

## (SOS)(MSc\_FoodTechnology)

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

#### Part A

Year	1st	Semester	1st	Credits -		Т	Ρ	С
i cai	131	Jemester	131	Greatta	4	0	0	4
Course Type	Theory only							
Course Category	Disciplin	e Core						
Pre-Requisite/s	student s Mathema BE (in Fo minimum	pursue a this course at the postgraduate level, udent should possess a BSc (in Physics, athematics, Biology, and Chemistry) or BTech/ E (in Food Technology) degree with the inimum qualifying marks as prescribed at a niversity/ college.						
Course Outcomes & Bloom's Level	discuss t CO2- To processi CO3- To addition CO4- Int increase CO5- Re	<ul> <li>CO1- Comprehend the principles and methods involved in the processing of foods and discuss the food preservation by heating. (BL1-Remember)</li> <li>CO2- To describe about irradiation, microwave processing and Ohmic heating as food processing techniques(BL2-Understand)</li> <li>CO3- To illustrate different freezing techniques, advantages and mechanism of freezing in addition to its effect on food quality. (BL3-Apply)</li> <li>CO4- Interpret the use of natural as well as chemical and bio- based preservatives to increase the shelf life of food.(BL4-Analyze)</li> <li>CO5- Recognize different drying methods, different dryers used in food processing and drying mechanisms including sorption isotherm(BL5-Evaluate)</li> </ul>						
Coures Elements	Entrepre Employa	onal Ethics X X /alues X	SDG (Goals)	SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part E	3
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Modules	Contents	Pedagogy	Hours
1	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
11	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
111	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

	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							

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Books	Potter, N. N., & Hotchkiss, J. H. (2012, December 6). Food Science. Springer Science & Business Media.
Articles	
References Books	Hui, Y. H., Barta, J., Cano, M. P., Gusek, T. W., Sidhu, J. S., & Sinha, N. K. (2008, February 28). Handbook of Fruits and Fruit Processing. John Wiley & Sons. De Vries, J. (2021, October 8). Food Safety and Toxicity. CRC Press.
MOOC Courses	https://nptel.ac.in/courses/126105015
Videos	https://www.youtube.com/watch?v=F8jhoaV-nsE

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



#### (SOS)(MSc\_FoodTechnology)

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

#### Part A

			Fall A								
Year	1st	Semester	1st	Credits	L	Т	Ρ	С			
			101		4	0	0	4			
Course Type	Theory of	heory only									
Course Category	Disciplin	e Core									
Pre-Requisite/s	BSc (in Chemist	pursue this course, student should possess a construction in Physics, Mathematics, Biology, and emistry) or BTech/ BE (in Food Technology) gree with the minimum qualifying marks Co-Requisite/s									
Course Outcomes & Bloom's Level	Student water ac CO2- To reaction CO3- To and cau CO4- To propertie develop CO5- Su will be a	<ul> <li>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)</li> <li>CO2- To describe about carbohydrate, its classification, structure and chemical eactions(BL2-Understand)</li> <li>CO3- To explain about lipids, its classification, structure, physical and chemical properties and causes of rancidity(BL3-Apply)</li> <li>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)</li> <li>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)</li> </ul>									
Coures Elements	Entrepre Employa Professi Gender	onal Ethics X X Values X	SDG (Goals)	SDG4(Quality education)							

Part	В
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Modules	Contents	Pedagogy	Hours
1	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
11	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
111	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</u> <u>classification. Activation inhibition and</u> <u>kinetics of enzyme activity, immobilized</u> <u>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, 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.	Lecture methods,Audio/Video clips, group discussion, quiz	10

			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	Bamji, M. S. (2019, February 28). Textbook of Human Nutrition.
Articles	
References Books	deMan, J. M. (2013, February 1). Principles of Food Chemistry. Springer Science & Business Media. Manay, N. S., & Shadaksharaswamy, M. (2008, January 1). Food: Facts and Principles.
MOOC Courses	https://nptel.ac.in/courses/102105034
Videos	https://youtu.be/DhwAp6yQHQI

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



## (SOS)(MSc\_FoodTechnology)

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

			Part A						
Year	1st	Semester	1st	Credits	L	Т	Р	С	
			100		4	0	0	4	
Course Type	Theory	only							
Course Category	Discipli	ne Core							
Pre-Requisite/s	Science Chemis Biocher	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.							
Course Outcomes & Bloom's Level	function non-nut firming agents, (BL1-R CO2- To applicat CO3- T food pro (BL3-A CO4- T Analyzo CO5- T	is of additives like priritive sweetness, em agents, bulking agen humectants, acidula <b>emember)</b> o give insight to vario cions of proteins, star he students will be a ocessing. They will a <b>pply)</b> he course will illustra <b>e)</b>	eservatives, acid iulsifier, stabilizer its, flour bleachin ites, leavening ac ous terminology s ches and lipids a ble to demonstra lso know about fl ite the types and be the e-codes a	nd about importance, cla , base, salts, chelating/s , thickeners, antioxidant g agents, bread improv gents in maintaining or i uch as isolation, function is functional ingredients te the types and stabilit avor emulsions, essent recommended doses o nd uses and function of	seque ts, ant es and mprov onal pr .( <b>BL2</b> y of fla ial oils f color	stering icaking d antin ing for opertion <b>-Unde</b> avours and c	g agen g ager nicrobi od qua es and erstand durinq bleores gents.(	nts, ial ality. I <b>d)</b> g sins.	
Coures Elements	Entrepr Employ Profess Gender	Values X	SDG (Goals)	SDG3(Good health and well-being) SDG12(Responsible consuption and production)					

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,</u> <u>types, properties and uses of saccharin,</u> <u>acesulfame-K, aspartame, HFCS, invert</u> <u>sugar, and sugar alcohols (polyols) as</u> <u>sweeteners in food products</u>	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	Emulsifiers: Introduction, types, selection of emulsifiers, emulsion stability, and mechanism of action. Thickeners and hydrocolloids: Introduction and types 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

			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		

Books	
Articles	
References Books	Food Additives by BranenAL,DavidsonPMandSalminen S Encyclopedia of Food and Color Additives by Gerorge AB Fenaroli's Handbook of Flavor Ingredients by Gerorge AB Food Flavors by Morton IDandMacleod AJ Food Proteins by NakaiS andModlerHW
MOOC Courses	https://nptel.ac.in/courses/126105027
Videos	https://youtu.be/Dm3yP7FF4nI

