



**MGM UNIVERSITY, AURANGABAD
INSTITUTE OF BIOSCIENCES AND TECHNOLOGY**

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

**Faculty of Engineering and Technology Graduate (UG)
program**

**Food Processing and Technology - CURRICULUM
w.e.f. Academic Year 2023-24**

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

SEMESTER (I and II)

**MGM UNIVERSITY, AURANGABAD
INSTITUTE OF BIOSCIENCES AND TECHNOLOGY**

CHOICE BASED CREDIT SYSTEM (CBCS)

SEMESTER PATTERN

Faculty of Engineering and Technology Graduate (UG) program

FOOD PROCESSING TECHNOLOGY - CURRICULUM

B.Tech. Food Processing Technology

FIRST YEAR

SEMESTER-I

CURRICULUM

MGM University
Chhatrapati Sambhajnagar– 431003
(Template format as per discussion at 14/05/2023)

Name of the College/Institute: Institute of Bioscience and Technology
 Name of the Program : **(3/4 Years UG programme)** B.Tech. Food Processing Technology
 Program Type: UG B.Tech Food Processing and Technology

Faculty of Engineering and Technology

Duration: - 04 Years (08 Semesters)

First Year (Semester I)																			
Course Type	Course code	Course Title	Type	Teaching period per week			Credits	Duration of exam	Evaluation Scheme (Marks)							Minimum Passing (Marks)			
				(Hrs /week)					Internal				External		Total	Internal	External		Total
				L	T	P			CA-I	MSE	CA-II	TW	ESE	PR			ESE	PR	
BSC	BFT42MML101	Introduction to Food Science and Nutrition	Theory	2		-	2		10	10	10	-	20	-	50	-	8	-	20
BSC	BFT42MML102	Biology Concept, Connection, Innovation And Application	Theory	2		-	2		10	10	10	-	20	-	50	-	8	-	20
ESC	BFT42MML103	Food Engineering-I	Theory	2			3		20	20	20	-	40	-	100	-	16		40
ESC	BFT42MML104	Chemistry of Food	Theory	2		-	3		20	20	20	-	40	-	100	-	16		40
AEC		Ability Enhancement Course	Theory	2	-	-	2		10	10	10	-	20	-	50	-	8		20
VSEC*	BFT42VSP101	Food Industry Lab	Practical	-		4	2		-	-		30	-	20	50	-	-	8	20
BSC	BFT42MMP101	Food Science Lab	Practical	-		4	2		-	-		30	-	20	50	-	-	8	20
ESC	BFT42MMP102	Food Engineering Lab	Practical	-		4	2		-	-		30	-	20	50	-	-	8	20
ESC	BFT42MMP103	Food Chemistry Lab	Practical	-	-	4	2		-	-		30	-	20	50	-	-	8	20
CCA		Co-Curricular Activity	Practical		-	4	2		-	-		30	-	20	50	-	-	8	20
Total (L-T-P) Hrs / week = 30				10		20	22								600				240

First Year (Semester II)																						
Course	Course code	Course Title	Type	Teaching period per week			Credit	Duration of exam	Evaluation Scheme							Minimum Passing						
				L	T	P			Internal				External			Total	Internal			External		Total
									CA-I	MSE	CA-II	TW	ESE	PR	CA/MSE/TW		ESE	PR				
BSC	BFT42MML105	Fundamentals of Food Technology & Microbiology	Theory	2		-	2		10	10	10	-	20	-	50		8		20			
BSC	BFT42MML106	Post-Harvest Management of Fruits and Vegetables Commodities	Theory	2		-	2		10	10	10	-	20	-	50		8		20			
ESC	BFT42MML107	Food Engineering – II	Theory	3			3		20	20	20	-	40	-	100		16		40			
ESC	BFT42MML108	Numerical and Computational Fundamentals-I	Theory	3		-	3		20	20	20	-	40	-	100		16		40			
PCC		Principles of Food Processing	Theory	2		-	2		10	10	10	-	20	-	50		8		20			
VSEC*	BFT42VSP105	Food Industry Lab	Practical	-		4	2			-		30	-	20	50			8	20			
ESC	BFT42MMP104	Engineering of Food Lab	Practical			4	2			-		30	-	20	50			8	20			
ESC	BFT42MMP105	Graphics and Product Designing Lab	Practical	-		4	2			-		30	-	20	50			8	20			
BSC	BFT42MMP106	Microbiology of Food Lab	Practical	-	-	4	2			-		30	-	20	50			8	20			
CCA		Co-Curricular Activity	Practical	-	-	4	2			-		30	-	20	50			8	20			
	Total (L-T-P) Hrs / week = 32			12		20	22								600				240			

*As per the requirement VSC / SEC can be used for Theory or Practical of core subject **as per the requirement, Department/Institute can offer OE practical

Award of UG certificate with 44 credits and an additional 4-credits core NSQF course / Internship OR continue with major and minor

SYLLABUS OF SEMESTER FIRST WITH LAYOUT

First Year (Semester I)																				
Course Type	Course code	Course Title	Type	Teaching period per week			Credits	Duration of exam	Evaluation Scheme (Marks)							Minimum Passing (Marks)				
				(Hrs /week)					Internal				External			Internal		External		Total
				L	T	P			CA-I	MSE	CA-II	TW	ESE	PR	Total	ESE	PR			
BSC	BFT42MML101	Introduction to Food Science and Nutrition	Theory	2		-	2		10	10	10	-	20	-	50		8	-	20	
BSC	BFT42MML102	Biology Concept, Connection, Innovation and Application	Theory	2		-	2		10	10	10	-	20	-	50		8	-	20	
ESC	BFT42MML103	Food Engineering-I	Theory	3			3		20	20	20	-	40	-	100		16		40	
ESC	BFT42MML104	Chemistry of Food	Theory	3		-	3		20	20	20	-	40	-	100		16		40	
AEC		Ability Enhancement Course	Theory	2	-	-	2		10	10	10	-	20	-	50		8		20	
VSEC*	BFT42VSP101	Food Industry Lab	Practical	-		4	2			-		30	-	20	50			8	20	
BSC	BFT42MMP101	Food Science Lab	Practical	-		4	2			-		30	-	20	50			8	20	
ESC	BFT42MMP102	Food Engineering Lab	Practical	-		4	2			-		30	-	20	50			8	20	
ESC	BFT42MMP103	Food Chemistry Lab	Practical	-	-	4	2			-		30	-	20	50			8	20	
CCA		Co-Curricular Activity	Practical		-	4	2			-		30	-	20	50			8	20	
Total (L-T-P) Hrs / week = 30				12		20	22								600				240	

INTRODUCTION TO FOOD SCIENCE & NUTRITION

University- MGM University, AURANGABAD **Faculty-** Engineering and Technology
Institute- Institute of Biosciences and Technology **Degree-** B.Tech- Food Processing
Technology

Course Title- Introduction to Food Science **Course Code-**
And nutrition

Credits- 2+0 (Theory)

Level of Study: UG

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

Recommended Year /Semester: B.Tech. Food Processing Technology, 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.

