



**PSGR
Krishnammal College for Women**



Affiliated to Bharathiar University \ Autonomous \ College of Excellence \ Accredited with A++ Grade \ Ranked 9th in NIRF

DEPARTMENT OF FOOD PROCESSING TECHNOLOGY AND MANAGEMENT

CHOICE BASED CREDIT SYSTEM (CBCS)

&

**LEARNING OUTCOMES- BASED CURRICULUM FRAMEWORK
(LOCF)**

**BACHELOR OF SCIENCE IN FOOD PROCESSING TECHNOLOGY AND
MANAGEMENT**

2025 – 2028 Batch



DEPARTMENT OF FOOD PROCESSING TECHNOLOGY AND MANAGEMENT

PROGRAMME LEARNING OUTCOMES (PLO's)

After Completion of the program, the students will

- PLO1 :** Acquire the knowledge about the chemical, biochemical, physical, microbiological changes that occur during processing and preservation of any food.
- PLO2 :** Possess the ability to identify, and solve problems related to Food manufacturing
- PLO3 :** Be able to differentiate between processed and safely processed food
- PLO4 :** Apply better/good practices and be more innovative in developing the food products as per the current requirements of the market.
- PLO5 :** Acquire skills to analyze different food products and interpret the results in an effective manner.
- PLO6 :** Be equipped to transfer this knowledge to the consumer

PROGRAMME SPECIFIC OUTCOME

- PSO1 :** Graduates with sufficient knowledge in the areas of food science, food chemistry, food processing and preservation of foods.
- PSO2 :** Development of a food technologist, food analyst, nutritionist and an administrator
- PSO3 :** Equip themselves to higher levels of learning and/or for the development of new products that will accommodate to start up new venture in areas of food processing.
- PSO4 :** Shall keep themselves abreast with the current trends to meet the food industry challenges.



**BACHELOR OF SCIENCE IN FOOD PROCESSING TECHNOLOGY AND
MANAGEMENT CHOICE BASED CREDIT SYSTEM (CBCS)
LEARNING OUTCOMES- BASED CURRICULUM FRAMEWORK (LOCF)**

**SYLLABUS AND SCHEME OF EXAMINATION
2025 - 2028**

Sem	Part	Course Code	Title of the Course	Course Type	Instruction hours/week	Contact hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	TOTAL	
I	I	TAM2501A/ HIN2501A/ FRE2501A	Tamil Paper I/ Hindi Paper I/ French Paper I	L	4	58	2	3	25	75	100	3
	II	ENG2501A	English Paper I	E	4	58	2	3	25	75	100	3
	III	BF25C01	Food Science	CC	4	58	2	3	25	75	100	3
	III	BF25C02	Principles of Management	CC	5	73	2	3	25	75	100	4
	III	BF25A01	Principles of Food and Nutrition	GE	5	73	2	3	15*	35*	50	3
	III	BF25CP1	Food Science Practical	CC	3	45	-	3	15*	35*	50*	3
	III	BF25AP1	Nutritional Menu Planning Practical	GE	3	45	-	3	15*	35*	50*	2
	IV	NME25B1 / NME25A1	Basic Tamil I / Advanced Tamil I	AEC	2	28	2	-	100	-	100	2
		NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100	
I - II	VI	NM25GAW	General Awareness	AECC	SS	-	-	-	100	-	100	Gr .
I - II	VI	COM25SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-

I-V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-
II	I	TAM2502A/ HIN2502A/ FRE2502A	Tamil Paper II Hindi Paper II French Paper II	L	4	58	2	3	25	75	100	3
	II	ENG2502A	English Paper II	E	4	58	2	3	25	75	100	3
	III	BF25C03	Fundamentals of Food Chemistry and Properties	CC	5	73	2	3	25	75	100	3
	III	BF24C04	Food Microbiology	CC	4	58	2	3	25	75	100	3
	III	BF23CP2	Microbiology Practical	CC	3	45	-	3	15 [#]	35 [#]	50 [#]	3
	III	BF25A02	Nutritional Biochemistry	GE	5	73	2	3	20 ^{\$}	55 ^{\$}	75 ^{\$}	3
	III	BF24AP2	Biochemistry Practical	GE	3	45	-	3	15 [#]	35 [#]	50 [#]	2
	IV	NME25B2* / NME25A2*	Basic Tamil II/ Advanced Tamil II	AEC				-	100	-	100	Gr
	IV	NM25GAW	General Awareness	AECC	SS	100	-	100	Gr.			
	IV	NM25UHR	Universal Human Values and Human Rights	AEC	2	30	-	-	100	-	100	2
III	I	TAM2303A/ HIN2303A/ FRE2303A	Tamil Paper III/ Hindi Paper III/ French Paper III	L	4	58	2	3	25	75	100	3
	II	ENG2403A	English Paper III	E	4	58	2	3	25	75	100	3
	III	BF24C05	Unit Operations	CC	5	73	2	3	25	75	100	3
	III	BF24C06	Fundamentals of Food Processing	CC	4	58	2	3	25	75	100	3
	III	TH24A23/ BF25A03	Numerical and Statistical Techniques/ Basics of Accountancy	GE	5	73	2	3	25	75	100	4
	III	BF23CP3	Unit Operations Practical	CC	3	45	-	3	15*	35*	50*	3
	III	BF24SB01	Generative AI for Food Industry	SEC	3	41	4	-	100	-	100	3
	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
	IV	BF24INST1	Field Work/Institutional Training	GC	-	-	-	-	100	-	100	2

I - III	IV	NM25HAW	Health and Wellness [€]	VAC	-	-	-	-	100*	-	100	1
I - V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-

L – Language

CC – Core Courses

GE – Generic Elective

AEC – Ability

Enhancement Course ACC

– Additional Credit Course

*CA conducted for 25 and converted into 15, ESE conducted for 75 and converted into 35

#CA conducted for 25 and converted into 20, ESE conducted for 75 and converted into 25

