



**MGM UNIVERSITY, CHHATRAPATI SAMBHAJINAGAR**

**INSTITUTE OF BIOSCIENCES AND TECHNOLOGY**

**CHOICE-BASED CREDIT SYSTEM(CBCS) SEMESTER PATTERN**

**Faculty of Basic and Applied Sciences Graduate (UG) Program**

**Food Technology and Processing - CURRICULUM**

**W.e.f. Academic Year 2023-24**

**B.Sc., B. Sc. (Hons.), B. Sc. (Hons.) with Research of Food Technology and Processing**

**SEMESTER (I,II)**

**Prepared By  
Dr. S. V. Maske**

**Submitted By  
Dr. S. V. Maske**

**Approved By  
Board of Studies**

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## MGM University

### Vision

- To ensure sustainable human development which encourages self-reliant and self-content society.
- To promote activities related to community services, social welfare and also Indian heritage and culture.
- To inculcate the culture of non-violence and truthfulness through vipassanna meditation and Gandhian Philosophy.
- To develop the culture of simple living and high thinking

### Mission

- To impart state of art education and technical expertise to students and give necessary training to teachers to create self-reliant society for future.
- To encourage students to participate in Indian and International activities in sports, literature, etc. so that future generation becomes base for free and liberal society
- To educate students in areas like Management, Finance, Human relations to inculcate philosophy of simple living and high thinking value of simple economic society.
- To inculcate culture of non-violence and truthfulness through Vipassana.

To sustain activities of Indian culture (viz. classical dance, music and fine arts) through establishing institutes like Mahagami, Naturopathy, etc.

## विद्यापीठ गीत

अत्त दिप भव भव प्रदिप भव,  
स्वरूप रूप भव हो  
ज्ञान सब्ब विज्ञान सब्ब भव,  
सब्ब दिप भव हो  
अत्ताहि अत्त नो नाथो,  
अत्ताहि अत्त नो गति  
अत्त मार्गपर अप्रमादसे है तुझे चलना  
सब्ब का कल्याण हो,  
वो कार्यकुशल करना  
सब्ब का उत्तम मंगल, पथप्रदर्शक हो  
अत्त दिप भव भव प्रदिप भव,  
स्वरूप रूप भव हो  
ज्ञान सब्ब विज्ञान सब्ब भव,  
सब्ब दिप भव हो  
बुद्धमं शरणं गच्छामि:  
धम्मं शरणं गच्छामि:  
संघं शरणं गच्छामि:

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## INSTITUTE OF BIOSCIENCE AND TECHNOLOGY

We are contributor in Medical and Advances in Agriculture sciences by studying living systems and organisms for development and research purpose. We shape our student for their bright future in thin field by proving knowledge and best practical facilities.

The Mahatma Gandhi Mission's Institute of Biosciences and Technology is promoted by Mahatma Gandhi Mission (MGM) Trust. The Mahatma Gandhi Mission Trust was founded with a vision to address the educational, health and other social needs of the public since 1983. MGM visualized the density of the field of life science resources and possible careers which will be helpful in the area of research. Through this keen interest MGM established the department of Biotechnology and Bioinformatics in 2001-2002.

Then in the year 2002-2003, with the affiliation of Dr. Babasaheb Ambedkar Marathwada University, the course of M.Sc. Biotechnology was started – a very large ambition and a great milestone in the area of Biotechnology. In the year 2004-05 MGM's IBT launched a course of B.Sc. Agricultural Biotechnology under the affiliation of Marathwada Krishi Vidyapeeth, Parbhani. With the launch of this course the department of biotechnology and Bioinformatics became the crowning glories of Marathwada region.

A tiny seedling turned into a huge tree with multiple branches. In the year 2005-2006 MGM's IBT visualized the importance informatics. Consistent with the attitude to excel in the field of biotechnology, the course of M.Sc. Bioinformatics was launched under the affiliation of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, in 2005-2006.

Now MGM's IBT is well established in the field of research focusing on the areas of Biotechnology and Bioinformatics with well-equipped R&D laboratory encouraging and supporting extensive research.

### **Vision**

“To achieve academic excellence through research, teaching and training in biosciences disciplines which will eventually serve and benefits the society”

### **Mission**

- To Generate necessary and intellectually qualified biological work force.
- Strive to provide services and solutions through biologic knowledge forecasting the welfare and benefit of the society



### Programs offered at IBT

Undergraduate Programmes	Postgraduate Programmes	PhD Programmes	PG Diploma Programmes	Certificate Programmes
B.Sc. Biotechnology Honours / Honours with Research	M.Sc. Biotechnology	Ph.D. Biotechnology		
B.Sc. Microbiology Honours/ Honours with Research	M.Sc. Microbiology/ Virology	Ph.D. Microbiology		
B.Sc. Bioinformatics Honours / Honours with Research	M.Sc. Bioinformatics	Ph.D. Bioinformatics		
B.Sc. Food Technology and Processing Honours / Honours with Research	M.Sc. Food Technology	Ph.D. Food Technology		
B.Sc. Food nutrition and Dietetics Honours / Honours with Research	M.Sc. Plant Breeding & Molecular Genetics	Ph.D. Plant Breeding & Molecular Genetics		
		Ph.D. Plant Biotechnology		

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**Name of Program** – B.Sc. (Food Technology and Processing) Hons. / Hons. with Research

**Duration** – Four Years

**Eligibility** –

**1. Maharashtra State Candidate.**

(i) The Candidate should be an Indian National and having domicile of Maharashtra state and/or born in Maharashtra state.

(ii) Passed HSC or its equivalent examination with Physics and Mathematics as compulsory subjects along with one of the Chemistry or Biotechnology or Biology or Technical Vocational subject or Computer Science or Information Technology or Informatics Practices or Agriculture or Engineering Graphics or Business Studies, and obtained at least 45% marks (at least 40% marks, in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only) in the above subjects taken together and the candidate should have appeared in MGMU-CET / MHT-CET / PERA CET should obtain non zero score in MGMU-CET / MHT-CET / PERA CET. However, preference shall be given to the candidate obtaining non-zero positive score in MGMU-CET over the candidates who obtained non-zero score in MHT-CET / PERA CET.

**2. All India Candidates –**

(i) The Candidate should be an Indian National.

(ii) Passed HSC or its equivalent examination with Physics and Mathematics as compulsory subjects along with one of the Chemistry or Biotechnology or Biology or Technical Vocational subject or Computer Science or Information Technology or Informatics Practices or Agriculture or Engineering Graphics or Business Studies , and obtained at least 45% marks (at least 40% marks, in case of Backward class categories and Persons with Disability candidates belonging to Maharashtra State only) in the above subjects taken together and candidate should have appeared in MGMU-CET / MHT-CET / PERA CET should obtain non-zero score in MGMU-CET / MHT-CET / PERA CET. However, preference shall be given to the candidate obtaining non-zero positive score in over the candidates who obtained non-zero score in MGMU-CET / MHT-CET / PERA CET.

**Name of Faculty:** Basic and Applied Sciences Graduate (UG) Program

**Name of the College/Institute/Department/School:** Institute of Bioscience and Technology

**Name of the Programme:** B.Sc./B.Sc. Hons. /B.Sc. Hons with Research

**Programme Type (UG/PG):** UG/ B.Sc./B.Sc. Hons./B.Sc. Hons with Research of Food Technology and Processing

**Duration:** 04 Years ( 08 Semesters)

First Year- Semester I												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	FPT42M ML101	Introduction to Food Science	Lecture	3	3		60	40	100		16	40
MM	FPT42M ML102	Basic Food Engineering (Fluid Mechanics, Heat and mass transfer)-I	Lecture	2	2	-	30	20	50		8	20
IKS	FPT42I KL101	Sustainable agriculture and food preservation methods	Lecture	2	2	-	30	20	50		8	20
AEC	MGM54 AEL104	Functional Marathi	Lecture	2	2	-	30	20	50		8	20
OE		Open Elective I	Lecture	2	2	-	30	20	50		8	20
OE		Open Elective II	Lecture	2	2	-	30	20	50		8	20
VEC	MGM21 VEL101	Environmental Studies	Lecture	2	2	-	30	20	50		8	20
VSC	FPT42VS P101	Food Lab I	Practical	2		4	30	20	50		8	20
SEC	FPT42SE P101	Sensory Evolution of food	Practical	2		4	30	20	50		8	20
MM	FPT42M MP101	Key Skills in food & Nutritional Science	Practical	1	-	2	30	20	50		8	20
CC	MGM62 CCP107	Cultural Activities	Practical	2		4	30	20	50		8	20
<b>Total</b>				<b>22</b>	<b>15</b>	<b>14</b>	<b>360</b>	<b>240</b>	<b>600</b>		<b>96</b>	<b>240</b>

**Note:**

**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

First Year- Semester II												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	FPT42M ML103	Basic Food Engineering (Unit operation for food process)-II	Lecture	2	2		30	20	50		8	20
MM	FPT42M ML104	Food Microbiology	Lecture	3	3	-	60	40	100		16	40
MI		Minor Course	Lecture	2	2	-	30	20	50		8	20
AEC	MGM54 AEL101	Communicative English	Lecture	2	2	-	30	20	50		8	20
OE		Open Elective III	Lecture	2	2	-	30	20	50		8	20
OE		Open Elective IV	Lecture	2	2	-	30	20	50		8	20
VEC	MGM56 VEL102	Constitution of India	Lecture	2	2	-	30	20	50		8	20
VSC	FPT42V SP102	Food Lab II	Practical	2		4	30	20	50		8	20
SEC	FPT42S EP102	Food Quality Labelling & Composition	Practical	2		4	30	20	50		8	20
MM	FPT42M MP102	Microbiological safety & Chemical Analysis of food	Practical	1	-	2	30	20	50		8	20
CC	MGM82 CCP103	Sports	Practical	2		4	30	20	50		8	20
Total				22	15	14	360	240	600		96	240

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**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

**Level 4.5 Award of UG certificate with 40 credits and an additional 4-credits core NSQF course / internship OR continue with major and minor**

Semester III												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact Hrs/week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	FPT42M ML201	Fundamentals of Food Development & Formulation	Lecture	2	2	-	30	20	50	-	08	20
MM	FPT42M ML202	Cereals, Legume, Pulses & oil seed Technology	Lecture	3	3	-	60	40	100	-	16	40
MM	FPT42M ML203	Food Manufacturing & Processing	Lecture	2	2	-	30	20	50	-	08	20
OE		Open Elective V	Lecture	2	2	-	30	20	50	-	08	20
MI		Minor Course	Lecture	3	3	-	60	40	100	-	16	40
AEC	MGM54A EL103	Functional Hindi	Lecture	2	2	-	30	20	50	-	08	20
MI		Minor Course	Practical	1	-	2	30	20	50	-	08	20
VSC	FPT42VS P201	Applied FTP Lab I	Practical	2	-	4	30	20	50	-	08	20
MM	FPT42M MP201	Sustainable Food Production	Practical	1	-	2	30	20	50	-	08	20
FP	FPT42FPJ 201	Filed Project	Project	2	-	4	30	20	50	-	08	20
CC	MGM82C CP201	Health and Wellness	Practical	2	-	4	30	20	50	-	08	20
<b>Total</b>				<b>22</b>	<b>14</b>	<b>16</b>	<b>390</b>	<b>260</b>	<b>650</b>		<b>104</b>	<b>260</b>

