FIRST SEMESTER

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 01: FOUNDATION TO FOOD SCIENCE AND TECHNOLOGY

School Name	**School of Food Science and Technology**					
Programme	**M Sc Food Science and Technology**					
Course Name	**FOUNDATION TO FOOD SCIENCE AND TECHNOLOGY**					
Type of Course	Core					
Course Code	FS M 21 C 01					
Course Summary & Justification	• The objective of this course is to impart the basic knowledge in the branch of food science and technology. • To develop a very good understanding about characteristics of different classes of foods, constituents and properties of foods, flavours and toxins in foods etc. • To enable students gain knowledge regarding food security, malnutrition and Food, agricultural policies					
Semester	First					
Total Student Learning Time (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of nutrition and food science**					

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Understand the classification of foods, and different techniques to improve the nutrient content of foods	U /E	1
2	Understanding of various physical and chemical properties of food	U/ An	1
3	Exemplify basic tools to study the properties of food in the laboratory	S	2,3
4	Understanding different types of food flavors, colors, toxins and allergens	U/R	1,
5	Understand worldwide scenario of food security and malnutrition	U/R	4
6	Create an insight to food and agricultural policies, research and development in food and agriculture.	U/An/ C	4,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 02: FOOD CHEMISTRY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD CHEMISTRY**					
Type of Course	Core					
Course Code	FS M 21 C 02					
Course Summary & Justification	• The course is designed to get a clear idea on the biomolecules that composes food. • To study their role in various chemical reactions during food processing and spoilage and their contribution towards organoleptic properties of food. • The course builds a base for the students to comprehend and articulate the advanced concepts in food science					
Semester	First					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basic understanding of chemical groups and bonding, basics of biochemistry**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Understand the chemistry and properties of water, ice and dispersed systems in foods.	U /E	1
2	To identify the different types of biomolecules such as carbohydrates, proteins, lipids, vitamins and minerals in various kind of food.	U/ An	1

3	To compare the structure and functions of carbohydrates, proteins, lipids, vitamins and minerals in contributing the organoleptic and nutritional properties of foods.	A	2
4	To understand various kinds of desirable and undesirable chemical reactions involving these bio molecules that occurs during food processing and food spoilage.	U/A/E	1
5	To understand various enzymes and their reactions in foods	U/R	1
6	To create an insight to the various chemical reactions responsible for changes of food during cooking, preservation and processing.	S/I	1,4
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 03: FOOD MICROBIOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD MICROBIOLOGY**					
Type of Course	Core					
Course Code	FS M 21 C 03					
Course Summary & Justification	• The objective of this course is to impart the basic knowledge in the branch of food microbiology. • To develop a very good understanding about characteristics of different types of microorganisms with desirable and undesirable actions in different categories of food. • To enable students gain knowledge regarding food spoilage, food production using microorganisms and food borne infections					
Semester	First					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and nutrition**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Understand the different categories of microorganism relevant to food system	U /E	1
2	Explain various factors affecting the microbial growth in food and their nutritional requirements and will be acquainted with methods to	U/ A	1,3,4

	Prevent the microbial growth in food.		
3	Exemplify basic tools to study these in the laboratory	S	2,3
4	Analyse various methods for determination and isolation of microorganisms in food.	An	2,3,4
5	Understand and apply different methods for the use of microorganisms for the production of food.	U/A/C	2,4
6	Explain different kind of food spoilage and characteristics of microorganism during food spoilage and food preservation	U/An	1, 3
7.	Create a deep understanding of food born infections and intoxication and techniques for its prevention	U/ I	1,4,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 04: FOOD PROCESSING AND PRESERVATION

School Name	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD PROCESSING AND PRESERVATION**					
Type of Course	Core					
Course Code	FS M 21 C 04					
Course Summary & Justification	• This course is designed to provide an overview of food processing and preservation • Course topics will include the food preservation by high and low temperature, freezing, dehydration, frying, emulsification, chemical preservation and irradiation. • The course also provides inputs regarding different classes of food items prepared using each preservation methods					
Semester	First					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics understanding of food science**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Understand various methods for the preservation of different kind of food items	U /C	1
2	Understand the role of temperature, pH, moisture in preserving	U/ An/E	1,

