

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Principles of Food Processing [T]
Course Code	FT-101[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	o pursue a this course at the postgraduate level, student should possess a BSc (in Physics, Mathematics, Biology, and Chemistry) or BTech/ BE (in Food Technology) degree with the minimum qualifying marks as prescribed at a university/ college.				Co-Requisite/s	knowledge of food components and food nutrition		
Course Outcomes & Bloom's Level	<p>CO1- Comprehend the principles and methods involved in the processing of foods and discuss the food preservation by heating. (BL1-Remember)</p> <p>CO2- To describe about irradiation, microwave processing and Ohmic heating as food processing techniques(BL2-Understand)</p> <p>CO3- To illustrate different freezing techniques, advantages and mechanism of freezing in addition to its effect on food quality. (BL3-Apply)</p> <p>CO4- Interpret the use of natural as well as chemical and bio- based preservatives to increase the shelf life of food.(BL4-Analyze)</p> <p>CO5- Recognize different drying methods, different dryers used in food processing and drying mechanisms including sorption isotherm(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)	SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction: Definition and scope of food Science and Technology, Historical Development of Food Processing and Preservation, General Principles of Food Preservation. Preservation by Heating: Introduction, thermal resistance of microorganism and enzyme.	Lecture methods, Audio/Video clips, group discussion, quiz	09
II	Irradiation: Source of Radiations, Mode of Action, Effect on Microorganism and different Nutrients, electromagnetic spectrum and applications. Microwave and Ohmic Heating: Principles and application in Food Processing.	Lecture methods, Audio/Video clips, group discussion, Review Analysis	10
III	Freezing: Introduction to freezing, chilling and refrigeration, freezing curve, storage of fresh food, Method of Freezing, Freezing point of selected food (chicken, milk, fruit juice, mushrooms and related), Effect of freezing, Influence of freezing and freezing rate on quality of the food product, Thawing.	Lecture methods, Audio/Video clips, group discussion, classroom presentations	09
IV	Preservation: Introduction, Preservation of food (baked goods, cheese, juices, pickles, sauce, fruits, wines carbonated drinks) by natural and chemical preservatives. Introduction to bio chemicals and their use (shikonin, quinine etc.)	Lecture Methods, Audio/Video clips, group discussion, quiz	10
V	Drying and Dehydration: Concept of Water activity, Sun drying of various foods (Apricots, hot pepper or chilies, etc) and its effect on the keeping quality, Sorption, Isotherm and their use. Characteristic of food substances related to their dehydration behavior, Drying phenomenon, factors affecting rate of drying, method of drying of various food products, type of Driers and their suitability of different foods.	Lecture Methods, Audio/Video clips, group discussion, quiz	12

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Fundamentals of Food Chemistry [T]
Course Code	FT-102[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	To pursue this course, student should possess a BSc (in Physics, Mathematics, Biology, and Chemistry) or BTech/ BE (in Food Technology) degree with the minimum qualifying marks			Co-Requisite/s	Knowledge of bioactive compounds present in food			
Course Outcomes & Bloom's Level	<p>CO1- The student should able to define food chemistry and importance of food chemistry. Student will also learn properties and nutritional importance of water in addition to role of water activity in food stability(BL1-Remember)</p> <p>CO2- To describe about carbohydrate, its classification, structure and chemical reactions(BL2-Understand)</p> <p>CO3- To explain about lipids, its classification, structure, physical and chemical properties and causes of rancidity(BL3-Apply)</p> <p>CO4- To comprehend proteins, its classification, structure, chemical reactions and functional properties. The students will understand to develop a basic idea in new food product development (BL4-Analyze)</p> <p>CO5- Summarizes about enzymes, their classification and food use. Besides that, students will be able to understand the classification and importance of vitamins and minerals in human diet(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction to food chemistry. Water: Its structure types and physical properties, hydrogen bonding. Nutritional significance of water, Water activity and its relation to storage stability of foods, E.R.H, aw of different types of foods.	Lecture methods,Audio/Video clips, group discussion, quiz	09
II	Carbohydrates; their chemical structure and classification, Physical and chemical properties of Carbohydrates. Browning Reactions in Food: Enzymatic and Non-Enzymatic browning.	Lecture methods,Audio/Video clips, group discussion, Review Analysis	10
III	Lipids: their classification and chemical structure. Food and industrial uses of lipids and oxidative changes of lipids, factors responsible for it	Lecture methods,Audio/Video clips, group discussion, classroom presentations	10
IV	Proteins: Physical and Chemical properties of proteins; protein denaturation, protein gels, functional properties of proteins, SCP. <u>Enzymes: their nomenclature and classification. Activation inhibition and kinetics of enzyme activity, immobilized enzymes</u>	Lecture methods,Audio/Video clips, group discussion, quiz	09
V	Enzymes: their nomenclature and classification. Activation inhibition and kinetics of enzyme activity, immobilized enzymes, <u>Nutritional aspects of Carbohydrates, Proteins, Fats and Vitamins, Acid, Base, Buffer system and Salts. Recommended Dietary Allowances: Concept of Balanced Diet, Menu Planning in Different ages and Diseases, Calorie requirement per day of Human, Respiratory Quotient of food.</u>	Lecture methods,Audio/Video clips, group discussion, quiz	10

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Food Additives [T]
Course Code	FT-103[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	BSc degree in Food Technology, Food Science, Food Engineering, Food Chemistry, Biotechnology, Microbiology, Biochemistry, or any other related field with a minimum of 50% marks.			Co-Requisite/s	Students must have basic knowledge of preservatives, chemical compounds and adulterants.			
Course Outcomes & Bloom's Level	<p>CO1- The students will be able to comprehend about importance, classification and functions of additives like preservatives, acid, base, salts, chelating/sequestering agents, non-nutritive sweetness, emulsifier, stabilizer, thickeners, antioxidants, anticaking agents, firming agents, bulking agents, flour bleaching agents, bread improvers and antimicrobial agents, humectants, acidulants, leavening agents in maintaining or improving food quality. (BL1-Remember)</p> <p>CO2- To give insight to various terminology such as isolation, functional properties and applications of proteins, starches and lipids as functional ingredients. (BL2-Understand)</p> <p>CO3- The students will be able to demonstrate the types and stability of flavours during food processing. They will also know about flavor emulsions, essential oils and oleoresins. (BL3-Apply)</p> <p>CO4- The course will illustrate the types and recommended doses of coloring agents. (BL4-Analyze)</p> <p>CO5- The course will describe the e-codes and uses and function of food additives in different food formulations. (BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)	SDG3(Good health and well-being) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction of food additives, classification and functions, preservatives, acid, base, salts, chelating/sequestering agents, nonnutritive sweetness, antioxidants, anticaking agents, firming agents, bulking agents, flour bleaching agents, bread improves and antimicrobialagents, humectants, acidulates, leavening agents.	Audio/Video clips, group discussion, lecture with ppt, quiz	12
2	Protein, starches and lipids as functional ingredients, isolation, functional properties and application in different food (modified starch), manufacturing and applications of fibers from food sources.	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	12
3	Flavor technology-types of flavor, stability of flavors during food processing extraction and analysis techniques of flavor, flavor emulsions, essential oils andoleoresin.	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	12
4	Coloring agents. Types, recommended doses of color. <u>Sweeteners: Introduction, types, properties and uses of saccharin, acesulfame-K, aspartame, HFCS, invert sugar, and sugar alcohols (polyols) as sweeteners in food products</u>	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	<u>Emulsifiers: Introduction, types, selection of emulsifiers, emulsion stability, and mechanism of action. Thickeners and hydrocolloids: Introduction and types</u> E-codes, CAS system. Uses and function of food additives in food formulations (different products).	Audio/Video clips, group discussion, lecture with ppt, quiz	09

