THE MAHATMA GANDHI UNIVERSITY

UNDERGRADUATE PROGRAMMES (HONOURS)

SYLLABUS

MGU-UGP (Honours)

(2024 Admission Onwards)

Faculty: Science

Expert Committee: Food Science and Quality Control

Subject: BSc (Hons) Food Science and Quality Control

Mahatma Gandhi University
Priyadarshini Hills
Kottayam – 686560, Kerala, India

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Preface

With liberalization of Indian economy, all-round industrial growth has been witnessed in all sectors with improvement in social and economic conditions of our people. This has created demand for more and better quality foods. With advancement in production technology, high yield levels will lead to large amount of marketable surplus of food grains and crop residues, demanding appropriate handling, processing, preservation, storage, marketing and utilization.

The development of processing industries to preserve the perishable agricultural produce will not only improve economic and nutritional status of our population but itmay help in employment generation in rural as well as urban areas of the country. This can be achieved by linking production and post-harvest technology in synergistic way.

At present the export from agro-sector represents about 16% of total Indian exports. The primary export commodities are cereals, fruits, vegetables and their processed products, and marine products but fast growing specialty products have also penetrated in foreign markets. Considering the contribution of these products in Indian export, it is necessary to have appropriate technology for handling and processing of agricultural produce.

The importance of Food Science and Quality Control lies in the fact that it has capability to provide food to our population through scientific conservations, eliminating avoidable losses and making available more balanced and nutritious food. High value products from low grade material can be produced by innovative and appropriate processing and packaging technologies and also from by- products and residue waste using integrated approach. Thus modernization of post-harvest operations and agro-processing industries through innovative and appropriate technology has a vital role to play in national economy in general and rural economy in particular.

Considering the above aspects, the role of food technologist does not stop at farm level but it continues till the harvested crops and animal products are processed, preserved and further modified in to useful and nutritious products, until it utilized by the consumer. Thus, the post-harvest handling and processing need to be attended on priority basis at national and international level. Moreover, with development of processing industries, it is quite likely that the demand for food scientists and technologists will increase in the next few decades. Hence, specializations offered at graduate level need to be strengthened considering occupational needs as well as demands of the food industries.

The field of food quality control and assurance has evolved substantially over the past decade, and certain key developments have become widely accepted. These include Quality Systems (e.g. ISO and HACCP. Consequently, it has become essential for undergraduate Food Science and Quality Control students preparing for careers in the food industry to have some basic training in these systems as part of the curriculum in their university or college programs.

The B.Sc. programme integrates the latest principles, practices, and terminology of food safety systems with those of quality management systems to provide an understanding of a single food quality management system. Modules define industry terminology, review the differences and components of food quality and food safety, explain quality programs and quality systems, and thoroughly examine Good Manufacturing Practices and HACCP. Designed primarily as an undergraduate-level programme, it combines the fundamentals of food science and quality management courses in its curriculum.

Food Science is basically an interdisciplinary programme involving chemistry, microbiology and quality assurance. Hence, basic knowledge of these three disciplines becomes mandatory if student wishes to pursue career in this discipline. In order to develop strong and need based programme, core courses in above disciplines should be there for developing Food Science and Quality Control discipline for effective preservation, processing and utilization of perishable agricultural produce ensuring its quality.

In addition, the programme offers industrial training giving students an opportunity to familiarize the food industrial unit operations while learning. Students can undertake industrial projects or pursue research based core courses well into the fourth year.

Expert Committee & External Experts

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ACKNOWLEDGMENT

The four-year degree programme has been designed keeping in mind the latest technological advances in the food processing industry and the need for complete professionals adept in all areas of the vast science of food.

The programme aims at training students not just academically but also in the areas that develop communication, soft skills and overall ability. The course is also designed to give a further thrust on developing in students a desirable attitude for self- employment.

I express profound gratitude to the Honorable Vice Chancellor, Pro- Vice Chancellor, Registrar, members of the Syndicate and Academic Council for their co-operation and guidance for the completion of the syllabus.

I express my heartfelt thanks to all the members of the University- academic section as well as the supporting staff members.

Thanks is also extended to our trainers for the FYUGP 5-day workshop and scrutiny and vetting of our syllabus

Special gratitude is extended to Sri. Subin Jose and Sri. Shaji M. N., our industrial associates for their inputs, timely advice, guidance and constant support in the framing of the four year undergraduate programme.

Heartfelt gratitude is extended to Dr. Jenny Ann John, Assistant Professor, Department of Food Science and Technology, Faculty of Ocean Science and Technology, KUFOS, who served as the external expert lending valuable suggestions during the scrutiny of the syllabus.

Dr. Beena Cherian, Associate Professor and Dean, Department of Biosciences has always been a constant support and guide in the syllabus preparation . A word of appreciation in this regard is extended for all help rendered.

Gratitude is extended for the inputs in the designing of this course from faculty members, Department of Food Science and Quality Control B.C.M. College , Kottayam, N.S.S. Hindu College, Changanacherry, St. George's College, Aruvithara, K. G College,

Pampady, Tribal College for Arts and Science, Nadukani, St Xavier's College, Vaikom. Heartfelt thanks is extended to the Principal and faculty members, Department of Food Technology, Nirmala College of Arts and Science, Thrissur.

I take this opportunity to thank the members of BoS for their suggestions in the preparation of the syllabus.

I gratefully acknowledge and thank my colleagues of the department of Food Science and Quality Control from

B.C.M. College, Kottayam, for their untiring support and help in making the necessary corrections, completion and final compilation of the draft syllabus of the four year B.Sc Food Science and Quality Control programme

Syllabus Index

Name of the Major**: Food Science and Quality Control**

Semester: 1

CourseCode	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG1DSCFSQ100	Introduction to Food Science and Food Adulteration	DSC	4	5	3		2	
MG1MDCFSQ100	Food Processing Technology	MDC	3	4	2		2	
MG1MDCFSQ101	Baking Technology							
MG1MDCFSQ102	Food and Culture							

L — Lecture, T — Tutorial, P — Practical/Practicum , O — Others

Semester: 2

CourseCode	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG2DSCFSQ100	Food and Nutrition	DSC	4	5	3		2	
MG2MDCFSQ100	Lifestyle Diseases and Social Health Problems	MDC	3	4	2		2	
MG2MDCFSQ101	Public Health in Food Policy							

Semester: 3

CourseCode	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG3DSCFSQ200	Food Preservation and Additives	DSC	4	5	3		2	
MG3DSCFSQ201	Food Chemistry	DSC	4	5	3		2	
MG3DSEFSQ200	Traditional Indian Foods	DSE	4	4	4		0	
MG3DSEFSQ201	Nutrition through Lifecycle			4	4		0	
MG3DSEFSQ202	Pre-requisites in Food Industry			4	4		0	
MG3DSCFSQ202	Food and Tourism	DSC B	4	5	3		2	
MG3DSCFSQ203	Fundamentals of Food Science							
MG3MDCFSQ200	Social Responsibility, HumanValues and Ethics in the Food Industry	MDC	3	3	3			
MG3MDCFSQ201	Indian Dairy Products							
MG3MDCFSQ202	Advances in Food Processing							
MG3MDCFSQ203	Culinary Science and Hospitality Management							
MG3VACFSQ200	Food in Tribal Community	VAC	3	3	3			
MG3VACFSQ201	Soft Skills and Personality Development							
MG3VACFSQ202	Disaster Management							

Semester: 4

CourseCode	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG4DSCFSQ200	Sensory Science	DSC	4	5	3		2	
MG4DSCFSQ201	Introduction to Food Microbiology	DSC	4	5	3		2	
MG4DSEFSQ200	Food Packaging Technology	DSE	4	4	4		0	
MG4DSEFSQ201	Principles and Practices of Food Hygiene		4	4	4		0	
MG4DSCFSQ202	Principles of Sanitation and HACCP	DSC C	4	5	3		2	
MG4SECFSQ200	Management in Food Industry	SEC	3	3	3			
MG4SECFSQ201	First-Aid, Fire Safety and Disaster Management		3	3	3			
MG4VACFSQ200	Entrepreneurship Development	VAC	3	3	3			
MG4INTFSQ200	Internship		2					

Semester: 5

CourseCode	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG5DSCFSQ300	Technology of Meat, Fish, Egg and Poultry	DSC	4	5	3		2	
MG5DSCFSQ301	Dairy Technology	DSC	4	5	3		2	
MG5DSEFSQ300	Technology of Cereals, Pulses and Oilseeds	DSE **(Any 3)**	4	4	4			
MG5DSEFSQ301	Coconut Processing Technology		4	4	4			
MG5DSEFSQ302	Confectionary and Chocolate Processing Technology		4	4	4			
MG5DSEFSQ303	Bakery Product Technology		4	4	4			
MG5DSEFSQ304	Spices and Oleoresins		4	4	4			
MG5DSEFSQ305	Processing Technology of Fruits andVegetables		4	4	4			
MG5SECFSQ300	Food Photography and Styling	SEC	3	3	3			
MG5SECFSQ301	Inflight Catering Technology	SEC						
MG5SECFSQ302	Food Safety Management System	SEC						

Semester: 6

CourseCode	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG6DSCFSQ300	Analysis of Foods	DSC	4	5	3		2	
MG6DSCFSQ301	Food Toxicology and Food Safety	DSC	4	5	3		2	
MG6DSEFSQ300	Street Foods	DSE (Select one)	4	5	3		2	
MG6DSEFSQ301	Snack Food Technology		4	5	3		2	
MG6DSEFSQ302	Engineering Aspects of Food Processing	DSE (Select one)	4	4	4			
MG6DSEFSQ303	Food Engineering							
MG6SECFSQ300	Chocolate and Sugar Crafting	SEC	3	3	3			
MG6SECFSQ301	Food and Journalism	SEC	3	3	3			
MG6VACFSQ300	Environmental Studies and Human Rights	VAC	3	3	3			

Semester: 7

CourseCode	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG7DCCFSQ400	Research Methodology and Statistical Analysis	DCC	4	4	4			
MG7DCCFSQ401	Innovation and Product Development	DCC	4	4	4			
MG7DCCFSQ402	Biochemistry	DCC	4	5	3		2	
MG7DCEFSQ400	Food Additives	DCE	4	4	4			
MG7DCEFSQ401	Beverage Processing Technology	DCE	4	4	4			
MG7DCEFSQ402	Nutraceuticals and Functional Foods	DCE	4	4	4			

Semester: 8

CourseCode	Title of the Course	Type of the Course DSC, MDC, SEC etc.	Credit	Hours/ week	Hour Distribution /week			
					L	T	P	O
MG8DCCFSQ400	Wine Technology	DCC	4	5	3		2	
MG8DCCFSQ401	Analytical Instrumentation	DCC	4	5	3		2	
MG8PRJFSQ400	**Project / Core course**		**12**					
MG8DCEFSQ400	Food as Medicine	DCE	4	5	3		2	
MG8DCEFSQ401	Equipment Plant Layout and Design	DCE	4	5	3		2	
MG8DCEFSQ402	Nano Biotechnology	DCE	4	5	3		2	

SEMESTER-1

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**INTRODUCTION TO FOOD SCIENCE**					
Type of Course	**DSC A**					
Course Code	**MG1DSCFSQ100**					
Course Level	**100 – 199**					
Course Summary	This course will introduce the basic concepts of food science and will familiarize students with FSSAI Adulteration tests.					
Semester	**1**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Define and recall fundamental concepts in food science including key terminologies.	K	3, 10
2	Understand the multidisciplinary nature and scope in food science.	U	3, 10
3	Explain food safety and security concepts.	U	1, 6, 10
4	Outline the major components and preservation principles in the food industry.	U	1, 3, 10

5	Application of qualitative tests for food adulterants.	A	6, 8, 10
6	Understand the mechanism, principle, procedure, employed for detection of adulterants in food.	U	2, 3, 6, 8,10
7	Develop basic skills in adulterant detection	A	3, 6, 8,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C),Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1 – Terminologies and Components of Food	1.1	History	1	1
	1.2	Definitions – Food, Food Science, Food Technology, Quality Control and Quality Assurance, Shelf-life	4	1
	1.3	Components – Carbohydrates, Proteins,Fats, Vitamins, Minerals and Water	5	1
	1.4	Functions of Food – Physiological,Sociological and Psychological	4	4
	1.5	Role of Multiple Disciplines in Food Science – Chemistry, Engineering, Microbiology, Physics, Toxicology, Nutrition, Industrial Management, Entrepreneurship	5	2
2 – Components of Food Processing Sector	2.1	Procurement of Raw Material – Inspection, Grading and Storage	3	2
	2.2	Food Manufacturing and Storage –Pre-processing, Primary and Secondary Processing. Finishedgoods Storage.	6	2
	2.3	Marketing – Wholesale and RetailDistribution	2	2
	2.4	Role of Food Technologist – QA, QC, R& D,NPD.	3	1,2

3- Food Safety and Security	3.1	Introduction to Food Safety and Security –Definition and Importance, Global context	4	3
	3.2	Food Safety Hazards –Physical, Chemical, Biological and Allergens, Food Safety Controls– Time, Temperature control, Low and High-risk Food, Control of Food Safety Hazards.	5	3
	3.3	Food Security Dimensions – Availability, Access, Utilization,Stability Sustainability	3	3
4 – Basic Food Adulteration Test	4.1	Milk and Milk Products- Detection of water in milk , Detection of starch in milk and Milk Products	4	5,6,7
	4.2	Oil and Fats- Detection of TOCP in oils and fats Proper winterization of refined winterized salad oils	6	5,6,7
	4.3	Fruits, Vegetables and Beverages- Detection of malachite green in green vegetables Detection of artificial color in green peas Tea: Detection of exhausted tea Detection of Iron filling Coffee: Detection of chicory in coffee powder	6	5,6,7
	4.4	Food Grains and its product- Food Grains: Detection of extraneous matter Detection of extraneous matter in Atta, Maida, Suji/ Rawa Detection excess bran in wheat flour	6	5,6,7
	4.5	Salt, Spices and Condiments – Qualitative Analysis of Spices: • Black pepper (Foreign seeds) • Asafetida (Soap stone, starch, foreign resin) • Chilli powder (brick powder, artificial colours, saw dust) • Turmeric (Metanil yellow, lead chromate, starch and chalk powder • Coriander powder (Starch, Cow dung) • Salt (chalk)	8	5,6,7
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1- Lecturing, ICT Enabled Learning. Module 2 - Lecturing, ICT Enabled Learning. Module 3 - Lecturing, ICT Enabled Learning. Module 4 — Practicum Module 5-

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory-25 Marks** Assignment / Viva / Seminar **Practical's- 15 Marks** Viva / Skill/ knowledge
	B. Semester End examination **Theory** 50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Srilakshmi, B. (2006). Nutrition Science. New Age International.
2. Potter, N.N. Food Science (5th edition), CBS publishers and Distributors, New Delhi, 1995
3. Manay, N.S, Shadaksharaswamy, M., Foods- Facts and Principles. New Age International Publishers. New Delhi., 2004.
4. Hui, Y. H., & Chandan, R. C. (2007). Handbook of food products manufacturing.
5. Subalakshmi, G and Udipi, S.A. Food processing and preservation; New Age International Publishers, New Delhi, 2001.
6. The State of Food and Agriculture (SOFA), FAO, 2022
7. FSSAI DART Manuals

Programme						
Course Name	**FOOD PROCESSING TECHNOLOGY**					
Type of Course	**MDC**					
Course Code	**MG1MDCFSQ100**					
Course Level	**100-199**					
Course Summary	To understand the industrial processing methods of various commodities in the food industry.					
Semester	**1**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		2	-	1	-	**60**
Pre-requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Define and explain the physical, mechanical, textural and biochemical properties of food.	K	1,2,3,6,10
2	Acquire the knowledge about heating of food material and effect of heat on food material.	U	1,2,8,10
3	Understand the basic concepts in food processing.	U	1,2,9,10
4	Understand the importance of processing food.	U	1,2,10
5	Create various processed foods applicable to food processing industry	C	1,10

Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate (E), Create (C),Skill(S), Interest(I) and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1 –Introduction to Food Processing	1.1	Define and history of food processing	2	1,2,3
	1.2	Importance, advantages of food processing and nutritional losses in food processing	3	1,2
	1.3	Primary processing, secondary processing tertiary processing- advantages and disadvantages	5	1,2
	1.4	Objectives and methods of conventional cooking methods	5	1,2,3
2 –Commercial Methods of Processing	2.1	High temperature methods – pasteurization, sterilization, canning	6	1,2,4
	2.2	Low temperature methods – freezing,refrigeration	5	1,2,4
	2.3	Drying, dehydration, concentration, fermentation, irradiation	4	1,2,4
3 – Food Processing Practicum	3.1	Processing of fruit products : jam, jelly, marmalade	10	5
	3.2	processing of vegetable products: tomato-based products- ketchup, sauce, soup, puree, pickling of vegetables	10	5
	3.3	Other products: mayonnaise, peanut butter, chocolates and syrup	10	5
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1 & 2 - Lecturing, ICT Enabled Learning Module 3- Practicum .

Assessment Types	**MODE OF ASSESSMENT** **A.Continuous Comprehensive Assessment (CCA)** **Theory** 15 Marks- Assignment / Viva / Seminar **Practicum** 15 Marks- Viva/Skill/ Knowledge
	B. Semester End examination **Theory** 35 marks (MCQ (15 Out of 15)- 15x1=15, Short answer (4 out of 6) (5 marks x4=20) **Practicum** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Food Science, Norman N Potter and Joseph H Hotchkiss,, (1986),4th edition,CBS publishers
2. Food Processing technology, P, J Fellows (2009) 3rd edition Wood head publishers.
3. Khetarpaul, N. (2005). Food processing and preservation. Daya Books
4. Singh, A. (2017). Sustainability through Post-Harvest Management of Produce and Need for Rural Industrialization in India. OIDA International Journal of Sustainable Development, 10(12), 11-16.

Mahatma Gandhi University Kottayam

Programme						
Course Name	**BAKING TECHNOLOGY**					
Type of Course	**MDC**					
Course Code	**MG1MDCFSQ101**					
Course Level	**100 -199**					
Course Summary	This subject will introduce the basic aspects of bakery science and processing techniques of some baked food products					
Semester	**1**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		2	-	1	-	**60**
Pre- requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the basic principle of bakery science	U	1,10
2	Outline the basic ingredients in baking technology	U	1,10
3	Apply the basic aspects of baking technology to develop new baked food products	A	1,10
4	To enhance the practical skills of students to prepare innovative baked food products	An	1,10

Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate (E), Create (C),Skill(S), Interest(I) and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1- Introduction to Bakery Science	1.1	Introduction to bakery science	2	1
	1.2	Introduction of baking ingredients	3	1
	1.3	Principles in baking	3	1
	1.4	Scope and importance of bakery science	2	1
2- Baking of Bread, Cake , Cookies	2.1	Ingredients, composition and types	10	1,2
	2.2	Processing , properties	10	2,3
3- Practicum	3.1	Baking of bread- sweet bread and croissants	5	3
	3.2	Baking of cake – vanilla and chocolate	10	3,4
	3.3	baking of cookies – butter, lemon andchocolate cookies	10	3,4
	3.4	Product formulation	5	3,4
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction** Module 1&2 - Lecturing, ICTEnabled Module 3- Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-15 Marks- Assignment / Viva / Seminar Practicum -15 Marks- Viva/Skill/ Knowledge **B.Semester End examination** 35 marks (MCQ (15 Out of 15)- 15x1=15, Short answer (4 out of 6) (5 marks x4=20) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Manay, N.S, Shadakshara Swamy,M., Foods - facts and principles., New AgeInternational Publishers., New Delhi.,2004.
2. Srilakshmi, B. (2003). Food Science. New Age International.

Programme						
Course Name	**FOOD AND CULTURE**					
Type of Course	**MDC**					
Course Code	**MG1MDCFSQ102**					
Course Level	**100-199**					
Course Summary	This course is an exploration of the intricate interplay between food and culture. It delves into the cultural, historical, and social dimensions of food practices, examining how food reflects and shapes identities, rituals, and societies.					
Semester	**1**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		2	-	1	-	**60**
Pre-requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Define and articulate the concept of food culture.	U	1,3,10
2	Explain the historical evolution of culinary traditions.	U	1,10
3	Apply cultural sensitivity in analyzing and adapting culinary practices.	A	3,10
4	Evaluate the symbolic meaning of foods in festivals and celebrations across different cultures	E	3,10
5	Synthesize knowledge of food and culture to present a cultural analysis of a specific cuisine.	C	1,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C),Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
1- Introduction to Food Culture & Culinary Heritage	1.1	Definition of food culture and its objectives	3	1
	1.2	Historical evolution of culinary traditions	3	1
	1.3	Traditional culinary practices and techniques and preservation of culinary heritage	4	2
	1.4	Impact of globalization in culinary traditions	4	3
	1.5	Origins and characteristics of fusion cuisine, authenticity vs. adaptation in culinary traditions	4	3
2- Festivals and Food Celebrations	2.1	Culinary traditions associated with festivals	4	3,4
	2.2	seasonal and harvest-related food celebrations	5	3,4
	2.3	The symbolic meaning of festive foods	3	3,4
3- Practicum	3.1	Culinary traditions associated with Indian traditional festivals- Holi, Christmas, Eid – Al Fitr, Onam, Ganesh Chaturthi, Navaratri, Pongal	10	5
	3.2	Thanksgiving, Pizza fest, Bacon Festival, Dumpling Festival, Vegetarian Festival, , Pancake Festival,	10	5
	3.3	Fusion-Butter Chicken, Pizza, Gulab Jamun, Cheese Cake, Coconut Ladoo ,Truffles	10	5
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1 & 2- Lecturing, ICT Enabled Learning. Module 3- Practicum

Assessment Types	**MODE OF ASSESSMENT** **A.Continuous Comprehensive Assessment (CCA)** **Theory** 15 Marks- Assignment / Viva / Seminar **Practicum** 15 Marks- Viva/Skill/ Knowledge
	B.Semester End Examination 35 marks (MCQ (15 Out of 15)- 15x1=15, Short answer (4 out of 6) (5 marks x4=20) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Atkins, P., & Bowler, I. (2016). Food in society: economy, culture, geography. Routledge.
2. Klein, J. A. (2014). Introduction: Cooking, Cuisine and Class and the Anthropology of Food. In Food Consumption in Global Perspective: essays in the anthropology of food in honour of Jack Goody (pp. 1-24). London: Palgrave Macmillan UK.
3. Jurafsky, D. (2014). The language of food: A linguist reads the menu. New York, NY: W.W. Norton & Company.

SEMESTER-II

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD AND NUTRITION**					
Type of Course	**DSC A**					
Course Code	**MG2DSCFSQ100**					
Course Level	**100-199**					
Course Summary	Retrieve knowledge from foundational sciences as a basis for understanding the role of food and nutrition in human health					
Semester	**2**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Recall the basics of food and nutrition and gain a comprehensive knowledge of essential nutrients, functions and role played in overall health	K	1,2,3,6,10
2	Understand and remember the relationship between nutrition and health	U	2,3,6,10
3	Explain the prevention and management of nutrition related diseases at community level	U	2,3,6,10
4	Interpret the emerging trends in nutrition	U	2,3,6,10
5	Develop effective communication skills to convey nutrition information and emphasize the importance ofmaking informed food choices	A	3,4,6,10
6	Analyze the nutritional parameters for various age Groups	An	2,3,6,10

*Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate (E),Create(C), Skill(S),Interest(I) and Appreciation(Ap

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
1 – Introduction to Nutrition	1.1	Definition – food, nutrition, nutrients, health, malnutrition, RDA, optimum diet, balanced Diet	3	1
	1.2	Inter relationship between nutrition and health-balanced diet, food pyramid and Groups	3	1
	1.3	Energy- components, BMR, SDA and factors affecting BMR	2	1,2
	1.4	Water- sources, distribution, functions, waterbalance, deficiency, toxicity	2	1,2
2– Macronutrients& Micronutrients	2.1	Carbohydrates- classification, functions, sources and deficiency/excess of carbohydrates, RDA	4	1
	2.2	Protein-Classification, functions, sources and deficiency/excess of proteins ,PEM, RDA	5	1
	2.3	Fat- Classification, functions, sources and deficiency/excess of fats , fats in the Body, fat in Foods, RDA	4	1
	2.4	Vitamins- Introduction, classification, functions, sources and deficiency- fat soluble vitamins - A, D,E,K	5	1
	2.5	Functions, classification, deficiency and sources of water soluble vitamins - C, Thiamine, Riboflavin, Niacin and Folic acid	5	1,3
	2.6	Functions, classification, deficiency andsources of minerals-Ca, Na, K,I and Fe	4	1,3,4
3 - Emerging trends in nutrition	3.1	Climate friendly and sustainable nutrition, digital nutrition therapy, plant based nutrition	4	1,4
	3.2	Space, sports and personalized nutrition	4	1,4
	4.1	BMI Calculation	7	6

4- Practium	4.2	Weaning Diet preparation	8	6
	4.3	Balanced diet preparation	7	6
	4.4	Nutritive Value calculations for different foods	8	6
5 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 ,3 & 4 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Srilakshmi, B. (2006). Nutrition Science. New Age International.