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	1	-	-	-	-	-	-	3	1	1
CO2	3	1	1	2	2	2	-	-	-	-	-	-	3	1	1
CO3	3	1	1	3	2	2	-	-	-	-	-	-	3	1	1
CO4	3	2	1	1	2	2	-	-	-	-	-	2	3	3	3
CO5	3	1	2	2	1	1	-	-	-	-	-	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## (SOS)(MSc\_FoodTechnology)

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

			Part A									
Year	1st	Semester	1st	Credits	L	Т	Р	С				
rear	151	Semester	4	0	0	4						
Course Type	Theory only											
Course Category	Discipli	viscipline Core										
Pre-Requisite/s	degree science receive	tss should have a in Food Technolog stream. They sho d at least a 50% m tion degree.	gy or in any uld have	Co-Requisite/s	Students should have basic knowledge of microbiology, microorganisms causing food spoilage, basic preservation techniques.							
Course Outcomes & Bloom's Level	food be Remer CO2- T temper CO3- T spoilag Apply) CO4- T importa CO5- T	esides learning the <b>nber)</b> To comprehend diffe ature, drying, food To illustrate Food-be re of different kinds To describe the prin ance of probiotics.(	factors influence erent methods of additives and ra- orne illnesses, p of foods like ce ciple of food fer <b>BL4-Analyze)</b> cal changes ca	al and spoilage microo ing growth of microorg of preservation like high adiation. <b>(BL2-Underst</b> poisoning, infections an ereals, fruits, vegetable mentation, different Ind used by microorganism	anism c n tempe and) dintoxio s, anim dian feri	on foods rature, cations al produ mented	s <b>(BL1-</b> low as well ucts. <b>(Bl</b> foods a	as L <b>3-</b>				
Coures Elements	Entrep Employ Profess Gende Humar	evelopment X reneurship X /ability √ sional Ethics X r X i Values X nment X	SDG (Goals)	SDG1(No poverty) SDG3(Good health a SDG6(Clean water a SDG12(Responsible	nd sanit	tation)	d produ	ction)				

Part A

Modules	Contents	Pedagogy	Hours
1	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 General characteristics, classification and identification of Lactic acid bacteria, Acetic acid bacteria, Clostridium, Proteolytic bacteria, Lipolytic bacteria, fungi, and algaein 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.	lecture methods,Group discussion, quiz	10
2	General principles of preservation, asepsis, anaerobic conditions by use of high temperature, by low temperature, drying, food additives and radiations, <u>hurdle</u> <u>technology, novel non-thermal methods of</u> <u>food preservation and microbial destruction</u>	lecture methods, Audio/Video clips,	9
3	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;</u> <u>bacterial pathogens-Salmonella, Bacillus,</u> <u>Listeria, E. coli, Shigella, Campylobacter.</u>	lecture methods, Audio/Video clips	11
4	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</u> <u>probiotics, application of probiotics and</u> <u>prebiotics in food industry</u>	lecture methods, Group discussion, quiz	10
5	Biochemical changes caused by microorganism - putrefaction, and lipolysis, Antagonism and Synergism in microorganism. Food hygiene and sanitation. <u>Indicator organisms; rapid</u> methods in detection of microorganisms. <u>Thermal inactivation of microbes- Concept,</u> determination & importance of TDT, F, Z & D values, factors affecting heat resistance	lecture methods, Audio/Video clips, quiz	10

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

#### Part E

Books	Adams, M. R., & Moss, M. O. (2007, January 1). Food Microbiology. New Age International.
Articles	https://www.sciencedirect.com/science/article/abs/pii/S0740002011000505
References Books	Frazier, W. C., & Westhoff, D. C. (1978, January 1). Food Microbiology. Jay, J. M. (2012, December 6). Modern Food Microbiology.
MOOC Courses	https://nptel.ac.in/courses/102103015
Videos	https://youtu.be/m27ouF6xfZg

COs	P01	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	3	1	1	-	-	-	-	-	-	3	1	1
CO2	3	3	3	2	3	3	2	-	-	-	2	2	3	1	1
CO3	3	2	2	1	1	1	1	-	-	1	1	1	3	1	1
CO4	1	1	1	1	1	1	-	-	-	-	-	1	3	3	3
CO5	1	1	1	1	1	1	-	-	-	-	-	1	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## (SOS)(MSc\_FoodTechnology)

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

Part A

			1		1	1	1	1	
Year	1st	Semester	1st	Credits	L	Т	Р	С	
i cai	ist Semester		151	Greatis	4	0	0	4	
Course Type	Theory	only				-			
Course Category	Discipli	ne Core							
Pre-Requisite/s		eted Bsc/BE in Food rocessing/ Food En	0,	Co-Requisite/s	Knowledge of food processing and preservation				
Course Outcomes & Bloom's Level	laborate CO2- T factors CO3- T and tes CO4- S orange CO5- T	<ul> <li>CO1- To analyze the basic concepts of sensory evaluation and requirements of a senso laboratory. (BL1-Remember)</li> <li>CO2- To illustrate criteria for selection of sensory panelists, sensory quality parameters factors affecting sensory measurements. (BL2-Understand)</li> <li>CO3- To define different sensory tests like discrimination, descriptive, affective; flavor pr and tests; ranking tests, detection, threshold and dilution tests. (BL3-Apply)</li> <li>CO4- Summarizes by-product utilization of different fruits such as apple, grape, papaya, orange, citrus, mango. (BL4-Analyze)</li> <li>CO5- The course will provide an understanding about nutritional quality of foods and its assessments like Digestibility, Biological value, NPU, PER, etc. (BL5-Evaluate)</li> </ul>							
Coures Elements	Entrepr Employ Profess Gender Human	evelopment ✓ reneurship × vability ✓ sional Ethics × r × Values × ment √	SDG (Goals)	SDG3(Good health and well-being) SDG6(Clean water and sanitation)					

Modules	Contents	п В Pedagogy	Hours
1	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
11	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
111	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

			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	Ramaswamy, H. S., & Marcotte, M. (2005, August 23). Food Processing. CRC Press.
Articles	
References Books	Lal, G., Siddappa, G. S., & Tandon, G. L. (1986, January 1). Preservation of Fruits and Vegetables Fortin, N. D. (2016, October 25). Food Regulation. John Wiley & Sons.
MOOC Courses	https://nptel.ac.in/courses/126105336
Videos	https://youtu.be/k1a2PSEXahM