E- English

CA – Continuous Assessment

ESE–End Semester Examination

Examination System

One test for the continuous assessment will be conducted on pre-determined dates, i.e., commencing on the 50th day from the date of reopening. The Model Exam will be conducted after completing 85th working days. Marks for ESE and CA with reference to the maximum for the course will be as follows

Question Paper Pattern

CA Question Paper Pattern and Distribution of marks - Language and English - UG

Section A	5 x 1 (No choice)	:	5 Marks
Section B	4 x 5 (4 out of 6)	:	20 Marks (250 words)
Section C	2 x 10 (2 out of 3)	:	20 Marks (500 words)
Total :			45 Marks

Marks UG- Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks : 2 x 3 = 6 Marks

One question with a weightage of 5 Marks : 5 x 3 = 15 Marks

(Internal Choice at the same CLO level)

One question with a weightage of 8 Marks : 8 x 3 = 24 Marks

(Internal Choice at the same CLO level)

Total = 45 Marks

Model & End Semester Examination – Question Paper Pattern and Distribution of Marks

Language and English – UG

Section A	10 x 1 (10 out of 12) :	10 Marks
Section B	5 x 5 (5 out of 7) :	25 Marks (250 words)
Section C	4 x 10 (4 out of 6) :	40 Marks (600 - 700 words)
Total	:	75 Marks

Core & Allied (Theory)

Question from each unit comprising of

One question with a weightage of 2 Marks: $2 \times 5 = 10$ Marks

One question with a weightage of 5 Marks: $5 \times 5 = 25$ Marks

(Internal Choice at the same CLO level)

One question with a weightage of 8 Marks : $8 \times 5 = 40$ Marks

(Internal Choice at the same CLO level)

Total = 75 Marks

Continuous Internal Assessment (CA)

Language, English, Core & Allied

CIA Test	- 5 Marks (Conducted for 45 marks after 50 days)
Model Exam	- 7 Marks (Conducted for 75 marks after 85 days - Q.P. Pattern (2,5,8 Marks) (Each Unit 15 Marks)
Sem/Ass/Quiz	- 5 Marks
Class Participation	- 5 Marks
Attendance	- 3 Marks (91-100% attendance: 3 Marks; 81-90% attendance: 2 Marks; 75-80% attendance: 1 Marks)

Total : 25 Marks

Core Practical (25 marks)

Lab performance	: 7 marks
Regularity	: 5 marks
Model	: 10 marks (Conducted for 75 marks)
Attendance	: 3 marks
Total	: 25 Marks

ESE Practical Pattern

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Advanced Tamil & Basic Tamil

CIA Test	- 25 Marks (Conducted for 50 marks after 50 days)
Model Exam	- 50 Marks (Conducted for 75 marks after 85days)
Quiz	- 15 Marks
Assignment	- 10 Marks
Total	- 100 Marks

SEMESTER I

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF25C01	Food Science	Theory	58	2	-	3

Preamble

To enable the students to

- Learn the basic concepts of food science and different methods of cooking
- Understand the classification, composition and nutritive values of various foods
- Gain knowledge on the cooking of cereals, pulses, meat, fish and poultry, types of spices and beverages

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Gain knowledge on the basic concepts of food science	K1
CLO2	Recognize structure, nutritive value and role of various food groups and describe their nutritional contribution	K2
CLO3	Gain knowledge on various role of food groups in cookery and develop new cookery concepts	K3
CLO4	Demonstrate effect of processing and preservation on composition and quality changes in foods related to practical application	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	M	M	M	S	M
CLO2	S	M	S	S	S	M
CLO3	S	M	S	S	S	M
CLO4	S	M	S	S	S	M

S- Strong; M-Medium

Syllabus**Unit I Food Science****12 Hours**

Introduction to food science – definition, functions of food, Classification of foods, food groups, food pyramid, and food in relation to health.

Cooking –objectives, preliminary preparations; Cooking methods – moist heat methods, dry heat methods, Combination methods – braising and microwave cooking; Recent methods- Ohmic cooking; Advantages and Disadvantages of cooking methods; Ancient cooking techniques and health benefits : Slow cooking (dum), tempering (tadka).

Factors affecting cooking of foods, Moist heat effect- Gelatinization, Gel formation, Retrogradation & Syneresis; Dry heat effect- Dextrinization; Factors affecting gel formation, denaturation, colloids, emulsion, foam and factors affecting foam formation and stability, fermentation, browning, rancidity.

Unit II Cereals, Pulses, Nuts and Oilseed**12 Hours**

Cereals and cereal products – structure, composition and nutritive value of wheat, rice, maize, jowar, ragi, bajra; Cereal starch –Types of starch, effect of moist heat and dry heat.

Pulses – composition and nutritive value, classification, toxic constituents, Effect of cooking and factors affecting cooking of pulses; Pulse cookery

Nuts & oil seeds – composition and nutritive value of coconut, flax seeds, almonds, groundnut, soya bean, sunflower seeds. Fats and oil- Refining of oils, Effect of heat on oil and Rancidity

Unit III Vegetables and Fruits and Spices**11 Hours**

Vegetables and Fruits – Classification, composition and nutritive value, selection, pigments, enzymes, flavor compounds:-bitter compound, Phytochemicals; ripening of fruits; Browning: - enzymatic and non-enzymatic browning, prevention of browning; Changes and effect of cooking.

Spices – Composition, medicinal values, potential health benefits and role of spices in cookery.

Unit IV Meat, Fish and Poultry**12 Hours**

Meat – classes of meat and related products, composition and nutritive value, post-mortem changes, ageing, tenderizing, curing, cuts, grades and meat cookery, Changes during cooking, methods of cooking

Fish- classification, composition and nutritive value, selection of fish, fish products, fish protein concentrate.

Poultry – classification, composition and nutritive value.

Unit V Egg, Milk and Sugar**11 Hours**

Egg- Structure, composition, nutritive value, egg quality grading, effect of heat on egg proteins, functions of egg in cookery.