**Note:**

**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Semester IV												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact Hrs/week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	FPT42M ML204	Fruits, vegetables, spices & Plantation crop processing Technology	Lecture	2	2	-	30	20	50	-	08	20
MM	FPT42M ML205	Exponential Technologies in food science	Lecture	3	3	-	60	40	100	-	16	40
MM	FPT42M ML206	Bakery, Confectionary, Snacks & Beverage Processing Technology	Lecture	2	2	-	30	20	50	-	08	20
OE		Open Elective VI	Lecture	2	2	-	30	20	50	-	08	20
MI		Minor Course	Lecture	3	3	-	60	40	100	-	16	40
AEC	MGM54 AEL203	Communication Skills	Lecture	2	2	-	30	20	50	-	08	20
SEC	FPT42SE P201	Applied FTP Lab II	Practical	2	-	4	30	20	50	-	08	20
MI		Minor Course	Practical	1	-	2	30	20	50	-	08	20
MM	FPT42M MP202	Fruits, vegetables, spices & Plantation crop processing Technology Lab	Practical	1	-	2	30	20	50	-	08	20
CEP	FPT42CE P201	Community Engagement Program	Project	2	-	4	30	20	50	-	08	20
CC	MGM73 CCP105	Fine Arts	Practical	2	-	4	30	20	50	-	08	20
Total				22	14	16	390	260	650		104	260

**Note:**

**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

**Level 5.0 Award of UG Diploma in major and minor with (44+44)= 88 credits and an additional 4-credits core NSQF course / internship OR continue with major and minor**

Semester V												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	FPT42M ML301	Food law, Ethics & cooperate social responsibilities	Lecture	2	2	-	30	20	50		8	20
MM	FPT42M ML302	Milk, Meat, Poultry, sea food & Fish Processing Technology	Lecture	3	3	-	60	40	100		16	40
MM	FPT42M ML303	Innovation & Design Principles for food	Lecture	2	2	-	30	20	50		8	20
ME	FPT42M EL201	Food Extrusion Technology/ Quantity Food Production & Service	Lecture	3	3	-	60	40	100		16	40
MI		Minor Course	Lecture	3	3	-	60	40	100		16	40
VSC	FPT42V SP301	Mini Project	Practical	2		4	30	20	50		8	20
MI		Minor Course	Practical	1	-	2	30	20	50		8	20
VSC	FPT42V SP302	Innovation & Design Principles for food	Practical	2	-	4	30	20	50		8	20
MM	FPT42M MP301	Food Perception & Product Designing	Practical	1	-	2	30	20	50		8	20
FP	FPT42F PJ301	Field Project	Practical	2		4	30	20	50		8	20
ME	FPT42M EP201	Extrusion Technology/ Quantity Food Production & Service Lab	Practical	1	-	2	30	20	50		8	20
<b>Total</b>				<b>22</b>	<b>13</b>	<b>18</b>	<b>420</b>	<b>280</b>	<b>700</b>		<b>112</b>	<b>280</b>

**Note:**

**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Semester VI												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	FPT42M ML304	Advance food safety & Quality Management	Lecture	2	2		30	20	50		8	20
MM	FPT42M ML305	Bakery, Confectionery, Snacks & Beverages processing Technology	Lecture	3	3		60	40	100		16	40
MM	FPT42M ML306	Post harvest Management of Fruits & Vegetables	Lecture	3	3		60	40	100		16	40
ME	FPT42M EL202	Food Additives and Preservatives/ Food fortification	Lecture	3	3		60	40	100		16	40
MI		Minor Course	Lecture	3	3		60	40	100		16	40
MI		Minor Course	Practical	1		2	30	20	50		8	20
OJT	FPT42J TP301	On Job Training	Training	4		8	60	40	100		16	40
MM	FPT42M MP302	Literature Review in Food Science & Nutrition	Practical	1		2	30	20	50		8	20
MM	FPT42M MP303	Quality Assurance-I	Practical	1		2	30	20	50		8	20
ME	FPT42M EP202	Food Additives and Preservatives Lab/ Food fortification	Practical	1		2	30	20	50		8	20
<b>Total</b>				<b>22</b>	<b>14</b>	<b>16</b>	<b>450</b>	<b>300</b>	<b>750</b>		<b>120</b>	<b>300</b>

**Note:**

**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

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**Level 5.5 Award of UG degree in major and minor (44+44+44)=132 credits**

**OR continue with major and minor**



Semester VII												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	FPT42M ML401	Advanced food Manufacturing	Lecture	3	3		60	40	100		16	40
MM	FPT42M ML402	Food Preservation, energy generation & conservation	Lecture	3	3		60	40	100		16	40
MM	FPT42M ML403	Advanced Food processing & Technology	Lecture	3	3		60	40	100		16	40
MM	FPT42M ML404	Advance Food Quality	Lecture	2	2		30	20	50		8	20
ME	FPT42M EL301	ICT application in food Industry/ Nutrition transition in India	Lecture	3	3		60	40	100		16	40
RM	FPT42R ML401	Research Methodology	Lecture	3	3		60	40	100		16	40
RM	FPT42R MP401	Macro Project	Practical	1		2	30	20	50		8	20
ME	FPT42M EP301	ICT application Programming Lab/ Nutrition transition in India	Practical	1		2	30	20	50		8	20
MM	FPT42M MP401	Quality Assurance-II Lab	Practical	1		2	30	20	50		8	20
MM	FPT42M MP402	Major Project	Practical	1		2	30	20	50		8	20
MM	FPT42M MP403	Advanced food Manufacturing Lab	Practical	1		2	30	20	50		8	20
				22	17	10	480	320	800		128	320

**Note:**

**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

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Semester VIII												
Cours e Catego ry	Course Code	Course Title	Natu re of Cour se	No. of Cred its	Teachi ng (Conta ct hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Inter nal	Exter nal	Tot al	Inter nal	Exter nal	Tot al
MM	FPT42MML405	Marketing Management	Lecture	3	3		60	40	100		16	40
MM	FPT42MML406	Adv. Quality Assurance and Certification	Lecture	3	3		60	40	100		16	40
MM	FPT42MML407	Food Law and Regulations	Lecture	3	3		60	40	100		16	40
MM	FPT42MML408	Business Management and Economics	Lecture	2	2		30	20	50		8	20
ME	FPT42MEL302	Lab Preparation and Management/ Storage and handling of fresh agriculture produce	Lecture	3	3		60	40	100		16	40
OJT	FPT42JTP401	On Job Training	Training	4		8	60	40	100		16	40
ME	FPT42MEP302	Lab Preparation and Management Lab/ Storage and handling of fresh agriculture produce	Practical	1		2	30	20	50		8	20
MM	FPT42MMP404	Marketing Management Seminar	Practical	1		2	30	20	50		8	20
MM	FPT42MMP405	Food Product Quality Lab	Practical	1		2	30	20	50		8	20
MM	FPT42MMP406	Food Law and Regulation Seminar	Practical	1		2	30	20	50		8	20
				22	14	16	450	300	750		120	300

**Note:**

**Nature of Course :** L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation,

**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

**Level 6.0 Four year UG Honours Degree in major and minor (44+44+44+44) = 176 credits**



**BFMML101 INTRODUCTION TO FOOD SCIENCE Credits: 3+0**

**University:** MGM University, Chhatrapati Sambhajinaga **Faculty:** Basic and Applied Sciences

**Institute:** Institute of Biosciences and Technology

**Degree:** B.Sc. (Hons.) Food Technology & Processing (UG)

**Course Unit Title:** Introduction to food science

**Course Code-** BFMML101

**Credits-** 3+0 (Theory)

**Level of Study:** UG

**Mode of delivery planned learning activities and teaching method:** Lecture 3 hrs/weekly

**Recommended Year /Semester:** B.Sc. (Hons.) Food Technology & Processing (UG), Year I/  
Semester I

**Prerequisites for registration:** Registration of a student in various courses in consultation with the respective course teacher and Adviser and acceptance by the principal. The approved courses must be mentioned in the roster form.

**Learning Outcomes:**

Upon successful completion, students will have the knowledge and skills to: introduce food in that learn about the classifications of foods, nutrients composition available in food, Spoilage of food, Causes of food spoilage, food poisoning etc. Student also learn about the primary food preservation methods, properties of food, etc

**Objective:**

This course is designed to introduce a basics of Food, nutrition, food processing, perishability of product, causes of spoilage of food, etc.

**COURSE CONTENT (Total Lecture- 45)**

**THEORY:**

**UNIT I: INTRODUCTION TO FOOD (10 Lecture)**

Introduction – Defining food; classification of food on the basis of perishability; classification of food on the basis of Nutrient Composition, constituents of foods Carbohydrates: Occurrence, Classification & Structures; Physicochemical and Metabolic functions; Biological role of carbohydrates; Metabolism of carbohydrates - glycolysis and respiration, production of ATP, brief description of electron transport chain, oxidative and substrate phosphorylation; Proteins: Occurrence, Classification & Structures; Physicochemical & Metabolic functions; Metabolism of proteins - Breakdown of proteins, transamination, deamination, decarboxylation, nitrogen fixation, urea cycle;

**UNIT II : LIPIDS, VITAMINS, MINERLAS (7)**

Lipids: Occurrence, Classification & Structure; Physicochemical and metabolic functions; Biological role of lipids; classification and biosynthesis; Introduction to water; roles, sources and its types, recent trends in food processing and preservation Vitamins; Sources and classification, Chemistry and Metabolic functions, deficiency syndromes, Minerals; Sources and classification, Chemistry and Metabolic functions, deficiency syndromes

### **UNIT III: FOOD SPOILAGE AND FOOD PRESERVATION (9 Lecture)**

Food spoilage – introduction, causes of food spoilage, food poisoning, food-borne intoxication, food-borne infection.

Food preservation and processing: Introduction; necessity; Principles of food preservation; Asepsis, Removal of microorganisms, Maintaining Anaerobic conditions, High temp., Low Temp., Drying, Food Additives and Radiations

### **UNIT IV: PRESERVATION METHODS (14 Lecture)**

Different food preservation methods: Preservation of food by using high temperature, low temperature, salt, sugar, acid, irradiation, chemical, etc. Canning, Filtration, Pickling, Pasteurization, Sterilization, Chilling, Freezing, Cold Storage, drying, freeze drying, UV radiation, Evaporation, smoking.

Recent methods in processing: Introduction; PEF, HPP, ultrasound, dielectric heating; microwave heating, ohmic heating; infrared heating; UV light, X-rays, membrane processing, ionization; high intensity electric field in pulses; new hybrid drying technologies; monitoring by NMR and MRI Technology, etc

### **UNIT V: EFFECT OF PROCESSING ON FOOD (5 Lecture)**

Effect of processing on nutritional value of food: Introduction; consuming raw foods; effect of processing on vitamins; effect of processing on minerals; effect of processing on carbohydrates; effect of processing on lipid.