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



## (SOS)(MSc\_FoodTechnology)

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

	_		Part A					
Year	1st	Semester	1st	Credits	L	Т	Р	С
i cui	131	Gemester	151	oreans	0	0	3	3
Course Type	Lab only	y						-
Course Category	Disciplin	ne Core						
Pre-Requisite/s	Food Te Chemis	ndidate must hold a E echnology, B.Sc. Biol try or equivalent. The age in the qualifying be 50%	ogy, B.Šc. Bio- e minimum	Co-Requisite/s	theo know food	oretica wledgo	e abou essing	ut
Course Outcomes & Bloom's LevelCO1- To recognize the importance and different ways of food preservation (BL1- Remember) CO2- To describe the composition of food and interaction of different food components with each other during processing and storage. (BL2-Understand) CO3- To estimate the effect of different processing on nutritional value of food and other components. (BL3-Apply) CO4- To apply the processing methods in real life to preserve food for longer term.(BL4- Analyze) CO5- To evaluate the spoilage in foods, its critical analysis and prevention strategies(BL5- Evaluate)						er <b>4-</b>		
Coures Elements	Entrepro Employ Profess Gender	Values X	SDG (Goals)	SDG3(Good health and well-being) SDG12(Responsible consuption and production)				

Part B

Modules Contents Pedagogy Hours
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Pa	rt	С
ıα	IL	$\mathbf{U}$

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

	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					

Books	
Articles	
References Books	Food Science-Potter NN and Hotchkiss Food Dehydration-Arsdel WB, Copley MJ andMorgan Food Processing Technology: Principle and PracticeFellows PJ Principles of Food Chemistry-DeMan JM. Food Chemistry-Fenemma
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	https://youtu.be/h5NpTku5BGc

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
2	1	3	3	3	3	-	-	-	-	-	-	3	1	1
2	3	3	2	2	2	I	I	-	-	-	-	3	1	1
3	2	3	2	3	3	-	-	-	-	-	-	3	1	1
3	2	3	3	3	3	-	-	-	-	-	-	3	3	3
3	3	2	3	2	2	-	-	-	-	-	-	3	3	3
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 2 3 3 3	2     1       2     3       3     2       3     2       3     3	2     1     3       2     3     3       3     2     3       3     2     3       3     3     2	2         1         3         3           2         3         3         2           3         2         3         2           3         2         3         2           3         2         3         3           3         2         3         3           3         2         3         3	2         1         3         3         3           2         3         3         2         2           3         2         3         2         3           3         2         3         2         3           3         2         3         3         3           3         2         3         3         3           3         3         2         3         3	2       1       3       3       3       3         2       3       3       2       2       2         3       2       3       2       3       3         3       2       3       2       3       3         3       2       3       3       3       3         3       3       2       3       3       3         3       3       2       3       2       2	2       1       3       3       3       3       3       -         2       3       3       2       2       2       -         3       2       3       2       3       3       -         3       2       3       2       3       3       -         3       2       3       3       3       -         3       3       2       3       3       3       -         3       3       2       3       2       2       -	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8           2         1         3         3         3         3         -         -           2         3         3         2         2         2         -         -           3         3         2         2         2         -         -         -           3         2         3         2         3         3         -         -           3         2         3         2         3         3         -         -           3         2         3         3         3         3         -         -           3         3         2         3         3         3         -         -           3         3         2         3         2         3         2         -         -	PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9           2         1         3         3         3         3         -         -         -           2         1         3         2         2         2         -         -         -           2         3         3         2         2         2         -         -         -           3         2         3         2         3         3         -         -         -           3         2         3         2         3         3         -         -         -           3         2         3         3         3         3         -         -         -           3         2         3         3         2         3         2         -         -         -           3         3         2         3         2         2         -         -         -	2       1       3       3       3       3       -       -       -       -         2       3       3       2       2       2       -       -       -       -         2       3       3       2       2       2       -       -       -       -         3       2       3       2       3       3       -       -       -       -         3       2       3       3       3       3       -       -       -       -         3       2       3       3       3       3       -       -       -       -         3       3       2       3       2       3       -       -       -       -         3       3       2       3       2       2       -       -       -       -         3       3       2       3       2       2       -       -       -       -	PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11         2       1       3       3       3       -       -       -       -       -       -         2       1       3       3       3       -       -       -       -       -       -         2       1       3       2       2       2       -       -       -       -       -       -         3       3       2       2       2       -	PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12         2       1       3       3       3       3       -       -       -       -       -       -         2       1       3       3       3       -	PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01         2       1       3       3       3       3       -       -       -       -       -       3         2       1       3       3       3       -       -       -       -       -       -       3         2       3       3       2       2       2       -       -       -       -       -       3         3       3       2       2       2       -       -       -       -       -       3       3         3       2       3       2       3       3       -       -       -       -       -       3         3       2       3       3       3       -       -       -       -       -       3         3       3       2       3       2       -       -       -       -       -       -       3         3       3       2       2       -       -       -       -       -       -       3 <td>PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         2       1       3       3       3       3       -       -       -       -       -       3       1         2       1       3       3       2       2       -       -       -       -       -       3       1         2       3       3       2       2       2       -       -       -       -       -       3       1         3       3       2       2       2       -       -       -       -       -       3       1         3       2       3       2       3       3       -       -       -       -       -       3       1         3       2       3       3       3       -       -       -       -       -       3       <t< td=""></t<></td>	PO1       PO2       PO3       PO4       PO5       PO6       PO7       PO8       PO9       PO10       PO11       PO12       PS01       PS02         2       1       3       3       3       3       -       -       -       -       -       3       1         2       1       3       3       2       2       -       -       -       -       -       3       1         2       3       3       2       2       2       -       -       -       -       -       3       1         3       3       2       2       2       -       -       -       -       -       3       1         3       2       3       2       3       3       -       -       -       -       -       3       1         3       2       3       3       3       -       -       -       -       -       3 <t< td=""></t<>



## (SOS)(MSc\_FoodTechnology)

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

			Part A			·	·	
Year	1st	Semester	1st	Credits	L	Т	Ρ	С
rear	ISL	Semester	151	Creatts	0	0	3	3
Course Type	Lab only	у			Ļ			
Course Category	Disciplin	ne Core						
Pre-Requisite/s	Food Te Chemis	ndidate must hold a E echnology, B.Sc. Biol try or equivalent. The age in the qualifying be 50%	ogy, B.Šc. Bio- e minimum	Co-Requisite/s	Student should have basic theoretical knowledge about sensory evaluation and food microbiology			t
Course Outcomes & Bloom's Level	<ul> <li>CO1- To identify the characteristics of microorganisms grown on different media(BL1-Remember)</li> <li>CO2- To discover isolation techniques of microbes(BL2-Understand)</li> <li>CO3- To apply the knowledge gained on utilizing the by-products into various value added products and differentiating products on sensory perception.(BL3-Apply)</li> <li>CO4- To analyse the food materials using instruments and compare the properties with sensory evaluation.(BL4-Analyze)</li> <li>CO5- To predict the industrial utilization of different under-utilized by-products and train the panellists for sensory evaluation(BL5-Evaluate)</li> </ul>							
Coures Elements	panellists for sensory evaluation(BL5-Evaluate)         Skill Development ✓         Entrepreneurship ×         Employability ×         Professional Ethics ×         Gender ×         Human Values ×         Environment ×						.,	