Objective: The aim of the course is to provide knowledge of various cooking methods (Boiling, steaming, stewing, frying, baking) associated with foods. Knowledge of the factors that determine the Classification, nutritive value of milk, spices, cereals, fruits etc.

Learning Outcomes: At the end of the course, students will be able to illustrate the nutrition. Compare various physical and chemical methods used analysis of nutritional values.

COURSE CONTENTS

THEORY

UNIT-I Cooking

Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure. Cereals, Pulses and grams – Varieties of pulses & grams, composition, nutritive value, cooking quality of pulses. Vegetables - Classification, composition, nutritive value, Fruits - Composition, nutritive value, changes during ripening, enzymatic browning.

UNIT-II Beverages

Beverages - Classification, nutritive value, fruit-based beverages and preparation of carbonated non – alcoholic beverages. Spices and Condiments - Uses. Fats and Oils - Types of oils, function of fats and oils, shortening effects of oil, factors affecting absorption of oil. Sugar cookery- Stages of sugar cookery, crystallization and factors affecting crystallization.

UNIT-III Milk

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and milk powder Egg - Structure, composition, classification, nutritive value, uses of egg in cookery, methods of cooking, foam formation and factors affecting foam formation.

UNIT-IV Meat

Meat -Structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, tenderness, methods of cooking meat and their effects. Poultry – types, composition, nutritive value, selection, methods of cooking. Fish - Structure, composition, nutritive value, selection of fish, methods of cooking and effects.

UNIT-V Nutrition

Introduction to Nutrition - General introduction, history of Nutrition. Energy - Definition of Kilocalories, Joule, energy value of foods. Basal metabolic rate definition, factors influencing

BMR. Recommended Dietary Allowances for energy; functions, source, utilization, and health (Water, Carbohydrates, Protein, Fats and Lipids, Vitamins, Minerals)

Reference Books/ Text Books

1. Food science, Chemistry and Experimental foods by M. Swaminathan.
2. Food Science by Norman.N.Potter.
3. Experimental study of Foods by Griswold R.M.
4. Food Science by Helen Charley.
5. Foundation of Food Preparation by A.G. Peckam.
6. Modern Cookery for teaching and trade, volume I&II, Thangam Philip. Orient Longmans Ltd.
7. Food Fundamentals by McWilliams, John Willy and sons, New York.
8. Food Facts & Principles by Shakunthalamanay&Shadakhraswamy.
9. Food Science by Srilakshmi, second edition, 2002.

BIOLOGY CONCEPT, CONNECTION, INNOVATION AND APPLICATION

University- MGM University, AURANGABAD **Faculty-** Engineering and Technology
Institute- Institute of Biosciences and Technology **Degree-** B.Tech. -Food Processing
Technology
Course Title- Biology concept, connection, Innovation and application
Course Code-
Credits- 2+0 **Level of Study:** UG

Mode of delivery planned learning activities and teaching method: Lecture 2hrs / weekly
Recommended Year /Semester: B.Tech. Food Processing Technology, 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: Understand biology concepts, applications. 2. Acquire knowledge on different connection of food nutrients and human body.

Objectives:

Study the concepts, characteristics, different connection of food nutrients and human body.

COURSE CONTENTS

Theory

UNIT-I plants and animals

Definition, scope and importance; biology and the connection of plants and animals. Importance of water to plants and animals.

UNIT-II Branches of biology

Branches of biology; importance, functions, scope, principles and objectives of branches (botany, zoology, microbiology, medical science)

UNIT-III Cell biology

Cell biology- (structure, function division); cell parts and their functions (vacuoles, cytoplasm, vesicles, centrioles, ribosomes, nuclear membrane, cell membrane, cytoskeleton, mitochondria, endoplasmic reticulum, nucleolus, Golgi apparatus and nucleus).

UNIT-IV Botany

Botany- study of plants including their structure, properties, and biochemical processes. included plant classification and the study of plant diseases and of interactions with the environment; applied sciences as agriculture, horticulture, and forestry.

UNIT-V Zoology

Zoology and microbiology- (introduction, importance); study of animals and microorganisms (origin, types, classification); uses of microorganisms.

Reference books:

Biology: Concepts and Applications by Lisa Starr, Cecie Starr, Christine Evers
Cell biology E-book. Elsevier Health Sciences Pollard, Thomas D., et al. , 2016.

Text-book of botany. Sachs, Julius. 1882.

A class-book of botany. Wood, Alphonso, Manufacturing Company, 1851.

A Text Book of Zoology. Volume I." A Text Book of Zoology. Volume I.Parker, T.Jeffery, and William A. Haswell. " (1940).

General zoology." Storer, Tracy Irwin. General zoology. 2nd ed (1951).

FOOD ENGINEERING-I

University: MGM University, Aurangabad

Institute: Institute of Biosciences and Technology

Faculty: Engineering and Technology

Degree: B. Tech-Food Processing
Technology

Course Unit Title: Food Engineering-I

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

Course Code-

Level of Study: UG

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

Recommended Year /Semester: B. Tech-Food Technology (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

Objective: Learn basic components of different process equipment and unit operation associated with them. Role of packaging material in food preservation. To study on engineering properties of foods, Evaporation, heat and mass transfer, agitation, mixing.

Learning Outcomes: Upon successful completion, students will have the knowledge and skills to: Engineering properties of foods, Evaporation, heat and mass transfer, agitation, mixing etc.

COURSE CONTENTS

THEORY

UNIT-I Engineering properties of foods

Engineering properties of foods (Importance and significance in equipment design, processing and handling of food products); Mechanism of heat and mass transfer (Steady and unsteady state heat transfer, boiling and condensation; Molecular diffusion and diffusivity, steady state diffusion of gases, convective mass transfer, mass transfer with laminar and turbulent flow, unsteady state mass transfer).

UNIT-II Fluidization

Fluidization and Pneumatic conveying (Aerodynamic and hydrodynamic properties, drag coefficient, terminal velocity and Reynolds number; Application of aerodynamic properties to the separation, fluidization, pneumatic handling and conveying of food products).

UNIT-III Mixing

Agitation and Mixing (Trends and challenges in mixing, mixing of liquids and power requirement- Power number and Froude number; Mixing time and mixing index; Mixing equipment- mixing of powders, viscous material and pastes, special agitation systems).

UNIT-IV Drying Technology

Recent developments in drying technology (Innovations in dryer designing based on drying characteristics (drying kinetics, drying curves), foam mat drying, spray drying, freeze drying, microwave drying, vacuum drying, fluidized bed drying and osmotic dehydration; Energy requirements for different methods of dehydration, mass and energy balances, psychrometric properties, chart and processes).

