas.
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):	
The report of the internship along with the supervisor's evaluation will have to be submitted to the Head of the Department within fifteen days of completion of internship before or after the theory examination depending upon the local conditions. She is required to maintain diary and present her work in viva voce held at the end of the internship. She will be assessed by the internship agency supervisor as well as Department/College mentor for the work done by her.	

End of Semester II