### **REFERENCES / TEXTBOOKS:**

1. Food Facts and Principles Manay, N. Shakuntala, Shadaksharaswamy, M New Age International Private Limited Fifth, 2022
2. Food Science (Multi Colour Edition) by B Srilakshmi generic 2022 nd edition.
3. Textbook of Food Science and Technology by Vijaya Khader Indian Council of Agricultural Research (ICAR);1 January 2013
4. Fundamentals of Biochemistry Jain JL, Jain S and Jain N S. Chand Publication, India 2016
5. Biochemistry Satyanarayana Elsevier, 2013
6. Leininger Principles of Biochemistry David L. Nelson and Michael M. Cox 6th Ed. Macmillan Learning, NY, USA. 2012
7. Outlines of Biochemistry Conn EE and Stumpf PK 4 th Edition Wiley Eastern Ltd, Pune (India)
8. Food science, Chemistry and Experimental foods by M. Swaminathan.
9. Food Science by Norman. N. Potter.
10. Experimental study of Foods by Griswold R.M.

**BFMML102**

**BASIC FOOD ENGINEERING I**

**Credits: 2+0**

**(Fluid Mechanics, Heat and mass transfer)**

**University: MGM University, Chhatrapati Sambhajinagar**

**Faculty: Basic and Applied Sciences**

**Institute: Institute of Biosciences and Technology**

**Degree: B.Sc. (Hons.) Food Technology & Processing (UG)**

**Course Unit Title: Basic Food Engineering -I**

**Course Code- BFMML102**

**Credits- 2+0 (2 Theory)**

**Level of Study: UG**

**Mode of delivery planned learning activities and teaching method: Lecture 2 hrs./weekly**

**Recommended Year /Semester: B.Sc. (Hons.) Food Technology & Processing (UG), Year 1/  
Semester I**

**Prerequisites for registration:** Registration of a student in various courses in consultation with the respective course teacher and Adviser and acceptance by the principal. The approved courses must be mentioned in the roster form.

**Learning Outcomes:**

Upon successful completion, students will have the knowledge and skills to: Basic heat transfer processes, Convection, Heat Exchangers, Mass transfer and Unit operation etc

**Objective:**

This course is designed to introduce a basic study of the phenomena of heat and mass transfer, to develop methodologies for solving a wide variety of practical engineering problems, and to provide useful information concerning the performance and design of particular systems and processes.

**COURSE CONTENT (Total Lecture- 30)**

**THEORY:**

**UNIT I: BASICS OF FLUID MECHANICS AND ENGINEERING (8 Lecture)**

Units and Dimensions, Introduction to fluids, properties of different fluids, Compressible and non-compressible fluids; Surface tension, capillarity, Pressures of liquids, static pressure, hydraulic pressure, gauge pressure etc

**UNIT II: PRESSURE MEASURING DEVICES (6 Lecture)**

Manometers, simple manometers, differential manometers, micro inclined manometers, pressure gauges, mechanical gauges, piezometers etc

**UNIT III: FLUID FLOW (8 Lecture)**

Introduction, Classification, Steady, uniform and non-uniform Fluid flow, laminar flow, turbulent flow, Reynolds Number, definition, equation and examples, Bernoulli's Equation

**UNIT IV: BASIC OF HEAT AND MASS TRANSFER (8 Lecture)**

Basics of heat and mass transfer process, heat transfer coefficient, heat transfer properties, conduction, convection and radiation, theory of heat conduction, Fourier's law and its derivation, forced and free convection, radiation, Heat Exchangers: General discussion, fouling factors, jacketed kettles, LMTD, parallel and counter flow heat exchangers, shell and tube and plate heat exchanger, heat exchanger design.

## **TEXT BOOK**

1. Heat and Mass Transfer Nag P McGraw Hill, 2011
2. Heat and Mass Transfer –Fundamentals and Applications Yunus AC and AfshinJGMcGraw Hill, 2015
3. Heat TransferJ.P. Gupta CP Prentice Hall of Media, New Delhi 1994
4. Heat Transfer Holman10 th Ed. McGraw-Hill Book Co., Boston,USA. 2010
5. Food Engineering Operations, J. G. Brennan, J. R. Butters, N. D. Cowell
6. Introduction to Food Engineering, R Paul Singh, Dennis Heldman
7. Fluid Mechanics, Frank M. White. 7th Ed. McGraw-Hill Book Co., Inc.,Boston, USA. 2010
8. Fluid Mechanics: Fundamentals and Applications. Yunus A. Çengel and John M. Cimbala, McGraw-Hill, Inc., New York, USA. 2006.
9. Fundamentals of Fluid Mechanics, Bruce R. M., Donald F. Y. and Theodore H. O. 4th Ed. John Wiley & Sons, Inc., New York, USA. 2002

# Food Lab -I

**BFVSP105**

**Credits: 0+2**

**University: MGM University, Chhatrapati Sambhajanagar**

**Faculty: Basic and Applied Sciences**

**Institute: Institute of Biosciences and Technology**

**Degree: B.Sc. (Hons.) Food Technology & Processing (UG)**

**Course Unit Title: Food Lab I**

**Course Code- BFVSP105**

**Credits- 0+2 (Practical)**

**Level of Study: UG**

**Mode of delivery planned learning activities and teaching method: Practical 4 hrs/weekly**

**Recommended Year /Semester: B.Sc. (Hons.) Food Technology & Processing (UG), Year I/ Semester I**

**Prerequisites for registration:** Registration of a student in various courses in consultation with the respective course teacher and Adviser and acceptance by the principal. The approved courses must be mentioned in the roster form.

## **Learning Outcomes:**

Students will gain the knowledge about new techniques also they will invent new ideas. They can handle all the equipment which are in laboratory.

**Objective:** While doing Lab students will understand new techniques.

## **COURSE CONTENTS**

Synopsis, Lab work, Thesis Writing, Presentation

### **Ideas of Lab:**

Defining Lab ideas is crucial for setting realistic expectations and laying out a clear vision for a Lab life cycle. Lab-based learning not only provides opportunities for students to collaborate or drive their own learning, but it also teaches them skills such as problem solving, and helps to develop additional skills integral to their future, such as critical thinking and time management.

### **Literature survey:**

A literature review establishes familiarity with and understanding of current research in a particular field before carrying out a new investigation. Conducting a literature review should enable you to find out what research has already been done and identify what is unknown within your topic.

#### **Performance:**

Performance measurement during a Lab is to know how things are going so that we can have early warning of problems that might get in the way of achieving Lab objectives and so that we can manage expectations. The criteria of it as given below.

#### **1. Implementation:**

Follows closely the design, uses appropriate techniques with skill and understanding to produce a good solution.



## 2. Evaluation:

Clearly relates to the problem. Shows a good understanding and appreciation of the solution. Objectives of what has been done.

## 3. Lab Log:

- a. The individual student's effort and commitment.
- b. The quality of the work produced by the individual student.
- c. The student's integration and co-operation with the rest of the group.
- d. The completeness of the logbook & time to time signature of guide

**Objective:** To elaborate the procedure for Guiding Student Labs

### Responsibility:

- All the Lab Guide.
- All Semester B.Sc. students
- Lab Heads

**BFSEP106**

**SENSORY EVALUATION OF FOOD**

**Credits: 0+2**

**University: MGM University, Chhatrapati Sambhajanagar**

**Faculty: Basic and Applied Sciences**

**Institute: Institute of Biosciences and Technology**

**Degree: B.Sc. (Hons.) Food Technology & Processing (UG)**

**Course Unit Title: Sensory evaluation of food**

**Course Code- BFSEP106**

**Credits- 0+2 (Practical)**

**Level of Study: UG**

**Mode of delivery planned learning activities and teaching method: Practical 4hrs/weekly**

**Recommended Year /Semester: B.Sc. (Hons.) Food Technology & Processing (UG), Year I/  
Semester I**

**Prerequisites for registration:**

Registration of a student in various courses in consultation with the respective course teacher and Adviser and acceptance by the principal. The approved courses must be mentioned in the roster form.

**Learning Outcomes:**

Upon successful completion, students will have the practical knowledge and skills to: Basic sensorial evaluation of food, heat and mass transfer in food, different food processing operation, food preservation and processing.

**Objective:**

This course is designed to introduce to the practical knowledge and skills of sensorial evaluation of food, heat and mass transfer in food, different food processing operation, food preservation and processing.

**Course Content**

**Practical's:**

1. Perform preference tests: Paired Comparison
2. Perform discrimination tests: Duo-trio
3. Perform discrimination tests: Triangle
4. Perform discrimination tests: Ranking test
5. Sensory evaluation of various food products using different scales, score cards etc.
6. Texture profile analysis of selected food product
7. Designing a sensory laboratory
8. Heat transfer analysis during conduction
9. Heat transfer analysis during convection
10. Study on various types of heat exchangers used in food industry

11. Study of thermocouples
12. Freezing of foods by different methods
13. Study of blancher, pasteurizers and Homogenizers
14. Preservation of food by using salt
15. Preservation of food by using chemicals

**BFMMP107                      KEY SKILLS IN FOOD AND NUTRITIONAL SCIENCE                      Credits: 0+1**

**University:** MGM University, Chhatrapati Sambhajinagar   **Faculty:** Basic and Applied Sciences

**Institute:** Institute of Biosciences and Technology

**Degree:** B.Sc. (Hons.) Food Technology & Processing (UG)

**Course Unit Title:** Key Skills in Food and Nutritional Science Course                      **Code- BFMMP107**

**Credits-** 0+1 (Practical)                      **Level of Study:** UG

**Mode of delivery planned learning activities and teaching method:** Practical 2 hrs/weekly

**Recommended Year /Semester:** B.Sc. (Hons.) Food Technology & Processing (UG), Year I/

Semester I

**Prerequisites for registration:**

Registration of a student in various courses in consultation with the respective course teacher and Adviser and acceptance by the principal. The approved courses must be mentioned in the roster form.

**Learning Outcomes:**

Upon successful completion, students will have the practical knowledge and skills to: Basic food processing and food analysis, food sustainability.

**Objective:**

This course is designed to introduce student to the practical knowledge and skills for basic food processing and food analysis, food sustainability, nutritional value of food groups.

**COURSE CONTENT**

**PRACTICALS:**

1. Determination of moisture content of foods using Hot air oven method
2. Determination of moisture content of liquid foods by Karl Fischer method
3. Determination of ash content of foods
4. Determination of acidity of foods
5. Minimal processing of food
6. Preservation of vegetables with minimal processing
7. Preservation of fruits with minimal processing
8. Sustainable food product development
9. Calculation of Basal Metabolic Rate
10. Calculation of Basal Metabolic Index
11. Studies on role of various national and international agencies in the field of food and human nutrition
12. Studies on nutritional value of different food groups
13. Nutritional labelling of food products
14. Visit to food analytical laboratory
15. Visit to Food processing industry

## First Year II Semester

[illegible]

**BFMML 108**

**Basic Food Engineering**

**Credits: 2+0**

**(Unit operation for food process)-II**

**University: MGM University, Chhatrapati Sambhajanagar**

**Faculty: Science (Food Tech. & Processing)**

**Institute: Institute of Biosciences and Tech.**

**Degree: Food Tech. & Processing (UG)**

**Course Unit Title: Food Engineering**

**Course Code: BFMML 108**

**Credits allocated: 2+0 (Theory)**

**Level of Study: UG**

**Mode of delivery, planned learning activities and teaching method: Lecture 2hrs / weekly**

**Recommended Year /Semester: Food Tech. & Processing -Bachelor of Science, Year I/ Semester II**

**Learning Outcomes:** Upon successful completion, students will have the knowledge and skills to:  
Basic concepts: systems, processes, cycles, energy, The Zeroth Law of Thermodynamics Ideal gases and Properties of steam.