UNIT-V Equipment design

Equipment design for Irradiation, Microwave processing and High-pressure processing (Characteristics, mechanism, equipment design, interaction with food material and safety) ; Aseptic processing and Extrusion (Advances in aseptic processing- process design, aseptic equipment's, preventive measures for contamination; Extrusion cooking- recent developments, methods, equipment's, design criteria of extruders)

REFERENCE BOOKS/TEXT BOOKS

1. Food Processing Technology: Principles and Practice, By P. Fellows, Second Edition, Woodhead Publishing Limited, 2000.
2. Food Engineering Practice by K. J. Valentas, E. Rotstein and R. P. Singh CRC Press LLC
3. Introduction to Food engineering by R. P. Singh and D. R. Heldman, 2004 Elsevier publication
4. Unit Operations of Chemical Engineering by W. L. McCabe, J. C. Smith and P. Harriot, 2005 McGraw- Hill publication
5. Transport Processes and Separation Process Principles by C. J. Ginkoplis, 2003 Prentice Hall of India
6. Engineering Aspects of Thermal Food Processing by Ricardo Simpson, RC Press, Taylor & Francis Group, London New York.
7. Physical Properties of Plant and Animal Materials by V Gordon & Breach Science Publ.
8. Elements of Food Engineering by Watson E. L & Harper J. C. AVI Publ.
9. Engineering Properties of Foods by Rao M.A. & Rizvi S. S. Marcel Dekker
10. Unit Operations in Food Processing by R. L. Earle and M. D. Earle, 2004, The New Zealand Institute of Food Science and technology

CHEMISTRY OF FOOD

University- MGM University, AURANGABAD
Institute- Institute of Biosciences and Technology

Faculty- Engineering and Technology
Degree- B.Tech. Food Processing
Technology

Course Title- Chemistry of Food

Course Code-

Credits- 2

Level of Study: UG

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

Recommended Year /Semester: B.Tech. Food Processing Technology, 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: Understand macronutrients, micronutrients and their functions. 2. Acquire knowledge on different methods of analysis 3. Structure and classification of macronutrients and micronutrients.

Objectives:

Study the characteristics, outcomes, objectives, and values of different nutrients; Structure, function and classification of carbohydrates, lipids, vitamins, minerals etc.

COURSE CONTENTS

Theory

UNIT-I Major food constituents

Definition and importance; major food constituents and their physico-chemical properties. role of water in food.

UNIT-II Water

Water as a constituent of food (Relationship of water with other food constituents/ nutrients-distribution and control of water and ice in foods); Glass transitions and molecular mobility in foods, their relevance to quality and stability of food products

UNIT-III Carbohydrates, proteins and lipids

Carbohydrates, proteins and lipids: classification, physical, chemical, nutritional, and functional properties and their structural correlations; auto-oxidation of lipids and rancidity.

UNIT-IV Minerals and vitamins

Properties of minerals, vitamins, pigments, antioxidants, flavour components, allergens, toxins and anti-nutritional factors in foods; Interaction of constituents in food systems; Changes during storage and processing; Browning reactions in foods.

UNIT-V Essential nutrients

Food groups and their typical composition; essential nutrients- sources, functions, deficiency diseases; requirements and recommended dietary allowances; digestion, absorption, transport and metabolism of nutrients in human system; protein quality evaluation.

Reference Books/ Text Books

1. Bamji MS, Rao NA & Reddy V. 2003. Textbook of Human Nutrition. Oxford &
2. Belitz HD. 1999. Food Chemistry. Springer Verlag.
3. DeMan JM. 1976. Principles of Food Chemistry. AVI.
5. Meyer LH. 1987. Food Chemistry. CBS.
6. Swaminathan M. 1974. Essentials of Foods and Nutrition. Vol. II. Ganesh & Co.

FOOD INDUSTRY LAB

University- MGM University, AURANGABAD
Institute- Institute of Biosciences and Technology

Faculty- Engineering and Technology
Degree- B. Tech-Food Processing
Technology

Course Title- Food Industry Lab

Course Code-

Credits- 0+2 (2 Practical)

Level of Study: UG

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

Recommended Year /Semester: B. Tech-Food Processing Technology, 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.

Select a food processing facility (e.g., a bakery, dairy, or beverage production plant) as the subject of the case study. The goal of this project is to identify areas for improvement in the facility's operations, production processes, and quality control measures. By conducting a thorough analysis and proposing effective solutions, students will gain insight into the challenges and opportunities present in the food industry.

Objective- Students will get familiar to the topic in detail. They will have hands on different instruments. They will develop technical handling skills. Understand the food processing facility's current workflow, equipment, and production methods, Evaluate the facility's adherence to food safety and quality standards, Identify bottlenecks and inefficiencies in the production process, Propose solutions to enhance productivity, reduce waste, and improve product quality

Learning outcomes- Students will gain knowledge about need of research in particular field and the idea development of how the lacuna can be erased that can be of social benefit.

COURSE CONTENTS

Practical

Methodology

Research: Gather information about the selected food processing facility, its product range, market position, and any previous initiatives for process improvement or quality enhancement

On-site Observation: Arrange visits to the facility to observe its operations and gain a firsthand understanding of the production processes. Interview key personnel, including production managers and quality control staff, to gather insights into their perspectives and challenges.

Data Collection: Collect relevant data related to production output, waste generation, equipment utilization, and quality control metrics. Use this data to perform a detailed analysis

SWOT Analysis: Conduct a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of the facility to assess its internal capabilities and external factors affecting its performance.

Process Mapping: Create flowcharts and process maps to visualize the production workflow, from raw material intake to finished product packaging and distribution.

Quality Assessment: Evaluate the facility's quality control measures, including testing procedures, documentation, and compliance with food safety regulations.

Case Study Report:

Facility Overview: Provide a brief introduction to the selected food processing facility, including its products, production capacity, and market presence.

Current Process Analysis: Describe the facility's production processes, equipment used, and key performance metrics. Identify any challenges or inefficiencies observed during the on-site visits.

Quality Control Evaluation: Present the findings of the facility's quality control assessment, highlighting areas of strength and areas needing improvement.

Bottlenecks and Waste Generation: Analyze the identified bottlenecks in the production process and quantify the amount of waste generated at various stages.

Recommendations for Improvement: Based on the analysis, propose specific recommendations to optimize the facility's production processes, enhance quality control measures, and reduce waste. Consider suggestions for investing in new equipment, implementing better inventory management, training staff, or adopting new technologies.

Cost-Benefit Analysis: Estimate the potential cost savings and benefits resulting from the proposed improvements.

Summarize the key findings from the case study and emphasize the significance of implementing the proposed recommendations for the food processing facility. Discuss the potential impact on the facility's efficiency, productivity, and product quality, as well as the implications for the broader food industry.

By conducting this case study, students will gain valuable insights into the practical challenges faced by food processing facilities and learn how to develop effective solutions to improve productivity and quality. Additionally, they will gain exposure to the industrial workings of the food industry and understand the importance of continuous improvement in this sector.

FOOD SCIENCE LAB

University- MGM University, AURANGABAD **Faculty-** Engineering and Technology
Institute- Institute of Biosciences and Technology **Degree-** B.Tech-Food Processing
Technology

Course Title-Food science lab

Course Code-

Credits- 0+2 (2 Practical)

Level of Study: UG

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

Recommended Year /Semester: B. Tech-Food Processing Technology, 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.