Milk- Composition, nutritive value, properties, effects of heat on milk, milk cookery and products and indigenous milk products

Sugar- Properties, sugar and related products, stages of sugar cookery, factors affecting crystallization; Sugar cookery and artificial sweeteners

Text Books

S. No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Srilakshmi, B	Food Science	New Age International (P) Ltd. Publishers, New Delhi.	2024 and 8 th edition
2.	Robert L. Shewfelt, Jerry W. H. O'Donnell.	Food Science: An Ecological Approach	CRC Press	2021 and 1st edition,
3.	Sarah J. L. Sutherland, Daniel M. Tomlins	Food Science: From Farm to Table	CRC Press	2021 and 1st edition

Reference Book

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Brian P. Murphy, Sheila R. Dillon	FoodScience An Introduction to the Science of Food and Nutrition	John Wiley & Sons	2021 and 1 st edition
2.	Rick Parker	Introduction to Food Science	Cengage Learning	2021 and 4 th edition
3.	Michael J. Leubke, Michael R. Clark	Principles of Food Science and Technology	CRC Press	2022 and 1 st Edition

Blended learning links

S. No.	Unit	Topics	Links
1.	I	Food Science – Methods of cooking	https://www.youtube.com/watch?v=u7sQjOFFISw
2.	II	Cereals and Millets and their products	https://www.youtube.com/watch?v=YfC4YGxagO8
3.	III	Enzymatic Browning in Fruits and Vegetables,.	https://www.youtube.com/watch?v=sCgcDyfafmM
4.	IV	Preparing And Cooking Meat Part 2 Methods Of Tenderizing Meat	https://www.youtube.com/watch?v=9h7Q62thXGg
5.	V	Uses of Egg In Cookery	https://www.youtube.com/watch?v=53Lpp6S6SpM

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

Course Designers:

- 1. Dr.N.Deepa Sathish**
- 2. Ms Priyanga M**

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF25C02	Principles of Management	Theory	73	2	-	4

Preamble

- To understand the fundamental concepts, theories, and functions of management.
- To develop managerial skills in planning, decision-making, organizing and controlling for effective management.
- To analyse the application of emerging technologies like AI, RPA, and Predictive Analytics in management.
- To integrate sustainable practices and ethical considerations in food business management.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the fundamental concepts, functions, and levels of management, along with traditional and modern management thoughts.	K1
CLO2	Explain the application of key managerial functions such as planning, organizing, staffing, controlling, coordination, delegation and authority	K2
CLO3	Apply management principles, theories, AI-driven decision-making, and indigenous knowledge systems (IKS) in food business management.	K3
CLO4	Analyze management practices, sustainability strategies, ethical concerns, and technological innovations such as AI and RPA in food business management.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	L
CLO2	S	S	M	S	M
CLO3	S	S	S	S	S
CLO4	S	S	M	L	L

S-Strong; M-Medium; L-Low

PRINCIPLES OF MANAGEMENT - BF25C02

73 Hours

UNIT – I

14 Hours

Management: Introduction - Meaning and Definition - ***Scope – Features - Levels of Management***-Skills and Competencies - Management Theories: Maslow's Hierarchy of needs, Theory X, Y. Management Thoughts: Scientific, Modern Management thoughts - ***Functions of Management***- Sustainable Management practices - IKS in Management.

UNIT – II

15 Hours

Planning: Introduction -Meaning and Definition - ***Nature and Characteristics -Importance*** - Types of Plans - Planning process - Management by Objectives.
Decision Making: Introduction - Meaning and ***Features of decision making*** - Types of decision making - Decision making phases and process - AI assisted decision making in food industry -. Design Thinking, Creativity & its Stages - Application in Food business.

UNIT – III

15 Hours

Organizing: Introduction - Meaning and Definition - ***Principles of Organizing*** - Formal and Informal Organization - ***Importance of Organizing***- Forms of Organisation (Organizational structure) in Food industry. Delegation of Authority: Meaning – Features – Process – Principles – Importance – Barriers – RPA in Delegation of Authority.
Staffing - Meaning- Importance – Process of staffing – Role of RPA in Staffing.

UNIT – IV

14 Hours

Controlling: Definition - ***Characteristics - Importance ***- Control process - Effective control system - KPIs and Performance Metrics in Controlling - Limitations of controlling - Types of Control - Role of Controlling in Food industry.
Co-ordination: Meaning and Definition – Features – Types - Benefits - Essentials for effective co-ordination.

UNIT – V

15 Hours

Food Business Management – Definition – Need – Importance - Process and Sustainability of food businessin Indian Economy - Application of AI in food business management - Sectors in Food industry - Emerging trends in food industry - Circular Economy in Food Business - ***Ethics in Food Business Management.**

*** Highlighted Text offered in blended mode (Links Provided)**

Text Books:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
1.	Harold Koontz and Heinz Weihrich	Essentials of Management	Tata McGraw Hill	2023 & 11th Edition
2.	Gupta CB	Management Theory and Practice	Sultan Chand & Sons	2022 & 21st Edition
3.	Dr. Mishra & Gupta	Principles of Management	SBPD PublishingHouse	2021& 1st Edition

Reference Books:

Sl. No.	Author(s)	Title of the Book	Publisher	Year & Edition
1.	Gareth R. Jones & Jennifer M George	Contemporary Management	McGraw-Hill Education	2024 12th Edition
2.	Stephen P. Robbins, Mary Coulter and Neharika Vohra	Management	Pearson Prentice Hall, New Delhi	2022 15 th Edition

Blended Learning Links:

Sl. No.	Units	Topics	Blended Learning Links
1	I	Scope, Features and Levels of Management	https://www.youtube.com/watch?v=X_0LEIQbgwg
2		Functions of Management	https://www.youtube.com/watch?v=pzSRAM5Hvg4
3	II	Nature, Characteristics and Importance of Planning	https://www.youtube.com/watch?v=zuM3u0du_5g
4		Features of decision making	www.youtube.com/watch?v=KWY_m6QfFhw
5	III	Principles of Organizing	https://www.youtube.com/watch?v=v9YkwuPPWxQ https://www.youtube.com/watch?v=p7zjC-HPCYM
6		Importance of Organization	https://www.youtube.com/watch?v=UEXrsZ3vkx0
7	IV	Characteristics, Importance	https://www.youtube.com/watch?v=__x1O5xaAsY https://www.youtube.com/watch?v=0HeAbUD4H78

		of controlling	
8	V	Ethics in food industry	https://www.youtube.com/watch?v=5Qxd7scGnas