**Objective:** To familiarize the students with the fundamental principles of Energy Generation & Conservation, various developments and its potential applications.

**COURSE CONTENT (Total Lecture- 30)**

**THEORY:**

**UNIT I: BASIC CONCEPTS OF THERMODYNAMICS (6 Lecture)**

Basic concepts: systems, processes, cycles, energy, The Zeroth Law of Thermodynamics Ideal gases: Equation of state, Compression and expansion of gases, The first Law of Thermodynamics: Internal energy, enthalpy.

**UNIT II: BASICS OF UNIT OPERATION FOR FOOD PROCESSING (14 Lecture)**

Size reduction: Benefits, classification, sieve/screen analysis, principle and mechanisms of comminution of food

Size reduction equipment: Principal types, hammer mills and impactors, attrition mills, buhr mill, tumbling mills, tumbling mills, colloid mill, cutting machines (slicing, dicing, shredding, pulping);

Mixing: Theory of solids mixing, criteria of mixer effectiveness and mixing indices, rate of mixing, theory of liquid mixing, power requirement for liquids mixing; Mixing equipment: Mixers for low- or medium-viscosity liquids (paddle agitators, impeller agitators, powder-liquid contacting devices, other mixers),

Mechanical Separations: theory, centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers, desludging machines; Filtration: theory of filtration, rate of filtration, pressure drop during filtration, applications, Filtration equipment; plate and frame filter press, rotary filters, centrifugal filters and air filters,

filter aids; Membrane separation: Concept, materials for membrane construction, Applications of ultra-filtration in food processing; Evaporation, concept of evaporation, mechanism

### **UNIT III: RENEWABLE ENERGY SOURCES (5 Lecture)**

Renewable energy sources like solar, wind and biogas and the its utilization in food processing, Related equipment and machineries to renewable energy sources

### **UNIT IV: FUELS AND CALORIFIC VALUE (5 Lecture)**

Fuels: Chemical properties, air force combustion, Calorific value and its determination. Properties of steam: Wet, dry saturated super-heated steam

Condensers; Layout of pipe-line and expansion joints, Air Compressors: Reciprocating, Single and two stage air compressors.

### **REFERENCES / TEXTBOOK**

1. Food Engineering Operation Brenan JG, Butters JR, Elsevier Applied Science London. 1990
2. Unit Operations in Food Processing Earle RL Elsevier, 2013
3. Unit Operations in Food Processing Ibarz A. and Gustavo VBC CRC Press, 2002
4. Engineering Thermodynamics C.P. Gupta and Rajendra Prakash
5. Thermal Engineering Ballaney P.L.S. Sivanagaraju, M. Balasubba Reddy, D.
6. Electric Energy-Generation, Utilization and Conservation S. Sivanagaraju,
7. Energy Management and Conservation P. Diwan and Dwivedi
8. Energy generation.
9. N.C. Pandya & C.S. Shah. Elements of Heat Engines Charotar Publishing House, Anand 1990
10. Indian Boiler Regulation Codes Indian Boiler Regulation Codes, 1991
11. Generation of Electrical Energy Gupta BR S. Chand Publishing, New Delhi 2010

# **FOOD MICROBIOLOGY**

**BFMML109**

**Credits: 3+0**

**University: MGM University, Chhatrapati Sambhajinagar      Faculty: Science (Food Tech. & Processing)**

**Institute: Institute of Biosciences and Tech.**

**Degree: Food Tech. & Processing (UG)**

**Course Unit Code: BFMML109**

**Credits allocated: 3+0 (Theory)**

**Course Unit Title: Food Microbiology**

**Level of Study: UG**

**Mode of delivery, planned learning activities and teaching method: Lecture 3hrs / weekly**

**Recommended Year /Semester: Food Tech. & Processing -Bachelor of Science, Year I/ Semester II**

**Learning Outcomes:** Upon successful completion, students will have the knowledge and skills to: Basic heat transfer processes, Convection, Heat Exchangers, Mass transfer and Unit operation etc

**Objective:** This Course is designed to introduce a basic study of the phenomena of heat and mass transfer, to develop methodologies for solving a wide variety of practical engineering problems, and to provide useful information concerning the performance and design of particular systems and processes.

## **COURSE CONTENT (Total Lecture- 45)**

### **THEORY:**

#### **UNIT I- INTRODUCTION OF FOOD MICROBIOLOGY (8 Lecture)**

Importance and significance of microbiology, microorganisms in food science, classification of Microorganisms, morphology of microorganisms, structure of cell (plant cell & animal cell)

#### **UNIT II-BACTERIA, YEAST, MOULD, VIRUSES (8 Lecture)**

Morphology and structure of Bacteria, Yeast, Mould and Viruses. cultivation of bacteria, nutritional requirements, nutritional classification of bacteria, phototrophs, chemotrophs, autotrophs and heterotrophs, obligate parasites. Thermophilic bacteria, Thermophobic bacteria, Prebiotics, Probiotics, Role of bacteria in different food production, bacterial spoilage

#### **UNIT III-MICROBIAL SPOILAGE OF FOOD (16 Lecture)**

Microbial spoilage of foods Factors affecting kinds, numbers, growth and survival of microorganisms in foods, Intrinsic factors; pH, water activity, nutrients etc and Extrinsic factors: Relative humidity, temperature and gaseous atmosphere. Chemical changes caused by microorganisms: Changes in nitrogenous organic compounds, non-nitrogenous organic compounds, organic acids, other compounds, lipids, pectic substances, Contamination of foods; Sources of contamination, Genera of bacteria, Maintenance of anaerobic conditions; Asepsis, removal of microorganisms; Intermediate moisture foods; Microbiology of cereal and cereal products, milk and milk products, meat and meat



products, poultry and eggs, fish and other sea foods, Microbiology of fruits and vegetables and canned foods, Microbiology of fruits and vegetables and canned foods

#### **UNIT IV- MICROSCOPES (6 Lecture)**

Introduction of Microscope, history, application, classification of microscope, basic to advance microscopes, Microscopy, introduction, types, application etc

#### **UNIT V- GROWTH CURVE (7 Lecture)**

Growth curve of bacteria, lag phase, log phase, Z value, D value, Bacteriological media, growth of bacteria, reproduction of bacteria, introduction to fungi, algae and protozoa and virus

#### **REFERENCES / TEXTBOOK**

1. Food Microbiology Frazier and Dennis 4th Ed. Tata McGraw-Hill Education, New Delhi. 1987
2. Modern Food Microbiology James M. Jay 6th Ed. Aspen Publishers, Inc., Gaithersburg, Maryland, USA. 2002
3. Basic Food Microbiology Banawart GJ 2nd Ed. AVI Publ. 1989
4. Essentials of Food Microbiology Garbutt J Arnold Heinemann, 1997
5. Fundamentals of Food Microbiology Ray B 3rd Edition, CRC Press, 2004
6. Microbiology by Pelczar, Chan and Krieg, 5th Ed. Tata McGraw-Hill Education, New Delhi.
7. Fundamentals of Microbiology , Jeffrey C.P. Elsevier Publication, London 2017

## **NUTRACEUTICAL AND FUNCTIONAL FOODS**

**BFMIL110**

**Credits: 2+0**

**University:** MGM University, Chhatrapati Sambhajanagar      **Faculty:** Science (Food Tech. & Processing)

**Institute:** Institute of Biosciences and Tech.

**Degree:** B.Sc. (Hons). Food Tech. & Processing (UG)

**Course Unit Code:** BFMIL110

**Course Unit Title:** Nutraceuticals and functional Foods

**Credits allocated:** 2+0 (Theory)

**Level of Study:** UG

**Mode of delivery, planned learning activities and teaching method:** Lecture 2hrs / weekly

**Recommended Year /Semester:** Food Tech. & Processing -Bachelor of Science, Year I/ Semester II

**Learning outcomes:** Upon successful completion, students will have the knowledge of basic concepts of nutraceuticals, bioactive compounds, functional foods, etc.

**Objective:** To familiarize students with the functional foods, nutraceutical in different foods, raw materials, function of bioactive component.

### **COURSE CONTENT (Total Lecture- 30)**

#### **THEORY:**

#### **UNIT-I: TECHNOLOGICAL ASPECTS OF NUTRACEUTICALS AND FUNCTIONAL FOODS (12 Lecture)**

Defining nutraceuticals and functional foods, nature, type and scope. Nutraceuticals and functional foods applications and their health benefits, classification, relevant descriptions.

**Nutraceutical for specific diseases:** Food recommended and restricted in metabolic disorders and disturbances, gastrointestinal disorders; fever and infection; liver, blood, circulatory and cardiac diseases; urinary and musculoskeletal diseases, allergies, infant and baby foods, adolescent/ teen age foods, foods for pregnant ladies and nursing mothers, geriatric foods

#### **UNIT –III: FUNCTIONAL ROLE OF BIO-ACTIVE COMPOUNDS (7 Lecture)**

Antioxidants, phytochemicals, isoflavones, lycopenes, their role in Nutraceuticals and functional foods, dietary fibers and complex carbohydrates as functional food ingredients. Health benefits/ mode of action of PUFA/ gamma linolenic acids, probiotic foods and their functional role, minerals and other minor food constituents as reported in literature.

#### **UNIT –IV: ROLE OF SPECIFIC FOOD PRODUCTS AS A FUNCTIONAL FOOD (6 lecture)**

Herbs as functional foods, health promoting activity of common herbs. Cereal products as functional foods- Oats, Wheat bran, rice bran etc. Functional vegetable products, oil seeds and sea foods. Coffee, tea and other beverages as functional foods/ drinks.

## **UNIT –V: LEGAL ASPECTS OF NUTRACEUTICALS & FUNCTIONAL FOODS (5 Lecture)**

Effects of processing and storage, interaction of various environmental factors on the potentials of such foods. Marketing and regulatory issues of Nutraceuticals and functional foods and. Recent developments and advances in the area of Nutraceuticals and functional foods.

### **REFERENCES / TEXTBOOK**

1. Handbook of Nutraceutical and Functional Foods, Wildman REC
2. Anti-angiogenic Functional and Medicinal Foods, Losso JN
3. Handbook of Nutraceuticals, Pathak YV
4. Innovations in Healthy and Functional Food, Ghosh D et al
5. Nutrition and Dietetics, S. A. Joshi

## FOOD LAB-II

BFVSP113

Credits: 0+2

**University:** MGM University, Chhatrapati Sambhajanagar

**Faculty:** Basic and Applied Sciences

**Institute:** Institute of Biosciences and Technology

**Degree:** B.Sc. (Hons.) Food Technology & Processing (UG)

**Course Unit Title:** FOOD LAB II

**Course Code-** BFVSP113

**Credits-** 0+2 (Practical)

**Level of Study:** UG

**Mode of delivery planned learning activities and teaching method:** Practical 4hrs/weekly

**Recommended Year /Semester:** B.Sc. (Hons.) Food Technology & Processing (UG), Year I/ Semester II

**Prerequisites for registration:** Registration of a student in various courses in consultation with the respective course teacher and Adviser and acceptance by the principal. The approved courses must be mentioned in the roster form.