2. Antia,F.P, Philip Abraham (2006), Clinical Dietetics and Nutrition, 5th edition, UniversityPress, New Delhi

3. Norman N Potter and Joseph H Hotchkiss (2006), Food Science 2nd edition, SK Jain forCBS Publishers and Distributors, New Delhi

Programme						
Course Name	**LIFESTYLE DISEASES AND SOCIAL HEALTH PROBLEMS**					
Type of Course	**MDC**					
Course Code	**MG2MDCFSQ100**					
Course Level	**100-199**					
Course Summary	Make students aware on the importance of healthy lifestyle in living a productive life and the knowledge of the impacts of smoking, alcoholism and drugs usage discourage them from involving in such antisocial activities					
Semester	**2**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		2	-	1	-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Define lifestyle diseases with causes and list common lifestyle diseases	K	1,2,3,6,10
2	List and define some of the social health problems like smoking, alcoholism, drugs and AIDS	K	1,2,3,6,8,10
3	Summarize the causes, risk factors and management of obesity	U	1,2,3,6,10
4	Interpret the types, causes, symptoms and management of Diabetes Mellitus and Hypertension,the most prevalent lifestyle diseases in the society Nowadays	U	1,2,3,6,10

5	Apply the principles of diet planning for various lifestyle disease	A	1,2,3,6,10

Remember(K), Understand(U), Apply(A), Analyse(An), Evaluate (E), Create (C), Skill(S), Interest(I) and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1- Lifestyle Diseases	1.1	Introduction to lifestyle diseases common causes of lifestyle diseases, common lifestyle diseases prevalent in our society	5	1
	1.2	Obesity and its management- BMI,grades, causes, risk factors and management of obesity	5	1,3
	1.3	Diabetes Mellitus- types, causes and management of Diabetes	5	1,4
	1.4	Hypertension- definition, causes , risk factors and management	5	1,4
2-Social Health Problems	2.1	Smoking-health effects, prevention	2	2
	2.2	Alcoholism-health effects, prevention	3	2
	2.3	Drugs- health effects, prevention	3	2
	2.4	AIDS-sources, prevention	2	2
3 – Practicum	3.1	Anthropometric assessment –height, weight, BMI	15	5
	3.2	Diet planning and preparation – Hypertension, Diabetes and Obesity	15	5
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1&2 -Lecturing, ICT Enabled Discussion. Module 3- Practicum

Assessment Types	**A. Continuous Comprehensive Assessment (CCA)** **Theory** 15 Marks- Assignment / Viva / Seminar **Practicum** 15 Marks- Viva/Skill/ Knowledge
	B. Semester End examination **Theory**-35 marks (MCQ (15 Out of 15)- 15x1=15, Short answer (4 out of 6) (5 marks x4=20) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Srilakshmi, B. (2006). Nutrition Science. New Age International.
2. F.P Antia, Philip Abraham (2006),'Clinical Dietetics and Nutrition', 5th edition, OxfordUniversity Press, New Delhi
3. M, Raheena Begum (2019), A Text Book of Foods, Nutrition and Dietetics, 3rd ed.,Sterling Publishers Pvt. Ltd. U.P
4. Talukdar, D. Rethinking Social Problem.
5. Dr. B, Saha, (2017), Preventive and Communicable Disease Hygiene, MBP

Programme						
Course Name	**PUBLIC HEALTH IN FOOD POLICY**					
Type of Course	**MDC**					
Course Code	**MG2MDCFSQ101**					
Course Level	**100-199**					
Course Summary	This course explores the intersection of public health and food policy, examining the impact of policies on nutrition, food safety, and health outcomes. Students will analyze current food policy frameworks, understand the role of advocacy, and develop strategies for promoting public health through effective policy interventions.					
Semester	**2**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		2	-	1	-	**60**
Pre-requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Recall and describe key public health principles embedded in food policy, demonstrating an understanding of the interplay between nutrition, health, and policy.	K	1,10

2	Understand the implications of various food policies on public health, demonstrating the ability to comprehend complex relationships between policy decisions and population health.	U	1,3,10
3	Apply public health knowledge to assess and recommend improvements to existing food policies, showcasing practical application skills in analyzing and influencing policy decisions.	A	1,3,10
4	Analyze the impact of food policies on diverse population groups, evaluating disparities and considering social determinants of health within the context of public health.	An	1,10
5	Create awareness by developing consumer education programs and digital Platforms in nutrition education	C	1,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C),Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1- Global Perspectives in Food Security	1.1	Understanding food security andits components	3	1,2
	1.2	Global food security challenges	3	1,2
	1.3	Public health implications of food insecurity	3	1,2,3
	1.4	Definition, scope ,key concepts and principles in public health	3	1,2
	1.5	Definition, importance of government and stakeholders in shaping food policy	3	1,2
2- Public Health	2.1	advocacy strategies for promoting healthy food policies, building partnerships and coalitions	4	2,3,4

Advocacy and Policy Implementation	2.2	Case studies in successful public health advocacy	4	2,34
	2.3	Implementing and monitoring food policies	3	2,3,4
	2.4	Assessing the effectiveness of public health interventions	4	2,3,4
3- Practicum	3.1	Consumer Education Programs	10	5
	3.2	Designing effective nutrition education campaigns	10	5
	3.3	Digital platforms and technology in nutrition education	10	5
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1&2 -Lecturing, ICT Enabled Discussion. Module 3- Practicum

Assessment Type	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 15 Marks Assignment / Viva / Seminar- **Practicum** 15 Marks- Viva/Skill/ Knowledge
	B. Semester End examination **Theory**-35 marks (MCQ (15 Out of 15)- 15x1=15, Short answer (4 out of 6) (5 marks x4=20) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Public Health Nutrition in Developing Countries by Barrie M. Margetts, Ricardo Uauy,and Lisa H. Allen
2. Food and Nutrition Security: Policy Responses in India edited by Alok Bhargava andRaghav Gaiha
3. Dhawan, A., Rao, R., Ambekar, A., Pusp, A., & Ray, R. (2017). Treatment of substance use disorders through the government health facilities: Developments in the “Drug De-addiction Programme” of Ministry of Health and Family Welfare, Government of India. Indian journal ofpsychiatry, 59(3), 380.

SEMESTER-III

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD PRESERVATION AND ADDITIVES**					
Type of Course	**DSC A**					
Course Code	**MG3DSCFSQ200**					
Course Level	**200-299**					
Course Summary	To make the students able to understand the importance and methods of food preservation and emerging techniques in industry					
Semester	**3**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	**75**
		3	-	1	-	
Pre-requisites, ifany						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No.
1	Explain the terms food preservation, spoilage and shelf life	U	1,2,3,6,10
2	Interpret the traditional methods and emerging technologies in food preservation	U	1,2,3,10
3	Identify the importance and principles of preservation	A	1, 2, 3, 6,10
4	Examine the classes and functions of additives and ethical issues	An	1,2,3,10
5	Create preserve food through principles of preservation	C	1,10

**Remember(K), Understand(U), Apply(A),Analyse(An),Evaluate (E),Create(C),Skill(S),Interest(I)and Appreciation(Ap)*

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 –Food Preservation and its Methods	1.1	Food Preservation, importance, spoilage, principles and methods of preservation (bacteriostatic and bactericidal methods)	5	1,3
	1.2	High Temperature Methods – sterilization,pasteurization, blanching and canning. effects of high temperature treatment on Foods	5	1,3
	1.3	Low Temperature Methods — refrigeration and freezing technical aspects of freezing- effects of low temperature treatment on foods	5	2,3
	1.4	Dehydration (Methods) effects on foods, concentration (method)	3	2,3
2– Emerging Techniques in Food Preservation	2.1	Ohmic heating, microwave heating, irradiation	3	2
	2.2	High pressure processing	2	2
	2.3	Pulsed electric field	2	2
	2.4	Membrane technology	3	2
3- Food Additives	3.1	Definition and need for food additives	3	4
	3.2	Classification	7	4
	3.3	Functions, permitted level of additives, e-number	3	4
	3.4	Impact on environmental issues, fair trade practice, human health, worker welfare, sustainability sourcing	4	4
4- Practicum	4.1	Preparation of jam	6	5

	4.2	Preparation of jelly	6	5
	4.3	Preparation of pickle (lime, mango, seafood)	6	5
	4.4	Preparation of tomato ketchup, sauce and puree	6	5
	4.5	Preparation of squash	6	5
5 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2 &3- Lecturing, ICT Enabled learning. Module 4- Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge

	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Gould, G. W. (2012). New Methods of Food Preservation. Springer Science and Business Media.

2. Manay, N. S., & Shadaksharaswamy, M. (2004). Foods - Facts and Principles. New Delhi: NewAge International Publishers.

3. Srilakshmi, B. (2003). Food Science. New Delhi: New Age International Publishers.

4. Subalakshmi, G., & Udipi, S. A. (2001). Food Processing and Preservation. New Delhi: New Age International Publishers.

5. Rahman, M. S. (2007). Handbook of Food Preservation (2nd ed.). CRC Press.

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD CHEMISTRY**					
Type of Course	**DSC A**					
Course Code	**MG3DSCFSQ201**					
Course Level	**200-299**					
Course Summary	This subject will cover the chemical classification, structure, properties and reactions of constituents of food.					
Semester	**3**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the classification and structure of the chemical constituents of food.	U	2, 10
2	Outline the properties of the chemical constituents of food.	U	2, 10
3	Distinguish different chemical components of food by usingtheir properties and reactions.	An	1, 2, 10
4	Understand the basic principle of quantitative estimation, based on neutralization reactions, redox reactions, Iodometric reactions and complex metric reactions.	U	1,2,10

5	Understand the principles for the quantitativeestimation of constituents of food.	U	2,10
6	Develop the skill for the quantitative estimation ofconstituents of food.	S	2,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skil (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Water and Carbohydrates	1.1	Structure of water and ice, physical constants of water, types of water, water holding capacity and water binding capacity, triple point of water, water activity – definition, role in food stability	4	1
	1.2	Monosaccharides — classification, properties, optical activity. Muta-rotation. straight and ring Structure of glucose, fructose and galactose.	3	1,2
	1.3	Oligosaccharides – classification, reducing & non-reducing sugar, Glyosidic bonds, structure of sucrose, maltose, Iso- maltose & lactose, inversion of sucrose	4	1
	1.4	Polysaccharides - classification. structure of starch, Cellulose, glycogen, pectin. difference between amylose & amylopectin, properties of starch — Gelatinization, retro gradation, gelation.	5	1
	1.5	Chemical reactions of carbohydrates – reactions of reducing groups, browning reactions - enzymatic & non-Enzymatic browning – Millard reaction, caramelization.	3	1,3
2 – Proteins and Enzymes	2.1	Amino Acids - classification of amino acid- structure, essential and non-essential amino acids, Zwitter ion, Isoelectric point, amphoteric property, peptide bond.	3	1,2,3
	2.2	Proteins - classification of protein – based on source,shape, composition and solubility, biological role.	3	1,2,3
	2.3	Structure of Protein, chemical bonds involved in protein structure, denaturation – agents causing denaturation, changes occurring during denaturation	3	1,2,3

	2.4	Enzymes - introduction, classification of enzyme, enzyme kinetics, enzyme activity, factors affecting enzyme activity. enzyme inhibitors- reversible (competitive, noncompetitive & uncompetitive), irreversible enzyme activators; regulation of enzymeactivity- zymogens inactivation, covalent modification and feedback, inhibition enzymes used in food industry.	4	3
3- Lipids	3.1	Classification of lipids according to chemical composition, classification of fat – animal fat,vegetable fat	2	1,3
	3.2	Fatty Acids – classification, structure, essential fattyacids.	3	1,3
	3.3	Physical Properties – refractive index, melting point (polymorphism, plasticity), smoke, flash and fire point, cold point, cloud point, Color, solid fat index.	3	1,3
	3.4	Chemical Properties RM, PK values, saponification value, iodine value, acid value, hydrogenation and interesterification.	2	1,3
	3.5	Rancidity: hydrolytic and oxidative rancidity; mechanism of autoxidation of fat; reversion, antioxidants - natural and synthetic, mechanism of action of antioxidants	3	1,4
4-Practicum	4.1	Protein- Estimation of protein Kjeldahl method Estimation of protein - Biuret method	10	4,5,6
	4.2	Fats- Estimation of Saponification Value Estimation of iodine value Estimation of free fatty acid Estimation of peroxide value Estimation of fat by Soxhlet method	10	4,5,6
	4.3	Carbohydrates- Qualitative Test for Carbohydrates (Molisches test, Seliwanoff's test, Benedicts test, Barfoeds tests Estimation of Glucose by Lane & Eynon's Method	6	4,5,6
	4.4	Estimation of hardness of water. Estimation of moisture by oven-drying method	4	4,5,6
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 & 3- Lecturing, ICT Enabled Learning Module 4 – Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**. 50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Jain, J. L. (1990). Fundamentals of Biochemistry (4th ed.). New Delhi: S. Chand &Company.
2. Aurand, L. W., & Woods, A. E. (1973). Food Chemistry. Westport: AVI.
3. Birch, G. G., Cameron, A. G., & Spencer, M. (1986). Food Science (3rd ed.). New York:Pergamon Press.
4. Fennema, O. R. (Ed.). (1976). Principles of Food Science: Part-I Food Chemistry. NewYork: Marcel Dekker.

Meyer, L. H. (1973). Food Chemistry. New Delhi: East-West Press Pvt. Lt

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**TRADITIONAL INDIAN FOODS**					
Type of Course	**DSE**					
Course Code	**MG3DSEF SQ200**					
Course Level	**200-299**					
Course Summary	The use of spices and herbs is a hallmark of Indian cuisine, providing depth and complexity to the flavors. Additionally, regional variationsand personal preferences can lead to a wide range of interpretations for each dish					
Semester	**3**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Knowledge of traditional Indian ingredients, including spices, herbs, grains, legumes, and vegetables, and learn how to select, handle, and store them.	K	1, 10
2	Understand the significance of various dishes in different regions and their roles in celebrations, festivals, and daily life.	U	1,3,10

3	Understanding the influences that have shaped Traditional Indian cuisine, including historical trade routes, invasions, and cultural exchanges.	U	1,3,10
4	Apply hands-on experience in preparing traditional Indian dishes, developing knife skills, mastering cooking techniques, and understanding the art of balancing flavors.	A	1,10
5	Create skills to adapt traditional recipes, innovate with ingredients, and create contemporary interpretations of classic dishes while respecting the essence of traditional flavors.	C	1,3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Exploring Traditional Indian Foods	1.1	Overview of historical roots and evolution of Indian cuisine, regional diversity and culinary traditions	5	1
	1.2	Ingredients of Indian Cuisine- Spices and Herbs: identification, flavor profiles, and uses essential pantry items: grains, legumes, and dairy	5	1,4
	1.3	Basic Cooking Techniques tempering , spice blending, and margination	5	1,4,5
2- North and South Indian Cuisine	2.1	Signature Dishes and Sweets - Butter Chicken (Murgh Makhani), Chicken biryani, Gulab Jamun, Barfi, Rasagolla,Kheer, Gear Ka Halwa, Badusha	5	1,2,5
	2.2	Chole Bhature, Rogan Josh	5	1,3,5
	2.3	Breads and Accompaniments: Naan, Paratha,Raita,Pickles	5	1,3,5

	2.4	Signature Dishes and Sweets - Masala Dosa, Sambar, Rosa, Pongal Hyderabadi Biryani, Chettinad Chicken Curry, Badam Halwa, Kozhikode Biryani,Payasam,Coconut Ladoo	10	1,5
	2.5	Rice and Tiffin Varieties - Hoppers(Appam, Idiyappam),Idli, Vada, Chutney	5	1,4
3-East and West Indian Cuisine	3.1	Signature dishes - Dhokla, Punta Bhat (Fermented Rice) Fish Curry, Farcha (Parsi Fried Chicken)	10	1,4
4-Festive Foods	4.1	Festive and special occasion foods- Holi, Diwali, Eid, Christmas	10	2,4,5
	4.2	Preparation of vegetarian and non-vegetarian specialties	10	2,4,5
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of Transaction)** Module 1,2 & 3- Lecturing, ICT Enabled Learning. Module 4 – Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar **MODE OF ASSESSMENT**
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Achaya, K. T. (1994). Indian Food: A Historical Companion.Oxford Univ Press
2. Pant, P. (2018). The Indian Vegetarian Cookbook.Phaidon Press
3. Journal of Ethnic Foods

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**NUTRITION THROUGH LIFE CYCLE**					
Type of Course	**DSE**					
Course Code	**MG3DSEFSQ201**					
Course Level	**200-299**					
Course Summary	Students can gain knowledge in the physiological changes, nutritional requirements and dietary modifications needed in different stages in life					
Semester	**3**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre-requisites, ifany						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Explain nutritional lifecycle, nutrition and menu planning	U	1,2,3,6,10
2	Identify the nutritional and food requirements during the periods of infancy, childhood, adolescence and old age	A	2,3,6,10
3	Examine the food sources for different age groups	An	2,3,6,10
4	Analyze the nutritional requirements and physiological changes during pregnancy and lactation	An	2,3,6,10

Remember(K), Understand(U), Apply(A), Analyze(An), Evaluate (E),Create(C),Skill(S),Interest(I)and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Understanding Nutrition and nutritional life cycle	1.1	Introduction to nutrition and health	5	1
	1.2	Nutritional life cycle	5	1
	1.3	Principles in menu planning	5	1
2 –Nutrition During Infancy and Childhood	2.1	physiological changes, dietary problems and additional requirements during pregnancy	5	2,4
	2.2	Additional requirements of lactating women and dietary Guidelines	4	2,4
	2.3	Infancy- nutritional requirements, breastfeeding, artificial feeding and weaning, requirements of weaning supplementary foods for Infants	4	2,4
	2.4	Factors affecting nutritional status in children and their food Requirements	5	2
	2.5	Importance of breakfast, packed lunches	5	2
	2.6	Nutrition related problems and preventive measures of children	4	2
3– Adolescence	3.1	Nutritional problems and requirements in adolescence	4	2
	3.2	Eating disorders	4	2,3

4-Adulthood and Old Age Nutrition	4.1	Reference man and reference women	5	2,3
	4.2	Physiological changes and nutritional requirements during old age	5	2,3
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 ,3&4- Lecturing, ICT Enabled

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Srilakshmi, B. (2004). Nutrition Science. New Age International Publishers.
2. Srilakshmi, B. (2006). Dietetics (5th ed.). New Age International (P) Ltd.
3. Antia, F. P., & Abraham, P. (2006). Clinical Dietetics and Nutrition (5th ed.). OxfordUniversity Press.
4. Begum, M. R. (2019). A Textbook of Foods, Nutrition, and Dietetics (3rd ed.). Sterling Publishers Pvt. Ltd.

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**PREREQUISITES IN FOOD INDUSTRY**					
Type of Course	**DSE**					
Course Code	**MG3DSEFSQ202**					
Course Level	**200-299**					
Course Summary	The subject will cover the programs and practices put in place to address and control the likelihood of introducing contamination, food safety hazards through the work environment which plays major role in producing safe food Products.					
Semester	**3**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4		-	-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	The course will enable the students to define and explain the prerequisite programs and associated terms.	K	1,7,10
2	The course will facilitate the students to outline the general hygienic and sanitary practices to be followed by different sectors of food business operators.	U	1,2,6,10

3	From this course student will be able to recognize and identify the contamination, food safety hazards through the work environment influencing the safety of foods.	A	1,2,3,10
4	The course will provide the means to properly apply the national and international legislation/ regulation.	A	1.2.6,10
5	Completing the course the students will better able to evaluate and modify the prerequisite programs and recommend the preventive measures for a food business operations	E	1,2,6.10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Introduction to Prerequisite Programmes and FSSAI Schedule4 Part I2 – FSSAI Schedule 4 Part II	1.1	Definition of pre-requisite programs and associated terms	2	1
	1.2	FSSAI Schedule 4-Part I -General hygienic and sanitary practices to be followed by petty food business operators applying forregistration	2	2,3,4,5
	1.3	FSSAI Schedule 4- Part I - A. sanitary and hygienic requirements for street food vendors and units other than manufacturing/processing	3	2,3,4,5
	1.4	Part-II- General Requirements on hygienic and sanitary practices to be followed by all food business operators – 1. location and surroundings	3	2,3,4,5
	1.5	Layout and design of food establishment premises	3	2,3,4,5
	1.6	Equipment & containers	3	2,3,4,5
	1.7	Facilities	3	2,3,4,5
2 –Pre-Requisites in Food Operations and	2.1	Procurement of raw materials	3	2,3,4,5
	2.2	Storage of raw materials and food	3	2,3,4,5

Controls	2.3	Food processing / preparation, packaging and distribution / service	4	2,3,4,5
3 – General Prerequisites for FoodIndustry	3.1	Cleaning, sanitation and maintenance of Premises	3	2,3,4,5
	3.2	Personal hygiene in food industry.	4	2,3,4,5
	3.3	Pest control in food industry.	4	2,3,4,5
	3.4	Waste management in food industry- solid waste and liquid waste	2	2,3,4,5
	3.5	Management, supervision, food testing facilities, audit, documentation and records	3	2,3,4,5
4- Pre requisites For Specific Food Industries	4.1	Visitors, product information and training	3	2,3,4,5
	4.2	Schedule 4-PART-III -Specific hygienic and sanitary practices to be followed by food business operators engaged in manufacture, processing, storing and sellingof milk and milk products.	4	2,3,4,5
	4.3	Schedule 4-PART IV- Specific hygienic and sanitary practices to be followed by food business operators engaged in manufacture, processing, storing and sellingof meat and meat products	4	2,3,4,5
	4.4	Schedule 4-Part – V- Specific hygienic and sanitary practices Tobe followed by food business operators engaged in catering / food service establishments	4	2,3,4,5
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2,3&4Lecturing, ICT Enabled Learning, Experientiallearning, Participatory learning. .