Pedagogy: Chalk &Talk, Lecture, Seminar, PPT, Group Discussion, Activity and Case Study

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF25A01	Principles of Food and Nutrition	Theory	73	2	-	3

Preamble

To enable the students to

- Gain knowledge about nutrition and malnutrition, sources and functions of vitamins and minerals
- Determine the energy values of foods
- Learn the Know the importance of water and electrolyte balance in the body

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Gain basic knowledge on the basic concepts of nutrition, food groups and meal planning	K1
CLO2	Understanding the sources, digestion and absorption of carbohydrates, proteins and fats	K2
CLO3	Understand the role of food and nutrients in health and disease prevention.	K3
CLO4	Able to conceptualize, implement and evaluate the functions, requirements and effects of deficiency of nutrients	K4

Mapping with Programme Learning Outcomes

CLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	M	M
CLO2	S	S	S	M	M	M
CLO3	S	S	S	M	M	M
CLO4	S	S	S	S	M	M

S-Strong; M-Medium

Syllabus**Unit I Introduction to Nutrition and Meal planning****15 Hours**

Food as source of nutrients, functions of food; Nutrition-Definition, importance and scope of nutrition, Relation of nutrition to health, Malnutrition, Nutritional Care and Nutritional Status. Recommended Dietary Allowances (RDA)-Significance and factors affecting RDA, Reference man and women. General concepts about growth and development and through different stages of life and RDA for Indians

Meal planning- Definition, Principles of meal planning, Basic five food groups, Balanced diet, Exchange lists, and factors affecting meal planning, Dietary Guidelines for different age group.

Unit II Carbohydrates and Energy**15 Hours**

Carbohydrate and Dietary fibre; -classification, functions, digestion and absorption, sources and requirements

Energy -Sources, physiological energy value of foods, thermogenic effect of foods; Basal Metabolic Rate (BMR) - factors affecting BMR and energy allowance for various activities

Unit III Proteins, Lipids and Water**15 Hours**

Proteins and Lipids- classification, functions, digestion and absorption, sources and requirements
Protein quality of foods-Protein Efficiency Ratio (PER), Biological Value (BV) and Net Protein Utilization (NPU).

Water-Daily requirement, Regulation and distribution of body water, Fluid Balance - Overhydration, Dehydration and water intoxication;

Unit IV Vitamins**14 Hours**

Fat soluble vitamins – vitamins A, D, E and K – functions, sources, requirements and deficiency.
Water soluble vitamins (thiamine, riboflavin, niacin, pyridoxine, folic acid, cyanocobalamin, biotin, pantothenic acid and ascorbic acid) – functions, sources, requirements and deficiency

Unit V Minerals**14 Hours**

Minerals – calcium, phosphorus, magnesium, sodium and potassium – functions, sources,

requirements and deficiency.

Minor and Trace minerals – iron, zinc, iodine, selenium, chromium, fluorine and chlorine – functions, sources, requirements and deficiency

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Srilakshmi, B	Nutrition Science	New age international Pvt. Ltd. New Delhi.	2022 and 8 th edition
2.	Sunil Kumar, Priyanka Agarwal	Nutrition Science: From Basics to Advanced	CRC Press	2022 and 1 st edition
3.	Sunil Kumar, Priyanka Agarwal	Nutrition Science: From Basics to Advanced	CRC Press	2021 and 1 st edition
4.	P. V. Satyanarayana, S. R. S. Reddy	Nutrition Science and Dietetics	Jaypee Brothers Medical Publishers	2021 and 2 nd edition

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Peter J. R. Smith, Anne M. O'Connor	Essentials of Nutrition Science	Wiley-Blackwell	2021 and 3 rd edition
2.	Jeffrey S. Volek, Richard D. Feinman	Nutrition Science and the Science of Nutrition	Elsevier	2022 and 4 th edition
3.	Deborah P. McHugh, Thomas M. Saunders	Fundamentals of Human Nutrition Science	McGraw-Hill Education	2023 and 1 st edition

Blended learning links

S. No.	Unit	Topics	Links
1.	I	Malnutrition	https://www.youtube.com/watch?v=jEd91r__5Y
2.	II	Proteins	https://www.youtube.com/watch?v=HSCUAjZQhXI

3.	III	Basal Metabolic Rate (BMR)	https://www.youtube.com/watch?v=zeZn2p-40QE
4.	IV	Fat- Soluble Vitamins	https://www.youtube.com/watch?v=ZLGMCYeeRgM
5.	V	Mineral: Iodine, Zinc, Fluoride, Selenium	https://www.youtube.com/watch?v=cWwpt3uI5d4

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar

Course Designers:

1. Dr. N. Deepa Sathish

2. Ms. Santhiya R

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF25CP1	Food Science Practical	Practical	58	2	-	3

Preamble

To enable the students to

- Learn the preparation of various food products- milk, egg & beverages
- Understand the effect of dry & moist heat methods of cooking
- Gain knowledge on browning of fruits & effect of acid/alkali/heat on vegetables
- Determine melting point, smoking point and flash point of fats

Course Learning Outcomes

On successful completion of the course

CLO Number	CLO Statement	Knowledge Level
CLO1	Classify the food groups and understand its properties	K1
CLO2	Recognize the effect of processing on structural changes of different food	K2
CLO3	Gain knowledge on the factors affecting properties of food	K3
CLO4	Apply the concepts of the changes and develop products	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	S
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	S	S

S- Strong

FOOD SCIENCE PRACTICAL (BF25CP1)