	Foods and study the characteristics of food system under these preservation methods.		
3	Explain food preservation by frying and emulsification	U/A	1,2
4	Create a deep insight to different types of chemicals for the preservation of food	U/A	1,4
5	Understanding the principles regarding preservation by irradiation of food and its legal aspects	U/R	1,5
6	Provide a basic knowledge in the preparation of different type of foods using these preservation methods	U/An/ C	1,2
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 05 : LABORATORY COURSE 1: FOOD CHEMISTRY AND FOOD MICROBIOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc. Food Science and Technology**					
Course Name	**LABORATORY COURSE 1: FOOD CHEMISTRY AND FOOD MICROBIOLOGY**					
Type of Course	Core					
Course Code	**FS M 21 C 05**					
Course Summary & Justification	The course is designed to equip students with the essential skills in laboratory techniques that are important in chemical and microbial analysis of food. This will enhance the practical abilities of the students to carry out the quality analysis of food in food industries.					
Semester	First					
Total StudentLearning Time (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total Learning Hours
	Eg. Authentic learning Collaborative learning Independent learning	10	10	120	-	140
Pre-requisite	General idea on reagents and solvents					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	To prepare reagents, buffers and other solutions in required concentrations and required pH.	Ap	2
2	To estimate different bio-molecules (sugar, polyphenols, gluten) in food samples	Ap/S	2
3	To study the different stages of sugar cookery	Ap/S	1,2
3	To determine boiling point and freezing point of water	S	2,3

4	To determine acidity and natural pigments in given food samples	S	2,3
5	To determine gelatinization of the given food sample	S	2,3
6	To determine the refractive index of fat sample	S	2,4
7	Students will acquire skills on practice of sterile and safety precautions in a food microbiology laboratory	Ap	2,3
8	Students will be able to prepare and sterilize media and to culture bacteria and fungi in laboratory	Ap/S	2,3
9	Students will be able to examine morphological, physiological and biochemical properties of bacteria and fungi in different types of food.	S	2,4
10	Students will be able to identify the microbiology of processed and unprocessed food	S	2,5
11	Students will be able to identify the microbiology of hand and the effect of hand sanitation and will be able to perform the isolation of a specific culture of microorganism	S	2,3
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 06: NANOTECHNOLOGY –CONCEPTS AND APPLICATIONS IN FOOD SCIENCE

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**NANOTECHNOLOGY –CONCEPTS AND APPLICATIONS IN FOOD SCIENCE**					
Type of Course	Elective					
Course Code	**FS M 21 E 06**					
Course Summary & Justification	• The content in this course has been designed with an objective to provide detailed understanding on the techniques, principle and applications of nanotechnology in food • Course also enable students to study regarding the different type of nano materials for food processing , food preservation and increasing the organoleptic and nutritive properties of foods • This will enable the students to identify the research, learning and job opportunities based on the latest developments in this subject of food technology.					
Semester	First					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basic knowledge in food science and bio technology**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	Understand the basic principles and techniques in the field of nanotechnology	U /E	1
2	Identify the latest techniques in nanotechnology for the food industry	U/ An	1,3,4
3	Understand the application of nanomaterials in food processing	An	1,3
4	Create an insight to the application of nano technology in food packaging	U/E	1,3
5	Understand the application of nano technology in food safety	An	1,3
6	Create an insight to regulatory framework for food nanotechnology	U/R	1,3,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 07: NUTRITIONAL BIOCHEMISTRY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**NUTRITIONAL BIOCHEMISTRY**					
Type of Course	Elective					
Course Code	**FS M 21 E 07**					
Course Summary & Justification	• This course is designed to equip students the essential knowledge in human nutrition, nutrients, and nutrient deficiencies. • It also helps students identify various nutritional problems in India and factors affecting it. • This course also helps students to develop skills in planning balance diet for people of different age groups. • This course also gives the basic knowledge about the therapeutic diet planning and preparation. • This will enable the students to identify the research, learning and job opportunities based on the latest developments in this subject of nutrition.					
Semester	First					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and nutrition**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	Students will be able to identify role of nutrition in maintain health	U /E	1
2	Students will be able to identify the major nutritional problems of India and factors affecting it	U/ An	1,4
3	Students will be able understand type ,functions, sources, digestion, absorption and metabolism and effect of deficiency of nutrients in food (carbohydrates, protein, fat, vitamins and minerals)	U/R	1,3
4	Students will be able to understand the concept of energy and fluid requirement for different classes of people	U/A	1,3
5	Students will be able to calculate the basal metabolic rate and body mass index and nutritive value of foods	S	1,3,4
6	Students will be able to understand the metabolism of water and electrolytesin the body.	U/R	1,3,4
7	Students will be able to understand different type of therapeutic diets and nutraceuticals	U/An/ C	1,3
8	Students will be able to plan nutritive menu for different classes of people	S/C	2,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 08: FOOD TOXICOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD TOXICOLOGY**					
Type of Course	Elective					
Course Code	**FS M 21 E 08**					
Course Summary & Justification	• The content in this course has been designed with an objective to provide detailed understanding of different types of toxins in food (natural , agricultural/industrial contaminants, toxins as aresult of processing and packaging) • This course helps to develop a very good understanding regarding the toxic food additives. • Understanding these is highly essential for a student to explore its theoretical and practical aspects for the benefit of society					
Semester	First					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basic knowledge of food science**					