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination **Theory** 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Food Safety And Standards (Licensing And Registration Of Food Businesses),Regulations 2011 Schedule 4.
2. Springer, R. (Year). Hygiene for Management: A Text for Food Hygiene Courses.
3. Marriott, N. G., Schilling, M. W., & Gravani, R. B. (2018). Principles of Food Sanitation. Springer Cham

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD AND TOURISM**					
Type of Course	**DSC B**					
Course Code	**MG3DSCFSQ202**					
Course Level	**200-299**					
Course Summary	This course explores the dynamic intersection of food and tourism, delving into the ways in which culinary experiences and food-related activities contribute to the broader tourism industry.					
Semester	**3**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Define and comprehend the concept of Culinary Tourism.	U	1,3
2	Identify the factors that contribute to the growth and significance of culinary tourism globally.	U	3,8

3	Discuss the social, economic and cultural effects of increased tourist interest in local food.	A	7
4	Identify popular culinary destinations and analyze the impact of food festivals, markets, and events on tourism.	An	2,3,7,8
5	Analyze potential future developments in the field and evaluate the ethical considerations of food-related activities in the tourism industry.	An	3,7,8
6	CO6- Evaluate theoretical knowledge into practical aspects through direct involvement and firsthand experience	E	3,7,8

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1-Foundations of Food and Tourism	1.1	Introduction to culinary tourism: definition and significance, historical context	3	1
	1.2	Culinary Destinations: identifying key culinary destinations on national and global levels, understanding destination Branding	5	1,2,4
	1.3	Economic impact of culinary tourism: analyzing economic trends, case studies on successful models	5	1,2,3
2- Culinary Experiences and Events	2.1	Gastronomy and Tourism: The role of gastronomy in travel experiences, exploring sensory aspects	5	1,4
	2.2	Culinary Events and Festivals: Planning and execution, promoting tourism through events	5	1,4
	2.3	Culinary event proposal students work in groups to plan a hypothetical culinary event	5	1,4
	3.1	Sustainable Practices: Implementing sustainable strategies, locavore movements	5	3,5

3- Sustainability and Technology in Culinary Tourism	3.2	Ethical Considerations: Addressing ethical issues in food tourism, responsible culinary tourism	5	4,5
	3.3	Role of Technology: technology in marketing and enhancing experiences, virtual culinary Experiences	5	5
	3.4	Emerging Trends: Predicting future trends infood and tourism	2	4,5
4- Practicum	4.1	Case study: - Sustainable Culinary Practices:	7	6
	4.2	Individual or groups presenting innovative ideas for food and tourism, peer evaluations	7	6
	4.3	Practical exposure to culinary tourism operations	8	6
	4.4	Individual Research and Presentation on Sustainable Culinary Practices	8	6
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3 - Lecturing, ICT Enabled Learning Module-4Practium

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Long, L. M. (2006). Culinary Tourism: The Hidden Harvest. Kendall/Hunt Publishing Co ,U.S.
2. Hall, C. M., & Sharp, L. (2004). Food Tourism

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FUNDAMENTALS OF FOOD SCIENCE**					
Type of Course	**DSC B**					
Course Code	**MG3DSCFSQ203**					
Course Level	**200-299**					
Course Summary	This course is a multidisciplinary field of study (and practice) that involves applying chemistry, analytical methods and microbiology to determine the quality characteristics of foods. This also makes the students understand about the food safety laws and regulations and the pre-requisites for a food industry, which will strengthen the foundation inthe field of food science.					
Semester	**3**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Outline the principles behind the analytical methods associated with food analysis	U	1, 3,10
2	Understand the general characteristics of microorganisms	U	2, 10

3	Explain about different culture medias and techniques used formicrobial analysis.	U	2,10
4	Explain the concept of GMP and GHP in food industries.	U	1,2,10
5	Outline the laws and regulations related to food safety	U	1,2,10
6.	Understand the principle for the quantitative estimation of constituents of food	U	1,2,10
7	Develop the skill for quantitative estimation for constituents of food	A,S	2,10
8	Develop the skill for microbiological analysis of food	A,S	2,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Principles of Proximate Analysis	1.1	Moisture Analysis - oven drying methods, distillation methods, chemical method – Karl Fischer titration	5	1
	1.2	Analysis of Proteins: - Importance of protein analysis, principle and procedure of: Kjeldahl method, Biuret, Lowry method	5	1
	1.3	Analysis of Carbohydrates: - Lane and Eynon's Method, Anthrone Method, Nelson- Somogyi Method, Refractive Index Measurement	5	1
	1.4	Analysis of Fat: - Semi Continuous Solvent Extraction Methods: Soxhlet Method, Discontinuous Solvent Extraction Method: Mojonnier Method. Non-Solvent Wet Extraction Method: Gerber Method.	5	1
	1.5	Ash Analysis - Dry, Wet, Low Temperature, Plasma Ashing, Vitamin Analysis - Vitamin C- Ascorbic Acid Dichloroindophenol Method	5	1

2 – General Characteristics of Microorganisms and Culture media and its techniques	2.1	Introduction to Microscopy	2	2
	2.2	Cell Structure – Prokaryotes and Eukaryotes	3	2
	2.3	General characteristics of Bacteria, Fungus, Virus.	2	2
	2.4	Factors affecting microbial growth, growth curve	2	2
	2.5	Culture Media –Types Culture Techniques-Types	3	2,3
3 – GMP & GHP in Food Industry	3.1	Importance of food safety, introduction of hazards related to food	2	4
	3.2	Location layout and facilities, material handling and storage, pre-production and post-production operations	2	4
	3.3	Labeling of food, maintenance operations, transport operations	2	4
	3.4	Cleaning and Sanitation, personal hygiene, pest control and waste disposal	2	4
4-Practicum	4.1	Moisture analysis- Oven Drying method	6	6,7
	4.2	Ash analysis- Muffle furnace method	6	6,7
	4.3	Protein and Fat analysis-kjeldahl method, Soxlet Method	6	6,7
	4.4	Vitamin analysis-dichloroindophenol method	6	6,7
	4.5	Staining and pure culture methods	6	8
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3 - Lecturing, ICT Enabled Learning Module4-Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Adams, Martin R., and Maurice O. Moss. Food microbiology. Royal society of chemistry,2000.
2. Black, J. G. "Microbiology: Principles and Explorations by Jacquelyn G. Black." (2005).
3. Frazier William C and Westhoff, Dennis C. Food Microbiology, TMH, New Delhi, 2004
4. Pelczar MJ, Chan E.C.S and Krieg, Noel R. Microbiology, 5th Ed., TMH, New Delhi, 1999.

5. S.Suzanne Nielsen (2017) Textbook of Food Analysis 5th Ed Springer US
6. FSSC 22000-Scheme version 5.1 & FSSC 22000-Scheme version 6
7. Food Safety And Standards (licensing and registration of food businesses), Regulations2011 Schedule
8. FSSAI Manuals

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Programme						
Course Name	**SOCIAL RESPONSIBILITY, HUMAN VALUES, AND ETHICS IN FOOD INDUSTRY**					
Type of Course	**MDC**					
Course Code	**MG3MDCFSQ200**					
Course Level	**200-299**					
Course Summary	This course provides a comprehensive exploration of the ethical dimensions and social responsibilities inherent in the food industry.					
Semester	**3**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre- requisites, ifany						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Articulate key ethical theories and frameworks applicable to the Food Industry.	U	1,8
2	Analyze the influence of cultural, religious, and societal values on food choices social and Environmental Impacts of different food production practices.	An	1,2

3	Examine the ethical implications of marketing practices on consumer choices and perceptions.	An	6,8
4	Assess the effectiveness of globalization and CSR initiatives in addressing ethical issues such as fair labor practices, food waste, and community engagement .	E	3,6
5	Evaluate how evolving societal norms and values impact ethical considerations in the industry.	E	8,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1-Foundations of Social Responsibility and Ethics	1.1	Introduction to social responsibility in the food industry: Definition and importance, historical context and Evolution	6	1
	1.2	Human values and their role:Identifying core human values, incorporating values into ethical decision-making	6	1
	1.3	Case Studies in Ethical Dilemmas: analyzing real-world examples in the food industry	5	1
2-Consumer Ethicsand Social Responsibility	2.1	Marketing Ethics in the Food Industry: Truth in advertising, ethical considerations in product promotion	5	2,3
	2.2	Consumer Rights and Education: empowering consumers to make ethical choices, role of education in promoting responsible consumption	6	1,2
	2.3	Activity- Consumer Awareness Campaign: students design a campaign to raise awareness of ethical food choices among consumers	6	1, 5

3- Integration and Future Perspectives	3.1	Integrating Social Responsibility into Business Models: strategies for incorporating ethical practices, role of leadership in fostering a socially responsible culture	6	1, 4
	3.2	Global perspectives in food ethics	5	4
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3- Lecturing, ICT Enabled Learning
Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. DeGeorge, R. T. (1995). Business Ethics. Prentice-Hall
2. Beauchamp, T. L., Bowie, N. E., & Arnold, D. G. (1988). Ethical Theory and Business.Journal of Business Ethics
3. Food and Agriculture Organization of the United Nations. (2001). Ethical Issues in Food andAgriculture.
4. Murray, S. O., & Tulley, C. M. (2023). Food Ethics: The Basics.Routledge
5. Thompson, P. B. (2015). From Field to Fork : Food Ethics for Everyone. Oxford Uni. Press.

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Programme						
Course Name	**INDIAN DAIRY PRODUCTS**					
Type of Course	**MDC**					
Course Code	**MG3MDCFSQ201**					
Course Level	**200-299**					
Course Summary	To give students awareness on the nutritional importance of milk, preservative techniques for milk and the preparation methods of a variety of Indian milk products					
Semester	**3**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, ifAny						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Explain milk, its nutritional importance and its base products	U	1,3, 6,10
2	Explain khoa and its products	U	1,3, 6,10
3	Explain channa based products	U	1,3, 6,10
4	Explain chakka based products	U	1,3, 6,10

Remember(K),Understand(U),Apply(A),Analyse(An),Evaluate (E),Create (C),Skill(S), Interest(I)and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1-Milk	1.1	Introduction to milk, nutritional importance of milk	5	1
	1.2	Spoilage in milk, perishable food common preservation methods	5	1
	1.3	Understanding terminologies like concentration, coagulation, fermentation	5	1
	1.4	Common milk products	5	1
2-Khoa And its Products	2.1	Base products of milk like Khoa, Channa and Chakka	4	1,3,4
	2.2	Method of preparation of Khoa	3	2
	2.3	Khoa based products like Barfi, Peda, Kalak and Rabri	4	2
3- Chhanna and Chhakka Products	3.1	Method of preparation of Channa	3	3
	3.2	Channa based products like Rasgulla, Sandesh, Rasmalai,Paneer	4	3
	3.3	Method of preparation of Chakka	4	4
	3.4	Chhakka based products like Shrikhand, Dahi, Lass, Payodhi	4	4
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2 & 3 - ICT Enabled learning, Lecturing, Participatory learning. .

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Pal, D., & Raju, P. N. (2006). Technological Developments in the Production of Shrikhand.In Developments in Traditional Dairy Products . CAS in Dairy Technology, NDRI, Karnal.
2. Aneja, R. P., Mathur, B. N., Chandan, R. C., & Banerjee, A. K. (2002). Technology of IndianMilk Products. Dairy India Publication, Delhi, India.
3. Potter, N. N., & Hotchkiss, J. H. (2006). Food Science (2nd ed.). CBS Publishers andDistributors, New Delhi.
4. Srilakshmi, B. (2003). Food Science. New Age International Publishers, New Delhi

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Programme						
Course Name	**ADVANCES IN FOOD PROCESSING**					
Type of Course	**MDC**					
Course Code	**MG3MDCFSQ202**					
Course Level	**200-299**					
Course Summary	This course enables the students to understand the novel technologies used in food processing and preservation and its application					
Semester	**3**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Outline the fundamental principles behind novel processing techniques	U	3, 10
2	Explain the various applications of emerging techniques of food preservation in food industry	U	3,10
3	Identify suitable methods for processing different food commodities	A	3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create

(C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – HPP and Pulsed Electric Field Processing	1.1	Introduction and principles of high pressure processing.	2	1
	1.2	Effects of HPP on Food Quality. - microorganisms, nutrients, texture, enzyme activity	4	1
	1.3	Applications of high pressure processing	4	1,2
		Introduction to pulsed electric field, principles	3	3
		Mechanism of action and applications in solid and liquid foods	2	3
		Pulsed Light Technology- principles and applications	2	3
2 – Osmotic Dehydration And Membrane Process	2.1	Introduction and mechanism of osmotic dehydration	3	1
	2.2	Applications and limitations of osmotic dehydration	3	1,2,3
	2.3	Membrane process- microfiltration, ultra-filtrations, reverse osmosis	4	1,2
	2.4	Applications- fruit juice concentration, whey concentration, waste water treatment	3	3
3- Alternative Thermal Processing and Innovations In Food Freezing	3.1	Ohmic heating, microwave heating- principles and applications	3	1
	3.2	Radio frequency processing- principles and applications	3	1
	3.3	Vacuum cooling of foods- basic principles and factors affecting the process	3	1
	3.4	Applications of vacuum cooling in food industry, - advantages and disadvantages.	3	1
	3.5	High Pressure Freezing- principles and application in food industry	3	1
4-Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 & 3- ICT Enabled learning, Lecturing

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Sun, D. W. (2014). Emerging Technologies for Food Processing.
2. Knorr, D., Froehling, A., Jaeger, H., Reineke, K., Schlueter, O., & Schoessler, K. (2011). Emerging technologies in food processing. Annual Review of Food Scienceand Technology.

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Programme						
Course Name	**CULINARY SCIENCE AND HOSPITALITY MANAGEMENT**					
Type of Course	**MDC**					
Course Code	**MG3MDCFSQ203**					
Couse level	**200 – 299**					
Course Summary	The course introduces pupil to different concepts of Hospitality and Culinary Sciences, building an understanding of related concepts.					
Semester	**3**					
Credits	**3**					
Course details	Teaching approach	Lecture	Tutorial	Practical	Others	Total hours
		3	-	-	-	**45**
Pre requisites, Ifany						

COURSE OUTCOME (CO)

CO NO.	Expected Course Outcome	Learning Domains *	PO NO.
1.	Outline the various principles and aspects of culinary science	**U**	1,3
2.	Demonstrate the importance of nutrition in culinary science	**U**	1,2,3,10
3.	Choose the appropriate operations to be adopted towards effective implementation of management in hospitality	**A**	1,2,3,6

4.	Utilize ethical considerations to implement sustainable operations in hospitality management	**A**	1,3,7,8

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I)and Appreciation (Ap)

COURSE CONTENT

Content for classroom transactions (unit)

Module	Units	Course Description	Hrs	CO No.
1 – Introduction to Culinary Science	1.1	Overview of culinary science	1	1
	1.2	Basic principles behind cooking	4	1
	1.3	Cooking methods and their applications	4	1
	1.4	Sanitation practices in the kitchen	4	1
2 – Nutrition In Culinary Science	2.1	Nutritional aspects of food	4	1,2
	2.2	Functional properties of ingredients	3	1,2
	2.3	Interaction between ingredients during cooking	3	1,2
	2.4	Dietary considerations and special diet	3	1,2
3 – Hospitality and Culinary Management, Types	3.1	Introduction, principles and operations of hospitality management, customer service and guest relations	4	1,3
	3.2	Hotel and lodging management, food and beverage management, event management human resource management, customer relationship management	5	1,3
	3.3	Relation between culinary science and hospitality management	5	1,3,4
	3.4	Ethical considerations in the food and hospitality industry	5	1,3,4
4-Teacher Specific Content				

Teaching and learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 & 3- ICT Enabled learning, Lecturing

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper **B. Semester End Examination** 50Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READINGS

1. Enz, C. A. (2009). Hospitality Strategic Management: Concepts and Cases. WileyPublishers
2. Barrows, C. W., & Powers, T. (2011). Introduction to Management in the HospitalityIndustry.
3. Penne, G. E. (2002). The Ethics of Food: A Reader for the Twenty-First Century.
4. McGee, H. (2004). On Food and Cooking: The Science and Lore of the Kitchen.Simon

&Schuster
5. Brown, J. E. (2013). Nutrition Through the Lifecycle. Cengage Learning
6. O'Fallon, M. J., & Rutherford, D. G. (2010). Hotel Management and Operations. Wiley Publishers
7. Wood, R. C. (2015). Hospitality Management: A Brief Introduction. SAGE Publications Ltd
8. Edelstein, S. (2013). Food Science: An Ecological Approach.
9. Cooks Illustrated. (2012). Science of Good Cooking.
10. Field, S. Q. (2012). Culinary Reactions: The Everyday Chemistry of Cooking.

Mahatma Gandhi University Kottayam

Programme						
Course Name	**FOOD IN TRIBAL COMMUNITIES**					
Type of Course	**VAC**					
Course Code	**MG3VACFSQ200**					
Course Level	**200-299**					
Course Summary	This course aims to explore the unique food cultures, traditions, and challenges within tribal communities, with an emphasis on cultural sensitivity and sustainability.					
Semester	**3**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Explain the role of food in the cultural practices, rituals, and identity of various tribal communities.	U	1
2	Identify challenges related to Food Security in tribal communities.	U	7,10
3	Examine the diversity of indigenous food systems within different tribal communities.	A	7
4	Discuss the challenges and opportunities for integrating tribal food products into broader economic systems.	An	6,7,10
5	Investigate the impact of modernization, globalization, and external influences on tribal food systems and advocacy for the recognition and protection of indigenous food rights.	E	3,6,8,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1-Introduction to Tribal Food Cultures	1.1	Overview of Tribal Communities: Diversity, distribution, and characteristics, introduction to key tribal regions	7	1
	1.2	Traditional Food Practices: Exploration of indigenous ingredients, rituals, ceremonies, and the role of food	7	1
2- Nutrition and Wellness in Tribal Diets	2.1	Nutritional Challenges- Identifying nutritional gaps and health challenges analysis of nutritional challenges in tribal communities' dietary patterns and health outcomes	8	2,4
	2.2	Indigenous Medicinal Foods: Traditional uses of food for medicinal purposes, intersection of traditional medicine and nutrition	8	3
3-Entrepreneurship and Advocacy	3.1	Culinary Tourism Opportunities :Exploring the potential of tribal cuisine in culinary tourism, challenges and ethical considerations	8	1
	3.2	Advocacy for Tribal Food Rights: Understanding policy issues related to tribal food rights	7	4
4- Teacher Specific Content				

Classroom Procedure (Mode of transaction)

Teaching and Learning Approach	Module 1, 2 &3 -Lecturing, ICT Enabled Learning,

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Kimmerer, R. W. (2013). Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants.
2. Calvo, L., & Rueda Esquibel, C. (2015). Decolonizing Diet: Healing by Reclaiming Indigenous Wisdom and Food.Additional readings and resources based on specific topic

Mahatma Gandhi University Kottayam

Programme						
Course Name	**SOFT SKILLS AND PERSONALITY DEVELOPMENT**					
Type of Course	**VAC**					
Course Code	**MG3VACF SQ201**					
Course Level	**200-299**					
Course Summary	In this course the student will learn about the sectors like time management, communication, work ethic, leadership, personal responsibility, and listening which enables him/her to fit in/at a workplace					
Semester	**3**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the importance and necessities of soft skills in life.	U	4,5,6,8,10
2	Develop social skills	A	4,5,6,8,10

3	Build multiple etiquettes for career	S	4,5,6,8,10
4	Create and apply professional skills like team work, job-oriented skills etc.	C	4,5,6,8,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Personal and Social Skills	1.1	Knowing oneself - Confidence building, defining strengths, thinking creatively	4	1
	1.2	Personal values	3	1,2
	1.3	Time and stress management.	3	1,2
	1.4	Appropriate and contextual use of language	3	1,2
	1.5	Non-verbal communication	3	1,2
	1.6	Interpersonal skills and problem solving	3	1,2
2 – Personality Development and Presentation skills	2.1	Personal grooming, etiquettes business etiquettes, corporate etiquette, social etiquette and telephone etiquette	6	1,3
	2.2	Role plays and body language	4	1,3
	2.3	Public speaking	4	1,3
3- Professional skills	3.1	Organizational skills - Team work	4	1,2,4
	3.2	Business correspondence and technical writing	4	1,3,4
	3.3	Job oriented skills and professional etiquettes	4	1,3,4
4 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3- Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Dorch, P. (2013). What Are Soft Skills? New York: Execu Dress Publisher.
2. Kamin, M. (2013). Soft Skills Revolution: A Guide for Connecting with Compassion forTrainers, Teams, and Leaders. Washington, DC: Pfeiffer & Company.
3. Klaus, P., Rohman, J., & Hamaker, M. (2007). The Hard Truth about Soft Skills. London:HarperCollins E-books.
4. Petes, S. J. F. (2011). Soft Skills and Professional Communication. New Delhi: TataMcGraw-Hill Education.
5. 5. Stein, S. J., & Book, H. E. (2006). The EQ Edge: Emotional Intelligence and YourSuccess. Canada: Wiley & Sons.

Programme						
Course Name	**DISASTER MANAGEMENT**					
Type of Course	**VAC**					
Course Code	**MG3VACFSQ202**					
Couse level	**200 – 299**					
Course Summary	This course instills the need and importance of understanding different forms of disaster and various modes and means of tackling such disasters.					
Semester	**3**					
Credits	**3**					
Course details	Teaching approach	Lecture	Tutorial	Practical	Others	Total hours
		3	-	-	-	**45**
Pre requisites, Ifany						

COURSE OUTCOME (CO)

CO NO.	Expected Course Outcome	Learning Domains *	PO NO.
1.	Explain the different kinds of disasters in place and draw an outline of general riskmanagement	U	1,3,6,10
2.	Relate to varying concepts of risk assessment and analysis	U	1,2,3,
3.	Build an understanding of recovery and rehabilitation services in accordance to the typeof disaster in discussion	A	1,2,3,8,10

4.	Identify the impact of governmental and non-governmental organizations in introducing preventive measures against disasters	A	1,2,3,6,8,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest(I)and Appreciation (An)

COURSE CONTENT

Content for classroom transactions (unit)

Module	Units	Course Description	Hrs	CO No.
1– Introduction to Disaster and Disaster Management	1.1	Definition concepts of disasters, types of disasters (natural, man-made, technological, miscellaneous accidents and terrorism)	4	1
	1.2	Definition and importance of disaster management	3	1
2– Emergency Response and Crisis Communication	2.1	Incident command systems	4	1,2
	2.2	Emergency response coordination	4	1,2
	2.3	Crisis communication strategies	3	1,2
	2.4	Media relations during disasters, evacuation planning and execution	4	1,2
3 –Recovery and Rehabilitation	3.1	Post-disaster recovery strategies	4	3
	3.2	Rehabilitation of affected communities	4	3
	3.3	Psychological and social aspects of recovery (effects of disaster on children, migrants, elderly and tribal)	5	3
	3.4	Long-term rebuilding and resilience, disaster administration in India — disaster management authority at national, state and district level	5	3,4
	3.5	Case studies (lessons learned from past disasters)	5	3

4- Teacher Specific Content				

Teaching And Learning Approach	**Classroom Procedure (Mode of Transaction)** Module 1, 2 &3 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper **B. Semester End Examination** 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READINGS

1. Becker, S. M. (2009). Psychosocial Care for Women Survivors of the Tsunami Disaster in India. American Journal of Public Health, 99(4), 654-658.
2. Government of India-United Nations Disaster Risk Program. (2009-2012). Disaster Management Guidelines.
3. Damon, P., & Copola, P. (2006). Introduction to International Disaster Management. Butterworth Heineman.
4. Généreux, M., Schluter, P. J., Takahashi, S., Usami, S., Mashino, S., Kayano, R., & Kim, Y. (2019). Psychosocial Management Before, During, and After Emergencies and Disasters—Results from the Kobe Expert Meeting. International Journal of Environmental Research and Public Health, 16(8), 1309.
5. Murthy, D. B. N. (2012). Disaster Management. Deep and Deep Publication Pvt. Ltd., New Delhi.
6. Modh, S. (2010). Managing Natural Disasters. Mac Millan Publishers India Ltd.

7. World Health Organization. (2005). Manual for Trainers of Community Level Workers: Psychosocial Care of Tsunami-affected Population (No. SEA-EHA-8). WHO Regional Office for South-East Asia.
8. Tot Module-PSS in DM Series -1 Psychosocial Care in Disaster Management. Accessed on June 25, 2022, from https://nidm.gov.in/PDF/Modules/Psychosocial.pdf

SEMESTER-IV

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**SENSORY SCIENCE**					
Type of Course	**DSC A**					
Course Code	**MG4DSCFSQ200**					
Course Level	**200-299**					
Course Summary	Sensory Science typically explores the principles and techniques related to the evaluation and analysis of sensory attributes in various products, including food and beverages. The course is designed with an understanding of how human senses, such as taste, smell, sight, touch, and hearing, contribute to the perception of products.					
Semester	**4**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No	Expected Course Outcome	Learning Domains *	PO No
1	Recall and identify basic sensory attributes such as taste, aroma, texture, and appearance in various food products and requirements in sensory evaluation.	**K**	1,3,10
2	Understand the principles of sensory evaluation, including the factors influencing perception and how different sensory attributes contribute to overall food quality and Various tests.	**U**	1,2,3,10
3	Apply sensory evaluation techniques to differentiate between samples and demonstrate practical application	**A**	1, 2,10
4	Analyze and interpret sensory data, drawing conclusions about the sensory characteristics of foods and the implications for product quality and consumer preference through industrial training.	**An**	1,2,10
5	Evaluate the ability to develop informed judgment and recommendations based on sensory evaluation results.	**E**	1,3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 -Introduction to Sensory Science, Evaluation of Food and Perception	1.1	Definition, importance, primary objective and basic principles of sensory evaluation in the foodindustry	3	1
	1.2	Sensory attributes in food (flavor, texture, appearance ,color ,taste, aroma)	3	1
	1.3	Factors influencing and application of sensory evaluation	2	1

	1.4	Gustation – importance, taste buds, taste enhancers, e-tongue	3	1
	1.5	Odor and flavor- importance, smelling technique, e-nose, olfaction theories	2	1
	1.6	Color- importance, dimensions (hue, value and Chroma), perception	3	1
	1.7	Texture- importance, classification, measurement	2	1
2- Sensory Evaluation Requirements	2.1	Sensory laboratory design, sensory booths	3	1
	2.2	Sensory panels, types of panels, recruitment, and selection criteria	3	1
	2.3	Sample preparation and serving procedures	3	1
	2.4	Scorecard, sensory scaling, line scale, numeric	3	1
3 –Testing Methods in Food and Data Analysis	3.1	Difference test –paired, duo-trio, compared, triangle test	3	2
	3.2	Threshold test, sensitivity test and descriptive test	3	2
	3.3	Tanking test, hedonic scale and scoring test	3	2
	3.4	Acceptance and preference test	3	2
	3.5	Measures of central tendency-mean, median, mode measures of standard deviation	3	2,4
4. – Practicum	4.1	Difference test- paired comparison test, duo-trio test, triangle test	10	3,5
	4.2	Rating test- ranking test, two sample difference test, multiple sample difference test	10	3,5
	4.3	Numerical scoring test, composite scoring test	10	3,4,5
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2&3-Lecturing, ICT Enabled Module 4- Lecturing -Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar Practical's- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READING

1. Meilgaard, M. C., Civille, G. V., & Carr, B. T. (2007). Sensory Evaluation Techniques.CRCPress
2. Lawless, H. T., & Heymann, H. (1998). Sensory Evaluation of Food: Principles andPractices.
3. Carpenter, R. P. (2000). Sensory Evaluation in Quality Control.