**Learning Outcomes:** Students will gain the knowledge about new techniques also they will invent new ideas. They can handle all the equipment which are in laboratory.

**Objective:** While doing Lab students will understand new techniques.

### COURSE CONTENTS

Synopsis, Lab work, Thesis Writing, Presentation

#### Ideas of Lab:

Defining Lab ideas is crucial for setting realistic expectations and laying out a clear vision for a Lab life cycle. Lab-based learning not only provides opportunities for students to collaborate or drive their own learning, but it also teaches them skills such as problem solving, and helps to develop additional skills integral to their future, such as critical thinking and time management.

#### Literature survey:

A literature review establishes familiarity with and understanding of current research in a particular field before carrying out a new investigation. Conducting a literature review should enable you to find out what research has already been done and identify what is unknown within your topic.

#### Performance:

Performance measurement during a Lab is to know how things are going so that we can have early warning of problems that might get in the way of achieving Lab objectives and so that we can manage expectations. The criteria of it as given below.

#### 1. Implementation:

Follows closely the design, uses appropriate techniques with skill and understanding to produce a good solution.

2. Evaluation:

Clearly relates to the problem. Shows a good understanding and appreciation of the solution. Objectives of what has been done.

3. Lab Log:

- a. The individual student's effort and commitment.
- b. The quality of the work produced by the individual student.
- c. The student's integration and co-operation with the rest of the group.
- d. The completeness of the logbook & time to time signature of guide

**Objective:** To elaborate the procedure for Guiding Student Labs

**Responsibility:**

- All the Lab Guide.
- All Semester B.Sc. students
- Lab Heads

**University: MGM University, Chhatrapati Sambhajanagar**

**Faculty: Science (Food Tech. & Processing)**

**Institute: Institute of Biosciences and Tech.**

**Degree: Food Tech. & Processing (UG)**

**Course Code: BFSEP114**

**Credits allocated: 0+2 (Practical)**

**Course Unit Title: Food Quality Labeling & Composition**

**Level of Study: UG**

**Mode of delivery, planned learning activities and teaching method:** Lecture 4 hrs / weekly

**Recommended Year /Semester:** Food Tech. & Processing -Bachelor of Science, Year I / Semester II

**Course Objectives:** To develop an understanding of basic skills for determination of food quality, different product development rich in nutraceuticals.

**Course outcomes:** To provide knowledge to the student for quality determination of foods, development of nutraceutical rich foods, labelling of food products.

## **COURSE CONTENT**

### **PRACTICAL:**

1. Preparation of functional food enriched with nutraceutical.
2. Production of flaxseed oil enriched cookies
3. Production of high value vitamin C enriched mango leather
4. Production of xylitol enriched hard boiled candy.
5. Production of iron enriched beverage.
6. Development of probiotic/ prebiotic food
7. Effect of packaging on food product.
8. Designing label for functional foods.
9. Quick test for food quality determination.
10. Adulteration detection test.
11. Study of FSSAI.
12. Determination of calorific value of fuel
13. Determination of dryness fraction of steam by throttling calorimeter
14. Determination of dryness fraction of steam by separating calorimeter
15. Study of Boiler mounting and boiler accessories.

**BFMMP115      MICROBIOLOGICAL SAFETY & CHEMICAL ANALYSIS OF FOOD**

**Credits: 0+1**

**University: MGM University, Chhatrapati Sambhajanagar**

**Faculty: Science (Food Tech. & Processing)**

**Institute: Institute of Biosciences and Tech.      Degree: Food Tech. & Processing (UG)**

**Course Unit Code: BFMMP115      Credits allocated: 0+1 (Practical)**

**Course Unit Title: Microbiological safety & Chemical Analysis of food      Level of Study: UG**

**Mode of delivery, planned learning activities and teaching method: 2hrs / weekly**

**Recommended Year /Semester: Food Tech. & Processing -Bachelor of Science, Year I / Semester II**

**Course Objectives:** To develop an understanding of basic skills for microbial and chemical analysis of food

**Course outcomes:** To provide knowledge to the student for basic skills for microbial and chemical analysis of food

**COURSE CONTENT**

**PRACTICAL:**

1. Estimation of Salmonella / Shigella / Staphylococcus from food samples
2. Estimation of Fungal toxins form food Samples
3. Heavy metal detection (Lead) in food.
4. Isolation and identification of Listeria and E. coli.
5. Study of HACCP for food industries by taking few models
6. Study of National and International microbial quality standards
7. Microbial analysis of water
8. Chemical analysis of water
9. Study of swelling characteristics of starches
10. Studies of solubility characteristics of starches
11. Study of rheological properties of food
12. Determination of essential amino acids in food
13. Isolation of protein from different sources of food
14. Preparation of protein isolates
15. Preparation of protein concentrates

## Syllabus Semester-III

<b>Course code:</b> FPT42MML201
<b>Course name:</b> Fundamentals of Food Development & Formulation
<b>Course category:</b> Major Mandatory <b>Credits:</b> 2 <b>Teaching scheme:</b> L-2
<b>Evaluation scheme:</b> CA-30, ESE-20
<b>Exam Duration:</b> 01 Hrs
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.
<b>Course Objectives:</b>
1. Integrate the knowledge acquired from course and apply it to the real life for develop a new food product.
2. Helps to understand market strategies and start their own business.
3. Develop a real new food product prototype and prepare a scientifically comprehensive description of this prototype
4. Demonstrate in practice constructive participation in team projects.
5. Prepare a team proposal for a company for scale-up processing, and market launching of a selected new product category.
<b>Course Outcomes:</b> At the end of the course, the students will be able to -
<b>CO1:</b> Upon successful completion students will have the knowledge and skills related to managing product development.
<b>CO2:</b> To understanding customer need, organizing product development, new product strategy, etc.
<b>CO3:</b> To get acquaint with product development management, understanding of customer need, product development organization.
<b>CO4:</b> To strategy for new product development, etc.

### Contents –

Unit	Content	Teaching hours
1	<b>MANAGING PRODUCT DEVELOPMENT</b> Introduction; Business Models for New Products; Managing Product Development; Definitions, management principles, scientific principles, administrative principles; Functions of management: Planning, organizing, staffing, directing, controlling; Organizational structures, principles of organization; Types of organization: Formal and informal, line, line and staff, matrix, hybrid.	7
2	<b>UNDERSTANDING CUSTOMER NEEDS</b> Identifying New Product Opportunities; Market Research for New Product Development; Introduction to economics: Definitions, nature, scope, difference between microeconomics and macroeconomics; Theory of demand and supply, elasticity of demand, price and income elasticity.	7
3	<b>ORGANIZING PRODUCT DEVELOPMENT</b> Product Architecture, Design for manufacturing and Prototyping; Organizing for Product Development; Developing Services and Product Service System; Markets: Types of markets and their characteristics; National income: GDP, GNP, NNP, disposable personal income, per capita income, inflation.	8
4	<b>NEW PRODUCT STRATEGY</b>	8



Building Markets and Creating Demand for New Products; Intellectual Property Issues in Product Development; New Product Business Plans – Strategy Consulting for New Products; Designing Products for Emerging Markets; Design Thinking for New Products	
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**Text Books:**

1. Marketing Management: A South Asian Perspective Philip Kotler, Keller, Koshy and Jha 14th Ed. Pearson Education. 2013
2. Marketing Management; Kotler and Keller, Burton Pearson Education Australia, 2008
3. Novel and Alternative Methods in Food Processing Biotechnological, Physicochemical, and Mathematical Approaches Edited By N. Veena, Megh R. Goyal, Ritesh B. Watharkar 2023
4. Novel Processing Methods for Plant-Based Health Foods Extraction, Encapsulation, and Health Benefits of Bioactive Compounds Edited By Megh R. Goyal, N. Veena, Ritesh B. Watharkar 2023
5. Food Product Optimization for Quality and Safety Control Process, Monitoring, and Standards Edited By Juan Carlos Contreras-Esquivel, Laxmikant S. Badwaik, Porteen Kannan, A. K. Haghi 2021

**Reference Books:**

1. Drew Boyd & Jacob Goldenberg (2013) Inside the Box: The Creative Method that Works for Everyone
2. Joseph V. Sinfield, Edward Calder, Bernard McConnell and Steve Colson (2012) How to Identify New Business Models, MIT Sloan Management Review Vol. 53, No.2.
3. Chun-Che Huang (2000) Overview of Modular Product Development, Proc. National Science Council ROC(A) Vol. 24, No. 3, pp. 149-165
4. Marc H. Meyer and Arthur DeTore (1999) Product Development for Services, The Academy of Management Executive, Vol. 13, No. 3, Themes: Teams and New Product Development (Aug., 1999), pp. 64-76
5. Drew Boyd & Jacob Goldenberg (2013) Inside the Box: The Creative Method that Works for Everyone

<b>Course code:</b> FPT42MML202	
<b>Course name:</b> Cereals, Legume, Pulses & oil seed Technology	
<b>Course category:</b> Major Mandatory	
<b>Credits:</b> 2	<b>Teaching scheme:</b> L-2
<b>Evaluation scheme:</b> CA-30, ESE-20	
<b>Exam Duration:</b> 01 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. Understand the basics of food manufacturing and processing,	
2. Explore the significance of food processing in the food industry.	
3. Learn about the historical development and evolution of food processing.	
4. Discuss principles of food safety and sanitation in food processing	
<b>Course Outcomes:</b> At the end of the course, the students will be able to -	
<b>CO1:</b> To gain the knowledge and skills related to manufacturing and processing of different products based on fruits, vegetable, cereals, legumes, egg, fish.	
<b>CO2:</b> To gain the knowledge and skills related recent advancement in processing.	
<b>CO3:</b> Study various methods of food preservation (e.g., canning, dehydration, irradiation, etc.).	
<b>CO4:</b> Understand the principles behind each preservation technique.	

**Contents –**

Unit	Content	Teaching hours
1	<b>INTRODUCTION OF FOOD MANUFACTURING</b> Significance of food manufacturing and processing; Fruits and vegetable product manufacturing and processing: jam, jelly, marmalade, candies, concentrates, sauerkraut, pickles, dehydrated fruits and vegetables, sauce and ketchup.	7
2	<b>MANUFACTURING PROCESSES</b> Confectionery and extruded product manufacturing and processing: cocoa and chocolate- based confectionery, hard boiled sweets, caramel, toffee, fondant, fudge, lozenges and traditional confectionery products.	7
3	<b>FERMENTED PRODUCTS</b> Cereal, legume and millet-based product manufacturing and processing: infant foods from cereals and millets, cereal based fermented products; Legume based fermented products, breakfast cereal foods, soy milk, soy paneer, etc.	8
4	<b>ADVANCED PROCESSING</b> Recent advances in food processing: Pulsed electric field, High pressure processing, ultrasound, dielectric heating; microwave heating, ohmic heating; infrared heating, ozonation and membrane processing.	8

**Text Books:**

1. Suri S and Malhotra A. Food Science, Nutrition and Safety, Pearson India Ltd, 2014
2. Natural Food Products and Waste Recovery Healthy Foods, Nutrition Design, and Extraction of Valuable Compounds Edited By Elizabeth Carvajal-Millan, Abu Zahrim Yaser, A. K. Haghi 2022

3. Novel Approaches in Biopreservation for Food and Clinical Purposes Edited By Enriqueta Garcia-Gutierrez, Natalia Gomez-Torres, Sara Arbulu 1st Edition 2024
4. Food Materials Science-Principles and practice – by José M. Aguilera and Peter J. Lillford (2008). Publisher: Springer, ISBN 978-0-387-71946-7
5. Srivastava R.P. and Sanjeev Kumar, Fruit and Vegetable Preservation Principles and Practices, International Book Distributing Company, New Delhi 2005
<b>Reference Books:</b>
1. Srilakshmi B. Food Science. Delhi: New Age International Private Limited, 2012
2. Potter N, Hotchkiss JH. Food Science. 5th edn. Delhi: CBS Publishers, 2007.