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IU		<u> </u>

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

	Theory											
Total MarksMinimum Passing MarksExternal EvaluationMin. External EvaluationInternal EvaluationMin. Intern Evaluation												
	Practical											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
100	50	60	30	40								

Books	
Articles	
References Books	Food microbiology-Khetarpaul, N Sensory Science: Theory and Applicatons in FoodsLawless HT & Klein BP Microbiology-Maslowitz H. Product Testing and Sensory Evaluation of FoodsPelzar, H.J. and Rober, D.
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	https://youtu.be/h5NpTku5BGc

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



## (SOS)(MSc\_FoodTechnology)

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

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Year	1st	Semester	2nd	Credits	L	Т	Р	С			
fear	151	Semester	2110	Creans	4	0	0	4			
Course Type	Theory	Theory only									
Course Category	Discipli	ne Core									
Pre-Requisite/s	in Food stream. least a	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/sStudents should prior knowle fruits and ve 									
Course Outcomes & Bloom's Level	handlin CO2- T concen etc(BL2 CO3- T added   CO4- lo CO5- T	g methods, process o illustrate the techn trates and powders, <b>2-Understand)</b> o describe the prese products from them. dentify the method o o demonstrate the p	ing and preserva iology of Fruits a squashes and c ervation methods ( <b>BL3-Apply</b> ) f production of d processing and c	sition, physiological dev ation of fruits and vegeta nd vegetables products ordials, beverages, jam and processing ways of ry fruits, tea and coffee hemical composition of chocolate. <b>(BL5-Evaluat</b>	ables.( like ju , jellie of spice ( <b>BL4-</b> cocoa	BL1-F licesar s, sau es dev Analy	Remem nd pulp ces, velop va ze)	i <b>ber)</b> s, alue			
Coures Elements	Entrepr Employ Profess Gender Human	evelopment X reneurship X rability √ sional Ethics X - X Values X ment X	SDG (Goals)	oals) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production)							

Modules	Contents	rt B Pedagogy	Hours
1	Status of production and processing of fruits and vegetables, 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. Techniques of processing and preservation of fruits and vegetables by refrigeration and freezing, canning and bottling, drying and dehydration	Lecture methods,Group discussion, quiz	10
2	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. 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.	Lecture methods,Audio/Video clips,	10
3	Manufacturing, related calculationsand related defects ofjam, jelly, marmalade, preserve and candy; tomato puree, paste, ketchup, sauce and soup; pickles, drying/ dehydration of fruits and vegetables. Spices: Introduction, Preservation and processing spices of India; spice extracts, Spice oils and oleoresins.	Lecture methods,Audio/Video clips, group discussion,	12
4	Manufacturing and calculationsof 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. 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	Lecture methods,Audio/Video clips, group discussion, quiz	12
5	Possible causes of post-harvest losses and conservation of fruits and vegetable. Post-	Lecture methods,Audio/Video clips, group discussion,quiz	6

harvest handling including controlled and modified storage; use of novel packaging, hypobaric storage.	
Production, processing and chemical composition of cocoa beans. Cocoa processing and various products of cocoa. Manufacturing process for chocolate, Enrobed and other confectionary products.	

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

	Part E
Books	Preservation of Fruits and Vegetables- Lal G, Siddapa GS and Tandon GL
Articles	https://ifst.onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2621.2001.00513.x
References Books	Post-harvest Technology of Horticultural Crops by Kadar AA. Preservation of Fruits and Vegetables by Lal G, Siddapa GS and Tandon GL Post-HarvestPhysiology, Handling and Utilization ofTropical and Subtropical Fruits and Vegetables by Pantastico B Storage, Processing and Nutritional Quality of Fruits and Vegetables by Salunkhe DK, Bolia HR and Reddy NR Post-Harvest Technology of Fruits and Vegetables by Thompson AK
MOOC Courses	
Videos	

						Col	irse A	rticula	tion N	latrix					
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	2	-	-	-	-	-	1	3	1	1
CO2	3	3	2	3	2	3	1	-	-	1	1	2	3	1	1
CO3	3	3	2	2	3	3	-	-	-	-	-	-	3	1	1
CO4	3	3	2	2	2	2	-	-	-	-	-	1	3	3	3
CO5	3	3	3	3	2	2	1	-	-	-	1	1	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



## (SOS)(MSc\_FoodTechnology)

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

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Year	1st	Semester	2nd	Credits	L	Т	Р	С	
					4	0	0	4	
Course Type	Theory	Theory only							
Course Category	Discipli	ne Core							
Pre-Requisite/s	Food Te Chemis percent	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%							
Course Outcomes & Bloom's Level	<ul> <li>CO1- Students will comprehend about the basic composition, milling and processing of wheat, wheat flour properties and manufacturing of wheat-based products.(BL1-Remember)</li> <li>CO2- Students will evaluate the basic composition, milling and processing of rice, and milling by-products and their utilization(BL2-Understand)</li> <li>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)</li> <li>CO4- Students will demonstrate the composition and processing of barley, sorghum and millets.(BL4-Analyze)</li> <li>CO5- Students will understand about the composition and processing of legumes, oil seeds and their value-added products.(BL5-Evaluate)</li> </ul>								
Coures Elements	Skill Development ×         Entrepreneurship ×         Employability ✓         Professional Ethics ×         Gender ×         Human Values ×         Environment ×								

Part B
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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</u> <del>different type</del> <del>of huller</del> ,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 <del>corn starch, corn steep liquor, corn oil and canned corn</del> . <u>Barley: Composition,</u> <u>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 Legumes: composition, Processing methods, Products and by-products. Oilseeds: composition, Processing methods, Products and by-products. Millets: composition, Processing methods, Products and by-products.	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 Sugar cane: Harvesting condition, Processing into sugarcane juice, jaggery and sugar. Beetroot: Harvesting condition, Processing into sugar, color extraction. Sugar: Refining and types.	Lecture methods, Audio/Video clips, group discussion, quiz	10