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**INTRODUCTION TO FOOD MICROBIOLOGY**					
Type of Course	**DSC A**					
Course Code	**MG4DSCFSQ201**					
Course Level	**200-299**					
Course Summary	This course will introduce Food microbiology, which is about the understanding of microorganisms that grow or multiply in or contaminate the food					
Semester	**4**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand fundamental concepts in food Microbiology.	U	1,10
2	Understand the role and significance of microbial adaptation and environmental factors on the growth and Response of microorganisms in various environments.	U	1,10
3	Understand the role of different microorganisms in food spoilage, food fermentation and food-borne diseases.	U	1,7,10

4	Identify the essential pathogens and spoilage microorganisms in foods.	A	1,10
5	Identify the common microorganisms through microscopic examination.	A	1,3,10
6	Identify spoilage microorganisms in foods.	A	1,3,10
7	Identify spoilage microorganisms in milk.	A	1,3,10
8	Identify spoilage microorganisms in water.	A	1,3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transactions (Units)

Module	Units	Course Description	Hrs.	CO No.
1 –Introduction to Food Microbiology	1.1	Microscopic examination of microorganisms	3	1
	1.2	Introduction to prokaryotic and eukaryotic cell	4	1
	1.3	Bacteriology (bacterial cell morphology, structure, function, cell wall of gram-positive and gram-negative organism), microbial nutrition factors affecting microbial growth	4	1
	1.4	Mycology (morphology, structure and reproduction)	4	2
	1.5	Virology (morphology, structure and reproduction), protozoology (morphology, structure and reproduction)	5	2
2 – Sterilization Techniques and Cultivation of Micro-Organisms	2.1	Factors affecting antimicrobial activity (environment, organism status of the organism, inoculum, concentrations)	3	2
	2.2	Physical and chemical sterilization Methods	3	2
	2.3	Pure culture technique methods of isolation and cultivation	3	2

3 – Spoilage of Specific Food Groups and Foodborne Diseases	3.1	Spoilage of specific food groups- milk products, meat, poultry and seafood, cereal and cereal products, fruits and vegetables and canned products	4	3
	3.2	Definition of food poisoning, infections, causative agents, foods involved symptoms and preventive measures.	4	3,4
	3.3	Food intoxications: Staphylococcus aureus, Clostridium botulinum and mycotoxins	4	3,4
	3.4	Food infections: Bacillus cereus, Escherichia coli, Shigella, Listeria mono cytogenes, Vibrio cholera	4	3,4
4 –Practicum	4.1	Microscopic examination and media preparation-microscopic observation of microorganisms commonly found in food - differential staining method preparation of culture media used in food examination	8	5
	4.2	Microbiological analysis of different food products- microbiological analysis of meat and fish microbiology of sauce microbiology of bread (yeast & mold) microbiology of fruits	8	6
	4.3	Microbiology of milk- quantitative analysis of milk by SPC (standard plate count method) enzymatic test of milk by MBRT determination of phosphatase activity of milk	7	7
	4.4	Microbiology of water-MPN membrane filtration method	7	8
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2&3-Lecturing, ICT Enabled Learning, Experiential Learning, Participatory learning. Module 4- Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks , Minor 5 Marks

SUGGESTED READINGS

1. Adams, M. R., & Moss, M. O. (2000). Food Microbiology. Royal Society of Chemistry.
2. Black, J. G. (2005). Microbiology: Principles and Explorations by Jacquelyn G. Black.
3. Frazier, W. C., & Westhoff, D. C. (2004). Food Microbiology. TMH.
4. Pelczar, M. J., Chan, E. C. S., & Krieg, N. R. (1993). Microbiology (5th ed.). TMH.
5. Dubey, R. C., & Maheshwari, D. K. (2002). Practical Microbiology. S. Chand Publishing.
6. Amaresan, N., Patel, P., & Amin, D. (Eds.). (2022). Practical Handbook on Agricultural Microbiology. Humana Press.

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD PACKAGING TECHNOLOGY**					
Type of Course	**DSE**					
Course Code	**MG4DSEFSQ200**					
Course Level	**200-299**					
Course Summary	This course explores the critical role of packaging in the food industry, covering principles, technologies, and innovations that contribute to the safety, preservation, and marketability of food products.					
Semester	**4**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-		-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Recognize the common materials used in food packaging and understand the primary functions of foodpackaging	U	1,2
2	Explain the principles of food packaging technologies	U	1,2,3

3	Examine and interpret regulatory requirements related to food packaging, including labelling laws and safetystandards.	A	6,8,10
4	Comprehend and assess current market trends andtesting methods in food packaging	An	10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Module	Units	Course Description	Hrs.	CO No.
1-Introduction to Food Packaging	1.1	Definition, importance, functions and scope of packaging foods, types of packaging: based on contact and functions (primary, secondary, tertiary and quaternary), based on physical properties and ability to deform (flexible, semi-rigid, rigid).	6	1
2-Rigid and Flexible Packaging	2.1	Glass packaging- types, properties, advantages and disadvantages.	2	1,2
	2.2	Metal packaging: tinplate, tfs, aluminum and aluminum foil. types of cans. Protective lacquers and coatings for metal containers.	3	1, 2
	2.3	Cellulose based packaging: paper-types, paperboard, corrugated fiber board- components and types, and their properties, advantages and disadvantages.	4	2
	2.4	Plastic packaging- polyethylene, polypropylene, polyamides, polyester, pvc, pvdc, pva, evoh, polycarbonates, cellophane, inomers, copolymers, phenoxy, acrylic and polyurethanes. Classification, properties, advantages and disadvantages of plastic packaging.	6	2
	2.5	Laminates- definition, properties, and types.	2	2
	2.6	Closures- lug, screw, Snap-On, press-on, pilfer-proof, flip-top, cork.	3	1, 2
	2.7	Forms of packaging- bags, bottles, boxes, cups, trays, jars, pouches, sachets, tetra pack	3	2

3-Recent trends& Regulation	3.1	Vacuum packaging, modified atmospheric packaging, FFS packaging, shrink packaging, retort pouch packaging, aseptic packing, active packaging, intelligent packaging, smart packaging- Q R codes, rfid (radio-frequency identification), and NFC (near field communication).	7	3,4
	3.2	Packaging laws and regulations	6	3
4- Testing in Food Packaging	4.1	Packaging material testing: global and specific migration, WVTR, GTR	6	3
	4.2	bursting strength, cobs value, tensile strength, tearing strength, impact strength, bond strength	6	3
	4.3	puncture resistance, heat seal strength, transport worthiness tests (drop test, vibration test, compression strength, rolling test)	6	3
5- **Teacher Specific Content**				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2,3&4 -Lecturing, ICT Enabled Learning.

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar

	B. Semester End examination 70 Marks MCQ-(20 Out of 20) - 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Ahvenainen, R. (Ed.). (2003). Novel Food Packaging Techniques. CRC Press.
2. Coles, R., McDowell, D., & Kirwan, M. J. (Eds.). (2003). Food Packaging Technology. CRC Press.
3. Han, J. H. (Ed.). (2005). Innovations in Food Packaging. Elsevier Academic Press.
4. Raija, A. (Ed.). (2003). Novel Food Packaging Techniques. In Food Science and Technology Series. Woodhead Publishing.
5. Brody, A. L., Strupinsky, E. R., & Kline, L. R. (2002). Active Packaging for Food Applications. CRC Press.
6. Robertson, G. L. (2012). Food Packaging – Principles and Practice. CRC Press Taylor and Francis Group.
7. Paine, F. A., & Paine, H. Y. (1992). A Handbook of Food Packaging. Blackie Academic and Professional.
8. Coles, R., McDowell, D., & Kirwan, M. J. (2003). Food Packaging Technology. Blackwell.
9. De Sousa, M. S., Schlogl, A. E., Estanislau, F. R., Souza, V. G. L., dos Reis Coimbra, J. S., & . Santos, I. J. B. (2023). Nanotechnology in Packaging for Food Industry: Past, Present, and Future.Coatings, 13(8), 141.

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**PRINCIPLES AND PRACTICES IN FOOD HYGIENE**					
Type of Course	**DSE**					
Course Code	**MG4DSEFSQ201**					
Course Level	**200-299**					
Course Summary	Make students aware of a safer food environment, reducing the risk offood borne illnesses .The knowledge prepares them to handle, prepare and store food in a way that promotes public health and wellbeing.					
Semester	**4**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre-requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Students gain comprehensive understanding of food borne illness, hygiene hazards, and importance of maintaining high standards of food handling	U	1,2,3,6,10
2	Acquiring practical skills in food preparation, storage, and hygienic practices.	U	1,2,3,6,10

3	Analyze and mitigate risk associated with contamination and cross contamination and lack ofpersonnel hygiene	An	1,2,3,6,10
4	Create a safer food supply chain and play a role inpromoting public health by preventing food borne diseases	C	1,2,3,6,10

Remember(K), Understand(U), Apply(A),Analyze(An),Evaluate (E),Create (C),Skill(S), Interest(I)and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 –Introduction to Food hygiene	1.1	Aims and benefits of food hygiene	5	1,2
	1.2	Hygiene and food safety, proper food handling	5	1,2
	1.3	Personnel hygiene –Hand washing, care ofhands, bactericidal soaps and cream, use of gloves, practices - good and bad	5	1,2
2– Food Hygiene and Food Storage	2.1	Sources of contamination ,cross contamination of food	3	1,3,4
	2.2	Storage conditions for perishable, semi perishable, non-perishable foods	3	1,3,4
	2.3	Storage of food- Cleanliness, segregation, purchase, rotation stock	3	1,3,4
	2.4	Dry storage, cool storage, freezer storage	4	1,3,4
	2.5	Pest control	3	1,3,4
3-Food Handling	3.1	Safe handling of fresh, frozen, canned foods	5	1,2,3
	3.2	Cooking temperature, reheating of foods, hot holding of foods, cooling before refrigeration, thawing	4	1,2,3,4
	3.3	Cleaning and sanitizing, premises and utensils, equipment and facilities	5	1,2,3,4

	3.4	Health supervision- pre-employment medical examination, health monitoring of employees	5	1,2,3,4
4- food Service Hygiene	4.1	Hygienic practices for street vendors	5	1,2,3,4
	4.2	Safe waste disposal practices	5	1,2,3,4
4-Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 , 3&4- Lecturing & Tutorial ICT Enabled Learning
Assessment Types	**MODE OF ASSESSMENT** **A.** Continuous Comprehensive Assessment (CCA) **Theory** 30 Marks- Assignment / Viva / Seminar
	MODE OF ASSESSMENT **B. Semester End examination** 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Owusu-Apenten, R., & Vieira, E. R. (2023). Elementary Food Science. Springer International Publishing.
2. Hayes, R. (2013). Food Microbiology and Hygiene. Springer US.
3. Kumar, A. (2019). Fundamentals of Food Hygiene Safety, and Quality. I K. InternationalPublishing House Pvt. Limited.

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Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**PRINCIPLES OF SANITATION AND HACCP**					
Type of Course	**DSC C**					
Course Code	**MG4DSCFSQ202**					
Course Level	**200-299**					
Course Summary	This course provides students a comprehensive understanding of a systematic approach to food sanitation and HACCP. Students learn to identify, assess, and control potential hazards at critical points in the food production process. Emphasis is placed on the application o HACCP and food sanitation principles to ensure the production of safe and high-quality food products.					
Semester	**4**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites, ifany						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the systematic approach of sanitation and HACCP in identifying, evaluating, and controlling food safety hazards.	U	1,2,3,,5,10
2	Explain relation of microorganisms to sanitation and prerequisite and their importance in ensuring food safety.	U	1,2,3,,5,10
3	Examine twelve steps and seven principles of the HACCP system in food industries.	An	1,2,3,,5,10
4	Evaluate role of total quality management for effective sanitation in food industries	E	1,2,3,,5,10
5	Combine the knowledge, confidence & skills to apply sanitation methods and effective HACCP system in food Industries	C	1,2,3,,5,10
6	Create a practical exercise atmosphere for implementation of principles of food safety.	C	1,2,3,5,10

Remember(K), Understand(U),Apply(A),Analyse(An),Evaluate (E),Create (C),Skill(S), Interest(I) and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 –Introduction to Sanitation and HACCP system	1.1	Introduction-sanitation, need, laws and regulation establishment of sanitary practices	2	1,2
	1.2	Introduction to HACCP ,history of HACCP	3	1,2,5
	1.3	Need & advantages of HACCP system	2	1,2,5
	1.4	Food quality assurance :The Indian scenario	2	1,2

2 –Food borne bio terrorism and Prerequisite programmes	2.1	Potential risk of food borne bio-terrorism	2	2
	2.2	How microorganisms relate to food sanitation.	2	1,2
	2.3	Food contamination, food spoilage and food borne illness	2	1,2
	2.3	Importance of prerequisite programs for HACCP ,GMP & GHP ,GAP	2	1,2
	2.4	SOP,SSOP	2	1,2
3 – HACCP System, Food Safety and Quality assurance for sanitation, Cleaning Compound and sanitizers	3.1	Role of HACCP in sanitation	2	2,3,5
	3.2	Assemble HACCP team, describethe product and intended use, construct and validate process flow diagram	2	3,4,5
	3.3	Seven principles of HACCP system	4	3,5
	3.4	Definition and essential features of an audit, types of audit, auditors, HACCP audit in practice	4	3
	3.5	The role of total quality management in food safety and sanitation	4	4
	3.6	Quality assurance for effective sanitation, major responsibilities of a sanitation quality assurance program	4	4
	3.7	International and national standards for food safety	2	4
	3.8	Soil and surface characteristics, classification of cleaning Compounds Cleaning and sanitizing equipment's CIP ,COP	2	2,5
	3.9	Sanitizing methods-physical methods Chemical methods of sanitization Pest control, IPM	2	2,5
4 – Practical	4.1	Demonstrate General Sanitation practices in in food processing plant-Sanitizers- detergents, disinfectants	6	6
	4.2	Introduce HACCP regulation and its format	6	6
	4.3	Conduct practical exercise for Hazard analysis; identify critical	6	6

		control points based on experience		
	4.4	Conduct practical exercise for Hazard analysis; identify critical control points based on experience	6	6
	4.5	Group presentation-Each group presents the results of their Hazard Analysis and HACCP Plan with comments and discussion from students and instructors	6	6
5 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2, 3&4-Lecturing, ICT Enabled Learning,Experiential learning, Participatory learning.

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination 50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. G. Iyer, T. S. (2007). HACCP Systems for Food Industries. India.
2. Pierson, M. D. (2012). HACCP: Principles and Applications. Springer US.
3. Corlett, D. A. (1998). HACCP User's Manual. Springer Netherlands.
4. 4. Marriott, N. G., & Gravani, R. B. (2006). Principles of Food Sanitation. Springer Ukraine.

Programme						
Course Name	**MANAGEMENT IN FOOD INDUSTRY**					
Type of Course	**SEC**					
Course Code	**MG4SECFSQ200**					
Course Level	**200-299**					
Course Summary	To develop managerial capabilities in students to equip them for working in food industries					
Semester	**4**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No.
1	Explain management, levels, principles, importance and challenges	U	1,2,3,4,5,10
2	Explain the functions of management	U	1, 2, 3, 10
3	Analyze the different channels of distribution and pricing techniques	An	1, 2, 3, 10
4	Assess the modes of promotional activities in the market	E	1, 2, 3, 10
5	Elaborate modern techniques of marketing	C	1, 2, 3, 4, 5,10

**Remember(K),Understand(U),Apply(A),Analyse(An),Evaluate (E),Create (C),Skill(S),Interest(I)and Appreciation(Ap)*

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1- Management- Principles, Levels and Functions	1.1	Management— Characteristics and objectives, levels of management, roles and skills of a manager, principles of management , functions and challenges of management	6	1,2
	1.2	Planning – objectives, steps	4	1,2
	1.3	Organizing – objectives, steps,types of organizations	3	1,2
	1.4	Decision making – objectives,steps, types of decisions	4	1,2
	1.5	Staffing— process of staffing, job description and specification	3	1,2
2 – Channels of distribution and Promotional activities	2.1	Channels of distribution	2	3
	2.2	Middlemen	4	3
	2.3	Pricing, sales promotion	4	3
	2.4	Advertising, after sales service	3	3
	2.5	Activity based on advertising	2	3
3– New trends in marketing	3.1	Direct Marketing, E marketing, tale marketing viral marketing and social marketing	3	4,5
	3.2	Videography and online marketing	3	4,5
	3.3	Personalized, voice search optimization, AI and catboats, social media, sustainability	4	4,5

		marketing, automated customer Support		
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3-Lecturing, ICT Enabled

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 arks- Assignment, Seminar, Test Paper
	B. Semester End Examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Koontz, H., & O'Donnell. (2005). Management: Systems and Contingency Analysis of Managerial Functions. McGraw-Hill Book Company.
2. Radha, V., Oommen, T., & Nair, S. (2003). Marketing Management. Lions Publications.
3. Sharma, R. K., & Gupta, S. K. (2004). Business Management. Kalyani Publishers.
4. International Trade Centre. (1993). Quality Control for the Food Industry: An Introductory Handbook.

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Programme						
Course Name	**FIRST AID, FIRE SAFETY, AND DISASTER MANAGEMENT**					
Type of Course	**SEC**					
Course Code	**MG4SECFSQ201**					
Course Level	**200-299**					
Course Summary	The course would help in improving the students with the essential life-saving skills, situational awareness of potential threats by teaching the standard physical protection techniques involving using the state of mind and essential skills.					
Semester	**4**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, if any	*Nil*					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	The course will enable the students to understand the importance of basic first aid techniques, fire safety, and industrial safety management systems in maintaining a safe and secure workplace environment.	U	1,3,10
2	Demonstrate knowledge of common injuries and medical emergencies that may occur in a workplacesetting.	U	1,2,3,10

3	This course will facilitate the students to Identify potential hazards and risks in an industrial or workplace setting and take appropriate measures to mitigate those risks.	A	1,2,3,6,10
4	From this course student can apply appropriate first aid techniques to assess, stabilize, and provide initial care for injuries such as cuts, burns, fractures, and medical emergencies including Cardiac arrest and choking.	A	1,2,3,6,10
5	From this course student can develop effective emergency response plans, including evacuation Procedures and communication protocols.	C	1,2,6.10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Introduction to Emergency Preparedness and Response	1.1	Importance of emergency preparedness and response.	3	1, 5
	1.2	Overview of emergency management systems andframeworks	3	1,5
	1.3	Roles and responsibilities of individuals and organizations in emergency situations	4	1,5
2-First Aid Techniques and Basic Life Support	2.1	First aid techniques and basic life support	4	1,2,3
	2.2	Assessment and management of common medical emergencies (e.g., heart attacks, strokes, seizures)	3	1,2,3
	2.3	Cardiopulmonary resuscitation (CPR)and automated external defibrillator (AED) use	3	1,2,3
	2.4	Choking and airway management	3	1,2,3

	2.5	Assessment and treatment of different types of injuries (e.g., wounds, fractures, burns)	4	1,2,3
3- Fire Safety And Preventive Measures	3.1	Fire safety regulations and standards	3	1,2,3,4,5
	3.2	Fire prevention strategies and practices, types and uses of firefighting equipment (e.g., fire extinguishers, sprinkler systems)	5	1,2,3,4,5
	3.3	Firefighting strategies and practices, Fire blanket operation and usage	5	1,2,3,4,5
	3.4	Safe evacuation procedures and emergency exits	5	1,2,3,4,5
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3-Lecturing, ICT Enabled

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 arks- Assignment, Seminar, Test Paper
	B. Semester End Examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Goodson, C. (Year). Essentials of Fire Fighting (5th ed.). Fire Protection Publications.
2. Rathore, S. K. (2010). Fire Fighting and Fire Safety. Sublime Publication.
3. Sarma, A. M. (2009). Safety and Health in Industry: A Handbook. BS Publication. Retrieved from www.BSpublication.net.
4. NIFE. (2009). Industrial Safety and First Aid. Retrieved from www.nifeindia.com. BSPublication.
5. Gupta, M. C. (Ed.). Manual on Natural Disaster Management in India. NIDM, New Delhi.
6. Government of India. (2005). Disaster Management Act.
7. Government of India. (2009). National Disaster Management Policy.

Programme						
Course Name	**ENTREPRENEURSHIP DEVELOPMENT**					
Type of Course	**VAC**					
Course Code	**MG4VACFSQ200**					
Course Level	**200-299**					
Course Summary	To give students awareness about the scope of business and encourage them for self-employment. The course help them to understand the business opportunities and the steps in starting a business					
Semester	**4**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites,if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Interpret scope of business and forms of business organizations	U	3, 6, 7, 10
2	Explain entrepreneurship, entrepreneurs, classification of entrepreneurs, entrepreneurs and managers and EDP	U	3, 5,6,10
3	Identify the role of entrepreneurs in the economic development of a nation	A	3,5,6,7,10

4	Discuss product Identification, selection and project formulation	C	1, 2, 3,6, 10

Remember(K),Understand(U),Apply(A),Analyse(An),Evaluate (E),Create (C),Skill(S), Interest(I)and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Scope of business, forms of Business Organization sand entrepreneurship	1.1	Scope of business	3	1
	1.2	Forms of business organizations- Sole proprietorship, partnership, joint stock company, co-operative societies	3	1
	1.3	Entrepreneurship, entrepreneurs and enterprise	3	2
	1.4	Factors affecting entrepreneurial growth	3	3
	1.5	Functions of entrepreneurs, importance of self-employment	4	3
2 – Entrepreneurship Development Programme	2.1	Concepts, need for training, target groups	3	2,3
	2.2	Phases of EDP	4	2,3
	2.3	Contents of training programme	4	2,3
	2.4	Institutions conducting EDPs EDII,NIESBUD,NEDB,SISI,DIC	4	2,3
3- Product Identification, Selection and Project Formulation	3.1	Identification of business opportunities	4	4
	3.2	Product selection	4	4
	3.3	Elements of project formulation	3	4
	3.4	Small scale industries	3	4

4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3-Lecturing, ICT Enabled

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 arks- Assignment, Seminar, Test Paper
	B. Semester End Examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Jayan, Dr., Nair, Dr. K. G. C., & Biji, Dr. (2007). Systematic Approach to EntrepreneurshipDevelopment and Management. Chand Books.
2. Nair, Dr. K. G. C., Hari, Dr., Sasi, Dr., & Biji, Dr. (2006). Systematic Approach toEntrepreneurship Development. Chand Books.
3. Paul, J., Kumar, N. A., & Mampilly, P. T. (1999). Entrepreneurship Development. HimalayaPublishing House.
4. Gupta, M. Dr. C. B., & Khanka, Dr. S. S. (1999). Entrepreneurship and Small BusinessManagement. Sultan Chand and Sons.

ON THE JOB TRAINING

On-the-job-training thus plays a vital role providing learning experience through hands-on training to the students for performing various tasks for a job in the food industry. Guide lines have been developed to implement formal OJT systematically. It will also serve as a general checklist and benchmark to organize OJT by the faculty for the students enrolled in the discipline of Food Science and Quality Control.

The students can undertake on the job training within and outside the state .