Total Hours: 45

Credit: 3

Syllabus

1. Study on organoleptic evaluation of foods
2. Determination of effect of taste thresholds of sugar, salt and acid on sensory perception
3. Effect of dry heat and moist heat on starch granules
4. Determination of gluten content in wheat
5. Cooking characteristics of pulses
6. Germination characteristics of pulses
7. Cooking characteristics of vegetables - effect of acid, alkali, heat and time
8. Study of enzymatic and non-enzymatic browning in fruits
9. Cooking characteristics of milk and its products.
10. Cooking characteristics of egg
11. Study on foam formation and stability
12. Study the shortening effects of fats and oils during cooking
13. Stages of sugar crystallization

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1	Manay Shakunthala, N And Shadaksharaswamy M.	Foods facts and Principles,	New Age International (P) Ltd Publishers,	2022 and 5 th edition
2	J. M. Ritchie	The Chemistry of Food and Nutrition	Macmillan.	2005 and 2 nd edition
3	Usha Chandrasekar,	Food Science in Indian Cookery	Phoenix publishers House Private Limited	2002
4	Srilakshmi B.	Food Science	New Age International (P) Ltd Publishers	2024 and 8 th edition

Reference Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1.	Paul and Paulmer	Food Theory and Application	John Wiley and sons, New York	1972
2.	Norman N. Potter and Joseph H. Hotchkiss,	Food Science	CBS Publishers and distributors	1997
3.	Swaminathan M	Food Science, Chemistry and Experimental foods	Bappo Publishers company Ltd	1997
4.	Meyer LH,	Food Chemistry	CBS Publication	1987

Pedagogy: Demonstration and hands on practical's

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Sujithra S

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
BF25AP1	Nutritional Menu Planning Practical	Practical	-	-	45	2

Preamble

To enable the students to

- Gain knowledge on the energy value of foods and the energy requirements of individual
- Understand about the nutritional composition of food.
- Analyze the methods of assessing nutritional status of an individual

Course Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To calculate the energy value of foods	K1
CLO2	To learn the standardization of menu planning	K2
CLO3	To learn energy requirements of an individual	K3
CLO 4	To gain knowledge on preparing a day's diet based on the nutritional status	K4

Mapping with Programme Learning Outcome

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	S
CLO2	S	S	S	S	S	S
CLO3	S	S	S	S	S	S
CLO4	S	S	S	S	S	S

S-Strong

NUTRITIONAL MENU PLANNING PRACTICAL (BF25AP1)

Total Hours: 45

Credits: 2

1. Calculation of energy values in foods from food composition tables and Preparation of food exchange lists
2. Calculation of basal metabolic rate and energy requirements of an individual per day.
3. Preparation and standardization of recipes, portion control and calculation of nutritive value
 - i. Controlling techniques - Weights and measures standard, Measurement Techniques, household measures for raw and cooked food
 - ii. Basic preparation of various foods from different food groups & their nutritive value (porridges, Salads, Beverages, Soups, desserts and puddings, custard, kheer, ice cream, poached, scrambled, fried omlette & egg-nogs and meat preparations)
4. Preparation of a day's diet and calculation of Nutritive value
 - a. Pregnant and Lactating Mother
 - b. Infants
 - c. School going children
 - d. Adolescents
 - e. Adults and
 - f. Elderly people
5. Preparation of a day's diet and calculation of Nutritive value for various health conditions
 - i. Weaning food
 - ii. Iron rich food
 - iii. Underweight
 - iv. Obesity
6. Methods of Assessing Nutritional status of an individual- BMI, Head circumference, Upper arm, mid arm circumference, skin fold thickness

Text Books

S.No	Name of the Authors	Title of the Book	Publishers	Year and Edition
1	Dr. C. Gopalan	Nutritive Value of Indian Books	ICMR and NIN	2021 and 1 st edition
2	Dr. C. Gopalan	Dietary Guidelines for Indians	ICMR and NIN	2024 and 3 rd edition
3	Pomrenz Y & Meloan CE	Food Analysis - Theory and Practice	CBS	2000 and 4 th edition
4	Food safety and standards, Ministry of health and family welfare FSSAI Authority of India	Manual of methods for analysis of foods	Government of India	2024 and 2 nd edition
5	David T Plummer	An Introduction to Practical Biochemistry	Tata McGraw Hill	2007 and 3 rd edition

Pedagogy

Demonstration and hands on practical's

Course Designers:

1. **Dr. N. Deepa Sathish**
2. **Ms Santhiya R**

SEMESTER II

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF25C03	FUNDAMENTALS OF FOOD CHEMISTRY AND PROPERTIES	THEORY	58	2	-	3

Preamble

- To enable the students to understand the types and important properties of food materials , Gain knowledge about classification, structure and reactivity of food compounds and to acquire knowledge about classification and structure of food materials

Prerequisite

- Basic knowledge in food science and chemistry

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the types and classification of food and its components	K1
CLO2	Know the structure and reactivity of food compounds	K2
CLO3	Demonstrate the effect of processing on the physiochemical properties	K3
CLO4	Analyze the various engineering properties of foods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	M	M	S	S	S
CLO2	S	M	M	S	S	S
CLO3	S	M	M	S	S	S
CLO4	S	M	M	S	S	S

S-Strong; M-Medium

Syllabus**Unit I – Chemistry of Carbohydrates, Amino acids, Proteins and Water 15 Hours**

Carbohydrates - Occurrence and classification. Structure of monosaccharides, disaccharides and polysaccharides. Optical activity of sugars, reactions of monosaccharides, inversion of sucrose, Lactose and Lactulose. Changes in starch during processing.

Proteins-Classification, Structural properties of proteins - primary, secondary, tertiary and quaternary. Changes in proteins during processing.

Water - Moisture in Foods, Hydrogen Bonding, Bound Water, Water and its interaction with food components and food stability, Water Activity in Foods, True Solutions, Dispersions and Sols

Unit II - Chemistry of Fats & Oils, Vitamins, Minerals & Enzymes 15 Hours

Fats and oils - Classification, functions, fatty acids – occurrence, types, nomenclature, essential fatty acids, physical and chemical properties of fats and oils, modification of fats, hydrogenation, inter esterification, acetylation, winterization, deterioration of fats – rancidity.