	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	Chakrabarty, M. (2003, November 9). Chemistry and Technology of Oils & Fats. Allied Publishers.						
Articles	https://ifst.onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2621.2010.02529.x						
References Books	<ul> <li>Delcour, J. A., &amp; Hoseney, R. C. (2010, January 1). Principles of Cereal Science and Technology. American Association of Cereal Chemists.</li> <li>Dendy, D. A. V., &amp; Dobraszczyk, B. J. (2001, January 1). Cereals and Cereal Products.</li> <li>Boom Koninklijke Uitgevers.</li> <li>O'Brien, R. D., Farr, W. E., &amp; Wan, P. J. (2000, January 1). Introduction to Fats and Oils Technology. Amer Oil Chemists Society.</li> </ul>						
MOOC Courses	https://nptel.ac.in/courses/126105023						
Videos	https://youtu.be/-NyDCWuAGfk						

# **Course Articulation Matrix**

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

#### Dart E



## (SOS)(MSc\_FoodTechnology)

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

Part A											
Year	Year 1st Semester 2r		2nd	Credits	L	Т	Р	С			
					4	0	0	4			
Course Type	Theory	Theory only									
Course Category	Discipli	ne Core									
Pre-Requisite/s	Food T Bio-Ch minimu	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% Student should basic knowle and dairy pro technologies processing a preservation milk products									
Course Outcomes & Bloom's Level	I CO3- The course will demonstration production of trozen milk product i a lice cream its							eese, its ne whey			
Skill Development × Entrepreneurship × Employability √ Professional Ethics × Gender × Human Values × Environment ×			SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health an SDG12(Responsible production)							

Part A

Part B
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Modules	Contents	Pedagogy	Hours
1	Importance of Milk Industry in India: <u>Major</u> <u>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</u> <u>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	Dairy Plant Operations and Management: Plant layout and design, Piping and equipment design, Maintenance and cleaning procedures, Energy management and waste disposal. 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

			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 A. R. (2002, January 1). Technology of Indian Milk Products.						
Articles https://www.mdpi.com/2076-2615/12/3/245						
References BooksRathore, N. S., Chasta, S. S., & M. (2008, January 1). Fundamentals of Dairy Theory & Practice. De, S. (1991, January 1). Outlines of Dairy Technology.						
MOOC Courses	https://nptel.ac.in/courses/126105015					
Videos	https://youtu.be/k1a2PSEXahM					

COs	P01	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	1	1	-	-	-	1	-	3	1	1
CO2	3	3	1	2	2	3	3	-	-	-	-	-	3	1	1
CO3	3	2	3	1	3	3	1	-	-	-	1	2	3	1	1
CO4	3	2	1	2	1	3	-	-	-	-	1	-	3	3	3
CO5	3	3	2	3	2	2	-	-	-	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



#### (SOS)(MSc\_FoodTechnology)

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

#### Part A

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Year	1st	Semester	2nd	Credits	L	Т	Р	С		
i cui	150	ochiester	Zild	oreans	4	0	0	4		
Course Type	Theory	only								
Course Category	Discipli	ne Core								
Pre-Requisite/s	Food Te Chemis percent	dent must hold a B.S echnology, B.Sc. Bio try or equivalent. Th age in the qualifying be 50%	logy, B.Sc. Bio- e minimum	Co-Requisite/s	Students should have prior knowledge of meat muscle , proteins, myoglobin and processing techniques					
Course Outcomes & Bloom's Level	and fac CO2- S product CO3- T meat in CO4- S eggs, fa Analyz CO5- S	<ul> <li>CO1- The course will demonstrate about the slaughtering, conversion of muscle to meat and factors affecting quality of meat. (BL1-Remember)</li> <li>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)</li> <li>CO3- The course will describe the slaughtering, composition and preservation of poultry meat in addition to its value-added products. (BL3-Apply)</li> <li>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)</li> <li>CO5- Students will assimilate the fish production and processing in India to develop dried, salted and smoked fish, Surimi, etc.(BL5-Evaluate)</li> </ul>								
Coures Elements	Entrepr Employ Profess Gender Human	evelopment × eneurship × ability √ ional Ethics × • × Values × iment ×	SDG (Goals)	SDG1(No poverty) SDG3(Good health ar SDG12(Responsible of production)						

Part	В
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Modules	Contents	Pedagogy	Hours
1	Fresh and processed Meat technology: Livestock: Slaughter and census of Meat animals. <u>Indian and world meat industry</u> , Slaughtering: Introduction, <del>Conversion of Muscle to Meat (PSE and DFD conditions</del> . <u>Ante-mortem &amp; Post-mortem</u> <u>examination of meat</u> , Different methods of slaughtering, and post slaughter factors affecting quality of meat	Lecture methods,Audio/Video clips, group discussion, quiz	9
2	Preservation of meat: <u>Refrigeration and</u> <u>freezing, thermalprocessing, dehydration,</u> <u>and irradiation;</u> Meatanalogue: <u>Introduction.</u> <u>Processing &amp; products; Meat products: RTE</u> <u>meat products, Sausages processing –</u> <u>Types and defects.</u> <u>Effects of processing</u> <del>parameters on product constituents, viz.</del> <u>Lipid, Protein, Carbohydrates and Flavor</u>	Lecture methods, Audio/Video clips, group discussion, Review Analysis	9
3	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. 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	Lecture methods, Audio/Video clips, group discussion, classroom presentations	10
4	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>Microbial spoilage of egg and egg products.</u> 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	Lecture methods,Audio/Video clips, group discussion, quiz	12
5	Fish Processing: Types of fish, composition and nutritive value, factors affecting the quality of fish. <del>Surimi Its production and</del>	Lecture methods,Audio/Video clips, group discussion, quiz	10

processing. Drying, Curing, salting, Smoking, Freezing and Canning of fishes, Byproducts of meat, fish, and poultry industry and their uses.	