ON THE JOB TRAINING - 2 CREDIT

TOTAL MARKS -50 MARKS

- DISTRIBUTION OF INTERNAL MARKS - 15

  Initiative- 5

  Creativity- 5

  Punctuality-5

- DISTRIBUTION OF FINAL MARKS -35

  Training performance- 10
  Accountability - 10
  Report Submission -15

SEMESTER-V

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**TECHNOLOGY OF MEAT, FISH, EGG AND POULTRY**					
Type of Course	**DSC**					
Course Code	**MG5DSCFSQ300**					
Course Level	**300 -399**					
Course Summary	This course will explain about the processing techniques of animal foods and their applications in food industry.					
Semester	**5**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, ifany						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Illustrate the Composition and Nutritive value in different types of Animal foods	U	1, 3, 10
2	Utilize the Acquired skills and knowledge of processing methods to develop a new food product.	A	2, 3, 6
3	Evaluate the relevance of emerging trends in animal food processing industry	E	1, 2,3,8
4	Design and develop animal based food processing techniques by choosing appropriate practices	C	3, 5, 6, 10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C),

Skill (S),Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1-Meat, Poultry and Fish	1.1	Meat-Definition, structure of muscles, classification of meat, chemical composition and nutritive value, ante-mortem examination of animals, stunning and slaughtering techniques, processing of carcass, meat cuts, post mortem changes of meat carcass, palatability characteristics of meat, ageing, tenderization, curing, smoking, drying, canning	10	1
	1.2	Meat products-Sausage, salami, ham, bacon, by-products- organ meat, blood, bone, skin, fat packaging of meat- vacuum packaging, shrink packaging	5	1,2,4
	1.3	Definition, classification of poultry, chemical composition and nutritive value, stunning and slaughtering techniques, poultry processing, poultry cuts	5	1,2,4
	1.4	Fish-definition, classification of fish, chemical composition and nutritive value, handling and transportation, quality examination, processing of fish- freezing, smoking, canning & drying, post-mortem changes	5	2,4
	1.5	Fish products-fish oil, fish meal, fish flour, surimi, fish protein concentrate, by-products- isinglass, fish glue, chitin, chitosan, fish gelatin & collagen packaging of fish- vacuum packaging, flexible packaging	8	1,2,3
2-Egg	2.1	Definition, chemical composition and nutritive value, grading of egg	3	1
	2.2	Quality parameters of egg- interior and exterior, quality test	4	2,4
	2.3	Processing of egg - drying, pasteurization, freezing	2	2,4
3-Emerging Trends	3.1	Emerging trends in animal-based foods**-** high pressure processing, pulsed electric field, ohmic heating, shock wave, irradiation	3	1,3

4-Practium	4.1	Preparation of meat products- meat pickle and meat cutlet	5	1,4
	4.2	Preparation of poultry products- chicken nuggets, fried chicken	5	2,4
	4.3	Preparation of fish product- fish fingers, fish pickle	5	2,4
	4.4	Preparation of egg- custard, soufflés, scones,	5	2,4
	4.5	Analysis of pickle-meat/fish Analysis of custard Analysis of nuggets	10	2,4
5-Teacher Specific Content				

Teaching and Learning Approach	Classroom Procedure (Mode of transaction) Module 1,2 & 3 - Lecturing, ICT Enabled Learning. Module 4- Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. **Semester End examination** **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Potter,N.N,.Hotchkiss,J.H.Food Science.CBS Publishers, New Delhi.2022
2. Manay, N. S., & Shadaksharaswamy, M. (2020).Food facts and principles. New AgeInternational Private Limited
3. Kent,J.A.Riegels Handbook of Industrial Chemistry, 7th edition. Van Nostrand ReinholdCompany, New York.2003.
4. Sen,D.P.Fish processing technology.Allied publishers, New Delhi.2010
5. Sreelaksmi,B.(2018).Food science. New Age International Publishers

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**DAIRY TECHNOLOGY**					
Type of Course	**DSC A**					
Course Code	**MG5DSCFSQ301**					
Course Level	**300-399**					
Course Summary	The subject will cover the programs and practices put in place to address and control the likelihood of introducing contamination, food safety hazards through the work environment which plays major role in producing safe food products.					
Semester	**5**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	**75**
		3	-	1	-	
Pre-requisites, if any	*Nil*					

COURSE OUTCOMES (CO)

CO NO.	Expected Course Outcome	Learning Domains *	PO No
1	The course will enable the students to summarize about the composition, and physicochemical properties of milk	U	1,7,10
2	This course will facilitate the students to utilize the Processing Technologies of milk and different milk products.	A	1,2,10

3	From this course students will be able to make use of and distinguish the processing of Indian dairy products	An	1,2,6,10
4	Completing the course the students will better able to evaluate and modify the dairy plant sanitation procedures	E	1,2,6.10
5	Create dairy products utilizing the various principles of milk processing technology and its standards to provide customer demand.	C	1,2,6,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Introduction to Dairy Technology andProperties of Milk	1.1	Definition and composition of milk from various sources.	2	1
	1.2	Factors affecting composition of milk.	2	1
	1.3	food and nutritive value, physico-chemical properties of milk	2	1
2 – Processing & packaging of Milk	2.1	Collection, processing, distribution and storage of liquid milk.	3	2
	2.2	Quality control tests for milk – platformtests, fat, SNF, phosphatase test, acidity, MBRT.	4	2
	2.3	Toned milk, double toned milk, standardized milk, sterilized milk, flavored milk, skimmed Milk	2	2
	2.4	Homogenized milk, and reconstituted &recombined milk.	3	2

	2.5	Various packaging techniques for milk- non-returnable plastic bottles plastic films aseptic packaging of milk legal sanitary requirements in dairy establishments CIP, COP, various cleaning chemicals and disinfectants used in dairy industry	5	2,4
2–Dairy Products	3.1	Cream- Composition,production processing, storageand defects butter - composition, processing, storage and defects Ice cream - composition, processing, storage and defects Cheese - composition, processing, storage and defects. processing of cheese: cottage and cheddar cheese	6	2,3
	3.2	Fermented milk products- Curd, Yoghurt, Acidophilus Milk, Kefir, Koumiss, Pro- biotic milk products Dried milks – whole milk powder and skim milk powder. composition, processing, storage and defects	5	2,3
	3.3	Concentrated whole milk Products-Kheer, Khoa, Rabri ,Kulfi	4	2,3
	3.4	Coagulated milk products –Dahi, Srikhand, Paneer, Channa	4	2,3
	3.5	Products of the clarified butter fat industry - Makhan, Ghee, Lassi	3	2,3
	4.1	Preparation of ice cream,	6	5

4 – Practicum	4.2	Preparation of Curd, Khoa, Paneer	10	5
	4.3	Preparation of Ghee	6	5
	4.4	Preparation of Lassi	3	5
	4.5	Preparation of Butter	5	5
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3- Lecturing, ICT Enabled Learning. Module 4- Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory-** 25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks)

	Practical Examination -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10 Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. De, S. (Year). Outlines of Dairy Technology.
2. Robinson, R. K. (Ed.). (2012). Modern Dairy Technology - Advances in Milk Processing (2nd ed., Vol. 2).
3. Mullan, M. (Ed.). (2021). International Journal of Dairy Technology.
4. Tetra Pak Processing Systems.Tetra Pak Dairy Processing Handbook. Lund, Sweden:Tetra Pak Processing Systems, S-221 86.
5. Walstra, P., Wouters, J. T. M., & Geurts, T. J. (2006). Dairy Technology (2nd ed.). CRCPress/Taylor & Francis.

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**TECHNOLOGY OF CEREALS,PULSES AND OILSEEDS**					
Type of Course	**DSE**					
Course Code	**MG5DSEFSQ300**					
Course Level	**300 – 399**					
Course Summary	The course focuses on the study of these important agricultural commodities. It provides an overview about the production, processing, value addition and packaging of the cereals and cereal products.					
Semester	**5**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-		-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the basic structure, composition and post-harvest process of rice	U	3,10
2	Outline the composition, types, post-harvest technology of wheat and dough testing instruments	U	1,2,10
3	Summarize the processing technology of corn and its products and byproducts	U	2,10
4	Assess the chemical composition, anti-nutritional factors and processing technology of different pulses	E	1,6,10

5	Explain the chemical composition, anti-nutritional factors and processing technology of oilseeds	E	1,2,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1-Technology of Rice	1.1	Structure of rice grain, chemical composition, nutritive value	3	1
	1.2	Rice classification: wild rice, brown rice, black rice, basmati rice	3	1
	1.3	Parboiling of rice : processing steps, changes occurring during parboiling, advantages and disadvantages	4	1
	1.4	Milling of rice	3	1
	1.5	Products (rice flour, parched paddy, flaked rice)and byproducts of rice(rice bran, rice bran oil, husk)	3	1
2- Technology of wheat	2.1	Structure of wheat grain, chemical composition, nutritive value types of wheat,quality requirements of wheat	2	2
	2.2	Milling of wheat Products – wheat flour, bread, biscuit, cake	5	2
	2.3	Dough testing instruments -farinograph, mixograph, alveograph, extensograph, amylograph	5	2
3 -Technology of Corn	3.1	Structure and composition of corn Varieties & uses of maize	2	2,3
	3.2	Milling of corn – dry and wet milling products andbyproducts of corn - corn grits, corn meal, corn llour, corn syrup, high fructose corn syrup, corn oil, corn starch, gluten and germ	4	3

4- Technology of Pulses & Oilseeds	4.1	Chemical composition and nutritive value of pulses & oilseeds Processing of pulses –soaking ,germination, decortication, cooking, fermentation Processing of oil - rendering, pressing, and solvent extraction	2.3	4,5
	4.2	Toxic constituents of pulses – trypsin inhibitors,sapiens, haemagglutinins, cyanogenic glycosides; lathyrism, favism Products: quick cooking legumes, instant legume powders and legume protein concentrates	3	4,5
	4.3	Methods of oil refining – degumming, neutralization, bleaching, deodorization Chemical modification of oil – hydrogenation ,interesterification	2	4,5
	4.4	Toxic factors in oilseeds	1	4,5
5 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2,3 & 4 - Lecturing, ICT EnabledLearning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Mats, A. S. (1996). The Chemistry and Technology of Cereal as Food and Feed (2nd ed.).CBS Publications.
2. Faridi. (2000). Dough Rheology and Baked Products Texture. CBS Publications.
3. Pandy, P. H.(2000).Principles and Practices of Postharvest Technology.Kalyani Publishers
4. Manay, N. S., & Shadaksharaswamy, M. (2004). Foods: Facts and Principles. New AgeInternational Publishers.
5. Srilakshmi, B. (2003). Food Science (3rd ed.). New Age International (P) Limited Publisher.
6. Subbulakshmi, G., & Udipi, S. A.(2001). Food Processing and Preservation. New AgeInternational

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**COCONUT PROCESSING TECHNOLOGY**					
Type of Course	**DSE**					
Course Code	**MG5DSEFSQ301**					
Course Level	**300-399**					
Course Summary	This course is designed with a comprehensive understanding of various processes involved in coconut processing. Participants will gain knowledge about the cultivation, harvesting, and processing of coconuts, with a focus on the production of various coconut-basedproducts. The course integrates theoretical knowledge with practical applications to equip students with the skills necessary for the coconut Processing industry.					
Semester	**5**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	**60**
		4	-	-	-	
Pre-requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Recall and describe the various stages of coconut processing, including harvesting, de husking, extraction methods, and processing techniques	U	3,10

2	Understand the principles underlying coconut processing technologies and the factors influencing product quality.	U	1,2,10
3	Apply coconut processing techniques to solve practical problems	A	2.10
4	Analyze the impact of different variables on coconut processing outcomes, such as the influence of temperature on oil extraction yield or the effect of processing methods on product shelf life.	An	1,10
5	Create and propose innovative coconut processing techniques or improvements, integrating knowledge from various stages ofprocessing to enhance efficiency or product quality.	C	1,3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 - Introduction to Coconut Processing Technology	1.1	Overview of coconut cultivationand importance	2	1
	1.2	Harvesting practices	2	1
	1.3	Processing methods and techniques (traditional methods and modern processing technologies)	3	1,2
	1.4	Copra –grades, drying techniques	2	2
	1.5	Post-harvest management (post-harvest handling and storage	2	1,2
2- Coconut Oil Extraction	2.1	Extraction methods (cold pressing, expeller pressing, solvent extraction)	6	1,4
	2.2	Refining processes	4	1,4

3- Quality Control in Coconut Processing	3.1	Quality parameters for coconut products (coconut oil, coconut water, coconut milk and cream, coconut flour and coconut sugar)	6	1,2
	3.2	Testing methods and quality assurance (moisture content, oil content , acidity)	6	1,2
4–Production of Coconut-Based Products and by-products	4.1	Coconut water processing and coconut apple products	6	3,4,5
	4.2	Coconut milk , cream andcheese production	5	3,4,5
	4.3	Desiccated coconut and coconut flour manufacturing	5	3,4,5
	4.4	Coconut honey, coconut jam andspray dried milk powder processing	5	3,4,5
	4.5	By-products of coconut processing	6	3,4,5
5 — Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2,3 & 4 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Asian and Pacific Coconut Community. (2013). Coconut Handbook.
2. Food and Agriculture Organization (FAO). (2016). Coconut Processing and Utilization: ATraining Manual.
3. Nair, E. S. (1970). Coconut: Production, Processing, Products. Avi Publishing

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**CONFECTIONARY AND CHOCOLATE PROCESSING TECHNOLOGY**					
Type of Course	**DSE**					
Course Code	**MG5DSEFSQ302**					
Course Level	**300-399**					
Course Summary	This course provides students with a comprehensive understanding of the science, technology, processes and quality control involved in the production of sugar-based products and confectionery.					
Semester	**5**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO NO.	Expected Course Outcome	Learning Domains *	PO No
1	Understand and categorize advanced sugar processing techniques and characteristics of various confectionery ingredients	U	1
2	Acquire competence in confectionery processes and products and analyze advanced formulations of confectionery products	A	1,2,3

3	Identify and evaluate confectionery manufacturing processes, considering factors such as cooking times, cooling rates, and storage conditions to achieve desired product attributes.	An	2,3
4	Comprehend quality assessments of sugar and Chocolate confectionery products	E	6,8,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Introduction to Sugar and Confectionary	1.1	History and evolution of confectionery	4	1
	1.2	Comprehensive understanding of rawmaterials used in the confectionery (cocoa, sugar, dried milk products, special fats, emulsifiers, nut kernels, alcoholic ingredients) and their effect on quality control methods.	3	1,2
2- Cocoa Products and processing	2.1	Processing: cleaning, breaking, winnowing, sterilization, alkalization, roasting, nib grinding, kibbling etc.	5	1,2
	2.2	Chocolate processing technology: Tempering and fat crystallization effects on chocolate quality, fat bloom formation and development in chocolate process.	7	2,3,4
	2.3	Enrobing technology, Compound coatings and presentation. The production of dark, milk and white chocolate. Production of other cocoa products and byproducts.	4	2,3,4
3 -Sugar & Flour Confectionery	3.1	General technical aspects of industrial sugar confectionery manufacture-crystallization methods, syrup preparation, and centrifugation. Sugar substitutes.	5	1,2,3
	3.2	Manufacture of high boiled candies: Ingredients, methods of manufacture. types: center–filled, lollipops, coextruded products. quality aspects. manufacture of gums and jellies and their quality aspects	5	2,3,4

	3.3	Ingredients and flour specification-Types of dough: developed dough, short dough, semi-sweet, enzyme modified dough, frozen dough and batters, importance of the consistency of the dough	5	2,4
	3.4	Indian and international flour confections manufacture: Flour specification, ingredients manufacturing process, types of chemically aerated goods	5	2,4
	3.5	Products-cupcakes, muffins, waffles, pancakes, donuts, scones, bread, cookies, biscuits, cakes, sweet breads	10	4
4-Miscellaneous Products	4.1	Caramel, toffee and fudge– Liquorice paste andaerated confectionery, lozenges, sugar panning, fruit confections: fruit drops and others	7	1,2,3
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2, 3 & 4 -Lecturing, ICT Enabled Learning.

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Afoakwa, E. O. (2011). Chocolate Science and Technology (1st ed.). John Wiley & Sons.
2. Beckett, S. T. (2011). Industrial Chocolate Manufacture and Use (4th ed.). John Wiley &Sons.
3. Bent, A., Bennion, E. B., & Bamford, G. S. T. (1997). The Technology of Cake Making (6th ed.). Blackie.
4. Jackson, E. B. (1999). Sugar Confectionery Manufacture (2nd ed.). Aspen Publishing.
5. Junk, W. R., & Pancost, H. M. (1973). Handbook of Sugars for Processors, Chemists andTechnologists. AVI Publishing.
6. Manley, D. J. R. (1983). Technology of Biscuits, Crackers, and Cookies. Ellis Horwood.
7. Matz, S. A. (1992). Bakery Technology and Engineering (3rd ed.). Chapman & Hall.
8. Pomeranz, Y. (1987). Modern Cereal Science and Technology. MVCH Publishing.
9. Beckett, S. (1988). Industrial Chocolate Manufacture

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**BAKERY PRODUCTS TECHNOLOGY**					
Type of Course	**DSE**					
Course Code	**MG5DSEFSQ303**					
Course Level	**300-399**					
Course Summary	This course explores the science and techniques behind the art of baking including fundamentals of ingredients, baking and quality aspects of various baked goods.					
Semester	**5**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Familiarize and recall bakery products including cakes, pastries, breads, and specialty items and their characteristics, processes and equipment used for manufacture.	U	1
2	Investigate and categorize bakery product formulations, including ingredients, ratios, and mixing methods.	U	1,2,3
3	Comprehend and apply baking processes for different bakery products	A	2,3

4	Analyze and evaluate the effects of temperature, time and other parameters on product quality.	An,E	6,8,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Bakery Industry and its fundamentals	1.1	History, current status, growth rate, and economic importance of bakery and confectionary industry.	4	1
	1.2	Theory of bakery and bakery fundamentals, basic knowledge of baking/ heating, refrigeration, freezing, chilling, interaction of element case study: temperature effects in baking	4	1,4
	1.3	Bakery products: Ingredients and processes for breads, biscuits, cookies and crackers, cakes and pastries	4	1
2-Technology of Bread Biscuits , Cookies and Crackers	2.1	Introduction, ingredients & process steps Different methods of bread making: conventional, chemical, mechanical and continuous bread making method. equipments used. Variety breads - whole wheat bread, brown bread, flat bread , high fiber bread , multi grain bread , buns and rolls	7	1,2
	2.2	Bread scoring. bread faults - external and internal , corrective measures, bread staling, retarding of staling	5	1,2,3
	2.3	Introduction, quality of raw materialsand functions of ingredients	3	2
	2.4	Classification of biscuits - Short dough and hard dough biscuits. manufacture of biscuits: ingredients, equipment's used, product quality characteristics, faults and corrective measures	3	1,2,4

	2.5	Cookies and crackers: ingredients & processes, equipments used, product qualitycharacteristics, faults and corrective Measures	4	2,4
3- Technology of Cakes, Pastries and other bakery products	3.1	Introduction, quality of raw materials, function of ingredients	3	1
	3.2	Formula balancing: Batter type , foam type , pound cake, chiffon cake , manufacture of cake: process and equipment's used cake faults: shape, structural ,textural, crust and crumb faults; remedies	5	2,3
	3.3	Different types of icing and design- butter, royal, fresh cream; basic cake decoration	4	2,3
	3.4	Muffins, cupcakes, gateaux. Pastries- short crust, choux, flaky, puff. pastry products - pies, tarts, éclairs, croissant. donuts, rusks, other baked products.	6	` 1,3
4- Modified Bakery Products and Safety Aspects of Bakery Products ,	4.1	Modification of bakery products for people with special nutritional requirements e.g. high fiber, low sugar, low fat, gluten free, vegan bakery products.	4	1
	4.2	Safety of products, pertinent standards and regulations.	4	2,3
5 -Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2, 3 & 4 -Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End Examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Edwards, W. P. (2007). The Science of Bakery Products. Royal Society of Chemistry.
2. Faubion, Faridi. (Year). Dough Rheology and Baked Product Texture. CBS Publications.
3. Matz, S. A. (Year). Bakery Technology and Engineering. CBS Publications.
4. Matz, S. A. (Year). Cookies and Cracker Technology.
5. NIIR Board. (2009). The Complete Technology Book on Bakery Products (2nd ed.).National Institute of Industrial Research.
6. Pyler, E. J., & Gorton, L. A. (2009). Baking: Science and Technology, Vol. II: Formulationand Production (4th ed.). Sosland Publishing Co.
7. Turret, R. A. I. (2003). Grain and Feed Milling Technology.
8. Dubey, S. C. (2007). Basic Baking (5th ed.). Chanakya Mudrak Pvt. Ltd.
9. Raina et al. (2003). Basic Food Preparation-A complete Manual (3rd ed.). Orient Longman Pvt. Ltd.
10. Manay, S., & Shadaksharaswami, M. (2004). Foods: Facts and Principles. New AgePublishers.
11. Barndt, R. L. (1993). Fat & Calorie – Modified Bakery Products. Springer US.
12. Matz, S. A. (1999). Bakery Technology and Engineering. PAN-TECH International Incorporated.
13. Faubion, Faridi. (1997). Dough Rheology and Baked Product Texture. CBS Publications

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Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**SPICES AND OLEORESIN**					
Type of Course	**DSE**					
Course Code	**MG5DSEFSQ304**					
Course Level	**300-399**					
Course Summary	This course will provide students with dietary significance, chemical composition, processing, Quality control and uses of major spices, essential oils and Oleoresins in India					
Semester	**5**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Acquire the knowledge regarding the functions and importance of spices and oleoresin as a food ingredient	**U**	1,10
2	Identify the characteristics and quality specification ofmajor and minor spices of India	**A**	1,3,8,10

3	List the post-harvest operations and processing ofdifferent spices.	An	1,3,10
4	Compare the methods of manufacture of oleoresins and essential oils.	E	1,10

Remember(K),Understand(U),Apply(A),Analyse(An),Evaluate (E),Create (C),Skill(S),Interest(I)and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Introduction to spices	1.1	Spices condiments seasonings and culinary herbs	4	1
	1.2	Primary function of spices-flavour, taste aroma texture color.	4	1
	1.3	Secondary function of spices-preservative ,antimicrobial antioxidant	5	1
2-Composition and characteristics of Major and minor Spices	2.1	Composition and characteristics of major and minor spices	5	2
	2.2	Quality specification, dietary and medicinal uses of major and minor spices	5	2
3- Post harvest handling of Spices	3.1	Post-harvest handling of seeds and fruits flowers buds	5	3
	3.2	Post-harvest handling of leaves, stem, barks and resins of roots and rhizomes	5	3
	3.3	Processing and manufacturing of major and minor Indian spices- pepper, cardamom, chilly, turmeric, ginger, garlic, clove, cumin coriander, cinnamon, fenugreek, mace, mint, vanilla, asafetida, all spices.	10	3
4- Oleoresin and essential oils	4.1	Chemistry of essential oil and oleoresin.	5	4
	4.2	Methods of manufacture- solvent extraction steam distillation, supercritical fluid extraction using liquid carbon Dioxide	6	4

	4.3	Byproducts of oleoresin industry	6	4
5—Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 ,3 & 4 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Parthasarathy, V. A., Chempakam, B., & Zachariah, T. J. (Eds.). (2008). Chemistry ofspices. Cabi.
2. Raghavan, S. (2006). Handbook of spices, seasonings, and flavorings. CRC press.

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Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**PROCESSING TECHNOLOGY OF FRUITS AND VEGETABLES**					
Type of Course	**DSE**					
Course Code	**MG5DSEFSQ305**					
Couse level	**300-399**					
Course Summary	This course will introduce the basic concepts of handling and processing of Fruits and Vegetables.					
Semester	**5**					
Credits	**4**					
Course details	Teaching approach	Lecture	Tutorial	Practical	Others	Total hours
		4	-	-	-	**60**
Pre requisites, If any						

COURSE OUTCOME (CO)

CO NO.	Expected Course Outcome	Learning Domains *	PO NO.
1.	Outline the post-harvest handling and processing of fruits and vegetables.	**U**	4,3,10
2.	Explain the concepts of storage and preservation.	**U**	3,7,10
3.	Plan appropriate preservation technique for each category of product involved.	**A**	2,7,10
4.	Build an understanding of emerging technologies infruit and vegetable processing.	**A**	2,6

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S),Interest (I) and Appreciation (A)

COURSE CONTENT

Content for classroom transactions (unit)

Module	Units	Course Description	Hrs.	CO No.
1 – Composition and Classification of Fruits and Vegetables	1.1	Composition of fruits and vegetables	2	1
	1.2	Climacteric and non- climacteric fruits, other classes of fruits- drupes, grapes, berries, melons, pome, tropical and sub-tropical fruits Classes of vegetables- tubers, rhizomes, bulbs, leafy vegetables	4	1
	1.3	Post-harvest handing- preprocessing, washing, blanching, peeling, sorting and grading, storage	4	1
	1.4	Post-harvest losses- factors affecting post- harvest losses, primary causes, secondary causes, measures to reduce Losses	4	1
2 – Methods of Storage	2.1	Refrigeration and cooling	4	1,2
	2.2	CAP, MAP, hypobaric storage	4	1,2
	2.3	Flavour, colour and nutritional changes during storage	4	1
	2.4	Extraction of natural colours from fruits and vegetables	4	4
3 – Preservation and Emerging trends for Fruits and Vegetable Processing	3.1	Freezing- methods, equipment and problems associated with freezing	3	1,2,3
	3.2	Dehydration — methods and problems associated with dehydration	3	1,2,3
	3.3	Canning	3	2,3
	3.4	Fruit preserves and flavour enhancers	3	2
	3.5	Application of ozone in fruit processing	3	4
	3.6	Electrolyzed water treatment	3	4

	3.7	Edible coating, multiple coating	3	4
4 - Fruits and Vegetable Products	4.1	Juice, jam, jelly, marmalades and preserves	2	1,2
	4.2	Fruit juice powder, candied fruits fruit juice concentrates, crystallized fruits /vegetables	3	1,4
	4.3	Tomato based products- sauce, puree, ketchup, tomato paste	2	1,2
	4.4	Fermented and non-fermented fruit beverages (wine, cider, vinegar, squash, syrup, nectar)	2	1,2,3
5 - Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2.3 &4- Lecturing, ICT Enabled Learning .