Vitamins: Occurrence, structure of fat soluble and water soluble vitamins, vitamins as coenzymes, vitamin retention during processing and storage, vitamins as antioxidants and supplements

Minerals: Minerals in foods and its chemistry–sodium, potassium, magnesium, calcium, chloride, phosphorus, iron, zinc, and changes during processing of foods.

Enzymes – Classification, chemical nature and properties, Enzyme Kinetics, Mechanism of enzyme action and factors affecting enzyme action.

Unit III – Physical, Frictional & Rheological Properties of Foods 15 Hours

Physical Properties- Measuring methods- Shape, size, volume, density, porosity, surface area and textural properties of foods.

Frictional properties - Solid friction, rolling resistance, angle of repose & internal friction

Rheological Properties - Rheology of solids- Uniaxial stress, Young's modulus, Bulk modulus, Shear modulus, Rheology of liquid foods - Newton's law of viscosity, Viscous foods - Newtonian fluids, Non-Newtonian fluids, Plastic fluids, Time dependent properties, Viscosity measurement - Capillary flow viscometer, Orifice type viscometer, Falling ball viscometer, Rotational Viscometer. Rheology Measurement - Rheometer Types and Advantages over Viscometers.

Unit IV - Thermal , Aerodynamic & Mechanical Properties**14 Hours**

Thermal Properties - Definitions & significance- specific heat, enthalpy, conductivity and diffusivity, surface heat transfer coefficient.

Aerodynamic Properties - Drag coefficient, terminal velocity and their application in the handling and separation of food materials.

Mechanical properties - Definition, Types of mechanical damage, causes of damage, Mechanical damage in grains, fruits & vegetables, Damage of food materials under static, impact and vibration.

Unit V – Magnetic, Electrical & Electromagnetic Properties of Foods**14 Hours**

Magnetic properties - Materials, Magnetization, Magnetic field forces, Magnetic resonance

Electrical Properties - Electrical conductivity and its measurement

Electromagnetic properties- Electrical polarization, Microwave heating- Mechanism of microwave heating, Dielectric Properties- Conversion of microwave energy into heat

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1	Fennema, O. R.	Fennema's Food Chemistry	CRC Press	2023 and 5 th edn.
2	Damodaran, S., Parkin, K. L.	Fennema's Food Chemistry	CRC Press	2022 and 5 th edn.
3	Belitz, H. D., Grosch, W., Schieberle, P.	Food Chemistry	Springer	2020 and 5 th edn.
4	Manay, N. S., Shadaksharaswamy, M.	Food Facts and Principles	New Age International	2022 and 4 th edn.

Books for Reference

S.No	Authors	Title	Publishers	Year and Edition
1	Rao, M. A.	Engineering Properties of Foods	CRC Press	2022 and 5 th edn.
2	Barbosa-Canovas, G. V., Ortega-Rivas, E.	Food Structure Engineering: Processing, Properties and Applications	Wiley-Blackwell	2023 and 1 st edn.
3	Gorton, L., Tornberg, E., and Johansson, L.	Food Processing: Principles and Applications	Wiley-Blackwell	2021 and 2 nd edn.
4	Ramaswamy, H. S., and Mascheroni, R. H.	Food Process Engineering: Theory and Practice	CRC Press	2022 and 3 rd edn.

Pedagogy

- Blended learning, lecture by chalk & talk, power point presentation, e- content, group discussion, assignment, quiz, seminar.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24C04	FOOD MICROBIOLOGY	THEORY	58	2	-	3

Preamble

- To enable the students to learn the types, structure and characteristics of microorganisms, understand the factors affecting the growth of microorganism, learn the causes of food spoilage and food borne disease and gain knowledge on the methods to enumerate the microbes

Prerequisite

- Basic knowledge in food science and structure of microbes

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Gain knowledge on the types and characteristics of microorganism	K1
CLO2	Understand the importance of microbes in food industry	K2
CLO3	Contrast on spoilage and food borne disease caused by microorganisms	K3
CLO4	Categorize hygiene and sanitation related to food safety	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S- Strong; M-Medium

Unit I Introduction to Microbiology**12 Hours**

Definition - Microbiology in daily life - General characteristics of microbes - physiological, cultural characteristics. morphology and classification of microorganisms. Importance of microbes in the food industry.

Food as substrate for microorganisms, Factors affecting the growth of microorganisms- intrinsic and extrinsic factors - Hydrogen ion concentration (pH), Moisture requirements - concept of water activity, oxidation-reduction potential; Growth of microorganisms - nutrient content, bacterial growth kinetics.

Unit II Microbiology of foods**12 Hours**

Important food spoilage bacteria in plant based - cereal & cereal products; plantation crops - tea, coffee, cocoa, canned foods, fruits and sugars and animal-based foods - milk and milk products, flesh foods - meat, fish, poultry, egg. Microbiological Examination of milk - MBRT, alkaline phosphatase test

Unit III Microbial food products**12 Hours**

Microorganisms as food - probiotics and its uses. Indian Knowledge System (IKS) on food fermentation and fermented foods. Recent advancements in food fermentation

Definition and Principle -Fermentation, Fermenter, Fermented foods - milk products (curd, yogurt, cheese, kefir), Beverages (Toddy, Handiya, Palm Wine, Mahua, vinegar, beer) Vegetables (sauerkraut, kimchi, pickles), Meat (sausage)

Unit IV Food Borne Diseases**11 Hours**

Definition of Food poisoning. Food borne infections - Bacteria (Salmonellosis, Gastroenteritis, E.Coli, shigellosis), Virus (Rotovirus, Hepatitis), Fungus (Apergillus, Pencillium, Fusarium) and intoxications with types - Symptoms, Control measures.