COURSE CONTENT

Practical-

1. Determination of engineering properties of foods
2. Study of forced circulation evaporators
3. Study of single and multiple-effect evaporators
4. Study of different methods of freezing of foods
5. Study of individual quick freezer
6. Study of air blast freezer
7. Determination of physical properties of cereal grains
8. Determination of chemical properties of cereal grains
9. Studies on cooking quality of cereals
10. Preparation of malt
11. Value added products from cereals and millets
12. Production of modified starch
13. Determination of physical properties of legumes and oil seeds
14. Determination of proximate composition of selected pulses and oilseeds
15. Determination of nutritional quality of selected pulses and oilseeds
16. Study of mini dhal mill
17. Study of mini oil mill
18. Preconditioning of pulses
19. Visit to oil mill industry
20. Visit to dal mill industry

FOOD CHEMISTRY LAB

University- MGM University, AURANGABAD **Faculty-** Engineering and Technology

Institute- Institute of Biosciences and Technology **Degree-** B.Tech.-Food Processing
Technology

Course Title-Food Chemistry Lab **Credits-** 0+2 (1 Practical)

Course Code- **Level of Study:** UG

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

Recommended Year /Semester: B. Tech-Food Processing Technology, 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.

COURSE CONTENT

Practical-

1. Sampling of milk and milk production
2. Determination of Fat.
3. Determination of Protein (Kjeldahl method).
4. Determination of TSS.
5. Determination of fiber of fiber rich fruits and vegetables.
6. Determination of carbohydrates cereal and cereal product.
7. Determination of Water Absorption Capacity (WAC) of biscuits, cookies.
8. Determination of Oil Absorption Capacity (OAC) of biscuits, cookies.
9. Determination of moisture.
10. Determination of Ash of cereal products.
11. Water quality parameters
12. Determination of pH of water samples
13. Determination of acidity of water
14. Determination of Alkalinity of water sample
15. Measurement of turbidity of water samples
16. Determination of conductivity of water sample
17. Estimation of dissolved Oxygen (DO) in water sample
18. Estimation of Biological Oxygen Demand (BOD) of water
19. Estimation of Chemical Oxygen Demand (COD) of water
20. Determination of calcium

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CHOICE BASED CREDIT SYSTEM (CBCS)

SEMESTER PATTERN

Faculty of Engineering and Technology
Graduate (UG) program

FOOD PROCESSING TECHNOLOGY - CURRICULUM

B.Tech Food Processing Technology

FIRST YEAR

SEMESTER-II

CURRICULUM

SYLLABUS OF SEMESTER SECOND WITH LAYOUT

First Year (Semester II)																				
Course	Course code	Course Title	Type	Teaching period per week			Credit	Duration of exam	Evaluation Scheme							Minimum Passing				
				L	T	P			Internal				External		Total	Internal		External		Total
									CA-I	MSE	CA-II	TW	ESE	PR		CA/MSE/TW	ESE	PR		
BSC	BFT42MML105	Fundamentals of Food Technology & Microbiology	Theory	2		-	2		10	10	10	-	20	-	50		8		20	
BSC	BFT42MML106	Post-Harvest Management of Fruits and Vegetables Commodities	Theory	2		-	2		10	10	10	-	20	-	50		8		20	
ESC	BFT42MML107	Food Engineering – II	Theory	3			3		20	20	20	-	40	-	100		16		40	
ESC	BFT42MML108	Numerical and Computational Fundamentals-I	Theory	3		-	3		20	20	20	-	40	-	100		16		40	
PCC		Food Processing	Theory	2		-	2		10	10	10	-	20	-	50		8		20	
VSEC*	BFT42VSP105	Food Industry Lab	Practical	-		4	2			-		30	-	20	50			8	20	
ESC	BFT42MMP104	Engineering of Food Lab	Practical			4	2			-		30	-	20	50			8	20	
ESC	BFT42MMP105	Graphics and Product Designing Lab	Practical	-		4	2			-		30	-	20	50			8	20	
BSC	BFT42MMP106	Microbiology of Food Lab	Practical	-	-	4	2			-		30	-	20	50			8	20	
CCA		Co-Curricular Activity	Practical	-	-	4	2			-		30	-	20	50			8	20	
	Total (L-T-P) Hrs / week = 32			12		20	22								600				240	

FUNDAMENTALS OF FOOD TECHNOLOGY AND MICROBIOLOGY

University- MGM University, AURANGABAD
Technology

Institute- Institute of Biosciences and Technology

Faculty- Engineering and

Degree- B.Tech-Food Processing
Technology

Course Title-

Fundamentals of Food Technology and Microbiology

Credits- 2+0 (3Theory)

Course Code-

Level of Study: UG

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

Recommended Year /Semester: B.Tech. Food Processing Technology, Year 1/ 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.

Objective: The aim of the course is to provide knowledge of microorganisms (pro-technological, probiotic, pathogens and spoilage) associated with foods and their origin and role. Knowledge of the factors that determine the presence, growth and survival of microorganisms in food.

Learning Outcomes:

1. At the end of the course, students will be able to illustrate the role of microorganisms in food safety
2. Cultivate and enumerate microorganisms from various food samples
3. Compare various physical and chemical methods used in the control of microorganisms

COURSE CONTENTS

THEORY

UNIT-I Introduction

Introduction- definition, history of microbiology of food, Introduction of microbiology and its relevance to everyday life, General characteristics of bacteria, fungi, virus, protozoa, and algae.

UNIT-II Microbial spoilage of foods Factors affecting kinds

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.

UNIT-III Role of microorganisms in food

Role of microorganisms in food: all factors affecting growth and destruction of microbes-aerobes and anaerobes, psychrophilic, psychrotrophs, mesophiles, thermophilic, thermophiles, halophiles, osmophiles and sporeformers.

UNIT-IV Contamination of food

Contamination of food-stuff, vegetables, fruits, cereals, pulses, oilseeds, milk and meat during handling and processing. Deterioration and spoilage of various types of food products- Fruits, vegetables, cereal and cereal products, meat and meat products, fish and other sea foods. Prevention of spoilage of these foods.

UNIT-V Toxicants

Definition scope and general principles of food toxicology; food contamination (physical, chemical and microbial).

Reference Books/Text Book:

1. Food Microbiology, 1st Edition, M. R. Adams, 1995
2. Food Microbiology, 5th Edition, Frazier, Westhoff, Vanitha N M, 2014
3. Laboratory Methods in Food Microbiology, 3rd Edition, Harrigan F.W, 2013
4. Fundamentals Food Microbiology, 4e, Ray, 2011

POST-HARVEST MANAGEMENT OF FRUITS AND VEGETABLES COMMODITIES

University- MGM University, AURANGABAD
Technology

Faculty- Engineering and

Institute- Institute of Biosciences and Technology

Degree- B.Tech-Food Processing
Technology

Course Title- Post-Harvest Management of Fruits and Vegetable Commodities

Course Code-

Credits- 2+0 (Theory)

Level of Study: UG

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

Recommended Year /Semester: B.Tech. Food Processing Technology, Year 1/ 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.

Objective: The aim of the course is to provide knowledge of Post-Harvest management of Fruits and Vegetables. To Study Morphology and Environmental factors affecting Fruits and Vegetables during Storage.