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End Examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READINGS

1. Dauthy, M. E. (1997). Fruit and vegetable processing. New York, NY: Springer.
2. Girdharilal. (1996). Preservation of fruits and vegetables. New Delhi, India: CBS Publishers &Distributors.
3. Hamson, L. P. (1975). Commercial processing of vegetables. Westport, CT: Avi PublishingCompany.
4. Srivastava, R. P., & Kumar, S. (2001). Fruit and vegetable preservation: Principles andpractices. New Delhi, India: New Age International.
5. Thompson, A. K. (2003). Fruit and vegetables: Harvesting, handling, and storage. Oxford,

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD PHOTOGRAPHY AND STYLING**					
Type of Course	**SEC**					
Course Code	**MG5SECFSQ300**					
Course Level	**300-399**					
Course Summary	The course is designed to introduce students to the fundamentals of food photography and styling. Students will learn essential techniques and skills required to capture visually appealing and enticing food images. The course will cover both technical aspects of photography and the artistry of styling to create compelling narratives through food Imagery.					
Semester	**5**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the basics of camera operation , lighting, composition specific to food photography	U	1,3,10
2	Understand and identify basic food styling techniques	U	3,10
3	Make use of introductory skills to create surreal food images	A	1,3,10

4	Make use of Storytelling elements into food photography projects	S	3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Introduction to Food Photography and Food Styling	1.1	Basics of camera operations- understand camera settings, including aperture, shutter speed, and ISO. learn different lenses for various food photography scenarios	5	1
	1.2	Importance of composition in food photography, explore principles of composition, framing, and the rule of thirds.	5	1
	1.3	Understand natural and artificial lighting techniques for food photography	5	1,2
	1.4	Introduction to basic food styling techniques, The art of arranging and styling food for the camera.	3	1,2
	1.5	Understand color theory and its application in food styling	3	2
	1.6	Props and backgrounds: select appropriate props and backgrounds to enhance food Presentation	5	2
2 – Lighting and Composition	2.1	Explore principles of composition, framing, and the rule of thirds	3	1,2,3
	2.2	Basic photo editing tools and techniques	3	2,3
3- Food Culture, Story Telling and	3.1	Explore the role of culture and storytelling in food photography	3	4

Story Telling through Food Imagery	3.2	Techniques or capturing distinct characteristics of various cuisines and dishes	5	4
	3.3	Explore how to tell a story or evoke emotions through food photography	3	4
	3.4	Develop a personal style and signature in food photography	2	4
4 – Teacher Specific Content	4.1			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 & 3-Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10

SUGGESTED READING

1. Dujardin, H. (2011). Plate to Pixel: Digital Food Photography & Styling. John Wiley & Sons.
2. Young, N. S. (2011). Food Photography: From Snapshots to Great Shots. Peachpit Press.
3. Gissemann, C. (2016). Food Photography: A Beginner's Guide to Creating AppetizingImages.

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**INFLIGHT CATERING TECHNOLOGY**					
Type of Course	**SEC**					
Course Code	**MG5SECFSQ301**					
Course Level	**300-399**					
Course Summary	This course provides an overview of the Airline Industry, food service standards, passenger expectations, the unique challenges and considerations in providing meals and services during airline flights.					
Semester	**5**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understanding the unique challenges and Considerations in providing meals and services duringairline flights.	U	3,10
2	Infer the importance in meeting strict food safety and quality standards required for inflight catering.	U	1,3,10
3	Interpret aviation regulations affecting catering services and compliance with international and local standards Security considerations in aviation catering	U	1,10

4	Identify the trends, challenges and solutions in transporting meals to airports and aircrafts	A	1,2
5	Design and analyze suitable menus for consumption at high altitudes with consideration of dietary restrictions, allergies, and cultural preferences of diverse passengers	An	1,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1-Introduction to Inflight Catering and Menu Planning design	1.1	Overview of aviation catering industry	2	1
	1.2	Importance of catering services in the airline industry, historical development and trends	3	1
	1.3	Principles of menu planning and design	3	1
	1.4	Dietary considerations and special meal requirements	3	1
	1.5	Culinary creativity and innovation in menu design	3	1
	1.6	Food preparation methods	4	1
2- Food Safety and Hygiene	2.1	Food safety regulations and standards	2	2,3
	2.2	Hygiene practices in food handling and preparation	2	2,3
	2.3	Quality control measures to ensure safe in- flight meals	2	2
3-Culinary Techniques and Packaging Technology	3.1	Familiarity with specialized inflight catering equipment, such as ovens and meal trays. adaptation of cooking methods to high altitude conditions	5	2,4,5
	3.2	Packaging considerations for maintaining food quality and safety During transportation and service.	4	2,4
	3.3	Culinary challenges and solutionsfor inflight kitchens	3	2,4
	3.4	Techniques to preserve food quality during air travel	3	4,5

4

	3.5	Innovations in packaging for airline meals	3	4,5
	3.6	Packaging materials suitable for different cuisines	3	4,5
4-– Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1& 2-Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Bazargan, M. (2016). Airline Operations and Scheduling. Taylor and Francis.
2. Jones, P., & Paramonov, I. V. Airline Catering: A Strategic Management Approach.
3. Fletcher, K., & Thomas, N. In-Flight Catering: Airline Meals and Menus.
4. Journal of Air Transport Management(2022). Elsevier Ltd

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD SAFETY MANAGEMENT SYSTEM**					
Type of Course	**SEC**					
Course Code	**MG5SECFSQ302**					
Course Level	**300-399**					
Course Summary	This course enables students to ensure that food is safe to eat and willnot lead to outbreaks of foodborne illness among consumers, food business operator's reputation in the industry, increase consumer confidence; food product recalls or returns compliance with food laws and standards.					
Semester	**5**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, if any	*Nil*					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	The course will enable the students to understand the key principles and concepts of food safety management systems, including hazard analysis, critical control points, and preventive measures.	U	1,3,10
2	This course will facilitate the students to identify and assess potential hazards in food production, processing, and handling.	A	1,2,3,10

3	From this course student will be able to develop and Implement an effective food safety management system (FSMS) based on international standards.	A	1,2,3,6,10
4	From this course students can apply risk assessment techniques to identify critical control points and establish control measures.	A	1,2,3,6,10
5	Completing the course, the students will better able to design and conduct internal audits to ensure compliance with food safety standards and continuously improve food safety management systems through data analysis, identification of trends, and implementation of corrective Actions.	E	1,2,6.10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Unit s	Course description	Hrs.	CO No.
1 – Introduction to Food Safety Management Systems and HACCP	1.1	Overview of food safety management systems, Importanceof food safety in the food industry	1	1,2,3,4,5
	1.2	International standards and guidelines for food safety, regulatory frameworks and requirements	1	1,2,3,4,5
	1.3	Terms & definitions, Preliminary steps of HACCP	1	1,2,3
	1.4	Hazard analysis and risk assessment, identification and evaluation of physical, chemical, and microbiological hazards, risk assessment techniques and tools	5	1,2,3
	1.5	Determination of critical control points, preventive controls and control measures, selection and implementation of control measures	5	1,2

	1.6	Monitoring and verification of control measures, corrective actions and continuous improvement, documentation and record-keeping Requirements	5	1,2
2 –ISO 22000-2018	2.1	Process approach – PDCA cycle,FSMS principles, terms & definitions	3	1,2,3,4,5
	2.2	Context of organization, leadership, planning, support	3	1,2,3,4,5
	2.3	Operation	4	1,2,3,4,5
	2.4	Performance evaluation, improvement	3	1,2,3,4,5
3– FSSC 22000 ADDITIONAL REQUIREMENTS and International food Standards	3.1	Management of services and purchased materials, product labeling,	2	1,2,3,4,5
	3.2	Food fraud mitigation, food defense	2	1,2,3,4,5
	3.3	Logo use, management of allergens, environmental monitoring, formulation of products, transport and delivery,	3	1,2,3,4,5
	3.4	Hazard control and measures for preventing cross-contamination, prp verification, product development, health status, requirements for organizations with multi-sitecertification	4	1,2,3,4,5
	3.5	Fundamentals of USFDA & CAC BRC, HALAL, KOSHER HARPC, SQF, GFSI	3	1,2,3,4,5
4–Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2, 3 -Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper

	B. Semester End examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Pierson, M. D., & Corlett, D. A. (2012). HACCP - Principles and Applications. Springer
2. Springer, R. (1985). Hygiene for Management: A Text for Food Hygiene Courses. HighfieldPublications
3. ISO. (2018). ISO 22000-2018 Document.
4. FSSC 22000-Scheme version 5.1 & FSSC 22000-Scheme version 6.
5. Pacifici, E., & Bain, S. (2018). An Overview of FDA Regulated Products-From Drugs and Cosmeticsto Food and Tobacco. Elsevier Science
6. Food and Agriculture Organization of the United Nations, World Health Organization. (2018).Understanding the Codex Alimentarius.
7. British Retail Consortium. (2022). BRC Global Standard for Food Safety Issue 9.
8. Amalmerge (M) Sdn. Bhd. (2004). Guidelines For The Preparation Of Halal Food And Goods ForThe Muslim Consumers Prepared By Dr. Ahmad Robin Wahab.
9. KOSHER STANDARD 001.
10. King, H., & Bedale, W. (2017). Hazard Analysis and Risk-Based Preventive Controls ImprovingFood Safety in Human Food Manufacturing for Food Businesses.
11. Spink, J. W. (2019). Food Fraud Prevention Introduction, Implementation, andManagement.

SEMESTER-VI

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**ANALYSIS OF FOODS**					
Type of Course	**DSC A**					
Course Code	**MG6DSCFSQ300**					
Course Level	**300-399**					
Course Summary	Helps students to understand and apply the principles of analytical methods for the quantitative analysis of food constituents					
Semester	**6**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites,if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Outline the importance of food analysis and sampling, and terms used in food analysis	**U**	1, 2, 3,10
2	Recognize clearly the principles behind the analytical methods associated with food analysis	**U**	1, 2, 3,10
3	Demonstrate practical knowledge of selected food analysis techniques	**A**	1, 2, 3,10
4	Discuss the role of emerging food analytical techniques	**An**	1, 2, 3,10

5	Understand the mechanism and principle, procedures and calculation of various techniques employed for general analysis.	**U**	2,10
6	Identify the various chemical techniques in the analysis of food	**An**	2,10

Remember(K), Understand(U), Apply(A),Analyse (An),Evaluate (E),Create (C),Skill(S),Interest(I)and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Introduction to Food Analysis, Sampling and Emerging Techniques in Food Analysis	1.1	Importance of food analysis in ensuring food safety and quality	3	1
	1.2	Terminology — accuracy and precision, experimental error, bias, uncertainty of measurement, volumetric and gravimetric, qualitative and quantitative analysis	3	1
	1.3	Sampling- types of samples,steps involved in sampling, sampling plan, sampling techniques, importance of sampling, sample preparation and storage	4	1
	1.4	FT-MIR, SERS TEM, SEM	3	1,4
	1.5	Electrochemical biosensors LCMS, ICP OES	3	1,4
2 – Analytical Methods	2.1	Methods- Physical/instrumental, chemical & biochemical, biology, microbiology and sensory	3	2
	2.2	Refractometry Polarimetry Viscometery-(Brookfield, Ostwald	4	2,5

		viscometers) Specific gravity		
3– Analysis of Macro nutrients and Micro nutrients	3.1	Moisture Analysis– Oven drying, Bidwell sterling moisture analysis, Karl Fischer titration, halogen moisture analyzer. Ash analysis– Dry ashing, wet ashing, low temperature plasma ashing, water soluble and insoluble ash, acid insoluble ash, alkalinity of Ash	5	3,5
	3.2	Protein Analysis- Kjeldahl method, Biuret method, Lowry method, ninhydrin method Lipid Analysis- Solvent and non-solvent methods. Test for rancidity Measurement of Antioxidant activity- DPPH, FRAP assay	6	3,5
	3.3	Carbohydrate Analysis – Reducing sugars and non-reducing sugars (Lane & Eynon, Willstatter's, Phenol sulphuric acid, alkaline ferricyanide) Starch analysis-AOAC method, crude fiber Weende's method	6	3,5
	3.4	Minerals and Vitamins Analysis- Calcium(Gravimetric), Fe(Redox titration), P(colorimetric) Vitamin A (Carr Price method) Vitamin C (DCIP) Vitamin D (Line test)	5	3,5
4–Practium	4.1	Analysis of milk /condensed milk- Total solids Acidity Fat-Gerber method	5	6

		Protein-formol titration Lactose		
	4.2	Analysis of honey/squash- Total solids,Acidity,Sucrose	5	6
	4.3	Analysis of jam/jelly- Total solids Acidity Sucrose	5	6
	4.4	Analysis of tea/coffee Moisture Ash Water extractives caffeine	5	6
	4.5	Analysis of spices- Moisture Ash Acid insoluble ash Volatile oil	5	6
	4.6	Analysis of wheat flour- Moisture Ash Gluten Acidity	5	6
5– Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2 & 3-Lecturing,ICT Enabled learning Module 4- Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory-**25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge

	B.Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Nielsen, S. S. (2017). Textbook of Food Analysis (5th ed.). Springer US.
2. Modi, B., Timilsina, H., & Bhandari, S. (2021). Current Trends of Food Analysis, Safety, andPackaging. International Journal of Food Science.
3. Marx, I. M. G. (2023). Emerging Trends of Electrochemical Sensors in Food Analysis.Electrochem.
4. FSSAI Manuals

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD TOXICOLOGY AND FOOD SAFETY**					
Type of Course	**DSC A**					
Course Code	**MG6DSCFSQ301**					
Course Level	**300-399**					
Course Summary	This course will introduce Food microbiology, which is about the understanding of microorganisms that grow or multiply in orcontaminate the food					
Semester	**6**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand fundamental concepts in toxicology	K	1,10
2	Understand the role and significance of natural toxins in food	U	1,10
3	Understand the Environmental contaminants in food	U	1,7,10
4	Understand the route of Xenobiotics	U	1,10
5	Understand the risks of food additives and GM foods	U	1,10
6	Create an understanding of the laws, standards and identify toxic microorganisms in food and toxic levels	C	1,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S),Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transactions (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Introduction to Toxicology and Natural toxins in food	1.1	Toxicological concepts.	2	1
	1.2	Classification of toxic substances.	2	1
	1.3	Dose-effect relationships and dose-response. Factors affect the adverse response	2	1
	1.4	Toxins of plant and animal origin	3	2
	1.5	Microbial toxins (e.g., bacterial, fungal and Algal toxins),	3	2
	1.6	Seafood toxins	3	2
	1.7	Antivitamins	3	2
2 – Environmental Contaminants & Xenobiotics	2.1	Pesticide residues in foods	3	3
	2.2	Heavy metal	2	3
	2.3	Veterinary drugs (e.g. malachite green in fish and β-agonists in pork)	3	3
	2.4	Radioactive contamination of food	3	3
	2.5	Xenobiotic- Absorption, distribution, metabolism and excretion	3	4
	2.6	Carcinogens, mutagens and teratogens	3	4
	3.1	Food additives	3	4
	3.2	Toxicants formed during food processing, such as the maillard reaction, caramelization,	3	4

3- Food Additives as Toxicants	3.3	Genetically modified food and its risk	2	5
	3.4	Food safety and standards (contaminants, toxins and residues) regulation 2011.	3	5
4 – Practicum	4.1	Enumeration of coliforms in water through MPN method	10	6
	4.2	Detection of allergen protein through strip method	10	6
	4.3	Identification of pathogens-Salmonella, Staphylococcus , Yeast & Mold	10	6
5— Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2&3-Lecturing, ICT Enabled learning Module 4- Practicum

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge

	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Timbrell, J., & Barile, F. A. (2023). Introduction to Toxicology. CRC Press.

2. Roberts, S. M., James, R. C., & Williams, P. L. (Eds.). (2022). Principles of Toxicology:Environmental and Industrial Applications. John Wiley & Sons

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**STREET FOODS**					
Type of Course	**DSE**					
Course Code	**MG6DSEFSQ300**					
Course Level	**300-399**					
Course Summary	This course delves into the rich and varied world of street food, examining its historical and cultural significance, culinary techniques, business practices, and contemporary challenges. Students will gain insights into the global landscape of street food and develop an understanding of the socio-economic, cultural, and regulatory aspects that influence this dynamic industry					
Semester	**6**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Define and articulate the key characteristics of street food from diverse cultural perspectives.	**U**	1,10
2	Explain the culinary techniques used in preparing street food across various cultures.	**U**	3,10
3	Apply food safety regulations and hygiene standards in the context of street food operations	**A**	3,10
4	Analyze the cultural significance of specific street foods, considering historical, social, and economic factors	**An**	3,10

5	Design and propose a unique street food concept, considering culinary creativity, cultural relevance, andpotential market appeal and hands on experience in preparation of Indian street food	**C**	10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C),Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1 – Introduction to Street Food and Culinary Techniques in Street Food	1.1	Definition and characteristics of street food	3	1
	1.2	Historical evolution and cultural significance	2	1
	1.3	Street food around the world: a global perspective	3	1
	1.4	Cooking methods and equipment used in street food	4	2
	1.5	Flavour profiles and regional variations	4	2
2 –Cultural Influences on Street Food	2.1	Anthropological perspectives on street food	5	4
	2.2	Street food as a cultural expression	3	4
	2.3	Street food and globalization	3	4
3-Food Safety, Regulations and - Emerging Trends and Innovations	3.1	Food safety considerations in street food	3	3
	3.2	Regulatory frameworks and hygiene standards	3	3
	3.3	Fusion street food and culinary creativity	5	5
	3.4	Technology in street food businesses	4	5
	3.5	Future prospects and challenges in the street food industry	3	2,5
4- Practicum	4.1	Egg omlette, kappa and fish curry, dosa and chutney	6	5
	4.2	Puttu and kadala , banana fritters, bhajji, vadas	6	5
	4.3	Parathas and beef curry , beef dry fry(bdf), chicken fry,	6	5
	4.4	Pav bhaji, bhel puri, vada pav, dahi puri, aloo chaat masala, momos, tunde kabas	6	5

	4.5	Curd rice, bisi bele bath	6	5
5— Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2&3- Lecturing, ICT Enabled Learning. Module 4 – Practicum Module 5-

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Cardoso, R. de C. V., & Galhardi, A. (2013). Street Food: Culture, Economy, Health, and Governance. In B. Kraig & C. T. Sen (Eds.), *Street Food Around the World: An Encyclopedia of Food and Culture* (pp. 2). Bloomsbury Publishing USA.

2. Kraig, B., & Sen, C. T. (Eds.). (2013). Street food around the world: An encyclopedia of food and culture. Bloomsbury Publishing USA.

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Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**SNACK FOOD PROCESSING**					
Type of Course	**DSE**					
Course Code	**MG6DSEFSQ301**					
Course Level	**300-399**					
Course Summary	This course provides an in-depth exploration of snack foods and technology, encompassing the development, production, and evaluation of various snack products					
Semester	**6**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Demonstrate a comprehensive understanding of the snack food industry	**U**	1,10
2	Understand the role of different ingredients in snack food formulations, including flavorings, seasonings, and additives and their regulations	**U**	1,3,10
3	Acquire knowledge and skills related to various snack food processing techniques, such as extrusion, frying, baking, and others	**A**	1,10
4	Analyze market and emerging trends and consumer behavior to make informed decisions in snack food product development and marketing.	An	6,8

5	Develop skills in snack product innovation, including the ability to create new and appealing snack products.	**C**	1,3,10
6	Create a practical framework for understanding and mastering technology and processes involved in snack food technology.	**C**	1,3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Snack Food Industry- An Overview	1.1	Global snack food market	4	1
	1.2	Historical development and evolution of snack foods	3	1
	1.3	The global snack food market trends	4	1
	1.4	Market size, growth, and key players.	4	1,4
2– Segments within the Snack Food Industry and Regulatory Trends	2.1	Different segments (e.g., savory snacks, confectionery, nuts, etc.).	4	2
	2.2	Unique characteristics of each segment.	5	2
	2.3	Examination of regulations and standards governing the snack food Industry.	5	2
	2.4	Compliance and quality control measures.	5	2
3–Technology, Innovation Consumer Trends ,Preferences and Industry Competitors	3.1	Exploration of technological advancements in snack food processing.	5	4
	3.2	Innovations in packaging, processing techniques, andproduct development	5	4
	3.3	Analysis of consumer preferences in snack foods.	4	4
	3.4	Impact of health and wellness trends on snack choices.	4	3,4,5

	3.5	Study of major companies andkey players in the snack food sector.	4	4
	3.6	Competitive analysis and market positioning	4	4
4- Practicum	4.1	Introduction to Snack foods- Activity- classification and market survey of different snack foods- Sensory evaluation of different products, analysis of nutritional labels	7	6
	4.2	Raw material selection and quality control- inspection and testing of any raw material	7	6
	4.3	• Innovative snack product development • Brainstorming and formulation of new snack product • Experimental trials and optimization of recipes • Sensory evaluation and consumer acceptability testing	8	6
	4.4	Visit to Snack Food Industry	8	6
5– Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**Module 1, 2,3&4 -Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Le-Bail, A. (2011). Food Product Development: From Concept to the Marketplace. Springer-Verlag New York Inc.
2. Lusas, E. W., & Rooney, L. W. (2001). Snack Foods Processing. CRC Press.
3. Prabhu, S. R. T. E., & Singh, N. Snack Foods: Processing and Product Development.

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Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**ENGINEERING ASPECTS OF FOOD PROCESSING**					
Type of Course	**DSE**					
Course Code	**MG6DSEFSQ302**					
Course Level	**300-399**					
Course Summary	The course collectively contributes to providing students with a comprehensive understanding of the principles and practices involved in basic food engineering					
Semester	**6**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre- requisites, if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Gain a foundational knowledge of the fundamental principles and concepts involved in food engineering.	**U**	1,2,3,10
2	Learn to apply basic engineering principles and conservation of energy to the design and optimization of processes involved in food production	**A**	1,2,3,10
3	Acquire knowledge of various unit operations in food engineering, such as heat transfer, mass transfer, fluid flow, and separation processes	**E**	1,2,3,10

Remember(K),Understand(U),Apply(A),Analyze(An),Evaluate (E),Create (C),Skill(S),Interest(I) and Appreciation(Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 - Introduction to Food Engineering, Mass and Energy Balance	1.1	Concept of unit operations units and measurements-types of units system-state of system, types and properties	4	1,2,3,10
	1.2	Density, concentration, temperature ,pressure, enthalpy	2	1,2,3,10
	1.3	Conservation of mass-conservation of mass for and open system, conservation of mass for closed system laws of thermodynamics	4	1,2,3,10
	1.4	Energy-types of energy	2	1,2,10
	1.5	Energy balance-Energy balance for closed and open system, total energy balance	3	1,2,10
2 - Fluid Flow	2.1	Properties of liquids	3	1,2,3,10
	2.2	Newton's law of viscosity	2	1,2,10
	2.3	Newtonian and non-Newtonian fluids	2	1,2,10
	2.4	Types of fluid flow-laminar, turbulent & transitional flow, Reynolds's number	2	1,2,3,10
	2.5	Continuity equation	2	1,2,3
	2.6	Liquid transport system pumps-centrifugal pumps, positive displacement pump	3	1,2,3,10
3 - Heat Transfer	3.1	Thermal properties of foods-specific heat, thermal conductivity, thermal diffusivity	3	1,2,3
	3.2	Systems for heating and cooling of foods-Contact type and non-contact type heat exchangers	2	1,2,3,10
	3.3	Modes of heat transfer-conduction, convection, radiative heat transfer	5	1,2,3.10

	3.4	Properties of steam, sensible heat, latent heat of vaporization, latent heat of fusion	5	1,2,3,10
	3.5	Steam generation systems-Water tube and fire tube boiler	4	1,2,3,10
4 — Membrane Separation Techniques	4.1	Cross flow membrane technology	3	1,2,3
	4.2	Membrane separation systems-Electro dialysis, reverse osmosis, ultrafiltration	4	1,2,3
	4.3	Membrane devices for reverse osmosis and ultrafiltration, plate and, spiral wound, hollow fiber	5	,2,3
5—Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 ,3 & 4 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A.** Continuous Comprehensive Assessment (CCA) 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Rao, D. G. (2010). Fundamentals of Food Engineering. PHI Learning Private Ltd.