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	To understand the classification, dose and determinants of toxins in food	U /E	1,3
2	Understanding toxic constituents and anti-nutritional factors naturally present in foods	U/ R	1,3
3	To identify the toxins in food as a result of agricultural and industrial contamination	U/E	1,5
4	To identify the toxic constituents in food due to processing and packaging	U/E	1,5
5	Create an insight to the toxic food additives	U/R	1,4
6	Give an understanding on the toxic implications of nano technology in food	U/An	3,4
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

SECOND SEMESTER

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 09: FOOD PRODUCT DEVOLOPMENT AND QUALITY EVALUATION

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD PRODUCT DEVOLOPMENT AND QUALITY EVALUATION**					
Type of Course	Core					
Course Code	**FS M 21 C 09**					
Course Summary & Justification	• This course is designed to develop a very good understanding regarding the stages and techniques of new food product development process • This will enable the students to identify the research, learning and job opportunities based on the latest developments in this subject • Course also gives an account on different kinds of specialty foods. • This course also equips students with a basic theoretical knowledge of different techniques of sensory evaluation, which is needed for food quality evaluation in food industries.					
Semester	Second					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and biotechnology**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	Students will be able to understand the need, stages and techniques in new food product development	U /An/ E	1
2	Students will be able to perform the standardization of recipe	S	2
3	Students will be equips with the basic knowledge in different type of quality evaluation of food	U/An	2
4	Students will be able to understand the importance of plant layout of food industry	U/E	2,3
5	Students will be able to understand different kinds of speciality and novel food products	U/R/E	2,3
6	Create an insight to the categories , techniques and methods in sensory evaluation of food products	U/An/ C	2,4
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 10: FOOD SAFETY AND QUALITY ASSURANCE

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD SAFETY AND QUALITY ASSURANCE**					
Type of Course	Core					
Course Code	**FS M 21 C 10**					
Course Summary & Justification	• The course is designed to get a deep knowledge of concept of food safety and food quality assurance. • This course provide an insight to food adulteration and its types, techniques and principles of food quality assurance • This course also gives a basic knowledge of HACCP system for quality assurance. • It also equips students with a sound knowledge on both international and national food laws and regulations and agencies for food safety.					
Semester	Second					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and quality control**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	Students will be able to understand the concept of food quality, food safety, food quality assurance and food quality management	U /An/E	1
2	Create an insight to Total Quality Management ,Good Manufacturing Practices, Good Hygienic Practices And Good Lab Practices	U/ An/E	3,5
3	Understand microbial and statistical quality control in food industry	U/A	3,5
4	Students will be equipped with a basic knowledge in HACCP	U/A/S	3,5
5	Understand national and international food laws and regulations for food safety	U/R	3,4,5
6	Create an insight to the national and international agencies in the field of food safety	U/R	1,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 11: TECHNIQUES IN FOOD ANALYSIS AND BIOSTATITICS