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

#### Part E

Books	Aberle, E. D., Forrest, J. C., Gerrard, D. E., & Mills, E. W. (2020, August 19). Principles of Meat Science.
Articles	https://www.sciencedirect.com/science/article/abs/pii/S0309174010001853
References Books	Hui, Y. H., Nip, W. K., & Rogers, R. (2001, July 27). Meat Science and Applications. Govindan, T. K. (1987, January 1). Fish Processing Technology.
MOOC Courses	https://nptel.ac.in/courses/102104058
Videos	

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



## (SOS)(MSc\_FoodTechnology)

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

Part A										
Year	1st	Semester	2nd	Credits	L	Т	Ρ	С		
					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.				edge o nass nsic ph	of lysics				
Course Outcomes & Bloom's Level	<ul> <li>CO1- To accomplish knowledge about fundamentals of food engineering and thermodynamics.(BL1-Remember)</li> <li>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)</li> <li>CO3- To comprehend about thermal processing of foods and student will learn the use and applications of heat exchangers and aseptic canning.(BL3-Apply)</li> <li>CO4- To illustrate the basics of chilling and freezing, cryogenic freezing and calculation of freezing time for typical foods(BL4-Analyze)</li> <li>CO5- To summarize different modes of heat transfer like conduction, convection and radiation and their applications in food industries(BL5-Evaluate)</li> </ul>									
Coures Elements	Entrepr Employ Profess Gender Human	evelopment X eneurship X rability X sional Ethics X X Values X ment X	SDG (Goals)	SDG4(Quality education) SDG11(Sustainable cities and economies)			s)			

Part	В
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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,</u> <u>Numerical problems on material balance</u> <u>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 asepticpackaging 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:</u> <u>Properties of air- water vapour mixture,</u> <u>psychometric chart, Application of</u> <u>psychrometry to drying; related numerical</u> <u>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

	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	Gupta, S., & Kapoor, V. (2020, September 10). Fundamentals of Mathematical Statistics. Sultan Chand & Sons.								
Articles	https://www.cabidigitallibrary.org/doi/full/10.5555/19810466570								
References Books	Gillett, B. E. (1976, January 1). Introduction to Operations Research. McGraw-Hill Companies.								
MOOC Courses	https://nptel.ac.in/courses/103107088								
Videos									

## **Course Articulation Matrix**

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



# (SOS)(MSc\_FoodTechnology)

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

			Part A										
Year	1st	Semester	2nd	Credits	L	Т	Ρ	С					
loui	151	Semester	2110	Creats	0	0	3	3					
Course Type	Lab on	Lab only											
Course Category	Discipli	Discipline Core											
Pre-Requisite/s	Food T Bio-Ch minimu	ident must hold a E echnology, B.Sc. B emistry or equivale im percentage in th ation should be 50	iology, B.Sc. ent. The ne qualifying	Co-Requisite/s	know vege cere shou theo vario	ent sho vledge stables, al prod ild have retical l ous milk ucts.	of fruits cereal ucts. A the the	s and s and lso they dge of					
Course Outcomes & Bloom's Level	Remen CO2- T Unders CO3- T CO4- T	nber) o explain different stand) o explain different o identify different o measure differer	preservation me preservation me preparation tecl	nniques of fruits and ve ethods of fruits and ve ethods of cereal and r nniques of cereal and ro & micro nutrient in o	getable nilk proc milk proc	produc lucts. <b>(E</b> oducts. <b>(</b>	ts.(BL2 5L3-Ap BL4-A	2- ply) nalyze)					
Coures Elements	Entrepr Employ Profess Gender Human	evelopment ✓ reneurship × vability × sional Ethics × r × values × nment ×	SDG (Goals)	SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production)									

Part	В
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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

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ıч	IL.	$\mathbf{U}$

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	

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

Books	Potter, N. N., & Hotchkiss, J. H. (2012, December 6). Food Science. Springer Science & Business Media.
Articles	
References Books	Chakrabarty, M. (2003, November 9). Chemistry and Technology of Oils & Fats. Van Arsdel, W. B., & Copley, M. J. (1963, January 1). Food Dehydration.
MOOC Courses	
Videos	

## **Course Articulation Matrix**

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	3	2	-	-	-	-	-	2	3	1	1
CO2	3	1	3	2	3	3	1	-	-	1	1	2	3	1	1
CO3	3	2	3	3	3	2	1	-	-	1	1	2	3	1	1
CO4	3	2	2	3	3	2	1	-	-	-	1	2	3	3	3
CO5	3	1	2	2	3	3	-	-	-	-	-	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



# (SOS)(MSc\_FoodTechnology)

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

Part A										
Year	Year 1st Semester 2nd Credits		2nd	Credits	L	Т	Р	С		
			orcano	0	0	3	3			
Course Type	Lab only	Lab only								
Course Category	Disciplin	Discipline Core								
Pre-Requisite/s	Food Te Chemis percent	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						eat cts		
Course Outcomes & Bloom's Level	CO2- To CO3- To Unders CO4- To	<ul> <li>CO1- To analyse physiochemical properties of milk (BL3-Apply)</li> <li>CO2- To analyse spoilage in milk products(BL5-Evaluate)</li> <li>CO3- To measure different levels or macro &amp; micro nutrient in cereal &amp; milk products. (BL2-Understand)</li> <li>CO4- To observe the structure of egg, its properties and quality.(BL2-Understand)</li> <li>CO5- To summarize the quality parameters of meat and its processing.(BL5-Evaluate)</li> </ul>								
Coures Elements	Entrepro Employ Profess Gender	Values X								

Part B

Modules	Contents	Pedagogy	Hours
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Part	Ρ	art	t C	
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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

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	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					

**Course Articulation Matrix** 

COs         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11         PO12         PS01         PS	2 PSO3
CO1     1     1     1     1     -     -     1     1     -     3     1	1
CO2     2     2     1     1     1     -     -     -     -     1     -     3     1	1
CO3       2       2       2       1       1       1       -       1       -       3       1	1
CO4       3       2       2       2       1       -       1       1       -       2       -       3       3	3
CO5       3       3       2       2       2       2       2       1       1       2       -       3       3	3
CO6         -	-



# (SOS)(MSc\_FoodTechnology)

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

					1	1	1			
Year	2nd	Semester	3rd	Credits	L	Т	Р	С		
	2.13				4	0	0	4		
Course Type	Theory on	Theory only								
Course Category	Discipline	Discipline Core								
Pre-Requisite/s	Technolog equivalent	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	<ul> <li>CO1- Comprehend the principles and methods involved in the processing of foods and discuss the food preservation by heating(BL1-Remember)</li> <li>CO2- To describe about irradiation, microwave processing and Ohmic heating as food processing techniques. (BL2-Understand)</li> <li>CO3- To illustrate different freezing techniques, advantages and mechanism of freezing in addition to its effect on food quality. (BL3-Apply)</li> <li>CO4- Interpret the use of natural as well as chemical and bio- based preservatives to increase the shelf life of food.(BL4-Analyze)</li> <li>CO5- Recognize different drying methods, different dryers used in food processing and drying mechanisms including sorption isotherm(BL5-Evaluate)</li> </ul>									
Coures Elements	Skill Development ×         Entrepreneurship ✓         Employability ✓         Professional Ethics ×         Gender ×         Human Values ×         Environment ×					)				