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Food Microbiology [T]
Course Code	FT-104[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Studentss should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			Co-Requisite/s	Students should have basic knowledge of microbiology, microorganisms causing food spoilage, basic preservation techniques.			
Course Outcomes & Bloom's Level	<p>CO1- To classify and identify the beneficial and spoilage microorganisms associated with food besides learning the factors influencing growth of microorganism on foods(BL1-Remember)</p> <p>CO2- To comprehend different methods of preservation like high temperature, low temperature, drying, food additives and radiation.(BL2-Understand)</p> <p>CO3- To illustrate Food-borne illnesses, poisoning, infections and intoxications as well as spoilage of different kinds of foods like cereals, fruits, vegetables, animal products.(BL3-Apply)</p> <p>CO4- To describe the principle of food fermentation, different Indian fermented foods and importance of probiotics.(BL4-Analyze)</p> <p>CO5- To predict Biochemical changes caused by microorganism, food hygiene and sanitation.(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	<p>General characteristics, classification and identification of yeasts, molds and group of bacteria important in food industry, sources of contaminations: air, water, sewage, post processing contamination.</p> <p>General characteristics, classification and identification of Lactic acid bacteria, Acetic acid bacteria, Clostridium, Proteolytic bacteria, Lipolytic bacteria, fungi, and algae in food industry, sources of contaminations: air, water, sewage, post processing contamination. Growth curves (different phases), synchronous growth, doubling/generation time, Factors influencing growth of microorganism on foods, Intrinsic factors and Extrinsic factors.</p>	lecture methods, Group discussion, quiz	10
2	<p>General principles of preservation, asepsis, anaerobic conditions by use of high temperature, by low temperature, drying, food additives and radiations, hurdle technology, novel non-thermal methods of food preservation and microbial destruction</p>	lecture methods, Audio/Video clips,	9
3	<p>Characteristic features, dynamics and spoilage of different kinds of foods: Cereals, fruits, vegetables, animal products – meat, fish, poultry and milk and milk products. Food-borne illness, food borne poisoning, infections and intoxications. <u>Toxins produced by Staphylococcus, Clostridium, Aspergillus; bacterial pathogens-Salmonella, Bacillus, Listeria, E. coli, Shigella, Campylobacter.</u></p>	lecture methods, Audio/Video clips	11
4	<p>Food fermentation: Microbial culture in food fermentations and their maintenance & evaluation, Traditional fermented food of India. Therapeutic value of fermented food. Probiotics and prebiotics: Introduction, uses, importance, <u>Safety considerations on probiotics, application of probiotics and prebiotics in food industry.</u></p>	lecture methods, Group discussion, quiz	10
5	<p>Biochemical changes caused by microorganism - putrefaction, and lipolysis, Antagonism and Synergism in microorganism. Food hygiene and sanitation. <u>Indicator organisms; rapid methods in detection of microorganisms. Thermal inactivation of microbes- Concept, determination & importance of TDT, F, Z & D values, factors affecting heat resistance</u></p>	lecture methods, Audio/Video clips, quiz	10

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Sensory Evaluation and Food Waste Management [T]
Course Code	FT-105[T]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Completed Bsc/BE in Food Technology/ Food Processing/ Food Engineering			Co-Requisite/s	Knowledge of food processing and preservation			
Course Outcomes & Bloom's Level	<p>CO1- To analyze the basic concepts of sensory evaluation and requirements of a sensory laboratory. (BL1-Remember)</p> <p>CO2- To illustrate criteria for selection of sensory panelists, sensory quality parameters and factors affecting sensory measurements. (BL2-Understand)</p> <p>CO3- To define different sensory tests like discrimination, descriptive, affective; flavor profile and tests; ranking tests, detection, threshold and dilution tests. (BL3-Apply)</p> <p>CO4- Summarizes by-product utilization of different fruits such as apple, grape, papaya, orange, citrus, mango. (BL4-Analyze)</p> <p>CO5- The course will provide an understanding about nutritional quality of foods and its assessments like Digestibility, Biological value, NPU, PER, etc. (BL5-Evaluate)</p>							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)	SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction to sensory analysis, general testing conditions, Requirements of sensory laboratory; organizing sensory evaluation programmers.	Audio/Video clips, group discussion, lecture with ppt, quiz	09
II	Selection of sensory panelists; Factors influencing sensory measurements; Sensory quality parameters -Size and shape, texture, aroma, taste, color and Gloss. Relationships between sensory properties and product acceptability, measurement of sensory perception.	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	10
III	Different tests for sensory evaluation– discrimination, descriptive, affective; Flavor profile and tests; Ranking tests, Detection, threshold and dilution tests.	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	10
IV	By Product utilization of different fruits such as apple, grape, papaya, orange, citrus, mango.	Audio/Video clips, group discussion, lecture with ppt, quiz	10
V	Nutritional Quality of foods and its assessments: Food proteins (Digestibility, Biological value, NPU, PER)	Audio/Video clips, group discussion, lecture with ppt, quiz	09

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	lab Course-I
Course Code	FT-106 [P]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	The candidate must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Student should have theoretical knowledge about food processing and food chemistry			
Course Outcomes & Bloom's Level	<p>CO1- To recognize the importance and different ways of food preservation(BL1-Remember)</p> <p>CO2- To describe the composition of food and interaction of different food components with each other during processing and storage. (BL2-Understand)</p> <p>CO3- To estimate the effect of different processing on nutritional value of food and other components. (BL3-Apply)</p> <p>CO4- To apply the processing methods in real life to preserve food for longer term.(BL4-Analyze)</p> <p>CO5- To evaluate the spoilage in foods, its critical analysis and prevention strategies(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG3(Good health and well-being) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Examination of the enzymatic browning in fruits and vegetables.	Experiments	BL2-Understand	3
2	Determination of Total Soluble Solids (TSS), pH, and titratable acidity in given Samples	Experiments	BL4-Analyze	3
3	Examination of the catalase and peroxidase activity in fresh and blanched samples.	Experiments	BL4-Analyze	3
4	Study the effect of blanching on vitamin C content in given food sample	Experiments	BL3-Apply	3
5	Study the effect of nitrites on meat colour	Experiments	BL3-Apply	3
6	Estimation of sodium Benzoate in Food sample	Experiments	BL5-Evaluate	3
7	Determining proximate composition of given food sample	Experiments	BL5-Evaluate	3
8	Determination of vitamin C from citrus fruits.	Experiments	BL4-Analyze	3
9	Examination of oxidative rancidity (PV value) of fats	Experiments	BL4-Analyze	3
10	Determination of saponification value from edible fats and oils.	Experiments	BL5-Evaluate	3
11	Determination of antioxidant activity of given food samples.	Experiments	BL5-Evaluate	3
12	Determination of diastase enzyme activity in honey	Experiments	BL5-Evaluate	3