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**TECHNIQUES IN FOOD ANALYSIS AND BIOSTATITICS**					
Type of Course	Core					
Course Code	**FS M 21 C 11**					
Course Summary & Justification	• The objective of this course is to impart the basic knowledge in the branch of techniques in food analysis • The syllabus content in this paper is designed with an objective to train the students in both theoretical and practical aspects of the subject • This will also enable the students to get an idea about the latest developments taking place in this subject • The course also gives a basic knowledge regarding bio statitics.					
Semester	Second					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and nutrition**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Students will be equipped with the basic knowledge regarding the principle, instrumentation and application of Spectroscopy, Chromatography, Colorimerty ,Gravimetry and Refractometry	U /S	1,4
2	Students will be able to understand different methods of extraction and analysis of carbohydrates ,proteins, lipids , vitamin and minerals in in foods	U/ An/S	1,4

3	Exemplify basic tools of these in the laboratory	S	2
4	Students will be able to understand different methods for analysis of moisture content in different type of foods	U/S	1
5	Create an insight in various tools in biostatistics	U/An/ C	1,4,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 12: FOOD ADDITIVES AND PACKAGING TECHNOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD ADDITIVES AND PACKAGING TECHNOLOGY**					
Type of Course	Core					
Course Code	**FS M 21 C 12**					
Course Summary & Justification	• This course is designed to provide a basic knowledge regarding the typeof food additives their safety, health aspects and regulations • It also gives a detailed account regarding food packaging, its categories , safety and health aspects and testing of packaging materials • The course also enable students to gather a sound knowledge in advanced techniques in food packaging such as edible packaging and smart packaging, CAP and MAP					
Semester	Second					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and nutrition**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Understand categories and functions of food additives	U /E	1
2	Understanding of safety, healthy and regulatory aspects of each food additive	U/ An/A	1,5

3	Understand the categories and properties, safety aspects of different type of food packaging materials	U/An	1,5
4	Identify the packaging requirement of different categories of food	U/E	1,3
5	Create an insight to the testing of packaging materials	U/S	1,3
6	Understand advanced packaging technologies such as aseptic packaging, smart packaging edible packaging and bio degradable packaging	U/An/ C	1,4
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

MAHATMA GANDHI UNIVERSITY

FS M 21 C 13: LABORATORY COURSE 2: TECHNIQUES IN FOOD ANALYSIS, FOOD ADDITIVES AND PACKAGING TECHNOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc. Food Science and Technology**					
Course Name	**LABORATORY COURSE 2: TECHNIQUES IN FOOD ANALYSIS, FOOD ADDITIVES AND PACKAGING TECHNOLOGY**					
Type of Course	Core					
Course Code	**FS M 21 C 13**					
Course Summary & Justification	• The main objective of the course is to give practical training to the students in quality analysis of different categories of food, estimation of additives in food and quality testing of food packaging. • This course enhances the practical abilities of the students in food quality control and gives a good exposure to the methodologies significant to food industry					
Semester	Second					
Total StudentLearning Time (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total Learning Hours
	Eg. Authentic learning Collaborative learning Independent learning	10	10	120	-	140
Pre-requisite	Basic knowledge in techniques of food analysis, food additives and food packaging					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	**On completing this course students will be able:** to prepare reagents, buffers and other solutions in required concentrations and required pH.	Ap	2
2	To detect presence of adulteration in the given food sample	Ap/S	2
3	to assess the purity of given water sample	S	2,4

4	To assess the quality of market samples of different categories of food commodities.	S	2,3
5	to perform the statistical application after the sample evaluation	S	2,4
6	to estimate iodine in iodized salt	Ap/S	2
7	to estimate food additives (Saccharin, Sodium benzoate ,Sulfur dioxide, Propyl gallate, Sorbic acid)in foods	Ap/S	2
8	to estimate chlorophyll and carotenoids in foods	S	2,5
9	to estimate salt in foods	S	2,4
10	to perform quality evaluation tests on different kinds of food packaging materials	Ap/S	2,4
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 14: FOOD BIOTECHNOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD BIOTECHNOLOGY**					
Type of Course	Elective					
Course Code	**FS M 21 E 14**					
Course Summary & Justification	• The objective of this course is to impart the basic knowledge in bio technology in relation to food system • The course gives a basic knowledge in principle and techniques in bio technology • To develop a very good understanding about the fermentation technology, its application in food industry. • The course also gives a sound knowledge regarding genetic engineering ,its applications for improving foods and safety issues.					
Semester	Second					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1.	**Students will be able to :** Understand the fundamental concepts and techniques in biotechnology	E	1
2	Acquire a sound knowledge in process of fermentation, different types of fermented foods ,history and scope of fermentation	An	1