2. Singh, R. P., & Heldman, D. R. Introduction to Food Engineering (2nd, 3rd, and 4th eds.).Academic Press.

3. Rao, C. G. (2006). Essentials of Food Process Engineering. B S Publications.

4. Fellow, P. (1988). Food Processing Technology.

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD ENGINEERING**					
Type of Course	**DSE**					
Course Code	**MG6DSEFSQ303**					
Course Level	**300-399**					
Course Summary	The course interprets and applies the principles of engineering, science, and mathematics to food manufacturing and operations, including the processing, production, handling, storage, conservation, control, packaging and distribution of food products.					
Semester	**6**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	**60**
		4	-	-	-	
Pre- requisites, ifany						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Define basic physical quantities, their dimensions and units.	K	2, 10
2	Understand the fundamentals of fluid flow	U	1,2,10
3	Explain the general fundamentals and principles of various modes of heat transfer	U	2,3,10

4	Categorize various separation processes and mechanical operations used in food industries.	An	2,3,10
5	Determine the basic technical aspects and machineries used for various process like refrigeration, freezing, drying and evaporation	E	2,3,10

Remember (K), Understand (U), Apply (A), Analyze (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 - Dimensions and units	1.1	Basic physical quantities – velocity and speed, acceleration, force and momentum, weight, pressure.	3	1
	1.2	Work, energy and power.	3	1
2 - Fundamentals of fluid flow	2.1	Properties of fluids - density, viscosity, Newtonian and non-Newtonian fluids.	4	2
	2.2	Handling system for Newtonian liquids –continuity equation, Reynolds number, entrance region and fully developed flow, velocity profile	4	2
	2.3	Measurement of fluid flow, pitot tube.	4	2
3 - Principles of heat transfer	3.1	Modes of heat transfer – conduction, convection, and radiation, conductive heattransfer in rectangular slab.	4	3
	3.2	Thermal properties of food, specific heat, thermal conductivity, thermal diffusivity.	4	3
	3.3	Heat exchangers – plate, tubular, scrappedsurface, shell and tube etc.	4	3
4 - Mechanical and Unit operations	4.1	Separation processes – centrifugation, filtration Mixing and size reduction of liquid and solid food materials.	8	4
	4.2	Extrusion technology	4	4
	4.3	Refrigeration – selection of refrigerant,components of a refrigeration system, advantages and disadvantages.	5	5

	4.4	Freezing – theories of freezing, types offreezing. Drying – Theories of drying, types of driers, merits and demerits of drying.	9	5
	4.5	Evaporation – Types of evaporators	4	5
5 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2, 3 & 4- Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Paul Singh, R., & Heldman, D. R. (Year). Introduction to Food Engineering (4th ed.). Elsevier.

2. Singh, R. P. (2004). Introduction to Food Engineering (3rd ed.). Academic Press

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Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**CHOCOLATE AND SUGAR CRAFTING**					
Type of Course	**SEC**					
Course Code	**MG6SECFSQ300**					
Course Level	**300-399**					
Course Summary	This course is designed to provide advanced insights into the world of chocolate and sugar crafting, covering the principles, techniques, and creative applications in the field					
Semester	**6**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understanding ingredients and comprehend different types of chocolate and sugar, their properties, and their uses in various applications	**U**	1,3,10
2	Proficiency in chocolate tempering, molding, and truffle making. Master pulled sugar techniques, including craftingflowers, ribbons, and blown sugar	**S**	1,3,10
3	Follow proper safety procedures when working with chocolate and sugar, including handling equipment, temperature control, and hygiene practices.	**A**	1,3,10

4	Develop artistic skills in crafting visually appealing and aesthetically pleasing chocolate and sugar creations.	**A**	10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Introduction to Chocolate and Sugar Artistry	1.1	Overview of chocolate and sugar crafting	4	1
	1.2	Introduction to the history and significance of chocolate and sugar artistry	3	1
	1.3	Understanding the basics of working with chocolate and sugar	3	1
	1.4	Identifying and using essential tools for chocolate and sugar crafting	3	1
	1.5	Safety precautions and best practices in handling tools	3	1
2 – Chocolate Techniques and Sugar Artistry	2.1	Chocolate techniques- Tempering chocolate ,understanding the tempering process for chocolate	4	2,4
	2.2	Hands-on practice in tempering dark, milk, and white chocolates	4	2,4
	2.3	Chocolate molding- Techniques for creating various chocolates, creating chocolate shapes and decorations late molds	6	1,2,3,4
	2.4	Introduction to sugar art	5	1
	2.5	Understanding different types of sugar and their uses, making flowers, ribbons, and other sugar decorations, blown sugar techniques	5	1
3- Chocolate and Sugar Creations	3.1	Combining chocolate and sugar elements for visually stunning creations	5	1,2,3,4

4 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 & 3 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B.Semester End examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Gonzalez, E. (1998)The Art of Chocolate: Techniques and Recipes for Simply Spectacular Desserts and Confections.Chronicle Books
2. Greweling, P. P. (2007). Chocolates and Confections: Formula, Theory, and Technique for the Artisan Confectioner. John Wiley & Sons.
3. Lodge, N. (2014). The Art of Sugarcraft: Sugarpaste Skills, Sugar Flowers, Modelling, Cake Decorating, Baking, Patisserie, Chocolate, Royal Icing and Commercial Cakes. B Dutton Publishing
4. Lodge, N. (1997). The Art of Sugarcraft: Lace and Filigree. Murdoch Books

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD AND JOURNALISM**					
Type of Course	**SEC**					
Course Code	**MG6SECF SQ301**					
Course Level	**300-399**					
Course Summary	This course is designed for students who have a foundational understanding of journalism and a keen interest in exploring the intersection of journalism and the culinary world. It delves into various aspects of food reporting, food writing, and the role of journalism in shaping public perceptions of food and food-related issues					
Semester	**6**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand basics of food writing, including descriptive language and storytelling techniques.	**U**	1,3,4,6,10
2	Understand and grasp the foundational principles of journalism, including news values, ethics, and the role of the journalist in society.	**U**	6,10
3	Develop an awareness of diverse food cultures and their significance in society.	**An**	3,10
4	Make use of digital tools used in journalism, including social media, blogging platforms, and content management systems.	**An**	3,9,10

5	Evaluate contemporary food issues and journalistic practices and provide constructive critiques of peers work.	**E**	1,3,5,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Introduction to Food Writing and Fundamentals of Journalism	1.1	Basics of food writing, including descriptive language and storytelling techniques.	3	1
	1.2	Produce short food-related pieces with a focus on clarity and creativity.	4	1
	1.3	Foundational principles of journalism, including news values, ethics, and the role of the journalist in society.	4	1,2
	1.4	Introduction to reporting on culinary events, restaurant reviews, and food-related news.	4	1
	1.5	Conduct basic interviews and gather information for food stories.	4	1
2 – Exploring Food Cultures Writing for Different Audiences	2.1	Develop an awareness of diverse food cultures and their significance in society.	4	3
	2.2	Discuss how cultural factors influence food reporting.	4	3
3-Ethical Considerations in Food Journalism	3.1	Adapt writing style to different audiences, considering the varied interests and backgrounds of readers.	4	4
	3.2	Explore the importance of tailoring content for different media platforms.	4	4
	3.3	Discuss and identify ethical considerations specific to food journalism.	5	4

	3.4	Explore the responsibility of journalists in portraying food-relatedissues accurately.	5	4,5
4– Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 & 3 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Gold, A. Food Journalism.
2. The Great Courses. (2016). Food: A Cultural Culinary History
3. Jurafsky, D. (2014). The Language of Food: A Linguist Reads the Menu. W. W. Norton &Company.

Mahatma Gandhi University
Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**ENVIRONMENTAL STUDIES AND HUMAN RIGHTS**					
Type of Course	**VAC**					
Course Code	**MG6VACFSQ300**					
Course Level	**300-399**					
Course Summary	This course is designed for students to understand the environment, its ecosystems resources, biodiversity and conservation , pollution and rights of the community. The topics provide a broad overview of the potential content that integrate environmental studies and human rights					
Semester	**6**	Credits			**3**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	-	-	**45**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the interconnectedness between man and the environment	**U**	1,3,10
2	Relate to resources, ecosystems and biodiversity and importance in conservation	**U**	1,10
3	Analyze how environmental issues disproportionately affect certain communities based on race, socioeconomic status, or geographic location.	**An**	1,6,10

4	Apply the interconnectedness of human rights and environmental issues	**A**	1,6
5	Participate in the conservation and preservation of the environment and contribute to its protection	**A**	1,3,6,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1 – The Multidisciplinary Nature of Environmental Studies	1.1	Definitions, scope and importance	2	1
	1.2	Need for public awareness	2	1
	1.3	Institutions in environment	2	1
2 – Natural Resources and Ecosystems	2.1	Natural resources and associated problems	3	1,2
	2.2	Nonrenewable resources	2	1,2
	2.3	Renewable resources	2	1,2
	2.4	Concept of an ecosystem	2	1,2
	2.5	Food chains, food webs and ecological pyramids	3	1,2
3 - Human Population, Environment and Human Rights	3.1	Population growth and variation among nations- global population growth	3	3
	3.2	Environmental and climate health	3	3
	3.3	Cancer and the environment case studies: regional studies	3	3
	3.4	Environment management system ISO 14001::2015	3	3
	3.5	Equity	3	3,4
	3.6	Nutrition , health and human rights	3	3,4
	3.7	Intellectual property rights and community biodiversity registers	3	3,4
	3.8	Value education- Environment, human heritage, equitable use of resources, ecological degradation	3	5

4– Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 & 3 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous ComprehensiveAssessment (CCA)** **Theory** 25 Marks- Assignment, Seminar, Test Paper
	B. Semester End examination 50 Marks (MCQ (20 out of 20) - 1 Marks x20 =20 Short answer (5 out of 7) (5 marks x4=20), Long essay (1 out of 2) (10 marks x 1=10)

SUGGESTED READING

1. Wright, R. T., & Boorse, D. F. (2011). Environmental Science: Toward a SustainableFuture.
2. Kolbert, E. (2014). The Sixth Extinction: An Unnatural History.
3. Pollan, M. (2006). The Omnivore's Dilemma: A Natural History of Four Meals.
4. United Nations General Assembly. (1948). The Universal Declaration of Human Rights.

SEMESTER-VII

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**RESEARCH METHODOLOGY AND STATISTICAL ANALYSIS**					
Type of Course	**DCC**					
Course Code	**MG7DCCFSQ400**					
Course Level	**400 - 499**					
Course Summary	The purpose of this course is to introduce the framework of research process. This course provides students with understanding of research designs, concepts and statistical techniques used in the Research methodology framework.					
Semester	**7**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Develop a basic understanding of Research process by identifying the nature, role concepts and objective of Research Methodology	**U**	3, 10
2	Examine the Research Process using different Statistical Tools	**An**	3, 10
3	Analyze and interpret data from various sources using statistical tools	**An**	1, 6, 10
4	Develop a critical argument to the solution of familiar and unfamiliar problems	**C**	1, 3, 10
5	Plan, design and formulate research activities and write a simple research project	**S**	6, 8, 10

Remember (K), Understand (U), Apply (A), Analyze (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Introductionto Research Methodology	1.1	Meaning and objectives of research, types of research, features of research, significance	2	1
	1.2	Research methods and methodology, research process and importance. criteria of a good research	3	1
	1.3	Defining the research problem - techniques involved	3	1
	1.4	Research design-needs and features, important research design concept, research design for exploratory, descriptive and diagnostic and hypothesis testing research studies	3	1
	1.5	Design of experiments- informal and formal experiment designs	3	1
2 – Sample Design And Measurement and Scaling	2.1	Census and sample survey, steps in sample design, criteria for electing a sampling procedure	3	1
	2.2	Types of sampling- Probability and non-probability sampling	3	1
	2.3	Measurement in research scales of measurement-nominal, ordinal, ratio, interval. Sources of error. test of sound measurement-validity, reliability, practicality	3	1
	2.4	Scaling, basis of classification important techniques of scaling-rating: paired comparison rank order,	3	1
3 – Data Collection Processing and Statistical Analysis	3.1	Methods of data collection- primary data: observation, interview, questionnaire, schedule, other methods: audit, consumer panels, devices. Secondary data collection.	4	1,2,3
	3.2	Processing of data-editing , coding classification, tabulation, problems in processing	4	1,2,3
	3.3	Measures of central tendency- mean median, mode, measures of dispersion- standard deviation measures of relationship- correlation measures of asymmetry-skewness	4	1,2,3
	3.4	Analysis of data- multiple regression analysis, multiple discriminant analysis	4	1,2,3

4 – Testing of Hypothesis, Interpretation and Report Writing	4.1	Parametric test of hypothesis, characteristicsof hypothesis, test of significance- chi-square test, & t test, anova- basic principle and technique	5	4
	4.2	Non parametric testing of hypothesis- sign test- one sample, two sample spearman's rank correlation	4	4
	4.3	Meaning of interpretation and techniques of interpretation	3	4
	4.4	Significance of report writing, different steps in report writing	3	4
	4.5	Research report layout and types of report	3	4
5 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of Transaction)** Module 1,2,3,4 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment(CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Kothari, C. (2017). Research Methodology Methods and Techniquesby CRKothari. Published by New Age International (P) Ltd., Publishers, 91.
2. Singh, Y.K. (2006). Fundamental of research methodology and statistics. New Delhi,India: New Age International (P) Ltd.

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**INNOVATION AND PRODUCT DEVELOPMENT**					
Type of Course	**DCC**					
Course Code	**MG7DCCFSQ401**					
Course Level	**400-499**					
Course Summary	This course will provide a comprehensive understanding of developing new innovative food product.					
Semester	**7**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the process involved in innovation andproduct development	**K**	1,2,3,10
2	Apply innovative thinking and product development strategies for solving problems and making informed decisions	**A**	1,2,3,10
3	Evaluate existing products and innovation processes, identifying strength, weakness, opportunities, and threats to inform effective product development strategies	**E**	1,2,3,10
4	Evaluate the success and impact of innovative product	**E**	1,2,3,10
5	Create novel product, concepts or improvements, integrating diverse ideas and methodologies and to poster creativity and innovation in the product development process.	**C**	2,3,10

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)*

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1- Introduction to Food Product Development	1.1	Overview of food industry trends, historical perspectives on food innovation	2	1
	1.2	Importance of innovation in the food sector	3	1
	1.3	Product management and planning-target audience, concept development, launch planning	3	1
	1.4	Feasibility analysis-assess the practicality and viability of the selected concept, availability of raw materials, conduct a preliminary assessment of technical, financial, and operational feasibility. identify potential challenges and risks.	4	1
2-Understanding Consumer Behavior in Food Industry	2.1	Market research and analysis, consumer insights and preferences	3	2
	2.2	Cultural influences on food choices, taste exploration and novel experiences	3	2
	2.3	Social media and digital influences	3	2
	2.4	Economic factors, brand loyalty and trust-income levels, price sensitivity	3	2
3-Ideas, Concepts, Prototyping and Testing	3.1	Brainstorming techniques for food product ideas- mind mapping, scamper technique, concept development and validation	4	3
	3.2	Creativity in recipe formulation ingredient selection, nutritional considerations, quantities and measurement, cost consideration, documentation, experimentation, understanding culinary techniques	5	3
	3.3	Creating food prototypes- outline of all ingredients, recipe instructions, serving size, packaging details, shelf life and storage instructions, consumer feedback forms, regulatory compliance	4	3

	3.4	Sensory evaluation-Principles of sensory analysis in food product testing, designing and conducting sensory test for prototypes, repeated evaluations	4	4
	3.5	Microbiological testing, stability and shelf life testing, packaging compatibility, allergen testing	3	4
	3.6	Packaging design and branding-sustainable packaging, storytelling through packaging, packaging materials	4	4
4- Market Research Analysis and Product Launch	4.1	Understanding the role of competitor analysis, identifying and defining competitors in food market, gathering and analyzing information on competitors' products and marketing strategies	4	3,5
	4.2	Pricing strategies- Overview, importance of effective pricing, pricing models and their applications, money psychology	4	3,5
	4.3	Product launch requirements - FDA compliance, food safety standards, product labeling, permits and license, certifications, traceability	4	3,5
5-Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2,3 & 4- Lecturing, ICT Enabled

	MODE OF ASSESSMENT **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Earle, M., & Earle, R. (2001). Food Product Development: From Concept to Market Place. :CRC Press.
2. Fuller, G. W. (2011). New Food Product Development: CRC Press.

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Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**BIOCHEMISTRY**					
Type of Course	**DCC**					
Course Code	**MG7DCCFSQ402**					
Course Level	**400-499**					
Course Summary	The student will learn about topics such as the structure of biomolecules, and how they interact in essential processes and pathways in our cells.					
Semester	**7**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand basics of genetics and details of central dogma in detail	**U**	3,6,8,9
2	Understanding laboratory techniques	**U**	1,3,10
3	Analyze the role of photosynthesis in food production and carbohydrate metabolism	**An**	3,9
4	Discuss the importance and metabolism of lipids	**An**	3,10,9
5	Analyze the role of hormones in biochemical system	**An**	1,3,9
6	Conclude the mechanism of immune system	**E**	2,9

Remember (K), Understand (U), Apply (A), Analyze (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1-Carbohydrate and Lipids	1.1	Digestion and absorption of carbohydrates, Utilization of glucose — Glycolysis, TCA cycle, pentose phosphate pathway, glycogenesis, glycogenolysis, gluconeogenesis, cori cycle.	6	1
	1.2	Diabetes mellitus – Classification, clinical features and diet management. Oral glucosetolerance test.	3	1
	1.3	Bile acids: Primary and secondary bile acids, role of bile acids in digestion of lipids	3	1
	1.4	Digestion and absorption of lipids. metabolism of fatty acids: fatty acid biosynthesis and beta oxidation, ketogenesis	5	1
	1.5	De novo synthesis of cholesterol, metabolism of bilirubin, hyper bilirubinemia,jaundice, kernicterus, conjugated and unconjugated Bilirubin	5	1
2- Hormones & Immune System	2.1	Types of hormones: Peptide and steroid hormones, binding of peptide hormone to the cell, endocytosis of steroid hormones	5	3
	2.2	Structure and functions of plant hormones: abscisic acid, auxins, brassinosteroids, cytokinins, ethylene,gibberellins, salicylic acid	5	3
	2.3	Abscission: Function, process, resorption, protective layer formation and detachment	3	3
	2.4	Cellular senescence: Occurrence, replicative senescence and hayflick limit, cell cycle g2/m DNA damage signaling	1	3

	2.5	Immunity: Innate Immunity and Adaptive Immunity, Natural and Artificial Immunity	2	5,6
	2.6	Immunoglobulin: Structure, antigen binding site,FC region, protein structure, antibody complexes Bcell receptors, epitope and paratope	3	56
	2.7	Isotypes of immunoglobulin's: IgA, IgD, IgE, IgG, and IgM	3	5,6
	2.8	Antibody-antigen interactions, Type I, II, III, and IV hypersensitive reactions	2	5,6
3– Nucleic Acids	3.1	Nucleosides and nucleotides, structure of ATP	2	4
	3.2	Structure of DNA & types. RNA-types, Structure of tRNA	3	4
	3.3	DNA replication	3	4
	3.4	Transcription, post-transcriptional modifications-capping and tailing, splicing	3	4
	3.5	Protein synthesis, post-translational modifications	3	4
4 -Practicum	4.1	Qualitative analysis of carbohydrates (glucose, fructose, lactose, maltose sucrose)	10	2
	4.2	Identification tests for proteins(albumin, casein)	10	2
	4.3	Ascending paper chromatography	10	2
5 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2, &3 – Lecturing, ICT Enabled Learning. Module 4-Practium

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory-** 50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Jain, J. L. (2016). Fundamentals of Biochemistry. : S. Chand and Company Ltd.
2. Rodwell, V. W., Bender, D. A., & Kennelly, P. J. (2018). Harper's Illustrated Biochemistry. : McGraw-Hill Education.
3. Satyanarayana, U., & Chakrapani, U. (2013). Biochemistry. : Books and Allied Pvt ltd.
4. Voet, J. G., & Voet, D. D. (2011). Textbook of Biochemistry. : John Wiley & Sons.

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD ADDITIVES**					
Type of Course	**DCE**					
Course Code	**MG7DCEFSQ400**					
Course Level	**400-499**					
Course Summary	This course explores the role, regulations, and applications of food additives in the food industry. Students will examine the types of food additives, their functions, safety considerations, and the impact of additives on food quality. The course will also cover regulatory frameworks, technological advancements, and emerging trends in the use of food additives.					
Semester	**7**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre- requisites if Any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Define the term food additives and classify them based on their functions.	**U**	1,3,10
2	Understand the principles behind the use of food additives in preserving, enhancing, and modifying food products	**U**	3,10
3	Evaluate real-world examples of food products to identify the types and functions of additives used and its safety concern.	**A**	1,10
4	Assess case studies involving controversies or challenges related to the use of specific food additives.	**An**	1,3

5	Develop a comprehensive report or presentation on the ethical and sustainable use of food additives in the food industry.	**C**	1,3

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1 - Fundamentals of Food Additives	1.1	Introduction to food additives; definition, classification, and historical perspective	2	1
	1.2	Functions and importance in the food industry	2	1
	1.3	Overview of regulatory frameworks and global standards	3	1
	1.4	Chemistry of food additives; chemical structures and properties of common additives	3	1,2
	1.5	Reactions and interactions in food matrices analytical techniques for detecting and quantifying additives	4	1,2
2- Functional Categories of Food Additives	2.1	Coloring agent, flavoring agent, thickening agents, anti-caking agents- classification, uses, applications in food, permitted limit	4	1,2,3
	2.2	Antioxidants, preservatives, emulsifiers, stabilizers –classification, uses, applications in food, permitted limit	4	1,2,3
	2.3	Sweeteners, leavening agents, curing agents and chelating agents- classification, uses, applications in food, permitted limit	4	1,2,3
3- Health and Safety Considerations and Regulatory Framework	3.1	Bioactive compounds in foods and their health benefits	3	4
	3.2	Formulation of functional foods consumer perceptions and market trends	3	4,5
	3.3	Safety assessment and regulatory compliance	3	3
	3.4	Risk assessment of food additives regulatory guidelines and compliance	3	3
	3.5	Case studies on incidents related to food additives	3	3,5

	3.6	National and international regulatory bodies	3	3
	3.7	Legislation and guidelines governing food additives	3	3
4 – Advanced Topics and Research Trends	4.1	Emerging trends in food additives, novel approaches to food preservation and enhancement	3	2,3
	4.2	Cutting-edge research in the field future challenges and opportunities	4	2,3
	4.3	Independent or group research project on specific aspect off food additives	3	2,3
	4.4	Presentation of findings and critical analysis peer review	3	4,5
5 – Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2,3 &4 - Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Ash, M., & Ash, I. (2008). Handbook of Food Additives. : Synapse Information Resources.
2. Belitz, H. D., Grosch, W., & Schieberle, P. (2009). Food Chemistry. : Springer.
3. Chen, Y., & Lee, S. (2022). Nanotechnology Applications in Food Additives. Elsevier.
4. Furia, T. E. (1980). Handbook of Food Additives. : CRC Press.
5. Wang, H., & Zhu, Q. (Eds.). (2023). Handbook of Natural Food Additives. CRC Press.