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Lab course-II
Course Code	FT-107 [P]

Part A

Year	1st	Semester	1st	Credits	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	The candidate must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Student should have basic theoretical knowledge about sensory evaluation and food microbiology			
Course Outcomes & Bloom's Level	<p>CO1- To identify the characteristics of microorganisms grown on different media(BL1-Remember)</p> <p>CO2- To discover isolation techniques of microbes(BL2-Understand)</p> <p>CO3- To apply the knowledge gained on utilizing the by-products into various value added products and differentiating products on sensory perception.(BL3-Apply)</p> <p>CO4- To analyse the food materials using instruments and compare the properties with sensory evaluation.(BL4-Analyze)</p> <p>CO5- To predict the industrial utilization of different under-utilized by-products and train the panellists for sensory evaluation(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Introduction to Microbiology Laboratory Safety, use of equipment and perform sterilization techniques	Experiments	BL2-Understand	3
2	To prepare culture media (Nutrient broth and agar)	Experiments	BL3-Apply	3
3	To perform different streaking techniques	Experiments	BL3-Apply	3
4	To examine the microbial load of different food samples	Experiments	BL4-Analyze	3
5	To perform simple and Gram's staining	Experiments	BL3-Apply	3
6	Use nine-point hedonic scale for sensory evaluation	Experiments	BL3-Apply	3
7	Dio-trio test for sensory evaluation	Experiments	BL5-Evaluate	3
8	Preparation of dilution sample for sensory evaluation	Experiments	BL4-Analyze	3
9	Threshold test in different food products	Experiments	BL3-Apply	3
10	Estimation of color properties in food sample	Experiments	BL4-Analyze	3
11	Extraction of pigments from fruits and vegetables	Experiments	BL6-Create	3
12	Preparation of value-added products from by-products	Experiments	BL6-Create	3

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Fruits and Vegetables Technology [T]
Course Code	FT-201 [T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			Co-Requisite/s	Students should have prior knowledge of fruits and vegetables, their parts and various preservation techniques			
Course Outcomes & Bloom's Level	<p>CO1- To comprehend the structure, composition, physiological development, post-harvest handling methods, processing and preservation of fruits and vegetables. (BL1-Remember)</p> <p>CO2- To illustrate the technology of Fruits and vegetables products like juices and pulps, concentrates and powders, squashes and cordials, beverages, jam, jellies, sauces, etc (BL2-Understand)</p> <p>CO3- To describe the preservation methods and processing ways of spices develop value added products from them. (BL3-Apply)</p> <p>CO4- Identify the method of production of dry fruits, tea and coffee. (BL4-Analyze)</p> <p>CO5- To demonstrate the processing and chemical composition of cocoa beans, cocoa processing and manufacturing process for chocolate. (BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG2 (Zero hunger) SDG3 (Good health and well-being) SDG12 (Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	<p><u>Status of production and processing of fruits and vegetables</u>, Structural, compositional and nutritional aspects of fruits and vegetables. Physiological development: Growth, Maturation, Ripening and Senescence, climacteric and non-climacteric fruits, Pre and post-harvest changes; pre-harvest factors affecting postharvest quality. <u>Techniques of processing and preservation of fruits and vegetables by refrigeration and freezing, canning and bottling, drying and dehydration</u></p>	Lecture methods, Group discussion, quiz	10
2	<p><u>Selection of fruits and vegetables for processing, Techniques of processing and preservation of fruits and vegetables by refrigeration and freezing, canning and bottling, drying and dehydration, spoilage of fruits and vegetables.</u></p> <p><u>Technology of Fruits and vegetables products: Juices and pulps, Concentrates and powders, squashes and cordials. Beverages, Jams, Jellies and Marmalades. Candies and crystallized fruits. Tomato products: Puree, Paste, Ketchup, Sauce and Soup, Chutneys, Pickles.</u></p>	Lecture methods, Audio/Video clips,	10
3	<p><u>Manufacturing, related calculations and related defects of jam, jelly, marmalade, preserve and candy; tomato puree, paste, ketchup, sauce and soup; pickles, drying/ dehydration of fruits and vegetables.</u></p> <p><u>Spices: Introduction, Preservation and processing spices of India; spice extracts, Spice oils and oleoresins.</u></p>	Lecture methods, Audio/Video clips, group discussion,	12
4	<p><u>Manufacturing and calculations of beverages - fruit Juices, pulps, concentrates, powders, squashes, cordials and RTS, Critical points to consider in the production of different processed fruits and vegetable products and solving the associated problems.</u></p> <p><u>Composition, Structure and characteristics of dry fruits. Composition, Production and processing of Tea leaves and its types. Production and processing of coffee cherries. Soluble/ Instant coffee, Use of chicory in coffee, decaffeinated coffee</u></p>	Lecture methods, Audio/Video clips, group discussion, quiz	12
5	<p><u>Possible causes of post-harvest losses and conservation of fruits and vegetable. Post-</u></p>	Lecture methods, Audio/Video clips, group discussion, quiz	6