3	Understand the benefits and functional properties of fermented foods	U/E	1,2
4	Understand the application of fermentation technology in food industries	U/C	2
5	Create an insight to genetic engineering, use of genetically modified plants and animals for food production	An/I	2,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 15: FUNDAMENTALS OF FOOD ENGINEERING

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FUNDAMENTALS OF FOOD ENGINEERING**					
Type of Course	Elective					
Course Code	**FS M 21 E 15**					
Course Summary & Justification	• The objective of the course is to give an insight into various aspects of food engineering. • This is course helps the students to get a deep understanding regarding principles of fluid flow, heat transfer in food processing, psychrometrics and principles of different type of mechanical operations in food industry and its applications.					
Semester	Second					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food technology**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	Apply knowledge of food engineering to design new process	A/C	2
2	Understand the velocity of flowing fluids	U/An	1
3	Understand pump selection	S	1
4	Able to calculate through different dimensions	S	2
5	Able to do thermal process calculations and calculation processing time in continuous flowsystem	S	2
6	Able to psychrometric chart to do complex air conditioning process.	S	2
7.	Understand different type of mixers used in food industry	U/An	1,3
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 16: TECHNOLOGY OF BEVERAGES

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**TECHNOLOGY OF BEVERAGES**					
Type of Course	Elective					
Course Code	**FS M 21 E 16**					
Course Summary & Justification	• The objective of this course is to understand the importance of beverage industry. • To develop a very good understanding about composition and nutritional quality of different kinds of beverages • This course enable students to illustrate the processing technology and packaging requirement of various beverages.					
Semester	Second					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	Students will be able to understand the science and technology of different types of beverages	U/E	1
2	Students will be able to explain the processing of alcoholic beverages ,carbonated beverages, ,tea, coffee and mineral water	U/ An	1,3
3	Students will be able to understand the permitted additives in beverages	U/E	3
4	Students will be able to understand the impact of processing on quality of beverages	U/E	1,3
5	Students will acquire knowledge of recent high value added beverages and recent trends in beverage industry	U/An	1,3
6	Students will be able to identify the packaging requirement of different types of beverages	U/S	1,3,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

THIRD SEMESTER

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 17: CEREALS, PULSES AND OILSEEDS TECHNOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**CEREALS, PULSES AND OILSEEDS TECHNOLOGY**					
Type of Course	Core					
Course Code	**FS M 21 C17**					
Course Summary & Justification	• The objective of this course is to illustrate the recent developments in cereal, pulses and oilseed technology • This course describes both traditional and modern techniques of processing of cereals, pulses and oilseeds. • To enable students gain knowledge regarding various processed product lines in food industries.					
Semester	Third					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and biotechnology**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	Understand the structure, composition and nutritive value of different cereals, pulses and oilseeds.	U /R	1
2	Grasp the basic and advanced milling methods of rice,wheat,corn and pulses.	U/ An	1
3	Explain the by product utilization of various grains and pulses.	E	3,4
4	Understand the toxic factors in pulses and oilseeds	U/R	1
5	Explain the influence of flour constituents on dough rheology	An	1,3
6	Comprehend the quality and processing aspects of cereals, pulses and oilseeds.	U/An/ I	1,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 18: TECHNOLOGY OF MILK, MEAT , POULTRY AND FISH

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**TECHNOLOGY OF MILK, MEAT , POULTRY AND FISH**					
Type of Course	Core					
Course Code	**FS M 21 C 18**					
Course Summary & Justification	• This course is designed to understand the importance of milk, meat ,fish and poultry industry • The course give a detailed understanding of structure , composition and nutritive quality of animal products • To illustrate the processing technology of milk, meat, fish and poultry products • To explain value addition and packaging of milk , meat, fish and poultry products					
Semester	Third					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and bio technology**					

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	**Students will be able to:** Understand the technology for handling, processing, and preservation of milk , meat ,fish and poultry	U /E	1
2	Understand different type of products from milk, meat, fish, poultry and egg.	U/ E	1
3	Apprehend the hygiene, sanitation, and mechanised practices these food commodities.	E	1,3
4	Comprehend the food standards in relation to those food commodities	U/R	1,3,5
5	Acquire the ability of value addition to milk, meat , fish and poultry	U/S	1,4
6	Acquire broad knowledge of status and scope of these food industries.	U/An	
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 19 : TECHNOLOGY OF FRUITS, VEGETABLES AND PLANTATION CROPS