Learning Outcomes:

1. At the end of the course, students will be able to do post-harvest management of fruits and vegetables
2. Able to plan Storage of Fruits and Vegetables
3. Compare various physical and chemical methods used in the control of microorganisms

COURSE CONTENTS

THEORY

UNIT-I: Introduction: Importance; Present status; export potential; employment generation
Introduction to Post Harvest Management: Definition of PHM, PHT, Scope, Responsibilities, Post-harvest losses, Possible measures, Morphology of Fruits and Vegetables: Introduction; Parts of fruit; Botanical classification of fruit; Consumer classification of fruit; Classification of fruits on the basis of origin; Vegetables;

Unit-II: Fruits vs. vegetables Nutritional value: Introduction; Water; Carbohydrates; Protein; Lipid; Organic acids; Vitamin and minerals, Volatiles; Physiology and Biochemistry: Introduction; Physiological development stages; Respiration; Respiration drift; Climacteric fruit; Non-climacteric fruit; Biochemistry of respiration; Aerobic and Anaerobic respiration; RQ;

Unit-III: Factors affecting rate of respiration; Transpiration; Maturity of Fruits and Vegetables: Introduction; Methods of identification of maturity, Fruit Ripening: Introduction; Changes during Ripening; Deterioration of Fruits & Vegetables: Introduction; Primary and Secondary causes of losses;

Unit-IV: Pre-harvest Factors affecting Quality: Introduction; Preharvest factors related to plant; Preharvest factors related to Environment; Preharvest factors related to chemicals; Harvesting of Fruits & Vegetables: Introduction, definition, methods of harvesting, factors during harvest affecting harvesting of fruits & vegetables:

Unit -V: Introduction; Post-harvest handling; Post-harvest Commodity Treatments: Precooling; Waxing; Sprout inhibition; Disinfestation; Fungicide application; Hot water treatment; Vapor heat treatment; Irradiation; Ripening and Degreening; Delaying ripening; Curing of roots and tubers; Dryings of root crops; Commodity treatments for apple Pre-cooling: Introduction; Effect of precooling on product quality; Factors

affecting precooling; Cooling methods; Packinghouse operations: Introduction; Dumping (loading and unloading); Washing; Drying; Sorting & Grading; Commodity treatments; Packaging; Transportation Storage Structures: Introduction; Goal of Storage systems; Storage considerations; Storage Systems; Low cost and High Cost Technology, MA, CA and Hypobaric storage Chemical Preservation of Fruits and Vegetables: General rules for chemical preservation; Factors affecting action of chemical preservatives, Hurdle technologies for preservation; Biotechnology of fruits and vegetables

References

Sr. No.	Name of Book	Author	Publisher
1	A Handbook on Post harvest Management of Fruits and Vegetables	P. Jacob John	Daya Publishing House, Delhi ISBN: 9788170355328
2	Postharvest: An introduction to the physiology and handling of fruit and vegetables, 6th edition	Wills R. and Golding J.	UNSW Press ISBN: 9781742247854
3	Post harvest Technology of Fruits and Vegetables – Vol. 1	Verma L. R. and Joshi V. K.	Indus Publishing Company, Delhi ISBN: 8173871086
4	Handbook of Analysis and Quality Control for Fruits and Vegetable Products	Ranganna S.	2 nd Edition, Tata-McGraw Hill, 2001
5	Handbook of Postharvest Technology	Chakraverty A. Mujumdar A. S. Ramaswamy H.	Marcel Dekker Inc. , New York ISBN: 0824705149
6	Handbook of Vegetable Science and Technology:	Salunke D. K. Kadam S. S.	Marcel Dekker Inc. , New York ISBN: 0824705149
7	Handling and Preservation of Fruits and Vegetables by Combined Methods for Rural Areas- Technical Manual	FAO	FAO Agr. Ser. Bull., 149. 2007

FOOD ENGINEERING-II

University: MGM University, Aurangabad
Technology

Faculty: Engineering and

Institute: Institute of Biosciences and Technology.

Degree: B. Tech-Food Processing
Technology

Course Unit Title: Food Engineering-II

Course Code-

Credits- 2+0 (2Theory)

Level of Study: UG

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

Recommended Year /Semester: B. Tech-Food Technology (UG), Year 1/ 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

Objective: Learn basic components of different process equipment and unit *operation* associated with them. Role of packaging material in food preservation. Identify key food processing and product parameters that can influence microbiological safety and quality of the processed product.

Learning Outcomes: Upon successful completion, students will have the knowledge and skills to: Evaporation, Evaporation equipment, Crystallization and dissolution and Sterilization.

COURSE CONTENTS

THEORY

UNIT I

Size reduction: Benefits, classification, sieve/screen analysis, principle, Size reduction equipment: Principal types, hammer mills and impactors, attrition mills, burr 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),

UNIT II

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: General considerations, materials for membrane construction, Ultra-filtration, processing variables, membrane fouling, Applications of ultra-filtration in food processing, reverse osmosis, mode of operation, and applications, Membrane separation methods, gel filtration, ion exchange, per-evaporation and micro filtration.

UNIT III

Evaporation: Principles of evaporation, factors affecting rate of evaporation, Evaporation equipment: Natural circulation evaporators, horizontal/vertical short tube, natural circulation with external calandria, long tube, forced circulation; Evaporator ancillary plant, design of evaporation systems, single effect, multiple effect evaporators, feeding methods of multiple effect evaporation systems, feed preheating,

Food freezing: Introduction, Principles of food freezing, Freezing systems; Direct contact systems, air blast immersion; Changes in foods; Frozen food properties; freezing time, factors influencing freezing time, freezing/thawing time; Frozen food storage.

UNIT IV

Crystallization and dissolution: Theory and principles, kinetics, applications in food industry, equipment for crystallization

Distillation: Principles, vapour-liquid equilibrium, continuous flow distillation, batch/differential distillation, fractional distillation, steam distillation, distillation of wines and spirits

UNIT V

Baking: Principles, baked foods, baking equipment; roasting: Principles of roasting, roasting equipment

Pasteurization: Purpose, microorganisms and their reaction to temperature and other influences, methods of heating, design and mode of operation of heating equipment, plate heat exchanger

Sterilization: Principles, design of batch and continuous sterilization, different methods and equipment; UHT sterilization, in the package sterilization, temperature and pressure patterns.

REFERENCE BOOKS/TEXT BOOK

1. Food Engineering Operation Brenan, Butters, Cowell and Lilly Elsevier Applied Science London. 1990
2. Unit Operations in Food Engineering. Albert Ibarz and Gustavo V. Barbosa-Cánovas CRC Press, Boca Raton, FL, USA. 2003
3. Unit Operations in Food Processing Earle RL R. Paul Singh and Dennis Elsevier, 2013
4. Introduction to Food Engineering, R. Heldman. 2014. 5 th Ed. Elsevier, Amsterdam, The Netherlands.
5. Unit Operations of Chemical Engineering Warren L. McCabe, Julian Smith, Peter Harriott 7 th Ed. McGraw-Hill, Inc., NY, USA. 2004
6. Transport Processes and Separation Process Principles (Includes Unit Operations), Christie John Geankoplis 4 th Ed. Prentice-Hall, NY, USA. 2003
7. Handbook of Food Processing Equipment George D. Saravacos and Athanasios E. Kostaropoulos Springer Science+Business Media, New York, USA. 2002
8. Coulson & Richardson's Chemical Engineering, Vol. 2, Particle Technology and Separation
9. 9. Processes, J. F. Richardson, J. H. Harker and J. R. Backhurst 5 th Ed. Butterworth-Heinemann, Oxford, UK. 2002
10. Handbook of Food Engineering Practice. Kenneth J. Valentas, Enrique Rotstein and R. Paul Singh CRC Press, Boca Raton, FL, USA. 1997

NUMERICAL AND COMPUTATIONAL FUNDAMENTALS - I

University: MGM University, Aurangabad
Technology

Faculty: Engineering and

Institute: Institute of Biosciences and Technology.