Food borne pathogens - Clostridium, Bacillus cereus, Staphylococcus aureus, Vibrio, Campylobacter, Yersinia

Unit V Food Spoilage and Sanitation**11 Hours**

Food spoilage- Definition, classification of food by ease of spoilage. Food Sanitation, Contamination of food through various sources and cross contamination.

Food Safety and Food Defense: -Definition, Control of Microorganisms - disinfectants, antimicrobial agents and their mechanism of action

Text Book

S.No.	Authors	Title	Publishers	Year and Edition
1	Baptist Dias	Food Microbiology	Discovery Publishing House	2024 and 1 st edn.
2	Virendra Kumar Pandey	Textbook of Food Microbiology	INSC International Publishers	2021 and 1 st edn.
3	Dongyou Liu	Handbook of Foodborne Diseases	CRC Press	2018 and 1 st edn.
4	Yanbo Wang, Wangang Zhang, Linglin Fu	Food Spoilage Microorganisms Ecology and Control	CRC Press	2017 and 1 st edn.

Books for Reference

S. No	Authors	Title	Publishers	Year and Edition
1	Arun Bhunia & Bibek Ray	Fundamental Food Microbiology	CRC Press	2025 and 6 th edn.
2	Karl R. Matthews, Kalmia E. Kniel, Faith J. Critzer	Food Microbiology: An Introduction	ASM Press	2024 and 5 th edn.
3	Michael P. Doyle & Robert L. Buchanan	Food Microbiology: Fundamentals and Frontiers	Wiley publishers	2024 and 5 th edn.

Pedagogy

- Lecture by chalk and talk, power point presentation, group learning, group discussion, assignment, quiz, peer learning, student seminar.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF25CP2	MICROBIOLOGY PRACTICAL	PRACTICAL	-	-	45	3

Preamble

- To enable the students to learn and apply cleaning and sterilization techniques, differentiate between the types of microorganisms, perform staining methods, and determine the potability of water

Prerequisite

- Basic knowledge in food science and microbes

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts and techniques	K1
CLO2	Recognize the type of microorganism and employing different staining techniques	K2
CLO3	Employ different staining techniques	K3
CLO4	Examine the potability of water and bacterial counting by biosensors	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	M
CLO2	S	S	S	S	S	M
CLO3	S	S	S	S	S	M
CLO4	S	S	S	S	S	M

S- Strong; M-Medium

Microbiology Practical (BF23CP2)

Under DBT scheme

Total Hours: 45

Credits : 3

1. Introduction to microscope, use of autoclave and Laminar air flow system and Laboratory safety and Biosafety measures
2. Cleaning and Sterilization techniques of glassware.
3. Preparation and sterilization of nutrient broth
4. Cultivation and sub – culturing of microbes
5. Morphological study of bacteria and fungi using permanent slides
6. Plating Techniques and preparation of slants using nutrient agar
7. Simple staining, Gram Staining, Negative staining methods for bacteria
8. Staining methods for fungi
9. Standard plate count or total plate count for milk or foods
10. Most probable number for water (MPN)
11. Swab Analysis of food surface areas and hands
12. Food bacterial count by biosensor techniques
13. To study bacterial growth curve
14. Visit to beverage industry

Pedagogy: Demonstration and hands on practical

Text Book

S.No	Authors	Title	Publishers	Year and Edition
1	Dubey, R.C. and D.K. Maheswari	A textbook of Microbiology	S. Chand & Co., New Delhi	2005 and 5 th edn.
2	Pelczar, M.J., E.C.S.Chanand N.R. Krieg, Noel R	Microbiology	McGraw– HillNew York	2002 and 7 th edn.
3	Power C.B. and H.F.Daginawala	General Microbiology, Vol. I and II	Himalayans Publishing House, New Delhi	1989 and 2 nd edn.
4	Kanika Sharma	Manual of microbiology – Tools and Techniques	Anshan Ltd	2007 and 1 st edn.

Books for Reference

S.No	Authors	Title	Publishers	Year and Editionn
1	Rangaswami,G D.J.Bagyaraj	Agricultural Microbiology	Asia publishing House, New Delhi	1992 and 2 nd edn.
2	Stanier, R.Y. J.Ingtaham, M.C.	The Microbial world	Prentice Hall, England. New Jersey	1986 and 5 th edn.
3	Tauro, P, Kapoor, K.K. and Yadav, K.S.	An Introduction to microbiology	Wiley New Delhi Publications,	1989 and 4 th edn.

Course Designers

1. Ms. Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF25A02	NUTRITIONAL BIOCHEMISTRY	CORE	73	2	-	3

Preamble

- To enable the students to understand the metabolism of carbohydrates, proteins and lipids, learn the chemistry of enzymes and to gain knowledge about the mechanistic behavior of hormones

Prerequisite

- Basic knowledge on biochemistry, enzymes, metabolism, and human physiology

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Introduce the concepts of metabolism of nutrients	K1
CLO2	Understand the properties of nucleic acids, characteristics of enzymes and functions of hormones.	K2
CLO3	Relate the reactions of metabolism with their functions	K3
CLO4	Explain the inborn errors	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S- Strong, M- Medium

Syllabus**UNIT-I Carbohydrate Metabolism****14 Hours**

Fate of absorbed carbohydrate-utilization of glucose-Intermediary metabolism of carbohydrate, steps involved in Glycogenesis, Glycogenolysis, Glycolysis , Gluconeogenesis-EMP pathway-citric acid cycle-conversion of pyruvate, acetate, oxaloacetate, electron transport chain, oxidative phosphorylation, pentose metabolism, cori's cycle (excluding structures)

UNIT-II Protein and amino acid Metabolism**15 Hours**

Protein – protein degradation pathway, enzymes for protein degradation. Protein metabolism- Removal of amino group- oxidative deamination, transamination-decarboxylation, transmethylation, disorder of amino acid metabolism and inborn errors of metabolism. Metabolism of ammonia-detoxification of ammonia-glutamine pathway-ornithine cycle.