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**BEVERAGE PROCESSING TECHNOLOGY**					
Type of Course	**DCE**					
Course Code	**MG7DCEFSQ401**					
Course Level	**400-499**					
Course Summary	This course is designed to provide students with a thorough understanding of the science, technology, and processes involved in the production, preservation, and quality control of various beverages.					
Semester	**7**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre- requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the basic principles of beverage formulation, including the role of ingredients, ratios, and processing Techniques.	**U**	1,10
2	Apply knowledge of beverage processing techniques, such as pasteurization, carbonation, and filtration	**A**	1,3,10
3	Analyze quality control measures in beverage production, including sensory evaluation, laboratory testing, and process monitoring.	**An**	1,6,10
4	Integrate knowledge of equipment, raw materials, and processing methods to design efficient and cost-effective beverage production processes.	**An**	1,3,10

5	Evaluate potential challenges in beverage production, such as equipment malfunctions or ingredient variations	**E**	1,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs.	CO No.
1- Overview of the Beverage Industry and Beverage Processing techniques	1.1	Importance of beverage processing	2	1
	1.2	Types of beverages (alcoholic and non-alcoholic	3	1
	1.3	Parameters affecting beverage quality, selection and quality control of raw materials	3	1
	1.4	Water quality in beverage processing	2	1
	1.5	Sugar, flavorings, colorings, and other additives	3	1
	1.6	Heat processing methods (pasteurization, sterilization), filtration, and clarification techniques including carbonation and gas injection	5	1,2
	1.7	Fermentation processes in alcoholic and non-alcoholic beverages	3	1,2
2 – Non Alcoholic Beverages	2.1	Introduction to non-alcoholic beverages definition and classification of non- alcoholic beverages, historical overview and cultural significance market trends and consumer behavior.	3	1,2
	2.2	Categories of non-alcoholic beverages carbonated soft drinks, fruit juices and nectars, functional beverages (sports drinks, energy drinks, etc.) flavoured water and enhanced waters, teas and coffees, non-alcoholic beer and wine	3	2,3
	2.3	Ingredients in non-alcoholic beverage formulations Sweeteners and flavorings, natural and artificial colours, preservatives and stabilizers, functional additives (vitamins, minerals, etc.)	3	2,3

	2.4	Production processes for non-alcoholic beverages. Mixing and blending, pasteurization and sterilization, carbonation processes, filtration and clarification and packaging considerations	3	2,3
3–Raw Material andProcessing Techniques of Alcoholic Beverages	3.1	Wine- Classification, raw material, alcohol content and processing technique	3	1,3,4,5
	3.2	Beer- Classification, raw material, alcohol content and processing technique	3	1,3,4,5
	3.3	Vodka and gin- Classification, raw material, alcohol content and processing technique	3	1,3,4,5
	3.4	Whisky- Classification, raw material, alcohol content and processing technique	3	1,3,4,5
	3.5	Brandy and rum- Classification, raw material, alcohol content and processing technique	3	1,3,4,5
4 – Environmental and Sustainability Consideration	4.1	Sustainable practices in beverage processing	3	1
	4.2	Waste management and environmental impact	3	1
	4.3	Energy efficiency in beverage production	3	1
5- Teacher SpecificContent				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1, 2,3 & 4 - Lecturing, ICT Enabled Learning.

	MODE OF ASSESSMENT **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar

Assessment Types	**B. Semester End examination** 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. Buglass, A. J. (2011). Handbook of Alcoholic Beverages: Technical, Analytical, andNutritional Aspects. : Elsevier.

2. Small, R. W., Couturier, M., & Godfrey, M. (2011).Beverage Basics: Understanding andAppreciating Wine, Beer, and Spirits. : Wiley-Blackwell.

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**NUTRACEUTICALS AND FUNCTIONAL FOODS**					
Type of Course	**DCE**					
Course Code	**MG7DCEFSQ402**					
Course Level	**400-499**					
Course Summary	This course explores the emerging field of nutraceuticals and functional foods, examining the science, regulations and health implications associated with these products. Students will gain insights into the role of bioactive compounds, dietary supplements, and specially formulated foods in promoting health and preventing disease.					
Semester	**7**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	-	-	-	**60**
Pre- requisites,if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand nutraceuticals and functional foods, and distinguish between the two, its historical development and evolution of the nutraceutical industry.	**U**	1,3,10
2	Identify and explain the major bioactive compounds present in foods, its sources and functions	**U**	1,10
3	Utilize knowledge of regulatory frameworks governing nutraceuticals and functional foods.	**A**	1,3,10

4	Evaluate the challenges and controversies associated with nutraceuticals, considering safety concerns and ethical considerations.	**E**	1,6,10
5	Create awareness of market trends, consumer behavior, and international perspectives in the nutraceutical industry as well as future trends.	**C**	6,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
1 – Introduction to Nutraceuticals and Functional Foods	1.1	Definition and differentiation between nutraceuticals and functional foods	3	1
	1.2	Historical perspective and evolution of the industry	2	1
	1.3	Market trends and consumer awareness	3	1
2 – Functional Foods and their Bioactive Components	2.1	Functional food components	3	1,2
	2.2	Sources of functional foods	3	1,2
	2.3	Health benefits	3	1,2
3 – Nutraceuticals and Industry Regulations	3.1	Classification, inorganic mineral supplement	3	1,2
	3.2	Probiotics, prebiotics, dietary fibers	3	1,2
	3.3	Antioxidants, herbs and spices	4	1,2
	3.4	Health benefits and nutraceuticals currently available in market	3	1,2
	3.5	Overview of regulatory frameworks governing nutraceuticals and labeling requirements and health claims	4	1,2
	3.6	International perspectives and harmonization efforts	4	3

4-Challenges, Controversies and Future Trends	4.1	Safety concerns and potential risks	3	3
	4.2	Ethical considerations in marketing and promotion	3	3
	4.3	Public perception and misinformation	3	3,4
	4.4	Cutting-edge research in nutrigenomics and personalizednutrition	5	3,4
	4.5	Technological advancements and innovations in delivery systems	5	34
5- Teacher Specific Content			3	3,4

Teaching And Learning Approach	**Classroom Procedure (Mode of Transaction)** Module 1,2,3 & 4-Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** 30 Marks- Assignment / Viva / Seminar
	B. Semester End Examination 70 Marks MCQ-(20 Out of 20) – 20 marks Short Answer- (6 out of 8) - 6x5 Marks=30 Essay- (2 out 4) - 2x10 marks =20 marks

SUGGESTED READING

1. B.Shah (2013). Text Book of Pharmacognosy and Phytochemistry. : Elsevier.
2. Brower, V. (1998). Nutraceuticals: Poised for a Healthy Slice of the Healthcare Market? Nature Biotechnology, 16(8), 728-731.
3. De Felice, L. S. (1995). The Nutraceutical Revolution, Its Impact on Food Industry. CRCPress.
4. Jack, D.B. (1995). Keep taking the tomatoes-the exciting world of nutraceuticals. Mol Med Today; 1(3):118-21.
5. Singh, R.P., Shadan, A., & Ma, Y. (2022). Biotechnological Applications of Probiotics: AMultifarious Weapon to Disease and Metabolic Abnormality. Probiotics & Antimicrobial Proteins, 14, 1184–1210.Springer

SEMESTER-VIII

Mahatma Gandhi University Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**WINE TECHNOLOGY**					
Type of Course	**DCC**					
Course Code	**MG8DCCFSQ400**					
Course Level	**400-499**					
Course Summary	This course provides in-depth understanding of the technological aspects involved in the production of wine.					
Semester	**8**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, ifany						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Recall the key varieties and their characteristics in winemaking	K	1,3,10
2	Understand the biochemical processes involved in fermentation during winemaking.	U	1,3,10
3	Demonstrate proper cellar techniques for aging and maturing wines.	A	1,3,10
4	Evaluate the chemical and sensory attributes of a given wine sample, identifying potential faults.	E	1,3,10

5	Create and apply sustainable winemaking plan considering organicand biodynamic practices.	C	1,3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Introduction to Wine Industry and Wine making	1.1	Overview of the global wine industry, historical development of winemaking, importance of technology in modern winemaking	3	1
	1.2	Fruits, vegetables, flowers, cereals and value added products	3	1,5
	1.3	Cultivation techniques	3	1
	1.4	Harvesting- factors influencing grape harvest timing harvesting methods and equipment	4	1
	1.5	Crushing- crushing and de stemming process	3	1
	1.6	Fermentation-role of yeast and bacteria in fermentation types of fermenters, fermentation vessels and temperature control, malo lactic fermentation	6	1,2
	1.7	Ageing-Aging and maturation processes	2	2
2-Wine Chemistry, Microbiology and Cellar Techniques	2.1	Chemical components influencing flavor and quality	2	3
	2.2	Yeast and Bacteria in fermentation	2	3
	2.3	Spoilage prevention	2	3
	2.4	Oak Barrel vs. stainless steel tank aging	2	3
	2.5	Clarification and stabilization methods	2	3
3-Wine Analysis, Tasting and Certification	3.1	Chemical analysis	3	4
	3.2	Physical analysis	3	4
	3.3	Wine tasting and sensory analysis	3	4

	3.4	Certification and Labelling	2	4
4- Practicum	4.1	Pre and post fermentation process- use of advanced fermentation technology, yeast management, chemical and microbial analysis of wine	7	5
	4.2	Quality management in wine making process	7	5
	4.3	Preparation of wines	8	5
	4.4	New Product Development	8	5
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2, &3-Lecturing, ICT Enabled Learning Module4-Practium

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory-**25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20

	Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Jackson, R. S. (2019). Wine Science: Principles and Applications. Academic Press
2. Bird, D. (2011). Understanding Wine Technology: The Science of Wine Explained.WineAppreciation Guild
3. Jordan, R. M. Enology: The Science of Wine.
4. Fugelsang, K. C., & Edwards, C. G. (2007). Wine Microbiology: Practical Applications and Procedures. Springer New York

Mahatma Gandhi University
Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**ANALYTICAL INSTRUMENTATION**					
Type of Course	**DCC**					
Course Code	**MG8DCCFSQ401**					
Course Level	**400-499**					
Course Summary	This course is a study of the theories, principles, merits and demerits, and method of operation of various types of analytical instruments and their applications in the qualitative and quantitative analyze of food samples.					
Semester	**8**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, ifany						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO. No
1	Understand the theories and principles of different qualitative and quantitative analytical methods.	**U**	2, 3,10
2	Apply general theories and principles of different types of chromatographic techniques used for the separation and Quantification of various foods.	**A**	2, 3,10
3	Apply general principles of electrophoresis in designing an electrophoretic system and the quantitative analysis of food composites.	**A**	2, 3,10
4	Analyze the quantitative and qualitative composites of food using spectroscopy.	**An**	2, 3,10
5	Explain the different types of spectroscopic instruments	**E**	

	used for the analysis of food.		2, 3,10
6	Appraise the recent analytical instrumentations for the qualitative and quantitative analysis of foods.	**E**	2, 3,10

Remember (K), Understand (U), Apply (A), Analyze (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1 – Basic Principles and Types of Chromatography And Electrophoresis	1.1	Principles of chromatography adsorption and partition chromatography	2	1, 2
	1.2	Affinity, size exclusion and ion-exchange chromatography	4	1, 2
	1.3	HPLC and GC — principles, instrumentation and applications.	5	1, 2
	1.4	General principles of electrophoresis, agarose gel electrophoresis, PAGE and SDS-PAGE	4	1,3
	1.5	Native gel electrophoresis, gradient gel electrophoresis and isoelectric focusing gel electrophoresis	2	1, 3
	1.6	Applications of electrophoresis, blotting techniques	2	1, 3
2 – Basic Principles and types Of Spectroscopy	2.1	Basic principles of spectroscopy, energy level transitions in spectroscopy and energy states of matter in spectroscopy	5	1,4
	2.2	UV-Visible spectroscopy -Principle and instrumentation	2	1, 4, 5
	2.3	Atomic absorption and emission spectroscopy-Principle and instrumentation	3	1, 4, 5
	2.4	Fluorimetry and mass spectroscopy ,infrared spectroscopy, applications of spectroscopy	7	1,4,5

3 – Enzymatic , Radio Tracer Techniques and Centrifugation	3.1	Basic principles of radioactive measurements, radioimmunoassay-applications	3	1, 6
	3.2	Scintillation counting (solid, liquid, gas)	3	1, 6
	3.3	ELISA- Types and applications	3	1, 6
4- Practicum	4.1	Detection of amino acids/protein by paper chromatography	6	6
	4.2	Estimation of vitamin C by 2,6, dichloro indo phenol titrimetric method	6	6
	4.3	Detection of proteins by TLC	6	6
	4.4	Estimation of calcium by gravimetric method	6	6
	4.5	Estimation of iron by titrimetric or spectrophotometric method	6	5,6
5 – Teacher Specific Content	5.1			

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)**. Module 1,2 & 3- Lecturing, ICT Enabled Learning

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Nielsen, S. S. (2004). Introduction to the Chemical Analysis of Foods. Jones and Bartlett Publishers.
2. Mahindru, S. N. (2000). Food Additives: Characteristics, Detection, and Estimation. Tata McGraw-Hill Publishing Company Limited.
3. Pearson, D. (2002). The Chemical Analysis of Foods. Churchill Livingstone.

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**FOOD AS MEDICINE**					
Type of Course	**DCE**					
Course Code	**MG8DCEFSQ400**					
Course Level	**400-499**					
Course Summary	This course provides the knowledge and tools to harness thehealing potential of food.					
Semester	**8**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre- requisites, ifAny						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the historical aspects holistic approach of using food as medicine, considering the interconnectedness of nutrition, lifestyle, and overall well-being.	U	1
2	Interpret concept of therapeutic diets, learning how specific foods and dietary patterns can be utilized to prevent, manage, or treat various health conditions.	U	1,6
3	Apply nutritional principles in creating personalized dietary plans, aligning with specific health goals and addressing individual health needs.	A	2,6

4	Analyze and evaluate scientific evidence on the relationship between food and health, discerning between fads and evidence-based dietary recommendations	An	6,8,10
5	Create and implement community nutrition programs aimed at improving public health outcomes .	C	6,8.10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Food for Specific Health Conditions	1.1	Cardio health: nutrition strategies for heart health, managing conditions like hypertension and hyperlipidemia	5	1
	1.2	Immune system support: foods that boost the immune system, nutritional approaches to prevent infections	5	1,3
	1.3	Mood and cognitive health: nutritional influences on mental health, role of diet incognitive function and well-being	5	1,3
2- Integrating Traditional Medicine and Nutrition	2.1	Ayurveda and traditional healing systems: incorporating ayurvedic principles into nutrition, traditional approaches to using food as medicine	5	1,2,4
	2.2	Culinary herbs and spices: Medicinal properties of herbs and spices, incorporatingherbs into everyday cooking	5	2,3
	2.3	Adapting global healing traditions: Exploring food-as-medicine practices worldwide, cultural perspectives on nutrition and health	5	1,3
3-Personalized Nutrition and Future Trends	3.1	Personalized nutrition: Individualized approaches to using food as medicine,nutrigenomics and its implications	5	2,3
	3.2	Emerging trends in nutritional science: advances in nutritional research, innovative approaches to food-based interventions	5	2,3,4

	3.3	Culinary medicine and practical applications: Integrating culinary skills with nutritional science Activity: designing personalized, health-focused meal plans	5	2,3
4- Practicum	4.1	Nutritional assessment – Techniques for assessing nutritional status using anthropometric methods, dietary surveys and biochemical tests	8	5
	4.2	Case studies – Developing nutritional care plans for individuals with various health conditions , focusing on diet modifications and therapeutic nutrition	7	5
	4.3	Creating and testing functional foods and nutraceutical products	7	5
	4.4	Designing food based formulation and implementing community based nutrition programs aimed at disease prevention and health promotion .	8	5
4- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Module 1,2 &3-Lecturing, ICT Enabled

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory-**25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge

	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Iwu, M. M. (2016). Food as Medicine: Functional Food Plants of Africa.CRC Press
2. Pratt, S. G., & Matthews, K. (2006). SuperFoodsRx: Fourteen Foods That Will Change YourLife. Harper
3. Scientific Articles, Research Papers, and Literature on the therapeutic aspects of food.

Mahatma Gandhi University
Kottayam

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**EQUIPMENT, PLANT LAYOUT AND DESIGN**					
Type of Course	**DCE**					
Course Code	**MG8DCEFSQ401**					
Course Level	**400-499**					
Course Summary	The course provides a comprehensive understanding of theprinciples and practices involved in designing efficient and effective industrial facilities through the planning and arrangement of equipment and plant layouts. The course encompasses a blend of theoretical concepts, practical applications, and case studies to equip students with the knowledge and skills necessary for successful plant layout design.					
Semester	**8**	Credits			**4**	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	-	1	-	**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Recall the fundamental principles of equipment selection and plant layout.	**U**	2,3,10
2	Understand the comprehension relationship between equipment functionality and overall plant layout	**U**	2,3,10
3	Apply knowledge of equipment specifications to design an efficient plant layout.	**A**	2,3,10

4	Evaluate the impact of different plant layouts on equipment performance and overall productivity	**E**	2,3,10
5	Create an optimal plant layout strategy based on a given set of equipment and operational requirements	**C**	2,3,10
6.	Create an atmosphere among students, in plant safety and develop the capacity to design suitable layouts for smooth work flow	**C**	2,3,10

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course Description	Hrs.	CO No.
1- Introduction to Plant Layout and Design and emerging trends	1.1	Fundamentals of plant layout and design principles	3	1,2
	1.2	Types of layouts: Process layout, product layout, cellular layout, fixed-position layout, hybrid layout, office layout and warehouse layout	5	1,2
	1.3	Significance and need for an effective layout in industrial processes advantages and limitations of different layout	5	1,3
	1.4	Advantages and limitations of different layout	3	1,4
	1.5	Emerging trends – Automated storage and retrieval systems, RFID(radio frequency identification), warehouse management system, automated guided vehicles safety standards and regulations	5	4
2- Plant Layout and Process Flow Analysis	2.1	Factors influencing plant layout, techniques for developing efficient plant layouts	3	4
	2.2	Computer-aided plant layout design, analysis of material flow within a plant	3	4
	2.3	Optimization of process flow for efficiency	3	4
	2.4	Bottleneck analysis and optimization techniques	3	4

3- Different Types of Equipment used in Food Industry	3.1	Food cooking equipment – Ovens, grills,steamers, sous vide machines, mixing tank and vessel tilting skillets, rotisseries, salamanders	3	1,2,3
	3.2	Food processing equipment - Mixers and blenders, food processors, quality	2	1,2,3
	3.3	Control equipment, heat exchangers, filling machines, conveyors, canning andbottling equipment, packaging equipment	3	1,2,3
	3.4	Storage equipment- Refrigeration units, freezers, warehousing systems, containers and bins, airtight containers, FIFO systems	2	1,2,3
	3.5	Human factors in equipment and plant layout design (workstation design, tools and equipment, workflow and efficiency, maintenance and repairs etc.	2	1,2,3
4- Practicum	4.1	Familiarizing students with equipment's used in food industries	7	6
	4.2	Site visits- visit to existing food processing plants to observe and analyze real world application of plant layout and design principles	8	6
	4.3	Case studies of successful plant designs	8	6
	4.4	Training in the application of safety standards and practices within the plant	7	6
5- Teacher Specific Content				

Teaching and Learning Approach	**Classroom Procedure (Mode of Transaction)** Module 1,2,3 & 4 -Lecturing, ICT Enabled Learning,

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End examination **Theory**-50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments-Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Baker, C. G. J. (2016). Handbook of Food Factory Design. Springer-Verlag.
2. Brown, G. G. (2019). Handbook of Food Factory Design. CRC Press.
3. Brown, G. G., & Johnson, H. P. (2015). Food Processing Plant Construction and DesignEngineering. Wiley.
4. Kessler, F. J. (2018). Food Plant Layout and Design. Elsevier.
5. Lopez-Gomez, A., Barbosa-Canovas, G. V. (2005). Food Plant Design. United Kingdom:CRC Press.
6. Singh, R. P., & Heldman, D. R. (2016). Introduction to Food Engineering (5th ed.).Academic Press.
7. Smith, P. J., & Wood, A. J. (2017). Equipment in the Food Industry. Woodhead Publishing.

Programme	**B.Sc. FOOD SCIENCE AND QUALITY CONTROL**					
Course Name	**NANO BIOTECHNOLOGY**					
Type of Course	**DCE**					
Course Code	**MG8DCEFSQ402**					
Course Level	**400-499**					
Course Summary	The course will address nanomaterials, nanoscale methods, and their integration into biotechnological applications. Students will understand the fundamentals of nanotechnology and its applications					
Semester	**8**	Credits			**4**	
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	Total Hours
		3	-	1	-	**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand the introduction of food biotechnology	**U**	1,3,6,10
2	Understand the introduction, advantages, regulation, labelling, and pros and cons of genetically modified (GM) foods.	**U**	1,3,6,10
3	Analyze challenges and opportunities in the application of nanotechnology in the food industry.	**A**	1,3,6,10
4	Analyze emergent strategies for the detection and control of biofilms in food processing	**An**	1,3,6,10

5	Evaluate regulatory aspects of nanotechnology in food	**E**	1,3,6,10
6	Create various experimental techniques used in nanotechnology, such as nanoparticle synthesis, characterization and functionalization	**C**	1,3,10

Remember (K), Understand (U), Apply (A), Analyze (An), Evaluate (E), Create (C), Skill (S),Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transactions (Units)

Module	Units	Course description	Hrs	CO No.
1 – Introduction to Food Biotechnology	1.1	Introduction: biotechnology contributes to social economics and environmental sustainability of agriculture	5	1
	1.2	Branches of biotechnology	5	1
	1.3	Use of microbial cultures in food fermentation	5	1
	1.4	Enzymes in food production and processing	5	1
	1.5	Biotechnological approaches to reduce food spoilage and waste	5	1
2 – Genetic Engineering in Food Production	2.1	Concept of recombinant DNA technology-restriction endonucleases, plasmid, purpose of gene cloning	5	2
	2.2	Manipulation techniques of DNA-PCR, agarosegel electrophoresis, SDS page blotting and hybridisation	5	2
	2.3	GM foods- introduction, advantages regulation, labelling, pros and cons	5	2
3 – Nanotechnology in Food Industry	3.1	Nanotechnology ,nano materials, nanoparticle:types properties and application	5	3
	3.2	Nanotechnology tools and techniques - Microscopy techniques (tem, sem, afm) metallic nanoparticles ,quantum dots,carbon based nanoparticle	5	3
	3.3	Nanoparticle synthesis methods characterization techniques for nanomaterial	5	3
	3.4	Nanomaterials in food packaging- active and intelligent packaging nanotechnology for extending shelf life	5	3

4 – Practicum	4.1	Synthesis of nanoparticle-bottom –up method	6	6
	4.2	Synthesis of nanoparticle-top-down method	6	6
	4.3	Isolation of DNA by Gel Electrophorosis	6	6
	4.4	Separation of protein by polyacrylamide gel electrophoresis(PAGE)	6	6
	4.5	PCR	6	6
5- Teacher Specific Content				

Teaching And Learning Approach	**Classroom Procedure (Mode of Transaction)** Module 1,2&3- Lecturing, ICT Enabled Learning Module4-Practium

Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** **Theory**-25 Marks Assignment / Viva / Seminar **Practical's**- 15 Marks Viva / Skill/ knowledge
	B. Semester End Examination **Theory-**50 marks (MCQ (10 out of 10) – 10 x 1=10 Short answer (4 Out of 6) (5 marks x 4=20 Marks) Essay (2 out of 4) (10 marks x 2 =20 Marks) **Practical Examination** -35 marks Lab report-5, Viva -5, Written Test (Principle and Procedure of two experiments)-10, Experimentation – Any two experiments- Major-10 Marks, Minor 5 Marks

SUGGESTED READING

1. Bhatia, S. C. (2017). Food Biotechnology. Woodhead Publishing India
2. Chaudhry, Q., Castle, L., & Watkins, R. (2017). Nanotechnologies in Food. Royal Society ofChemistry.
3. Dhanasekaran, D., & Thajuddin, N. (2016). Microbial Biofilms: Importance And Applications.IntechOpen.
4. Lee, B. H. (2015). Fundamentals of Food Biotechnology. Wiley-Blackwell.

PROJECT EVALUATION

Project Evaluation –12 credits

Total marks- 200 marks

- Distribution of Internal Marks- Total - 60 marks

  Punctuality-10
  Overall Performance - 15
  Involvement- 10
  Attendance-15
  Creativity- 10

- Distribution of External marks- Total -140 marks

  Relevance of the topic- 20
  Materials and methods -20
  Review of literature -25
  Result and Discussion - 30
  Viva- 20
  Presentation of report- 25

Syllabus Revision Workshop Participants

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