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**TECHNOLOGY OF FRUITS, VEGETABLES AND PLANTATION CROPS**					
Type of Course	Core					
Course Code	**FS M 21 C 19**					
Course Summary & Justification	• This course is developed to acquaint students with the post- harvest technologies of fruits , vegetables and plantation crops to reduce post - harvest losses and their value addition • Course gives a deep knowledge in the area of techniques of processing and preservation of fruits , vegetables and plantation crops • Course also gives an exposure in emerging trends in processing technology of fruits , vegetables and plantation crops					
Semester	Third					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and bio-technology**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	Student will be able to understand about fruit and vegetable physiology, metabolic processes and various nutritional changes in fruits and vegetable along with its post- harvest techniques	U /E	1
2	Attain an overview of post-harvest losses of fruits and vegetables and various products prepared from fruits, vegetables and plantation crops.	U/ R	1,4
3	Develop an understanding on the harvest maturity indices of fruits and vegetables	S	1,3
4	Acquire a deep knowledge regarding the post- harvest operations, storage , processing, packaging of fruits and vegetables.	U/A	1,3
5	Equip with the knowledge of emerging trending in the processing technology of fruits and vegetables.	E	1,2
6	Create an insight to production, composition, processing of various plantation crops.	U/An/ C	1,3
7.	Acquire the ability of value addition to fruits, vegetables	S	2,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 20 : BAKERY AND CONFECTIONARY TECHNOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**BAKERY AND CONFECTIONARY TECHNOLOGY**					
Type of Course	Core					
Course Code	**FS M 21 C 20**					
Course Summary & Justification	• The objective this course is imparts a wide knowledge in various bakeryand confectionary products and their manufacturing techniques. • The course also gives an overview of quality control in bakeries and standards of bakery products					
Semester	Third					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Food science basics**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Students will be able to understand the manufacturing techniques of bread, cakes, biscuits, pies and pastries	U /E	1,2
2	Students will be able to understand role of baking ingredients in improving the quality of bakery products	U/ An	1,3
3	Students will get an overview of different type of confectionaries and their preparation techniques	U/An	1,2

4	Students will acquire the knowledge of chocolate processing , different type of chocolates , and quality control in chocolate industry	U/E	1,3
5	Students will be able to determine the packaging requirements for varies bakery products	U/A	1,3
6	Students will get an overview of quality standards and specifications of bakery and confectionary products, quality and hygienic standards in bakeries	U/An/ C	1,5
7.	Students will acquire the ability to prepare different type of baked products and confectionaries	S	5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 C 21: LABORATORY COURSE 3: FOOD PROCESSING AND PRESERVATION TECHNOLOGY

SchoolName	**School of Food science and Technology**					
Programme	**M.Sc. Food science and Technology**					
Course Name	**LABORATORY COURSE 3: FOOD PROCESSING AND PRESERVATION TECHNOLOGY**					
Type of Course	Core					
Course Code	**FS M 21 C 21**					
Course Summary & Justification	• The purpose of this laboratory course is to design and evaluate the processing procedure for preserving various food products. • It also give an experience to students to understand the effect of various preservation techniques on the quality of food products.					
Semester	Third					
Total StudentLearning Time (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total Learning Hours
	Eg. Authentic learning Collaborative learning Independent learning	10	10	120	-	140
Pre-requisite	Basics of food processing and preservation					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Student will be able to develop a processing procedure for various food products	Ap/S	2
2	Students will be able to understand the effect of different processing techniques on the quality of various food products	Ap/S	2
3	Students will develop ability to utilize different food preservation techniques	S	5
4	Students can understand physical evaluation of	S	3

	thermally processed foods		
5	Students will learn the preparation and standardization of Indian traditional fermented foods	S	2
6.	Students will get an opportunity to visit a food processing and preservation unit	I/Ap	1
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 22: WASTE MANAGEMENT IN FOOD INDUSTRY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**WASTE MANAGEMENT IN FOOD INDUSTRY**					
Type of Course	Elective					
Course Code	**FS M 21 E 22**					
Course Summary & Justification	• The objective of this course is to develop a very good understanding about characteristics of bio -degradable and non-degradable wastes from the food industry, its safe and hygienic storage and disposal. • This course also gives an overview regarding different methods of utilizing wastes from food industry to make value added products. • It also enable students gain knowledge in legislations related to waste management which helps student to explore its theoretical and practical aspects for the benefit of society					
Semester	Third					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and chemistry**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Students will be able to identify the characteristics of different type of wastes from food industry	U /E	1