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<b>Course code:</b> FPT42MML202	
<b>Course name:</b> Cereals, Legume, Pulses & oil seed Technology	
<b>Course category:</b> Major Mandatory	
<b>Credits:</b> 2	<b>Teaching scheme:</b> L-2
<b>Evaluation scheme:</b> CA-30, ESE-20	
<b>Exam Duration:</b> 01 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. Understand the basics of food manufacturing and processing,	
2. Explore the significance of food processing in the food industry,	
3. Learn about the historical development and evolution of food processing,	
4. Discuss principles of food safety and sanitation in food processing,	
<b>Course Outcomes:</b> At the end of the course, the students will be able to -	
<b>CO1:</b> To gain the knowledge and skills related to manufacturing and processing of different products based on fruits, vegetable, cereals, legumes, confectionary.	
<b>CO2:</b> To gain the knowledge and skills related recent advancement in processing	
<b>CO3:</b> Study various methods of food preservation (e.g., canning, dehydration, irradiation, etc.).	
<b>CO4:</b> Understand the principles behind each preservation technique.	

**Contents –**

Unit	Content	Teaching hours
1	<b>INTRODUCTION OF FOOD MANUFACTURING</b> Significance of food manufacturing and processing; Fruits and vegetable product manufacturing and processing: jam, jelly, marmalade, candies, concentrates, sauerkraut, pickles, dehydrated fruits and vegetables, sauce and ketchup.	7
2	<b>MANUFACTURING PROCESSES</b> Confectionery and extruded product manufacturing and processing: cocoa and chocolate- based confectionery, hard boiled sweets, caramel, toffee, fondant, fudge, lozenges and traditional confectionery products.	7
3	<b>FERMENTED PRODUCTS</b> Cereal, legume and millet-based product manufacturing and processing: infant foods from cereals and millets, cereal based fermented products; Legume based fermented products, breakfast cereal foods, soy milk, soy paneer, etc.	8
4	<b>ADVANCED PROCESSING</b> Recent advances in food processing: Pulsed electric field, High pressure processing, ultrasound, dielectric heating; microwave heating, ohmic heating; infrared heating, ozonation and membrane processing.	8

**Text Books:**

1. Suri S and Malhotra A. Food Science, Nutrition and Safety, Pearson India Ltd, 2014
2. Natural Food Products and Waste Recovery Healthy Foods, Nutrition Design, and Extraction of Valuable Compounds Edited By Elizabeth Carvajal-Millan, Abu Zahrim Yaser, A. K. Haghi 2022
3. Novel Approaches in Biopreservation for Food and Clinical Purposes Edited By

Enriqueta Garcia-Gutierrez, Natalia Gomez-Torres, Sara Arbulu 1st Edition 2024
4. Food Materials Science-Principles and practice – by José M. Aguilera and Peter J. Lillford (2008). Publisher: Springer, ISBN 978-0-387-71946-7
5. Srivastava R.P. and Sanjeev Kumar, Fruit and Vegetable Preservation Principles and Practices, International Book Distributing Company, New Delhi 2005
<b>Reference Books:</b>
1. Srilakshmi B. Food Science. Delhi: New Age International Private Limited, 2012
2. Potter N, Hotchkiss JH. Food Science. 5th edn. Delhi: CBS Publishers, 2007.

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<b>Course code:</b> FPT42VSP201	<b>Course name:</b> Applied FTP Lab I
<b>Course category:</b> Vocational skill course	
<b>Credits:</b> 2	<b>Teaching scheme:</b> P-4
<b>Evaluation scheme:</b> CA–30, ESE–20	
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. Understand the basics of food manufacturing and processing,	
2. Explore the significance of food processing in the food industry,	
3. Learn about the historical development and evolution of food processing,	
4. Discuss principles of food safety and sanitation in food processing,	
5. Explore methods and techniques for quality assurance in food manufacturing.	
<b>Lab Outcomes:</b> At the end of the course, the students will be able to -	
<b>LO1:</b> To gain the knowledge and skills related to manufacturing and processing of different products based on fruits, vegetable, cereals, legumes, confectionary.	
<b>LO2:</b> To gain the knowledge and skills related recent advancement in processing.	
<b>LO3:</b> Study various methods of food preservation (e.g., canning, dehydration, irradiation, etc.).	
<b>LO4:</b> Evaluate the advantages and limitations of different preservation methods.	

**Contents –**

Sr.No.	Title of the Experiment
1	Study the standard operating procedure
2	Preparation of jam
3	Preparation of marmalade
4	Preparation of candies
5	Preparation of concentrates
6	Preparation of sauerkraut
7	Preparation of pickles
8	Preparation of sauce and ketchup
9	Preparation of Confectionery chocolate
10	Preparation of hard-boiled sweets
11	Preparation of caramel

12	Preparation of fondant
13	Preparation of toffee
14	Preparation of fudge
15	Preparation of traditional confectionery products
16	Preparation of infant foods from cereals and millets
17	Preparation of Legume based fermented products
18	Preparation of breakfast cereal foods
19	Preparation of cereal based fermented products
20	Preparation of soy milk, soy paneer

**Reference Book / Hand Books/ Lab Manual**

1. Barrett, D. M., & Somogyi, L. P. (Eds.). (2002). Processing fruits: Science and technology (2nd ed.). CRC Press.
2. Novel and Alternative Methods in Food Processing Biotechnological, Physicochemical, and Mathematical Approaches Edited By N. Veena, Megh R. Goyal, Ritesh B. Watharkar 2023
3. Sustainable Marine Food and Feed Production Technologies Edited By Anil Kumar Patel, Reeta Rani Singhania, Cheng-Di Dong, Ashok Pandey 2023
4. Bioactive Compounds in Fermented Foods Health Aspects Edited By Amit Kumar Rai, Anu Appaiah K. A. 1st Edition 2022

<b>Course code:</b> FPT42MMP201	<b>Course name:</b> Sustainable food production
<b>Course category:</b> Major Mandatory	
<b>Credits:</b> 2 <b>Teaching scheme:</b> P-4	<b>Evaluation scheme:</b> CA-30, ESE-20
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
Understanding Sustainability in Agriculture,	
The concept of sustainability in the context of food production,	
Explore the principles of agroecology and their role in sustainable food production,	
Investigate technological innovations in agriculture that contribute to sustainability,	
Discuss the role of precision farming, biotechnology, and other emerging technologies in sustainable food production.	
<b>Lab Outcomes:</b> At the end of the course, the students will be able to -	
<b>LO1:</b> Environmental Sustainability	
<b>LO2:</b> Research and Innovation	
<b>LO3:</b> Ethical and Sustainable Practices	
<b>LO4:</b> Entrepreneurship Development	

**Contents –**

Sr.No.	Title of the Experiment
1	Standard operating Procedure of laboratory
2	Identify and source local ingredients for food production.
3	Plan menus based on seasonal availability to reduce the need for long-distance transportation
4	Implement strategies to minimize food waste in the food industry
5	Explore composting and recycling options for food packaging materials.
6	Explore and incorporate alternative protein sources
7	Preparation of plant-based protein
8	Preparation of biodegradable packaging material
9	Preparation of insect-based product
10	Learn about sustainable fishing practices
11	Implement sustainable packaging solutions by using edible starch



12	Development of plastic alternative packaging material
13	Study on sustainable cooking methods
14	Study of carbon footprint
15	Study of Good Agricultural Practices
16	Monitor the impact of sustainable practices in food system
17	Study to enhance traceability and transparency in the food supply chain
18	Development of cultured meats
19	Incorporation of renewable energy sources in food production
20	Visit to the organic food production industry

**Reference Book / Hand Books/ Lab Manual**

1. Tiwari, B. K., Norton, T., & Holden, N. M. (Eds.). (2013). *Sustainable food processing*. John Wiley & Sons.
2. Lawrence, M., & Friel, S. (Eds.). (2019). *Healthy and sustainable food systems*. Routledge.
3. Blay-Palmer, A. (2016). *Food fears: From industrial to sustainable food systems*. Routledge.

<b>Course code:</b> FPT42FPJ201	<b>Course name:</b> Field Project
<b>Course category:</b> Field Project	
<b>Credits:</b> 2 <b>Teaching scheme:</b> J-4	<b>Evaluation scheme:</b> CA–30, ESE–20
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. Students will be able to practice acquired knowledge within the chosen area of technology for development	
2. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.	
<b>Lab Outcomes:</b> At the end of the course, the students will be able to -	
<b>LO1:</b> Students will be able to practice acquired knowledge within the chosen area of technology for project development.	
<b>LO2:</b> Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.	

**Contents –**

Sr.No.	Title of the Experiment
1	Food Processing, Equipment Design
2	Novel Processing Technology
3	Waste Product Utilization
4	New Product Development
5	Food Packaging
6	Sensors in Food Industry

**Ideas of project:**

Defining project ideas is crucial for setting realistic expectations and laying out a clear vision for a project life cycle. Project-based learning not only provides opportunities for students to collaborate or drive their own learning, but it also teaches them skills such as problem solving, and helps to develop additional skills integral to their future, such as critical thinking and time management.

**Literature survey:**

A literature review establishes familiarity with and understanding of current research in a particular field before carrying out a new investigation. Conducting a literature review should

enable you to find out what research has already been done and identify what is unknown within your topic.

**Performance:**

Performance measurement during a project is to know how things are going so that we can have early warning of problems that might get in the way of achieving project objectives and so that we can manage expectations. The criteria of it as given below.

**Implementation:**

Follows closely the design, uses appropriate techniques with skill and understanding to produce a good solution.

**Evaluation:**

Clearly relates to the problem. Shows a good understanding and appreciation of the solution.

Objectives of what has been done.