Degree: B. Tech-Food Processing
Technology

Course Unit Title: Numerical and Computational
Fundamentals –I

Course Code-

Credits- 2+0

Level of Study: UG

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

Recommended Year /Semester: B.Tech. Food Processing Technology, Year 1/ 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

Objective:

To develop an understanding of basic mathematical tools and their application.

To model real world problems into mathematical expressions using numerical representation.

Learning Outcomes:

Use knowledge of content and mathematical procedures to solve problems.

Understand the fundamental ideas and application of Calculus.

COURSE CONTENTS

THEORY

UNIT I Python Basics I:

Numbers, Strings, Lists, Loop, Functions

UNIT II Python Basics II: Biostatistics, Data Input and Output

UNIT III – Numerical I Elementary Concepts: Statements and Quantifiers, Sets, Functions and Methods of proofs,

UNIT IV Numerical II: Introduction, Quadratic equation, Factorization method, Completing square method, Formula method, Nature of roots.

UNIT V Numerical III: Introduction, Factorial notation, Permutation, Combination.

References

Suggested Reading Book:

1. Python in Nutshell, Alex Martelli, O'Reilly.
2. Objective Mathematics for JEE Main 15th Edition by Anoop Srivastava (Author)

FOOD PROCESSING

University- MGM University, AURANGABAD
Technology

Institute- Institute of Biosciences and Technology

Faculty- Engineering and

Degree- B.Tech-Food Processing
Technology

Course Title-Food Processing

Credits- 2+0 (3Theory)

Course Code-

Level of Study: UG

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

Recommended Year /Semester: B.Tech. Food Processing Technology, 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.

Objective: The aim of the course is to provide knowledge of Principles of food Processing, Spoilage and Preservation methods. To Study Preservatives and recent advancement in food processing.

Learning Outcomes:

1. At the end of the course, students will be able to apply principles of food processing
2. Able to preserve the food spoilage
3. Recent advancement in food processing

COURSE CONTENTS

THEORY

UNIT-I

Introduction: Defining food; Classification of food; Constituents of foods; Food processing; Food preservation; Food Spoilage – Introduction, Causes of food spoilage, Food poisoning, Food-borne intoxication, Food-borne infection,

Unit II

Food Preservation and Processing: Introduction; necessary; Methodology; Principles and Methods of food preservation, High Temperature Preservation: Introduction; Blanching; Pasteurization; Sterilization; Canning, Drying, Dehydration and Concentration: Introduction; Purpose; Water activity and relative humidity; Factors affecting rate of drying and dehydration; Drying methods; Changes during drying and dehydration; different Driers; Concentration- Methods of concentration, Changes; Effect of drying, dehydration and concentration on quality of foods, Food Irradiation: Introduction; Radiation sources; Measurement of radiation dose; Mechanism of Action; Type of irradiation; Factors affecting food irradiation; Effect of irradiation,

Unit-III

Preservation using Sugar, Salt and Acids: Sugar – Introduction, Factors affecting osmotic pressure of sugar solution, Foods preserved using sugar; Salt: Introduction, Antimicrobial activity of salt, Estimation of salt, Food products preserved using salt; Acid – Introduction, Mechanism, Common foods preserved using acids, Preservation by Use of Chemical preservatives: Introduction; Objectives; Factors affecting antimicrobial activity of preservatives; Type of chemical preservatives; Sulphur dioxide, Benzoic acid, etc.; Use of other chemicals like acidulants, antioxidants, mold inhibitors, antibodies, etc. Food Fermentation: Introduction, methods, common fermented foods

Unit-IV

Recent methods in Processing: Introduction; PEF, HPP, Ultrasound, Dielectric heating; Microwave heating, Osmic 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 nutritional value of food: Introduction; Consuming raw foods; Changes during meat grilling; Effect of processing on vitamins; Effect of processing on minerals; Effect of processing on carbohydrates; Effect of processing on lipids.

References

Sr. No.	Name of Book	Author	Publisher
1	Preservation of Fruits & Vegetables	Girdhari Lal, G. S. Siddappa, G. L. Tandon,	Indian Council of Agricultural Research, Publications 1986
2	Food Processing Technology: Principles and Practice	P. Fellows	CRC Press, 2000 ISBN: 9780849308871
3	Handbook of Food Preservation	Shafiur Rahman M.	CRC Press, 2007 ISBN: 9781420017373
4	Emerging Technologies for Food Processing	Da-Wen Sun	Academic Press, 2005 ISBN: 9780080455648
5	Introduction to Food Processing	Jelen P.	Prentice Hall , 1985
6	Handbook of Analysis and Quality Control for Fruit and Vegetable Products.	Ranganna S.	2nd Ed. Tata-McGraw-Hill. 2001.

FOOD INDUSTRY LAB

University- MGM University, AURANGABAD
Institute- Institute of Biosciences and Technology

Faculty- Engineering and Technology
Degree B. Tech-Food Processing
Technology

Course Title- Food Industry Lab

Course Code-

Credits- 0+2 (2 Practical)

Level of Study: UG

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

Recommended Year /Semester: B. Tech-Food Processing Technology, Year 1/ 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.

Select a food processing facility (e.g., a bakery, dairy, or beverage production plant) as the subject of the case study. The goal of this project is to identify areas for improvement in the facility's operations, production processes, and quality control measures. By conducting a thorough analysis and proposing effective solutions, students will gain insight into the challenges and opportunities present in the food industry.

Objective- Students will get familiar to the topic in detail. They will have hands on different instruments. They will develop technical handling skills. Understand the food processing facility's current workflow, equipment, and production methods, Evaluate the facility's adherence to food safety and quality standards, Identify bottlenecks and inefficiencies in the production process, Propose solutions to enhance productivity, reduce waste, and improve product quality

Learning outcomes- Students will gain knowledge about need of research in particular field and the idea development of how the lacuna can be erased that can be of social benefit.

COURSE CONTENTS

Practical

Methodology

Research: Gather information about the selected food processing facility, its product range, market position, and any previous initiatives for process improvement or quality enhancement

On-site Observation: Arrange visits to the facility to observe its operations and gain a firsthand understanding of the production processes. Interview key personnel, including production managers and quality control staff, to gather insights into their perspectives and challenges.

Data Collection: Collect relevant data related to production output, waste generation, equipment utilization, and quality control metrics. Use this data to perform a detailed analysis

SWOT Analysis: Conduct a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of the facility to assess its internal capabilities and external factors affecting its performance.