2	Students will understand the safe and hygienic disposal methods for different classes of wastes from food industries.	U/ An/A	1,3
3	Students will acquire knowledge regarding waste water treatment and its importance	An/A	1,5
4	Students will understand the legislations related to waste management and its application in food industry	U/R/A	1,5
5	Students will acquire knowledge regarding methods of utilizing food industry wastes to make value added products.	E/S	5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 23: FOOD BUSINESS MANAGEMENT AND ENTREPREURSHIP

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**FOOD BUSINESS MANAGEMENT AND ENTREPREURSHIP**					
Type of Course	Elective					
Course Code	**FS M 21 E 23**					
Course Summary & Justification	• This elective course is designed to provide students an overview regarding basics of management and entrpreureship development • This course enable students to gain knowledge about functions and principles of management, functional areas of management, marketing principles, costing and pricing methods which help them to understand the need of careful management of a food business. • The course also provides a basic knowledge regarding importance of entrepreureship, its problems and opportunites in relation to food sector.					
Semester	Third					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science and commerce**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	Students will understand the principle, functions and functional areas of management which help them to understand the need of careful management of a food business	U /S	1

2	Students will be able to understand the market types, the marketing principles and challenges in relation to food sector	U/ An	1,4
3	Students will understand the importance of management of human resource in an industry	U/S	1,2
4	Students will get a wide knowledge regarding scope, opportunities and challenges of entrepreneurship	U/A	1,5
5	students can illustrate the entrepreneurship development policies of government in food business	An	5
6	Students will get the ability to set up their own food business	C/S	5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 24: NEUTRACEUTICALS AND FUNCTIONAL FOODS

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**NEUTRACEUTICALS AND FUNCTIONAL FOODS**					
Type of Course	Elective					
Course Code	**FS M 21 E 24**					
Course Summary & Justification	• This elective course is designed to get the basic understanding of neutraceuticals and functional foods and their use for managing chronic diseases • It helps to gain knowledge about the neutraceutical constituents present in various food products • The course also introduces emerging trends in this subject					
Semester	Third					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of biotechnology and food science**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.
1	After completion of the course the students will be ableto: Acquire knowledge on various neutraceutical components in various food products and their health benefits	U /E	1
2	Understand the role of various neutraceuticals and functional foods towards managing chronic diseases	U/ An	1,3

3	Understand regarding methods of isolation and purification of phytochemicals and its recent developments	U/A	1,4
4	Acquire knowledge regarding health benefits of pro-biotics, prebiotics and symbiotics	U/E	1,4
5	Understand the recent development in the field of functional foods	U/I	1,4
6	Describe a healthy food choices, and explain why such choices will help prevent health problems	S	2
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

	MAHATMA GANDHI UNIVERSITY
	FS M 21 E 25: SPICES AND FLAVOUR TECHNOLOGY

SchoolName	**School of Food Science and Technology**					
Programme	**M.Sc Food Science and Technology**					
Course Name	**SPICES AND FLAVOUR TECHNOLOGY**					
Type of Course	Elective					
Course Code	**FS M 21 E 25**					
Course Summary & Justification	• This elective course will provide students with dietary significance , chemical composition, processing and quality control of major Indian spices • The course also provides an overview of natural and artificial flavouring agents, flavour analysis, standards and specification for flavour.					
Semester	Third					
Total StudentLearningTime (SLT)	Learning Approach	Lecture	Tutorial	Practical	Others	Total LearningHours
	Authentic learning Collaborative learning Independent learning	60	20	0	40	120
Pre-requisite	**Basics of food science**					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	PSO No.

1	**Students will be able to**: understand different types and composition of various spices	U /E	1
2	Acquire knowledge regarding the post- harvest operations and processing of different spices	U/ An	1
3	Understand different pest control methods and decontamination techniques for spices	E	1,3
4	Understand flavor compounds involves in the development of flavor	An	1,4
5	Understand the analytical techniques involved in flavour analysis	An	2,5
Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			