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Processing of Cereals, Pulses, Oilseeds and Sugar Crops [T]
Course Code	FT-202 [T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	The student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Students should have the theoretical knowledge about the classification of cereals, grains and pulses.			
Course Outcomes & Bloom's Level	<p>CO1- Students will comprehend about the basic composition, milling and processing of wheat, wheat flour properties and manufacturing of wheat-based products.(BL1-Remember)</p> <p>CO2- Students will evaluate the basic composition, milling and processing of rice, and milling by-products and their utilization(BL2-Understand)</p> <p>CO3- Students will illustrate about composition, milling and processing of corn to prepare products like cornflakes, corn syrup, corn starch, corn steep liquor, corn oil and canned corn(BL3-Apply)</p> <p>CO4- Students will demonstrate the composition and processing of barley, sorghum and millets.(BL4-Analyze)</p> <p>CO5- Students will understand about the composition and processing of legumes, oil seeds and their value-added products.(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Wheat: Composition, Processing (wheat milling), by- products of wheat milling, aging of flour, chemical improvers bleaching and maturing agents, manufacture of wheat-based products – Bread, Biscuits, cookies, Cakes etc, processed cereal foods for infants.	Lecture methods, Audio/Video clips, group discussion, quiz	9
2	Rice: Composition, Processing (milling) methods; <u>operations different type of huller</u> , by-products of rice milling and their utilization, parboiling of rice and its effective Value on cooking quality, Products of rice.	Lecture methods, Audio/Video clips, group discussion, Review Analysis	9
3	Corn; Composition, Processing methods, Products (Corn flakes; corn syrup) and by-products corn starch, corn steep liquor, corn oil and canned corn. <u>Barley: Composition, Processing methods, Products (uses in brewing industry) and by-products.</u>	Lecture methods, Audio/Video clips, group discussion, classroom presentations	10
4	Processing of Barley; quality of grains, Processing methods and uses in brewing industry. Processing of millets; Composition, processing methods, products of millets. Sorghum: Chemical composition, refining and nutritive value <u>Legumes: composition, Processing methods, Products and by-products. Oilseeds: composition, Processing methods, Products and by-products. Millets: composition, Processing methods, Products and by-products.</u>	Lecture methods, Audio/Video clips, group discussion, quiz	12
5	Processing of Barley; quality of grains, Processing methods and uses in brewing industry. Processing of millets; Composition, processing methods, products of millets. Sorghum: Chemical composition, refining and nutritive value <u>Sugar cane: Harvesting condition, Processing into sugarcane juice, jaggery and sugar. Beetroot: Harvesting condition, Processing into sugar, color extraction. Sugar: Refining and types.</u>	Lecture methods, Audio/Video clips, group discussion, quiz	10

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Processing of Milk and Milk Products [T]
Course Code	FT-203 [T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	The student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Student should have basic knowledge of dairy and dairy products, technologies related to processing and preservation of milk and milk products.			
Course Outcomes & Bloom's Level	<p>CO1- The students will be able to comprehend milk source and composition, its characteristics, collection, chilling, transportation, cream separation, standardization, pasteurization, sterilization, homogenization, packaging, storage and distribution. (BL1-Remember)</p> <p>CO2- The course will illustrate the production of fermented milk products like curd, cheese, butter, yoghurt, shrikhand, etc. (BL2-Understand)</p> <p>CO3- The course will demonstrate production of frozen milk product i.e., ice cream, its classification, manufacturing, packaging, and storage. Student can also differentiate the frozen desserts and ice cream. (BL3-Apply)</p> <p>CO4- The course will describe the manufacturing of evaporated milks, milk powders, whey protein isolate and their packaging and storage defects. (BL4-Analyze)</p> <p>CO5- The course depicts the knowledge about the different adulterants present in milk and their detection techniques. (BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Importance of Milk Industry in India: <u>Major dairy industries in India</u> . Composition and Characteristics of Milk, Collection, Chilling, Transportation, Cream Separation, standardization, Pasteurization, sterilization, Homogenization, Packaging, storage and distribution of Milk. CIP	Lecture methods, Audio/Video clips, group discussion, quiz	9
2	Technology of Fermented Milk Products, <u>role of lactobacillus in dairy</u> , Principles and Practices of Manufacture, Packaging, Storage and Marketing of Curd, Butter, Yoghurt, Shrikhand etc. Cheese: Manufactured of Hard, Semi-hard, Soft and Processed Cheeses. Storage, Grading and Marketing of Cheeses, Cheeses Defects and them control.	Lecture methods, Audio/Video clips, group discussion, Review Analysis	9
3	Technology of Frozen Milk Products: Classification, Manufacture, Packaging, storage and Marketing of Ice Cream, Defects of frozen products and their control. Differences between Ice cream and frozen Desserts, Introduction and Importance of Ice Cream Stabilizers.	Lecture methods, Audio/Video clips, group discussion, classroom presentations	10
4	Technology of Evaporated and dried Milk: Manufacture of Evaporated Milks and Milk Powders, Packaging and Storage Defects and their control. Whey protein concentrate and whey protein isolate	Lecture methods, Audio/Video clips, group discussion, quiz	12
5	<u>Dairy Plant Operations and Management: Plant layout and design, Piping and equipment design, Maintenance and cleaning procedures, Energy management and waste disposal.</u> Milk adulterations: adulterants, synthetic milk; harmful effects, detection techniques. Application of Membrane Technology and Biotechnology in Dairy. Naturally occurring preservatives in Milk.	Lecture methods, Audio/Video clips, group discussion, quiz	10

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Livestock products Technology [T]
Course Code	FT-204 [T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	The student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Students should have prior knowledge of meat muscle , proteins, myoglobin and processing techniques			
Course Outcomes & Bloom's Level	<p>CO1- The course will demonstrate about the slaughtering, conversion of muscle to meat and factors affecting quality of meat.(BL1-Remember)</p> <p>CO2- Students will be able to comprehend about the preservation of meat and meat products and effects of processing parameters on product properties.(BL2-Understand)</p> <p>CO3- The course will describe the slaughtering, composition and preservation of poultry meat in addition to its value-added products.(BL3-Apply)</p> <p>CO4- Students will be able to understand the composition, structure and nutritive value of eggs, factors affecting egg quality, preservation, and microbial spoilage of shell egg.(BL4-Analyze)</p> <p>CO5- Students will assimilate the fish production and processing in India to develop dried, salted and smoked fish, Surimi, etc.(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	<p>Fresh and processed Meat technology: Livestock: Slaughter and census of Meat animals. <u>Indian and world meat industry</u>, Slaughter: Introduction, <u>Conversion of Muscle to Meat (PSE and DFD conditions)</u>. <u>Ante-mortem & Post-mortem examination of meat</u>, Different methods of slaughtering, and post slaughter factors affecting quality of meat</p>	<p>Lecture methods, Audio/Video clips, group discussion, quiz</p>	9
2	<p>Preservation of meat: <u>Refrigeration and freezing, thermal processing, dehydration, and irradiation</u>; Meat analogue: <u>Introduction. Processing & products</u>; Meat products: <u>RTE meat products, Sausages processing – Types and defects</u>. <u>Effects of processing parameters on product constituents, viz. Lipid, Protein, Carbohydrates and Flavor</u></p>	<p>Lecture methods, Audio/Video clips, group discussion, Review Analysis</p>	9
3	<p><u>Status of Poultry Industry in India, Slaughtering. Composition and Chemistry of Chicken Muscle, Pre and Post Slaughter factors affecting poultry Meat Quality. Preservation of Poultry Meat. Preparation of poultry products.</u></p> <p><u>Meat Processing: Curing: curing ingredients and their roles, methods of curing. Smoking: composition of smoke, production of smoke, advantages of liquid smoke, Canning: Introduction, Processing, Advantage & disadvantage. Meat cooking- dry and moist cooking methods, its effect on quality.</u></p>	<p>Lecture methods, Audio/Video clips, group discussion, classroom presentations</p>	10
4	<p><u>Egg: Structure, Composition and nutritive value of egg, egg proteins and functional properties of egg white and yolk. Factor affecting egg quality and its measurements. Industrial uses of eggs. Preservation of shell egg.</u></p> <p><u>Microbial spoilage of egg and egg products. Introduction to Poultry Production: Overview of the poultry industry and its importance in the food sector. Poultry breeds and their characteristics, Slaughtering: Introduction, Ante-mortem & Post-mortem examination of meat, Different methods of slaughtering, and post slaughter factors affecting quality of meat</u></p>	<p>Lecture methods, Audio/Video clips, group discussion, quiz</p>	12
5	<p>Fish Processing: Types of fish, composition and nutritive value, factors affecting the quality of fish. <u>Surimi—Its production and</u></p>	<p>Lecture methods, Audio/Video clips, group discussion, quiz</p>	10