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-DistilledBeverages: 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, flavoursand 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

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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					

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	

Course Articulation Matrix

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



# (SOS)(MSc\_FoodTechnology)

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

Year	2nd	Semester	3rd	Credits	L	Т	Р	С					
rear	Zhu Gemester		514	oreans	4	0	0	4					
Course Type	Theory o	Theory only											
Course Category	Discipline	Discipline Electives											
Pre-Requisite/s	Food Teo They sho	s should have a bach chnology or in any so buld have received a their graduation dec	cience stream. t least a 50%	Co-Requisite/s	knowle analytic chroma	dge rega cal techn atograph	d have ba arding var iques like y, Spectro f these m	ious scopy					
Course Outcomes & Bloom's Level	is to disc CO2- To capillary CO3- To course w CO4- To types of s and Refr CO5- To	<ul> <li>CO1- To discover different kinds of chromatographic techniques, theirprinciples and applications. Main focus is to discuss the use of advanced chromatographic techniques in food analysis.(BL1-Remember)</li> <li>CO2- To insight about principle and various types of electrophoresis methods ,mainly SDS- PAGE and capillary electrophoresis.(BL2-Understand)</li> <li>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)</li> <li>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)</li> <li>CO5- To illustrate different methods to estimate the food constituents like carbohydrates,proteins, minerals, vitamins, and lipids.(BL5-Evaluate)</li> </ul>											
Coures Elements	Entrepre Employa	onal Ethics X X /alues X	SDG (Goals)	SDG1(No poverty) SDG3(Good health and we SDG6(Clean water and sa SDG12(Responsible const	nitation)		ction)						

Modules	Contents	Pedagogy	Hours
1	Chromatographic technique: principle and application of adsorption, column, partition and affinity chromatography, Size exclusion chromatography and lon 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 Refrectrometry.	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 andMinerals from food products, Measurement of color, flavor, taste and texture using sophisticated instruments	Lecture methods,Group discussion, quiz	12

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40	0						
	·		Practical	<b>.</b>							
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- 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								

Course Articulation Matrix

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



# (SOS)(MSc\_FoodTechnology)

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

	1	i										
Year	2nd	Semester	3rd	Credits	L	Т	Р	С				
real	2110	Gemester	514	oreans	4	0	0	4				
Course Type	Theory or	lly										
Course Category	Discipline	Discipline Core										
Pre-Requisite/s	Technolog equivalen	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/sStudent 										
Course Outcomes & Bloom's Level	<ul> <li>CO1- To comprehend the fundamentals of nutraceuticals, nutrigenomics and functional foods. They learn the applications of rheology and texture profile analysis in product development. (BL1-Remem CO2- To describe, basics of product development, different steps of product development process at innovation strategies are covered which will enhance the capability of student's thinking while development food product. (BL2-Understand)</li> <li>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 Apply)</li> <li>CO4- To explore basics of food safety laws and regulations governing the country and the world (BL Analyze)</li> <li>CO5- Illustrate technology to development new food products (product qualities, raw material proper processing, packaging requirement, distribution and marketing). (BL5-Evaluate)</li> </ul>											
Coures Elements	Entrepren Employab	nal Ethics ✓ alues ✓	SDG3(Good health and w SDG4(Quality education) SDG12(Responsible cons		0,	oduction	)					

Р	art	В
	~	

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

Theory												
Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
40	60	18	40									
-	·	Practical	<b>.</b>									
Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
	Marks 40 Minimum Passing	Marks     Evaluation       40     60       Minimum Passing     External	Minimum Passing MarksExternal EvaluationMin. External Evaluation406018PracticalMinimum PassingExternalMin. ExternalMin. External	Minimum Passing MarksExternal EvaluationMin. External EvaluationInternal Evaluation40601840PracticalMinimum PassingExternalMin. ExternalInternal								

#### Part E

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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=DSKre3LkkIg

Course Articulation Matrix

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



# (SOS)(MSc\_FoodTechnology)

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

Year	2nd	Semester	Credits	L	Т	Ρ	С				
rear	2110	Gemester	3rd	oreans	4	0	0	4			
Course Type	Theory only										
Course Category	Discipline	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/sStudent s basic kno food pack materials.										
Course Outcomes & Bloom's Level	<ul> <li>CO1- To explore the fundamentals of food packaging and different packaging materials-paper, glass, plasmetal, and cans.(BL1-Remember)</li> <li>CO2- To comprehend different types of packaging forms like modified atmospheric packaging, control atmospheric packaging, vacuum packaging and retortable plastic packaging(BL2-Understand)</li> <li>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)</li> <li>CO4- To illustrate recent advances in packaging techniques like edible packaging, microwavable packaging intelligent packaging and active packaging(BL4-Analyze)</li> <li>CO5- To demonstrate testing of packaging materials, Bar code labelling and packaging laws and regulatio (BL5-Evaluate)</li> </ul>										
Coures Elements	Skill Devel Entreprene Employabi Profession Gender X Human Va Environme	eurship X ility √ nal Ethics X ilues X	SDG (Goals)	SDG1(No poverty) SDG4(Quality education) SDG12(Responsible const	uption	and pr	oducti	on)			

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Modules	Contents	Pedagogy	Hours
1	Background of food packaging, functions and levels, Origin of packaging material. Different packaging materialsand their manufacturing- paper, glass, plastics, metaland 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</u> <u>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</u> <u>barcodes; Active packaging – oxygen scavengers,</u> <u>ethylene scavengers, moisture scavengers,</u> <u>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</u> tests, tensile strength, puncture resistance, bursting strength, etc., Barcode labeling, package desingn,Information printing on the package. Packaging laws and regulation.	Lecture methods,Group discussion, quiz	8

	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												

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

Course Articulation Matrix

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



# (SOS)(MSc\_FoodTechnology)

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

<u> </u>	1	i	TarrA	<u>i</u>			1	1
Year	2nd	2nd Semester 3rd Credits		L	Т	Р	С	
Tear	2110	Gemester	514	oreans	4	0	0	4
Course Type	Soft skill							
Course Category	Specializa	ation Elective Courses						
Pre-Requisite/s	Technolog equivalen	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/sStudent should ha 						ing
Course Outcomes & Bloom's Level	<ul> <li>CO1- The course prepares the student to understand the basic concepts of ResearchMethodology, its applications in experimental design and future prospects.(BL1-Remember)</li> <li>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)</li> <li>CO3- The course aims to provide experimental basis, and to enable students to acquirea specialized knowledge and understanding of data and its applications in experimental verification.(BL3-Apply)</li> <li>CO4- The course aims to provide basis of analyzing the applications of Research Methodology in various fields of research and industries.(BL4-Analyze)</li> <li>CO5- To apply the understanding of statistical tools in evaluation in various samples.(BL5-Evaluate)</li> </ul>							
Coures Elements	Entrepren Employab	nal Ethics X alues √	SDG (Goals)	SDG4(Quality education)				