**Project Log:**

- a. The individual student's effort and commitment.
- b. The quality of the work produced by the individual student.
- c. The student's integration and co-operation with the rest of the group.
- d. The completeness of the logbook & time to time signature of guide

**Objective:** To elaborate the procedure for Guiding Student projects

**Responsibility:**

1. All the Project Guide.
2. All Semester B.Sc. students
3. Project Heads

**PROCEDURE**

SN	Activities	Responsibilities
1	PG students are deciding on their team members for their semester project with their proposed project domain and title	Project head, PG students
2	Director shall allocate the project guide based on their area of expertise ( not more than 3 batches to a guide )	Director
3	Ensuring that students have regular discussion meetings with their project guides.	Project guide Project head
4	Synopsis preparation and submission	Project head
5	Verification of student project log book	Project guide Project head

6	Approval of PPT: Abstract, existing, proposed system. 30% of proposed work. 80% of proposed work. 100% of proposed work.	Project guide
7	Preparation and submission of progress report during project	Students Project head
8	Preparing list for Redo students (insufficient content, plagiarism, poor presentation, genuine absentees.	Project head
9	Submission of hard copy of project report	Project head
10	Evaluation of project report	External examiner
11	Organizing final project viva-voce	Project heads
12	Ensuring that if a candidate fails to submit the project report on or before the specified deadline , he/she is deemed to have failed in the project work and shall re – enroll for the same	Project head Project guide Director

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## Syllabus Semester-IV

<b>Course code:</b> FPT42MML204	<b>Course name:</b> Fruits, vegetables, spices & Plantation crop processing Technology
<b>Course category:</b> Major Mandatory	
<b>Credits:</b> 2	<b>Teaching scheme:</b> L-2
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. Improve cultivation practices and enhance fruit quality, implement advanced farming techniques to maximize yield and quality, optimize vegetable farming for increased productivity, utilize sustainable farming methods to ensure a consistent and diverse vegetable supply,	
2. Enhance spice production and quality.	
3. Implement measures for sustainable spice farming, including proper crop rotation and soil management.	
4. Refer to specific spice varieties and their cultivation practices outlined in sources like the 'List of Indian Spices.	
<b>Course Outcomes:</b> At the end of the course, the students will be able to -	
<b>CO1:</b> The knowledge of fruits and vegetable processing technology, supply chain, waste management and processed products.	
<b>CO2:</b> The knowledge of spices and condiments processing technology, supply chain, waste management and processed products.	
<b>CO3:</b> The knowledge of in-depth understanding of various fruits, vegetables, spices, and plantation crops, including their varieties, growth cycles, and key characteristics.	
<b>CO4:</b> Develop skills to minimize waste during processing, adopting sustainable practices to enhance resource efficiency and environmental responsibility in the production of processed crops.	

### Contents –

Unit	Content	Teaching hours
1	<b>FRUITS AND VEGETABLE PROCESSING</b> Scope of fruit and vegetable Processing industry in India. Present status, constraints and prospects, Principles and preservation methods of fruits and vegetables, Primary processing and pack house handling of fruits and vegetables; Minimal processing of fruits and vegetables Blanching operations and equipment. Canning of Fruits and Vegetables.	7
2	<b>FRUITS AND VEGETABLE PRODUCTS</b> Preparation, preservation and machines for manufacture of crystallized fruits and preserves, jam, jelly and marmalades, problems, candies, Preparation, preservation and machines for manufacture of preserve, concentrate, sauerkraut, chutney, pickles, sauce, puree, paste, ketchup; toffee. Preparation and preservation of juices, squashes, syrups, sherbets, nectars, cordials, Problems on squash and RTS.	7
3	<b>SPICES</b> Production and processing scenario of spice, flavour & plantation crops and its scope: Major spices: Post harvest technology, composition, processed	8

	products of spices – ginger, chilli, turmeric, onion, garlic, pepper, cardamom, cashew nut and coconut, Minor spices, herbs and leafy vegetables: processing and utilization, All spice, Annie seed, sweet basil, caraway seed, cassia, cinnamon, clove, coriander, cumin, dill seed, Fern seed nutmeg, mint, marjoram, Rose merry, saffron, sage, etc	
4	<b>TEA, COFFEE, COCOA</b> Tea, Coffee, Cocoa: production and processing scenario and its scope, Processing quality control, Vanilla and annatto-processing, Spice oil and oleoresins	8

**Text Books:**

1. Handbook of Herbs and spices Peter VK Woodhead Publishing 2012
2. The Complete Book on Spices & Condiments (with cultivation, processing & uses) NIIR BOARD Asia Pacific Business Press Inc.2010
3. Handbook on Spices and Condiments (cultivation, processing and extraction) Panda H. Asia Pacific Business Press Inc.2010
4. Preservation of Fruits and Vegetables Khader ICAR, New Delhi 2010
5. Fruit and Vegetable Preservation Principles and Practices Srivastava R. P. and Sanjeev Kumar International Book Distributing Company, New Delhi 2005
6. Barrett, D. M., & Somogyi, L. P. (Eds.). (2002). Processing fruits: Science and technology (2nd ed.). CRC Press. [1]
7. Fellows, P. J. (2000). Food processing technology: Principles and practice (2nd ed.). Woodhead Publishing. [5]
8. Singh, R. P., Heldman, D. R., & Singh, R. K. (2016). Introduction to food engineering (5th ed.). Academic Press. [6]

**Reference Books:**

1. Food Flavourings P.R. Ashust Springer, 2012
2. Spices and Seasonings: A Food Technology Handbook Tainter DR and Grannis AT John Wiley and Sons, 2001
3. Preservation of Fruits and Vegetable G. Lal, G. S. Siddappa, G. L. Tandan ICAR Publication, New Delhi 1996

<b>Course code:</b> FPT42MML205	<b>Course name:</b> Exponential Technologies in food science
<b>Course category:</b> Major Mandatory	
<b>Credits:</b> 3 <b>Teaching scheme:</b> L-3	<b>Evaluation scheme:</b> CA-60, ESE-40
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. To study about the food processing techniques for improve the quality, improve the shelf life, increase the supply chain,	
2. To study about the different emerging technology of food preservation for minimizing loss of nutrition of foods as well as or waste of food, minimize the cost of processing, minimize the time of processing,	
3. To study in detail packing technology for food packaging system,	
4. To understand the emerging packaging system for minimizing loss of nutrition of food as well as or waste of food, minimize the cost of processing, minimize the time of packaging and also detail study about the storage.	
5. To study about the refrigeration process and cold chain in food processing or preservation	
<b>Course Outcomes:</b> At the end of the course, the students will be able to -	
<b>CO1:</b> Upon successful completion students will have the knowledge of advance technologies in food processing sector.	
<b>CO2:</b> Understand the different recent advance technology for food processing and preservation	
<b>CO3:</b> Study on different types of packaging system for food and food products	
<b>CO4:</b> Understand the cold chain and refrigeration for agriculture produces storage	

**Contents –**

Unit	Content	Teaching hours
1	<b>FOOD PROCESSING TECHNIQUES</b> Definition, classifications of food processing and preservation, principles of food processing, preservation, Thermal and Nonthermal food processing, Difference between thermal and non-thermal food processing effect on food quality or properties.	9
2	<b>NOVEL TECHNOLOGY FOR FOOD PROCESSING</b> High Pressure Processing, Pulsed Electric Field, Irradiation, Microwave, Ohmic Heating: Definition, mechanism, construction and working, working principle, advantages, disadvantages, application if food processing and preservation, effect on food quality or properties.	9
3	<b>FOOD PACKAGING</b> Introduction to subject, Packaging situations in world and India, need of packaging, plastic consumption/use in world, India etc. package requirements, package functions. Package materials: classification packages, paper as package material its manufacture, types, advantages, corrugated and paper board boxes etc. Glass as package material, manufacture, advantages, disadvantages, metal as package material-manufacture, advantages, disadvantages, aluminum as package material, its advantages and disadvantages, plastic as package material, classification of polymers, properties, uses and chemistry of each plastic such as polyethylene, polypropylene, polystyrene, polycarbonate, PVC, PVDC,	9

	cellulose acetate, nylon etc	
4	<b>NOVEL PACKAGING &amp; STORAGE TECHNOLOGY</b> Active packaging, Aseptic packaging, Definition, mechanism, construction and working, working principle, advantages, disadvantages, application if food processing and preservation, effect on food quality or properties. Modified atmospheric packaging, control atmospheric packaging, zero energy cool chamber: Definition, mechanism, construction and working, working principle, advantages, disadvantages, application if food processing and preservation, effect on food quality or properties.	9
5	<b>FOOD REFRIGERATION AND COLD STORAGE</b> Principles of refrigeration: Definition, unit of refrigerating capacity Production of low temperatures, reverse Carnot cycle, Common refrigerants and their properties: classification, nomenclature, desirable properties of refrigerants- physical, chemical, safety, thermodynamic and economical, Cold storage: Cold store, design of cold storage for different categories of food resources, size and shape, construction and material, insulation, vapour barriers, floors, frost-heave, interior finish and fitting, evaporators, automated cold stores, security of operations, Air-conditioning: Meaning, factors affecting comfort air-conditioning, classification, sensible heat factor, industrial air-conditioning	9

**Text Books:**

1. Food Packaging: Principles and Practice, Third Edition Robertson G.L. CRC Press, 2012 ISBN: 9781439862414
2. The Technology of Food Preservation by Norman W. Desrosier (Author) 6 July 2017
3. Food Processing Technology: Principles and Practice (Woodhead Publishing Series in Food Science, Technology and Nutrition) by P J Fellows (Author) 13 October 2016
4. Plastic Packaging: Properties, Processing and Applications Culter JD and Hernandez RJ Hanser, 2004 ISBN: 9783446229082
5. Food Packaging Technology Richard C, Derek M, Mark J.K. CRC Press, 2003 ISBN: 9780849397882

**Reference Books:**

1. Principles of Food Packaging Sacharwo S and Griffin RC AVI Publication, 1980
2. A Handbook of Food Packaging Painy FA Blackie Academics, 1992



<b>Course code:</b> FPT42MML206 & Beverage Processing Technology	<b>Course name:</b> Bakery, Confectionary, Snacks
<b>Course category:</b> Major Mandatory	
<b>Credits:</b> 2 <b>Teaching scheme:</b> L-2	<b>Evaluation scheme:</b> CA-30, ESE-20
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. To develop a comprehensive understanding of the raw materials used in bakery, confectionary, snacks, and beverage processing, including their properties.	
2. To study various processing techniques involved in the production of bakery, confectionary, snacks, and beverage products, such as mixing, baking.	
3. To familiarize students with the operation and maintenance of specialized equipment used in the industry, promoting efficiency, safety, and the ability to troubleshoot common issues.	
4. To foster creativity and innovation in product development, encouraging students to explore new recipes, flavors, and processing methods to stay competitive in the market related to this subject.	
<b>Course Outcomes:</b> At the end of the course, the students will be able to -	
<b>CO1:</b> In-depth knowledge of various ingredients used in bakery, confectionary, snacks, and beverage processing, including their characteristics, functionalities.	
<b>CO2:</b> Develop expertise in the application of processing techniques such as mixing, baking, with a focus on achieving desired product characteristics.	
<b>CO3:</b> Foster creativity and innovation in product development by exploring new flavors, textures, and recipes, keeping up with consumer trends and preferences.	
<b>CO4:</b> Exhibit creativity in exploring and applying innovative uses of ingredients, contributing to the development of unique and marketable bakery, confectionary, snacks, and beverage offerings.	