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Food Engineering [T]
Course Code	FT-205 [T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C	
					4	0	0	4	
Course Type	Theory only								
Course Category	Discipline Electives								
Pre-Requisite/s	Students should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			Co-Requisite/s	Students should have prior knowledge of heat and mass transfer, basic physics principals and laws.				
Course Outcomes & Bloom's Level	<p>CO1- To accomplish knowledge about fundamentals of food engineering and thermodynamics. (BL1-Remember)</p> <p>CO2- To give an insight about the chemical kinetics of processed foods, quality changes during storage of foods, size reduction, homogenization and mixing (BL2-Understand)</p> <p>CO3- To comprehend about thermal processing of foods and student will learn the use and applications of heat exchangers and aseptic canning. (BL3-Apply)</p> <p>CO4- To illustrate the basics of chilling and freezing, cryogenic freezing and calculation of freezing time for typical foods (BL4-Analyze)</p> <p>CO5- To summarize different modes of heat transfer like conduction, convection and radiation and their applications in food industries (BL5-Evaluate)</p>								
Courses Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		SDG (Goals)	SDG4(Quality education) SDG11(Sustainable cities and economies)					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to food engineering, Introduction to thermodynamics, fundamentals of heat, Mass transfer in food processing. <u>Energy and material balance, Numerical problems on material balance related to food processing</u>	Lecture methods, Audio/Video clips, group discussion, quiz	10
2	Chemical Kinetics - kinetics of reactions occurring in processed foods, velocity constant, order of reaction, Quality changes during storage of foods. Size reduction, Homogenization, Mixing and Forming.	Lecture methods, Audio/Video clips, group discussion, Review Analysis	12
3	Thermal processing of foods - Commercial sterility, Pasteurization. Sterilization. Determination of TDT, heat exchangers, types of flows. Aseptic canning process, hydrostatic sterilizer and aseptic packaging design problems	Lecture methods, Audio/Video clips, group discussion, classroom presentations	11
4	Chilling and freezing, Properties of frozen foods; freezing point depression. Cryogenic freezing and IQF. Types of Freezers; Calculation of Freezing Time for typical foods (Fruits and Vegetables) <u>Psychrometry: Properties of air- water vapour mixture, psychrometric chart, Application of psychrometry to drying; related numerical problems.</u>	Lecture methods, Audio/Video clips, group discussion, quiz	12
5	Heat transfer: Heat flow in fluids by conduction and convection. Individual heat transfer coefficients, overall coefficient, Heating and cooling of fluids, Heat transfer equipment. Radiation. Heat transfer in turbulent flow. Applications and use in food industries	Lecture methods, Audio/Video clips, group discussion, quiz	10

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Lab course-III [P]
Course Code	FT-206 [P]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	The student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Student should have knowledge of fruits and vegetables, cereals and cereal products. Also they should have the theoretical knowledge of various milk and milk products.			
Course Outcomes & Bloom's Level	CO1- To identify different preparation techniques of fruits and vegetable products. (BL1-Remember) CO2- To explain different preservation methods of fruits and vegetable products. (BL2-Understand) CO3- To explain different preservation methods of cereal and milk products. (BL3-Apply) CO4- To identify different preparation techniques of cereal and milk products. (BL4-Analyze) CO5- To measure different levels or macro & micro nutrient in cereal & milk products. (BL5-Evaluate)							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG11(Sustainable cities and economies) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to food engineering, Introduction to thermodynamics, fundamentals of heat, Mass transfer in food processing. Energy and material balance, Numerical problems on material balance related to food processing	Lecture methods, Audio/Video clips, group discussion, quiz	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To prepare the dehydrated fruits and vegetables food products.	Experiments	BL3-Apply	3
2	To prepare fruit jam using seasonal fruits	Experiments	BL3-Apply	3
3	To prepare fruit jelly using seasonal fruits	Experiments	BL3-Apply	3
4	To prepare fruit jam using citrus fruits	Experiments	BL3-Apply	3
5	To prepare and evaluate RTS and squash using seasonal fruits	Experiments	BL5-Evaluate	3
6	To prepare papain/guava cheese using seasonal fruits.	Experiments	BL6-Create	3
7	To determine 1000 kernel weight, bulk density, particle density and angle of repose of given cereals, millets and pulses	Experiments	BL4-Analyze	3
8	To determine the gluten content of wheat flour	Experiments	BL4-Analyze	3
9	Preparation of Channa and paneer	Experiments	BL6-Create	3
10	To study the preparation of soy milk	Experiments	BL4-Analyze	3
11	To determine the purity of milk using lactometer	Experiments	BL5-Evaluate	3
12	Detection of adulterants in milk like water, urea, neutralizers, preservatives, sucrose starch	Experiments	BL4-Analyze	3

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	0

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Lab course- IV [P]
Course Code	FT-207 [P]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	The student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50			Co-Requisite/s	Student should have theoretical knowledge of meat and meat products and milk products.			
Course Outcomes & Bloom's Level	CO1- To analyse physiochemical properties of milk (BL3-Apply) CO2- To analyse spoilage in milk products (BL5-Evaluate) CO3- To measure different levels of macro & micro nutrient in cereal & milk products. (BL2-Understand) CO4- To observe the structure of egg, its properties and quality. (BL2-Understand) CO5- To summarize the quality parameters of meat and its processing. (BL5-Evaluate)							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Determination of Quality parameters of bottled water	Experiments	BL3-Apply	2
2	To determine protein content in milk	Experiments	BL4-Analyze	2
3	To study the preparation of soy milk	Experiments	BL3-Apply	2
4	To determine the purity of milk using lactometer	Experiments	BL4-Analyze	2
5	Detection of adulterants in milk like water, urea, neutralizers, preservatives, sucrose starch	Experiments	BL4-Analyze	2
6	Preparation of Channa and paneer	Experiments	BL6-Create	2
7	Determination of water holding capacity of meat	Experiments	BL4-Analyze	2
8	Determination of extract release volume (ERV) of meat	Experiments	BL4-Analyze	2
9	To study the effect of curing on the color of meat	Experiments	BL3-Apply	2
10	Preparation of meat emulsion and meat balls	Experiments	BL6-Create	2
11	To visit a related industry	Industrial Visit	BL2-Understand	2