Process Mapping: Create flowcharts and process maps to visualize the production workflow, from raw material intake to finished product packaging and distribution.

Quality Assessment: Evaluate the facility's quality control measures, including testing procedures, documentation, and compliance with food safety regulations.

Case Study Report:

Facility Overview: Provide a brief introduction to the selected food processing facility, including its products, production capacity, and market presence.

Current Process Analysis: Describe the facility's production processes, equipment used, and key performance metrics. Identify any challenges or inefficiencies observed during the on-site visits.

Quality Control Evaluation: Present the findings of the facility's quality control assessment, highlighting areas of strength and areas needing improvement.

Bottlenecks and Waste Generation: Analyze the identified bottlenecks in the production process and quantify the amount of waste generated at various stages.

Recommendations for Improvement: Based on the analysis, propose specific recommendations to optimize the facility's production processes, enhance quality control measures, and reduce waste. Consider suggestions for investing in new equipment, implementing better inventory management, training staff, or adopting new technologies.

Cost-Benefit Analysis: Estimate the potential cost savings and benefits resulting from the proposed improvements.

Summarize the key findings from the case study and emphasize the significance of implementing the proposed recommendations for the food processing facility. Discuss the potential impact on the facility's efficiency, productivity, and product quality, as well as the implications for the broader food industry.

By conducting this case study, students will gain valuable insights into the practical challenges faced by food processing facilities and learn how to develop effective solutions to improve productivity and quality. Additionally, they will gain exposure to the industrial workings of the food industry and understand the importance of continuous improvement in this sector.

FOOD ENGINEERING LAB

University- MGM University, AURANGABAD

Faculty- Engineering and Technology

Institute- Institute of Biosciences and Technology

Degree B. Tech-Food Processing
Technology

Course Title- Food Engineering Lab

Course Code-

Credits- 0+2 (2 Practical)

Level of Study: UG

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

Recommended Year /Semester: B. Tech-Food Processing Technology, Year 1/ 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.

COURSE CONTENTS

Practical

List of Practical to be completed

Sr. No.	Topics	No. of Experiments
1.	Study of Principle, working and demonstration of hammer mill and crushing roll	1
2.	Study of Principle, working and demonstration of attrition mill	1
3.	Study of Principle, working and demonstration of colloidal mill	1
4.	Study of Principle, working and demonstration of modern house mill/ magnum mill	1
5.	Determination of reduction ratio of different size reduction machineries	1
6.	Study of different disintegration operations (slicing, dicing, shredding and pulping)	1
7.	Determination of mixing index of a food mixer	1
8.	Power requirement in size reduction of grain using Rittinger's law, Kick's law and Bond's law	1
9.	Study of centrifugal separation (centrifugal cream separation, centrifugal machine)	1
10.	Study of principle and working of roller dryer, cabinet dryer	1
11.	Study of principle and working of freeze dryer and vacuum dryer	1
12.	Study on osmosis of fruit	1
13.	Study on reverse osmosis	1
14.	Study of filtration operation (ultrafiltration)	1
15.	Study of membrane separation	1
16.	Study of plate and frame filter press	1

GRAPHICS AND PRODUCT DESIGNING LAB

University- MGM University, AURANGABAD

Institute- Institute of Biosciences and Technology

Faculty- Engineering and Technology

Degree B. Tech-Food Processing
Technology

Course Title- Graphics and Product Designing Lab **Course Code-**

Credits- 0+2 (2 Practical)

Level of Study: UG

Mode of delivery planned learning activities and teaching method: Practical 4 hrs. /
Weekly

Recommended Year /Semester: B. Tech-Food Processing Technology, Year 1/ 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.

COURSE CONTENTS

Practical

List of Practical to be completed on individual half empirical size drawing sheet,

1. Draw 03 cases of Projection of Solids
2. Draw 03 cases of Section of Solids
3. Draw 03 cases of Development of Surface
4. Draw 03 cases of Isometric Drawings
5. Draw 01 2D drawing and 01 3D Model using suitable CAD software

MICROBIOLOGY LAB

University- MGM University, AURANGABAD

Faculty- Engineering and Technology

Institute- Institute of Biosciences and Technology

Degree B. Tech-Food Processing
Technology (UG)

Course Title-Microbiology Lab

Course Code-

Credits- 0+2 (2 Practical)

Level of Study: UG

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

Recommended Year /Semester: B. Tech-Food Processing Technology, Year 1/ 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.

COURSE CONTENTS

Practical

1. Study of compound microscope.
2. Study of autoclave
3. Cleaning and sterilization of glassware
4. Preparation of nutrient broth.
5. Preparation of potato dextrose.
6. Preparation of nutrient agar media.
7. Growth curve characterization of bacteria.
8. Determination of moisture content from sample
9. Determination of fat content from sample
10. Determination of total mineral content from sample
11. Streak plate count
12. Microbial examination of street food
13. Microbial examination of cereal and cereal products
14. Microbial examination of meat and meat products
15. Microbial examination of milk and milk products
16. Assessment of quality of raw milk

List of Options to select from Bucket of Courses provided in various categories (Sample of Faculty of Basic and Applied Sciences):

Major
Food Technology and Processing

Minor options Within Faculty of Basic Sciences	Biotechnology
	Biomedical Engineering

Minor options from Other Faculty	Faculty of Engineering and Technology	Faculty of Social Sciences and Humanities	Faculty of Design	Faculty of Management and Commerce	Interdisciplinary Faculty	Performing Arts
	Artificial Intelligence (AI)	Journalism and Mass Communication	Product Design	Operations and Supply Management	Cosmetic Technology	Theatre Arts
	Machine Learning (ML)	Film Making	Visual Communication	Human Resource (HR)	Educational Technology	Dance
	Data Analytics	Photography	Contemporary Arts	Finance Management	Yoga Sciences	Music
	Robotics	Psychology	Interior Design	Marketing	Physical Education	Painting
	Industrial Automation	Economics	Fashion Technology	Accounting	Library Sciences	Pottery

IKS (As per the UGC guidelines. Visit Link:https://iksindia.org/English-BGSamposhan-Kendram-1-updated.pdf) ***	Faculty of	AEC (to be discussed and developed by committee of Dean)*		OE (Provide 4-8 courses of your department to be approved by the BOS)	Faculty of
Holistic medicine and wellness	***Courses For reference purpose only	Communicative English	*Courses For reference purpose only	Instrumental Techniques in Food Analysis	Food Technology
Indian psychology and yoga		Communication and Soft Skills		Unit Operation in Food Processing	Food Technology
Indian sports and martial arts		German		Advances in Food Innovation OR Food Biotechnology	Food Technology
Architectural engineering, town planning, civil engineering, Vaastu and Shilpa Shastra		French		Post-Harvest And Storage Engineering	Food Technology
Sustainable agriculture and food preservation methods		Spanish		Industrial Microbiology	Food Technology

VSEC (Respective departments will prepare the list)	Faculty of	CC(Two courses to be finalized for I & II Semester)***		VEC (to be discussed and developed by committee of Dean) ***
		NSS	***Courses For reference purpose only	Universal Human Values
		Digital Awareness		Gandhian Studies
		Personality Development		Value Education
		Yoga		
		NCC		