Part	В
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Modules	Contents	Pedagogy	Hours
1	Definition of Research, QualitiesofResearcher, Componentsof ResearchProblem,VariousStepsinScientific Research,TypesofResearch;HypothesesResearch 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

			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				

r	
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/oXnjR0OtfBI

Course Articulation Matrix

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



# (SOS)(MSc\_FoodTechnology)

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

Part A

Voar	Year 2nd Semester 3rd Cred		Credits	L	Т	Р	С		
leal	2110	Semester	514	Creats	0	0	3	3	
Course Type	Lab only	Lab only							
Course Category	Discipline	Core							
Pre-Requisite/s	Technolog equivalen	Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or Co-Requisite/s knowledge						ould have basic of food analysis entation and echnology	
Course Outcomes & Bloom's Level	CO1- To study the concept of additives being used in beverages(BL2-Understand) CO2- To evaluate the quality standards comprising of Chemical, Microbial & Sensory Evaluation (BL5- Evaluate) CO3- To discover different kinds of chromatographic techniques, their principles and applications.(BL4- Analyze) CO4- To understand about principle and various types of electrophoresis methods, mainly SDS- PAGE and electrophoresis.(BL2-Understand) CO5- To design different methods to estimate the food constituents like crude fibre, crude fat, calcium content, protein content, etc.(BL5-Evaluate)								
Coures Elements	Entrepren Employat	nal Ethics X alues X	SDG (Goals)						

Part B

	T dit B		
Modules	Contents	Pedagogy	Hours

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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

	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										

Course Articulation Matrix

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



# (SOS)(MSc\_FoodTechnology)

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

Part A

Year	2nd	Semester	3rd	Credits	L	Т	Ρ	С
Teal	2110	Semester	510	Credits	0	0	3	3
Course Type	Lab only							
Course Category	Discipline	Core						
Pre-Requisite/s	Technolog equivalent	nt must hold a B.Sc deg y, B.Sc. Biology, B.Sc. I . The minimum percent on should be 50%	Bio-Chemistry or	Co-Requisite/s The student should h theoretical knowledg various food packagi materials				
Course Outcomes & Bloom's Level	metal, and CO2- To p testing of p CO3- To d CO4- To a	plastic( <b>BL2-Understa</b> rovide the students a sp backaging systems for v emonstrate new packag pply the knowledge gain	nd) becialized knowledge various types of food( ging systems and safe ned from specialized	stics of various packaging ma about packaging equipment <b>BL3-Apply)</b> ety and legislative requireme techniques in food packaging eate innovative food package	and m nts <b>(BL</b> g such	achine . <b>6-Crea</b> as Act	ry and ate) ive, ase	eptic,
Coures Elements	Skill Devel Entreprene Employabi Profession Gender X Human Va Environme	eurship X lity X hal Ethics X lues X	SDG (Goals)	SDG1(No poverty) SDG12(Responsible consuption and prod			oductio	n)

Part B

Modules	Contents	Pedagogy	Hours
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Part	С
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Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Identification of different types of packaging and packaging materials	Experiments	BL3-Apply	3
2	To perform different destructive tests for glass containers	Experiments	BL3-Apply	3
3	Measurement of thickness of packaging materials	Experiments	BL4-Analyze	3
4	Determination of water-vapour transmission rate	Experiments	BL4-Analyze	3
5	Testing of chemical resistance of packaging materials	Experiments	BL5-Evaluate	3
6	To perform sterilization of different packaging materials	Experiments	BL3-Apply	3
7	To determine leakage of plastic pouches	Experiments	BL4-Analyze	3
8	To determine the basis weight, density and grammage of paper and paper board	Experiments	BL4-Analyze	3
9	To determine the wax content in given sample of wax paper	Experiments	BL4-Analyze	3
10	Visit to relevant industries	Experiments	BL3-Apply	3

	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									

Part E									
Books Hall, G. M. (2012, December 6). Fish Processing Technology. Springer Science & Business Media.									
Articles									
References Books	Viets, F. G., Service, U. S. C. A. M., & Hageman, R. H. (1967, January 1). Agriculture Handbook.								
MOOC Courses									
Videos									

Course	Articula	tion Ma	atrix	

-															
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	3	1	1
CO2	-	-	-	-	-	-	-	-	-	-	-	-	3	1	1
CO3	-	-	-	-	-	-	-	-	-	-	-	-	3	1	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



# (SOS)(MSc\_FoodTechnology)

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

## Part A

Voar	Year 2nd Semester 4th Credits		Cradita	L	Т	Р	С			
fear	Znu	Semester	401	Credits	0	0	18	18		
Course Type	Projec	Project								
Course Category	Projec	Projects and Internship								
Pre-Requisite/s		tudent should h edge of food sc		Co-Requisite/s	enable students observe, first hand, work flow and process food industries and associate enterprises			cesses in		
Course Outcomes & Bloom's Level	techno	<ul> <li>CO1- The student will be able to appreciate different processing and production technologies in various industrial settings(BL4-Analyze)</li> <li>CO2- The student will be exposed to the diverse setting in food industries (BL5-Evaluate)</li> </ul>								
Coures Elements	✓ Entrep Emplo Profes X Gende Huma	Development preneurship X pyability V ssional Ethics er X n Values X pnment X	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

			Theory					
Total Marks	Minimum Passing MarksExternal EvaluationMin. External EvaluationInternal 							
	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	P06	P07	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



# (SOS)(MSc\_FoodTechnology)

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

## Part A

				L	Т	Р	С	
Year	2nd	Semester	4th	Credits	0	0	4	4
Course Type	Project		•				•	
Course Category	Projects	s and Internship						
Pre-Requisite/s		ete knowledge of a ne subjects of Foc		Co-Requisite/s	Proje prese		/Dissert	ation
Course Outcomes & Bloom's Level	CO2- ir CO3- e	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)						
Coures Elements	Entrepr Employ Profess Gender Human	evelopment ✓ eneurship X rability ✓ sional Ethics X X Values X ment X	SDG (Goals)					

# Part B

Modules	Contents	Pedagogy	Hours
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			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	

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

## Course Articulation Matrix