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	0

Part E

Books	Debnath, M. (2005, January 1). Tools and Techniques of Biotechnology.
Articles	
References Books	
MOOC Courses	https://nptel.ac.in/courses/106101224
Videos	https://youtu.be/1qKsm0A41IM

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Beverage Technology [T]
Course Code	FT-301 [T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	The candidate must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Students should have basic knowledge about beverages, their composition, total soluble solids, etc.			
Course Outcomes & Bloom's Level	<p>CO1- Comprehend the principles and methods involved in the processing of foods and discuss the food preservation by heating(BL1-Remember)</p> <p>CO2- To describe about irradiation, microwave processing and Ohmic heating as food processing techniques. (BL2-Understand)</p> <p>CO3- To illustrate different freezing techniques, advantages and mechanism of freezing in addition to its effect on food quality. (BL3-Apply)</p> <p>CO4- Interpret the use of natural as well as chemical and bio- based preservatives to increase the shelf life of food.(BL4-Analyze)</p> <p>CO5- Recognize different drying methods, different dryers used in food processing and drying mechanisms including sorption isotherm(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG3(Good health and well-being) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Water for beverages: Types of water required for beverages, treatment of water. Type of beverages: fruit & vegetable juices, fermented and non-fermented beverages, synthetic beverages, carbonated and non-carbonated beverages. Tea, Coffee and Cocoa: Production, composition, processing and preparation.	Lecture methods, Audio/Video clips, group discussion, quiz	9
2	Fruit and Vegetable Beverages: Juice extraction, clarification, preservation, packaging, concentration and drying. Various beverages from fruit juices, their preparation and preservation.	Lecture methods, Audio/Video clips, group discussion, classroom presentations	10
3	Non-carbonated and carbonated synthetic beverages: Ingredients, source of carbon dioxide, chemical and physical properties of carbon dioxide, carbonating process, packaging of carbonating beverages.	Lecture methods, Audio/Video clips, group discussion , classroom presentations	9
4	Alcoholic Beverages: Non-Distilled Beverages: Beer and Wine. Distilled Beverages: Vodka, Rum, Gin, Whisky, Arack, Toddy, Brandy	Lecture methods, Audio/Video clips, group discussion, quiz	10
5	Additives for beverages: Natural and synthetic sweeteners and colours, acids, emulsifiers, preservatives, flavours and flavour enhancers. Quality control of beverage: Quality standards for beverages, chemical, microbial and sensory evaluation, product shelf life	Lecture methods, Audio/Video clips, group discussion, quiz	12

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	
Articles	https://link.springer.com/article/10.1007/s13197-022-05439-8
References Books	Food Science -Potter NN and Hotchkiss Food Facts and Principles -Shakuntala Manay Beverages: Processing and Technology-Deepak Mudgil, Sheweta Barak Beverages: Technology, Chemistry and Microbiology-A. Varnam, J.M. Sutherland Fruit and Vegetable Preservation- Principles and Practices. International Book Distributors-Srivastava RP and Kumar S.
MOOC Courses	
Videos	

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Food analysis and Instrumentation [T]
Course Code	FT-302 [T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Students should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			Co-Requisite/s	Students should have basic knowledge regarding various analytical techniques like chromatography, Spectroscopy and principles of these methods.			
Course Outcomes & Bloom's Level	<p>CO1- To discover different kinds of chromatographic techniques, their principles and applications. Main focus is to discuss the use of advanced chromatographic techniques in food analysis. (BL1-Remember)</p> <p>CO2- To insight about principle and various types of electrophoresis methods ,mainly SDS- PAGE and capillary electrophoresis. (BL2-Understand)</p> <p>CO3- To comprehend Principle, types and applications of centrifugation will be introduced to students. The course willalso cover principle and applications of ultra-centrifugation in food industry. (BL3-Apply)</p> <p>CO4- To describe the principle of spectrophotometry, working of a spectrophotometer and itsand different types of spectrophotometric techniques like UV, Visible, IR and fluorescenc espectroscopy, AAS, Polarimetry and Refractometry (BL4-Analyze)</p> <p>CO5- To illustrate different methods to estimate the food constituents like carbohydrates,proteins, minerals, vitamins, and lipids. (BL5-Evaluate)</p>							
Coures Elements	Skill Development ✗ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG12(Responsible consupction and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Chromatographic technique: principle and application of adsorption, column, partition and affinity chromatography, Size exclusion chromatography and Ion exchange chromatography, Advance chromatographic techniques.	Lecture methods, Group discussion,	12
2	Electrophoresis: Introduction, principle and types of electrophoresis, PAGE, Capillary electrophoresis, SDS- PAGE, Isoelectric focusing and Isotachophoresis.	Lecture methods, Audio/Video clips,	10
3	Centrifugation: Principle, RPM, RCF, rotor types, and applications of centrifugation in food processing, Ultra centrifugation and their types, applications in food industry	Lecture methods, classroom presentations	9
4	Spectroscopic techniques: Lamberts-Beer law, Colorimetry, Principle and application of UV, Visible, IR and fluorescence spectroscopy, AAS, FTIR, Polorimetry and Refractrometry.	Lecture methods, Audio/Video clips, quiz	12
5	Sampling methods, sample preparation, Determination of Carbohydrates – sugars, fibre, starch; Lipid – free fatty acids and fats, Proteins – amino acids and soluble and insoluble proteins, Vitamins and Minerals from food products, Measurement of color, flavor, taste and texture using sophisticated instruments	Lecture methods, Group discussion, quiz	12

Part D (Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	0
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

Part E

Books	Kirk, R. S., & Sawyer, R. (1991, January 1). Pearson's Composition and Analysis of Foods. Addison-Wesley Longman Limited.
Articles	https://www.tandfonline.com/doi/pdf/10.1080/20014091091878
References Books	Debnath, M. (2005, January 1). Tools and Techniques of Biotechnology. Nielsen, S. (2003, April 30). Food Analysis. Springer Science & Business Media.
MOOC Courses	https://nptel.ac.in/courses/106101224
Videos	https://youtu.be/1qKsm0A41IM?si=J-I_zLmqPhxInmkf