TENTATIVE COURSE STRUCTURE III SEM TO VIII SEM

Second Year (Semester III)																				
Course Type	Course code	Course Title	Type	Teaching period per week			Credits	Duration of Exam	Evaluation Scheme (Marks)						Total	Minimum Passing (Marks)			Total	
				L	T	P			Internal				External			Internal				
									CA1	MSE	CA2	TW	ESE	PR		CA/MSE/TW	ESE	PR		
PCC	BFT42MML201	Food Engineering-III	Theory	2	-	-	2		10	10	10	-	20	-	50				8	20
PCC	BFT42MML202	Fundamentals of Fresh Produce and Preservation	Theory	2	-	-	2		10	10	10	-	20	-	50				8	20
PCC	BFT42MML203	Numerical And Computational Fundamentals-II	Theory	2	-	-	2		10	10	10	-	20	-	50				8	20
MDM		Genetics and Evolution	Theory/Practical	2	-	-	2		10	10	10	-	20	-	50				8	20
OE		Instrumental Techniques in Food Analysis	Theory	2	-	-	2		10	10	10	-	20	-	50				8	20
OE		Industrial Microbiology	Practical	-	-	4	2			-		30	-	20	50				8	20
AEC		Ability Enhancement Course	Theory	2	-	-	2		10	10	10	-	20	-	50				8	20
EEMC		Entrepreneurship Management-I	Theory/Practical	2	-	-	2			-		30	-	20	50				8	20
VEC		Value Education	Theory	2			2		10	10	10	-	20	-	50				8	20
FP		Field Project	Practical	-	-	4	2					30	-	20	50				8	20
PCC	BFT42MMP202	Food Lab	Practical		-	4	2					30	-	20	50				8	20
		Total = 28		16		12	22								650					260

Second Year (Semester IV)

Course Type	Course code	Course Title	Type	Teaching period per week			Credit	Duration of Exam	Evaluation Scheme (Marks)						Total	Minimum Passing (Marks)					Total
				L	T	P			Internal				External			Internal			External		
									CA 1	MSE	CA2	TW	ESE	PR		CA	MSE	TW	ESE	PR	
PCC	BFT42MML204	Food Preservation, Energy Generation And Conservation	Theory	2	-	-	2		10	10	10	-	20	-	50				8		20
PCC	BFT42MML205	Food Quality Assurance, HACCP and Hygiene	Theory	2		-	2		10	10	10	-	20	-	50				8		20
PCC	BFT42MML206	Numerical And Computational Fundamentals-III	Theory	2	-	-	2		10	10	10	-	20	-	50				8		20
MDM		Genomics and Proteomics	Theory	2	-	-	2		10	10	10	-	20	-	50				8		20
OE		Unit Operation in Food Processing	Theory	2		-	2		10	10	10	-	20	-	50				8		20
VSEC	BFT42VSP201	Mini Project	Project/Practical	-	-	4	2		-	-	-	30	-	20	50					8	20
EEMC		Entrepreneurship Management-II	Theory	2	-	-	2		10	10	10	-	20	-	50				8		20
VEC		Value Education Course	Theory	2	-	-	2		10	10	10	-	20	-	50				8		20
PCC	BFT42MMP203	Food Lab	Practical	-	-	4	2		-	-	-	30	-	20	50					8	20
PCC	BFT42MMP204	Food Quality Lab	Practical	-	-	4	2		-	-	-	30	-	20	50					8	20
PCC	BFT42MMP205	Food Preservation Lab	Practical	-	-	4	2		-	-	-	30	-	20	50					8	20
		Total = 30		14		16	22								550						220

Third Year (Semester V)

Course Type	Course code	Course Title	Type	Teaching period per week			Credit	Duration of Exam	Evaluation Scheme (Marks)							Minimum Passing (Marks)					
				L	T	P			Internal				External			Internal			External		Total
									CA 1	MSE	CA2	TW	ESE	PR	Total	CA	MSE	TW	ESE	PR	
PCC	BFT42MML301	Cereals, Legumes, Pulses And Oil Seeds Processing Technology	Theory	3	-	-	3		20	20	20	-	40	-	100				16		40
PCC	BFT42MML302	Food Defence And Sustainability	Theory	3		-	3		20	20	20	-	40	-	100				16		40
PCC	BFT42MML303	Numerical And Computational Fundamentals-IV	Theory	2	-	-	2		10	10	10	-	20	-	50				8		20
PEC		1. Confectionary and Snacks Technology	Theory	2		-	2		10	10	10	-	20	-	50				8		20
PEC		1. Confectionary and Snacks Lab	Project/Practical			4	2		-	-	-	30	-	20	50					8	20
MDM		1. Plant Tissue Engineering	Theory	2	-		2		10	10	10	-	20	-	50				8		20
MDM		1. Plant Lab Or Mini Project	Project/Practical		-	4	2		-	-	-	30	-	20	50					8	20
OE		Advances in Food Innovation	Theory	2	-		2		10	10	10	-	20	-	50				8		20
PCC	BFT42MMP301	Food Lab	Practical	-	-	4	2		-	-	-	30	-	20	50					8	20
PCC	BFT42MMP302	Food Processing Lab	Practical		-	4	2					30	-	20	50					8	20
Total =30				14		16	22								600						240

Third Year (Semester VI)

Course Type	Course code	Course Title	Type	Teaching period per week			Credit	Duration of Exam	Evaluation Scheme (Marks)							Minimum Passing (Marks)					
				L	T	P			Internal				External		Total	Internal			External		Total
									CA 1	MSE	CA2	TW	ESE	PR		CA	MSE	TW	ESE	PR	
PCC	BFT42MML304	Fruits, Vegetables, Spices And Plantation Crop Processing Technology	Theory	2	-	-	2		10	10	10	-	20	-	50				8		20
PCC	BFT42MML305	Food Law Ethics And CSR	Theory	2		-	2		10	10	10	-	20	-	50				8		20
PCC	BFT42MML306	Food Rheology, Texture and Sensory Science	Theory	2		-	2		10	10	10	-	20	-	50				8		20
PEC		Instrumentation and Process Control	Theory	3		-	3		20	20	20	-	40	-	100				16		40
PEC		Food Processing Equipment Design	Theory	3		-	3		20	20	20	-	40	-	100				16		40
PEC		Food Instrumentation and Equipment Design Lab	Practical		-	4	2		-	-	-	30	-	20	50				8		20
MDM		Animal Tissue Engineering	Theory/Practical	2	-		2		10	10	10	-	20	-	50				8		20
VSEC	BFT42VSP301	Mini Project	Project/Practical	-	-	4	2		-	-	-	30	-	20	50				8		20
PCC	BFT42MMP303	1. Seminar (Research Paper Based) OR 2. Food Product Design	Practical	-	-	4	2		-	-	-	30	-	20	50				8		20
PCC	BFT42MMP304	Processing And Evaluation Lab	Practical	-	-	4	2					30	-	20	50				8		20
		Total = 30		14		16	22								600						240