**Contents –**

Unit	Content	Teaching hours
1	<b>INTRODUCTION OF BAKING</b> Introduction to baking; role of bakery ingredients (major and minor) and their functions; Machines and equipment for batch and continuous processing of bakery products.	7
2	<b>HARD AND SOFT WHEAT BAKERY PRODUCT</b> Bakery products, from hard wheat: bread processes of bread making using straight and sponge, dough methods role of each ingredient, quality control Testing of raw material testing of final product Defects in bread; staleness, ropiness. Baked product from soft wheat; cookies, crackers, biscuits, cakes – ingredients, process, fault causes and remedy.	8
3	<b>INTRODUCTION OF BEVERAGE TECHNOLOGY</b> History, importance of beverages, Processing of beverages, juice-based beverages, Water treatment and quality of water, Synthetic, still, carbonated, low-calorie and dry beverages, isotonic and sports drinks, dairy based and alcoholic beverages.	7
4	<b>INTRODUCTION OF SNACKS AND CONFECTIONARY</b> History; Traditional confectionary goods; Types of confectionaries;	8

Classification of confectionery products. High Boiled Sweets: introduction, composition, properties of high boiled sweets, preparation of high boiled sweets, traditional, batch and continuous method of preparation. different types of higher boiled sweets, recipes.	
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**Text Books:**

1. Gisslen, W. (2017). Professional baking. John Wiley & Sons.
2. Edwards, W. P., & Magee, T. R. (2008). Bakery technology and engineering. Springer Science & Business Media.
3. Stauffer, C. E. (2015). Technology of biscuits, crackers and cookies (2nd ed.). Woodhead Publishing.
4. Cauvain, S. P. (2013). Baking problems solved. Elsevier.
5. Shamsuzzoha, A. H. M., & Hossain, M. (2016). Bakery products science and technology. CRC Press.
6. Rao, P. H., & Ananthanarayanan, V. S. (2009). Bakery products: Science and technology. Blackwell Publishing.
7. Rao, P. H., & Ananthanarayanan, V. S. (2011). Handbook of food products manufacturing: Principles, bakery, beverages, cereals, cheese, confectionery, fats, fruits, and functional foods. John Wiley & Sons
8. Nielsen, S. S. (Ed.). (2017). Food analysis (5th ed.). Springer.
9. Kulp, K., & Lorenz, K. J. (2017). Handbook of cereal science and technology. CRC Press.
10. Sarkar, S. (Ed.). (2016). Food processing technology: Principles and practice. CRC Press.

**Reference Books:**

1. Bakery Technology & Engineering; Matz SA; 1960; AVI Pub.
2. Up to-date Bread Making; Fance WJ & Wrogg BH; 1968, Maclasen & Sons Ltd.
3. Modern Cereal Chemistry; Kent-Jones DW & Amos AJ; 1967, Food Trade Press Ltd.
4. Modern Bakery Products: EIRI, EIRI Publication, New Delhi

<b>Course code:</b> FPT42SEP201	<b>Course name:</b> Applied FTP Lab II
<b>Course category:</b> Skill Enhancement course	
<b>Credits:</b> 2 <b>Teaching scheme:</b> P-4	<b>Evaluation scheme:</b> CA-30, ESE-20
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. Understanding Packaging Functions	
2. Evaluation of Packaging Design	
3. Exploration of Packaging Materials	
4. Conduct experiments to evaluate the performance of packaging materials, including tests for barrier properties, seal integrity, and shelf-life extension.	
5. Characterization of Composition of cereal and cereal products	
<b>Lab Outcomes:</b> At the end of the course, the students will be able to -	
<b>LO1:</b> Understanding of Packaging Materials	
<b>LO2:</b> Practical Skills in Packaging Design	
<b>LO3:</b> Quality Assessment of food packaging	
<b>LO4:</b> Analysis of cereals and cereal products	

**Contents –**

Sr.No.	Title of the Experiment
1	Standard operating Procedure of laboratory
2	Identification of packaging materials
3	Measurement of thickness of packaging films, papers and boards
4	Measurement of water absorption of paper, paper boards
5	Measurement of bursting strength of paper of paper boards
6	Measurement tear resistance of papers
7	Determination of physical properties of cereal grains
8	Determination of chemical properties of cereal grains
9	Germination of grains
10	Studies on cooking quality of cereals (cooking time, grain elongation, etc)
11	Functional properties of different cereal flour

12	Determination of starch content of cereal
13	Milling of cereal grains
14	Preparation of bread
15	Evaluation of quality parameters of bread
16	Preparation of biscuit
17	Evaluation of physical properties of cookies
18	Preparation of sponge cake
19	Rheological Testing (farinograph, mixograph, extensiograph, alveograph, amylograph)
20	Visit to milling industry

**Reference Book / Hand Books/ Lab Manual**

1. Cereal and Cereal Products, Dendy DAV & Dobraszczyk BJ Aspen Publication, 2001
2. Bakery Science and Cereal Technology Khetarpaul Daya Books, New Delhi 2005
3. Bakery Products Science and Technology Zhou and Hui John Wiley and Sons, 2014
4. Yam, K. L. (2009). The Wiley Encyclopedia of Packaging Technology. John Wiley & Sons.
5. Han, J. H. (Ed.). (2016). Innovations in Food Packaging (2nd ed.). Academic Press.
6. Robertson, G. L. (2013). Food Packaging: Principles and Practice (3rd ed.). CRC Press.
7. Yam, K. L., & Papadakis, S. E. (Eds.). (2008). Food Packaging: Material Science and Technology. CRC Press.

<b>Course code:</b> FPT42MMP202	<b>Course name:</b> Fruits, vegetables, spices & Plantation crop processing Technology Lab
<b>Course category:</b> Major Mandatory	
<b>Credits:</b> 1 <b>Teaching scheme:</b> P-2	<b>Evaluation scheme:</b> CA–30, ESE–20
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. To introduce to the practical knowledge and skills of sensorial evaluation of Food products	
2. To study different preservation techniques of fruits and vegetables	
3. To study about different components of spices	
4. To gain knowledge of standard specification of spices	
5. To make a bridge between theoretical understanding and practical application	
<b>Lab Outcomes:</b> At the end of the course, the students will be able to -	
<b>LO1:</b> Theoretical knowledge to solve real-world problems, showcasing the practical relevance of academic concepts.	
<b>LO2:</b> A deeper understanding of the subject matter through hands-on experiences, leading to a more comprehensive grasp of concepts.	
<b>LO3:</b> Technical proficiency in utilizing processing equipment and techniques specific to fruits, vegetables, spices, and plantation crops.	
<b>LO4:</b> Troubleshooting and problem-solving skills by identifying and addressing issues that may arise during practical exercises, ensuring the ability to overcome challenges in real-world processing scenarios.	

Sr.No.	Title of the Experiment
1	Standard operating Procedure of laboratory
2	Primary processing of selected fruits and vegetables
3	Preparation of grape raisins
4	Preparation of fruit leather
5	Preparation of dried onion/garlic/ginger
6	Preparation of banana/ potato wafers
7	Preparation of dried fig / banana fig
8	preparation of RTS beverage

9	Preparation of squash
10	Study on Curing of ginger
11	Detection of adulteration in spices
12	Determination of piperine content of black pepper
13	Extraction of oil/oleoresins from spices
14	Determination of curcumin content in turmeric
15	Preparation of curry powder
16	Preparation of Indian Masala for different foods
17	Study of standard specification of spices
18	Preparation of Indian Masala for different foods
19	Visit to spice industry
20	Visit to fruits and vegetables processing unit

Reference Book / Hand Books/ Lab Manual	
1.	The Complete Book on Spices & Condiments (with cultivation, processing & uses) NIIR BOARD Asia Pacific Business Press Inc. 2010
2.	Handbook of Fruit and Vegetable Processing Sinha and Hui John Wiley and Sons, 2010
3.	Fruit and Vegetable Preservation Principles and Practices Srivastava R.P. and Sanjeev Kumar International Book Distributing Company, New Delhi 2005
4.	Fruit and Vegetable Preservation -Principles and Practices Srivastava RP & Kumar S International Book Distributors, 2003

<b>Course code:</b> FPT42CEP201	<b>Course name:</b> Community Engagement Programme
<b>Course category:</b> Community Engagement Programme	
<b>Credits:</b> 2 <b>Teaching scheme:</b> P-4	<b>Evaluation scheme:</b> CA-30, ESE-20
<b>Exam Duration:</b> 02 Hrs	
<b>Pre-requisites:</b> The student should have basic knowledge of biological and applied sciences, and successfully completed the first year of the Degree Program.	
<b>Course Objectives:</b>	
1. Enhancing Community Awareness: Educating communities about food safety, nutrition, and sustainable food practices to improve public health and well-being.	
2. Promoting Sustainable Practices: Encouraging the adoption of eco-friendly food production, processing, and consumption methods to minimize environmental impact.	
<b>Lab Outcomes:</b> At the end of the course, the students will be able to -	
<b>LO1:</b> Community Engagement Skills: Students will develop effective communication, leadership, and interpersonal skills necessary for engaging with diverse community stakeholders.	
<b>LO2:</b> Applied Knowledge: Students will apply theoretical concepts and practical skills acquired in food technology to address real-world challenges faced by communities.	

Sr.No.	Title of the Experiment
1	Food Processing, Equipment Design
2	Novel Processing Technology
3	Waste Product Utilization
4	New Product Development
5	Food Packaging
6	Sensors in Food Industry

### Ideas of project:

Defining project ideas is crucial for setting realistic expectations and laying out a clear vision for a project life cycle. Project-based learning not only provides opportunities for students to collaborate or drive their own learning, but it also teaches them skills such as problem solving, and helps to develop additional skills integral to their future, such as critical thinking and time management.

### Literature survey:

A literature review establishes familiarity with and understanding of current research in a particular field before carrying out a new investigation. Conducting a literature review should enable you to find out what research has already been done and identify what is unknown within your topic.

**Performance:**

Performance measurement during a project is to know how things are going so that we can have early warning of problems that might get in the way of achieving project objectives and so that we can manage expectations. The criteria of it as given below.

**Implementation:**

Follows closely the design, uses appropriate techniques with skill and understanding to produce a good solution.

**Evaluation:**

Clearly relates to the problem. Shows a good understanding and appreciation of the solution.

Objectives of what has been done.

**Project Log:**

- a. The individual student's effort and commitment.
- b. The quality of the work produced by the individual student.
- c. The student's integration and co-operation with the rest of the group.
- d. The completeness of the logbook & time to time signature of guide

**Objective:** To elaborate the procedure for Guiding Student projects

**Responsibility:**

1. All the Project Guide.
2. All Semester B.Sc. students
3. Project Heads

**PROCEDURE**

SN	Activities	Responsibilities
1	PG students are deciding on their team members for their semester project with their proposed project domain and title	Project head, PG students
2	Director shall allocate the project guide based on their area of expertise ( not more than 3 batches to a guide )	Director
3	Ensuring that students have regular discussion meetings with their project guides.	Project guide Project head
4	Synopsis preparation and submission	Project head
5	Verification of student project log book	Project guide Project head



6	Approval of PPT: Abstract, existing, proposed system. 30% of proposed work. 80% of proposed work. 100% of proposed work.	Project guide
7	Preparation and submission of progress report during project	Students Project head
8	Preparing list for Redo students (insufficient content, plagiarism, poor presentation, genuine absentees.	Project head
9	Submission of hard copy of project report	Project head
10	Evaluation of project report	External examiner

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