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Food Safety and Management [T]
Course Code	FT-303 [T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Students should have prior knowledge of food hazards, risk, food safety and Critical control points.			
Course Outcomes & Bloom's Level	<p>CO1- To comprehend the fundamentals of nutraceuticals, nutrigenomics and functional foods. They will also learn the applications of rheology and texture profile analysis in product development. (BL1-Remember)</p> <p>CO2- To describe, basics of product development, different steps of product development process and innovation strategies are covered which will enhance the capability of student's thinking while developing a new food product. (BL2-Understand)</p> <p>CO3- To evaluate different aspects of food quality, total quality control and management, statistical quality control methods, which will help him to learn the development and maintenance quality of new product. (BL3-Apply)</p> <p>CO4- To explore basics of food safety laws and regulations governing the country and the world (BL4-Analyze)</p> <p>CO5- Illustrate technology to development new food products (product qualities, raw material properties, processing, packaging requirement, distribution and marketing). (BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✗ Professional Ethics ✓ Gender ✗ Human Values ✓ Environment ✓		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to nutraceuticals, Nutrigenomics and Functional foods, Introduction and applications of rheology, texture profile.	Lecture methods, Audio/Video clips, group discussion, quiz	8
2	Concept of product development - product success and failure, factors for success, process of product development, managing for product's success. Innovation strategy - possibilities for innovation, building up strategy, product development programme.	Lecture methods, Audio/Video clips, group discussion, Review Analysis	10
3	Ways of describing of Food Quality, Quality control and Quality Assurance functions. Total Quality Control (TQC) and the role of management/ TQM. Statistical quality control. Quality costs	Lecture methods, Audio/Video clips, group discussion, classroom presentations	9
4	Food standards and Specifications: Compulsory and voluntary trade and Company standards. Consumer, company, In-process and finished product specifications. Relevant Food laws: PFA, FPO, SWMA, MPO, AgMark, and BIS Standards.	Lecture methods, Audio/Video clips, group discussion, quiz	12
5	The knowledge base for product development technology – knowledge and the food system, knowledge management, knowledge for conversion of product concept to new product, technological knowledge (product qualities, raw material properties, processing, packaging requirement, distribution and marketing.	Lecture methods, Audio/Video clips, group discussion, quiz	10

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	
Articles	https://www.sciencedirect.com/science/article/abs/pii/S2214799316300777
References Books	New Product and Process Development by Clarke and Wright Angi-angiogenic Functional and Medicinal Foods by Losso IN Handbook of Nutraceuticals and Functional Foods by Robert EC Rheology and Texture in Food Quality by J.M.DeMan Food Product Development by Earle R, Earle R and Anderson
MOOC Courses	https://onlinecourses.swayam2.ac.in/cec20_ag06/preview
Videos	https://www.youtube.com/watch?v=DSKre3Lkklg

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Food Packaging [T]
Course Code	FT-304 [T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have a bachelor's degree in Food Technology or in any science stream. They should have received at least a 50% marks in their graduation degree.			Co-Requisite/s	Student should have basic knowledge of food packaging materials.			
Course Outcomes & Bloom's Level	<p>CO1- To explore the fundamentals of food packaging and different packaging materials-paper, glass, plastics, metal, and cans.(BL1-Remember)</p> <p>CO2- To comprehend different types of packaging forms like modified atmospheric packaging, control atmospheric packaging, vacuum packaging and retortable plastic packaging(BL2-Understand)</p> <p>CO3- To describe packaging requirements and application for different food products like red meat, fish, poultry, eggs, milk and milk products, cereal product, bakery and confectionary products, fruits and vegetables :fresh and processed, oils and fats.(BL3-Apply)</p> <p>CO4- To illustrate recent advances in packaging techniques like edible packaging, microwavable packaging, intelligent packaging and active packaging(BL4-Analyze)</p> <p>CO5- To demonstrate testing of packaging materials, Bar code labelling and packaging laws and regulations.(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✗ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓		SDG (Goals)	SDG1(No poverty) SDG4(Quality education) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Background of food packaging, functions and levels, Origin of packaging material. Different packaging materials and their manufacturing- paper, glass, plastics, metal and cans, Tatra packaging.	Lecture methods, Group discussion, quiz	10
2	Rotatable plastic packaging- structure of rsetort pouches and their fabrication, Modified atmospheric packaging- reasons, requirement, application for different food, limitation. Control atmospheric packaging. Vacuum packaging. <u>Machineries requirements for MPA, CAP and vacuum packaging</u>	Lecture methods, Audio/Video clips, group discussion	10
3	Packaging of different foods: requirement and application; Red meat, fish, poultry, eggs, milk and milk products, cereal product, bakery and confectionary products, fruits and vegetables: fresh and processed, oils and fats.	Lecture methods, Audio/Video clips, group discussion, classroom presentations	10
4	Edible packaging, Microwavable packaging, Intelligent packaging- <u>sensors, indicators and barcodes</u> ; Active packaging – <u>oxygen scavengers, ethylene scavengers, moisture scavengers, antioxidant and antimicrobial packaging</u> , Aseptic packaging: principles and requirements	Lecture methods, Audio/Video clips, quiz	12
5	Testing of packaging materials – <u>grammage, vibration tests, tensile strength, puncture resistance, bursting strength, etc.</u> , Barcode labeling, package design, Information printing on the package. Packaging laws and regulation.	Lecture methods, Group discussion, quiz	8

Part D (Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

Part E

Books	Gillett, B. E. (1976, January 1). Introduction to Operations Research. McGraw-Hill Companies.
Articles	https://www.researchgate.net/profile/Kenneth-Marsh-3/publication/5850700_Food_PackagingRoles_Materials_and_Environmental_Issues/links/5a046cf8a6fdcc1c2f6062e0/Food-PackagingRoles-Materials-and-Environmental-Issues.pdf
References Books	Harrington, J. P., & Jenkins, W. A. (1991, February 18). Packaging Foods with Plastics. CRC Press. Crosby, N. T. (1981, January 1). Food Packaging Materials. Elsevier Applied Science.
MOOC Courses	https://nptel.ac.in/courses/127106237
Videos	https://youtu.be/0b3As1QHvk8

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Research Methodology [T]
Course Code	FT-305 [T]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					4	0	0	4
Course Type	Soft skill							
Course Category	Specialization Elective Courses							
Pre-Requisite/s	The student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Student should have basic knowledge of mean, median mode, sampling methods and probability			
Course Outcomes & Bloom's Level	<p>CO1- The course prepares the student to understand the basic concepts of Research Methodology, its applications in experimental design and future prospects. (BL1-Remember)</p> <p>CO2- The subject Research Methodology is designed for post graduate students of Biotechnology for describing the basic concepts of each and every division of the subject along with its applications in other fields. (BL2-Understand)</p> <p>CO3- The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding of data and its applications in experimental verification. (BL3-Apply)</p> <p>CO4- The course aims to provide basis of analyzing the applications of Research Methodology in various fields of research and industries. (BL4-Analyze)</p> <p>CO5- To apply the understanding of statistical tools in evaluation in various samples. (BL5-Evaluate)</p>							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✗		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Definition of Research, Qualities of Researcher, Components of Research Problem, Various Steps in Scientific Research, Types of Research; Hypotheses Research Purposes - Research Design - Survey Research - Case Study Research. Research Reports, Introduction to SPSS. Technology transfer: Introduction and procedure.	Lecture methods, Audio/Video clips, group discussion, quiz	12
2	Data Collection: Sources of Data: Primary Data, Secondary Data; Procedure Questionnaire Sampling Merits and Demerits-Experiments-Kinds-Procedure; Control Observation.	Lecture methods, Audio/Video-clips	9
3	Introduction to Statistics Probability Theories Conditional Probability, Point and Interval Estimates of Means and Proportions; Hypothesis Tests, One Sample Test-Two Sample Tests/Chi-Square Test, t-test-Standard deviation.	Lecture methods, Audio/Video-clips, group discussion	10
4	Statistical Applications: Analysis of Variance, Completely Randomized Design, Randomized Complete Block Design, Latin Square Design. Use of computers for preparing and presenting Documents. Standard operating procedure (S.O.P): Introduction and procedure	Lecture methods, Audio/Video-clips, group discussion, quiz	12
5	Research proposal and thesis writing: Purpose of research proposal, Academic/ Project/ Case study proposals, Steps for the preparing proposal and Common mistakes, Methods selecting relevant literature, Structure of Thesis, Steps in thesis writing, Citation and Referencing: Different ways of work citation, Publication in Research journals	Lecture methods, Audio/Video-clips, group discussion, quiz	12

Part D (Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

Part E

Books	Kothari, C. R. (2004, January 1). Research Methodology. New Age International.
Articles	
References Books	Panneerselvam, R. (2014, April 4). RESEARCH METHODOLOGY. PHI Learning Pvt. Ltd. Wilkinson, T. S., & Bhandarkar, P. L. (2003, January 1). Methodology and Techniques of Social Research. Young, P. V. (1956, January 1). Scientific Social Surveys and Research. Englewood Cliffs, N.J. : Prentice-Hall.
MOOC Courses	https://nptel.ac.in/courses/110105091
Videos	https://youtu.be/oXnjR00tfBI

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Lab Course-V [P]
Course Code	FT-306 [P]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	The candidate must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	Student should have basic knowledge of food analysis and instrumentation and beverage technology			
Course Outcomes & Bloom's Level	<p>CO1- To study the concept of additives being used in beverages(BL2-Understand)</p> <p>CO2- To evaluate the quality standards comprising of Chemical, Microbial & Sensory Evaluation (BL5-Evaluate)</p> <p>CO3- To discover different kinds of chromatographic techniques, their principles and applications.(BL4-Analyze)</p> <p>CO4- To understand about principle and various types of electrophoresis methods, mainly SDS- PAGE and electrophoresis.(BL2-Understand)</p> <p>CO5- To design different methods to estimate the food constituents like crude fibre, crude fat, calcium content, protein content, etc.(BL5-Evaluate)</p>							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
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Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Determination of Quality parameters of bottled water	Experiments	BL4-Analyze	2
2	Brewing perfect French press coffee from roasted coffee beans	Experiments	BL3-Apply	3
3	Preparation of fruit smoothies	Experiments	BL6-Create	3
4	Determination of the caffeine level in stimulating beverages	Experiments	BL4-Analyze	3
5	Preparation of coconut water energy drink	Experiments	BL6-Create	3
6	Preparation of seasonal-fruit based RTS	Experiments	BL6-Create	3
7	Estimation of chlorophyll content in each sample using spectrophotometer	Experiments	BL4-Analyze	3
8	To perform paper chromatography	Experiments	BL3-Apply	3
9	To study HPLC process	Experiments	BL4-Analyze	3
10	Estimation of calcium content in given food sample	Experiments	BL4-Analyze	3
11	Determination of total polyphenolic content in given food samples using Spectrophotometer	Experiments	BL5-Evaluate	3
12	To study the working of FTIR	Experiments	BL3-Apply	3

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	12	60	0

Part E

Books	Chakrabarty, M. (2003, November 9). Chemistry and Technology of Oils & Fats. Allied Publishers.
Articles	
References Books	De, S. (1991, January 1). Outlines of Dairy Technology. Dendy, D. A. V., & Dobraszczyk, B. J. (2001, January 1). Cereals and Cereal Products. Boom Koninklijke Uitgevers.
MOOC Courses	
Videos	

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Lab course-VI [P]
Course Code	FT-307 [P]

Part A

Year	2nd	Semester	3rd	Credits	L	T	P	C
					0	0	3	3
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s	The student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%			Co-Requisite/s	The student should have theoretical knowledge of various food packaging materials			
Course Outcomes & Bloom's Level	<p>CO1- To understand the manufacturing and characteristics of various packaging materials viz paper, glass, metal, and plastic (BL2-Understand)</p> <p>CO2- To provide the students a specialized knowledge about packaging equipment and machinery and testing of packaging systems for various types of food (BL3-Apply)</p> <p>CO3- To demonstrate new packaging systems and safety and legislative requirements (BL6-Create)</p> <p>CO4- To apply the knowledge gained from specialized techniques in food packaging such as Active, aseptic, controlled & modified atmospheric packaging etc. to create innovative food package systems. (BL3-Apply)</p>							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG1(No poverty) SDG12(Responsible consumption and production)				

Part B

Modules	Contents	Pedagogy	Hours
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Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Research Project [P]
Course Code	FT-401 [P]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					0	0	18	18
Course Type	Project							
Course Category	Projects and Internship							
Pre-Requisite/s	The student should have knowledge of food science			Co-Requisite/s	enable students observe, first hand, work flow and processes in food industries and associated enterprises			
Course Outcomes & Bloom's Level	CO1- The student will be able to appreciate different processing and production technologies in various industrial settings(BL4-Analyze) CO2- The student will be exposed to the diverse setting in food industries (BL5-Evaluate)							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	Selection of industry relevant to food and allied products	Hands-on working experience in the industry/ Internship Report	8
2	Working in department/s within the selected industry	Hands-on working experience in the industry/ Internship Report	8
3	Periodic analysis of data and preparation of report	Hands-on working experience in the industry/ Internship Report	8
4	Final preparation of internship report	Hands-on working experience in the industry/ Internship Report	8

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
200	0	200	0	0	0

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	3	2	2
CO2	-	-	-	-	-	-	-	-	-	-	-	-	3	2	3
CO3	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO4	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3

Syllabus-2023-2024

(SOS)(MSc_FoodTechnology)

Title of the Course	Research Report and Presentation [P]
Course Code	FT-402 [P]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					0	0	4	4
Course Type	Project							
Course Category	Projects and Internship							
Pre-Requisite/s	Complete knowledge of all the core discipline subjects of Food Technology			Co-Requisite/s	Project presentation/Dissertation			
Course Outcomes & Bloom's Level	CO1- dissertation, works as skills development in students.(BL1-Remember) CO2- increases their mental ability.(BL2-Understand) CO3- express their opinion and thoughts.(BL3-Apply) CO4- enhancing writing skills and knowledge.(BL4-Analyze)							
Courses Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗		SDG (Goals)					

Part B

Modules	Contents	Pedagogy	Hours
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Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
	0				
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	0	100	0	0	0

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	2	2	1
CO2	-	-	-	-	-	-	-	-	-	-	-	-	2	3	2
CO3	-	-	-	-	-	-	-	-	-	-	-	-	3	3	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