UNIT-III Lipid Metabolism**14 Hours**

Fatty acid oxidation -activation and transport of fatty acid by acyl-CoA, β -oxidation-reaction sequence of β -oxidation, Ketosis-ketogenesis in liver-regulation of ketogenesis-metabolism of ketone bodies- prevention of ketosis (excluding structures)

UNIT-IV Enzymes**15 Hours**

Definition, classification, Mechanism of enzyme action- characteristics of enzyme active site. Coenzymes-Definition, types, classification, functions of co-enzymes. Role of enzymes - LH, CPK, SGOT and SGPT in medical diagnosis. Isoenzymes – definition, Disorder of carbohydrate metabolism and inborn errors of metabolism

UNIT V Hormones**15 Hours**

Classification, functions, properties and chemical nature of hormones, hormones of Thyroid gland, parathyroid gland, adrenal gland, Islets of Langerhans, Pituitary gland, Gastrointestinal tract, hormonal regulation in Growth and development ,carbohydrate metabolism, protein metabolism and fat metabolism, hormonal disorders, counter-regulatory hormone

Text Book

S.No	Authors	Title	Publishers	Year and Edition
1	Ghosh, S., Chakraborty, S., and Sharma, S.	Nutritional Biochemistry: An Introduction	Wiley India	2022
2	Darshan Malik	Textbook of Nutritional Biochemistry	Springer Singapore	2023 and 1 st edn.
3	Mahan, L. K., Escott-Stump, S.	Krause's Food & the Nutrition Care Process	Elsevier	2022 and 16 th edn.

Books for Reference

S.No	Authors	Title	Publishers	Year and Edition
1	Dr. Sunjay Jain & Nitin Jain	Fundamentals of Biochemistry	S. Chand Publishing	2025 and 1 st edn.
2	D. M. Vasudevan	Practical Textbook of Biochemistry	Jaypee Brothers Medical Publishers	2024 and 4 th edn.
3	Victor W. Rodwell, David Bender	Harper's Illustrated Biochemistry	Doody's Core Publishers	2024 and 32 nd edn.

Pedagogy

- Lecture by chalk & talk, power point presentation, e-content, group discussion, assignment, quiz, seminar.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24AP2	BIOCHEMISTRY PRACTICAL	PRACTICAL	-	-	45	2

Preamble

- To enable the students to identify sugars and amino acids and estimate metabolites of blood and urine sample

Prerequisite

- Basic knowledge in principles of nutrition and laboratory practices

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the principles and procedures for estimation	K1
CLO2	Explain the biochemical basis and physiological significance of the estimations	K2
CLO3	Apply standard laboratory techniques to accurately perform the estimation	K3
CLO4	Analyze experimental results to identify trends, detect anomalies, and interpret the relevance	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	S	S	M
CLO2	S	S	M	S	S	M
CLO3	S	S	M	S	S	M
CLO3	S	S	M	S	S	M

S- Strong; M- Medium;

Biochemistry Practical (BF24AP2)

Total hours: 45

Credit: 2

Qualitative analysis

1. Qualitative - analysis of carbohydrates-monosaccharides,disaccharides and polysaccharides- starch
2. Qualitative analysis of amino acids

Quantitative analysis :

1. Estimation of blood glucose
2. Estimation of iron and heamoglobin content in blood
3. Estimation of urinary creatinine
4. Estimation of urinary urea
5. Estimation of amino acid by Ninhydrin method
6. Estimation of protein and albumin /globulin ratio

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1	Sadasivam and Manickam	Biochemical Methods	New Age International	2022 and 4 th edn.
2	Geetha Swaminathan and Mary George	Laboratory chemical methods in food analysis	Margham Publications	2014 and 5 th edn.

Books for Reference

S. No	Authors	Title	Publishers	Year and Edition
1	Beedu Sashidhar Tao,Vijay Deshpande	Experimental Biochemistry-A student companion	K.International pvt Ltd	2020 and 1 st edn. (Reprint)
2	David T Plummer	An Introduction to Practical Biochemistry	Tata McGraw Hill	2017 and 3 rd edn. (Reprint)
3	Divya Shanthi, Sowbhagya Lakshmi	An easy guide for practical Biochemistry	Jaypee Brothers medical Publishers pvt. Ltd	2010 and 1 st edn.

Pedagogy

- Demonstration and hands on practical

Course Designers

1. Dr. N. Deepa Sathish
2. Ms. Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24C05	UNIT OPERATIONS	THEORY	73	2	-	3

Preamble

- To enable the students to gain knowledge on the principles of food process engineering and its significance in food industry, understand the units, dimensions and formulas related to food processing, familiarize with food processing unit operations and provide knowledge on various unit operations involved in food industry.

Prerequisite

- Basic understanding of Food Science, and Physics concepts related to heat, mass transfer, and material properties.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic concepts of unit operations in food processing	K1, K2
CLO2	Outline the working principles of various equipment & methods	K2
CLO3	Demonstrate the significance of processing methods in unit operations	K3
CLO4	Apply the knowledge of various operation methods in food processing industry	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S- Strong; M-Medium

Syllabus**Unit I Introduction to Unit operations****14 Hours**

Fundamentals of unit operation, processing and handling of food products. Pre-treatment operations- Cleaning, Dehulling/Dehusking, Peeling, Mixing and Forming, Sorting and Grading, Size reduction and separation.

Indian Traditional Food Processing Techniques: Indigenous methods of pre-treatment operations - manual dehulling, traditional grinding stones, sun drying and age-old fermentation techniques.

Unit II Size reduction processes**14 hours**

Size reduction: Principles, Theory, size reduction methods- compression, impact, shearing and cutting; cereal grinding, degree of grinding, size reduction machinery- crusher, grinder, attrition mills, hammer mill, ball mills, rietz mill; oil expression and extractions- hydraulic press, screw press

Unit III Separation processes**15 hours**

Definition and Introduction to Separation; Types of Separators and its applications in food industry.

Mechanical Separations: Screening and Screening equipment, sedimentation: principle, equipment and applications.

Centrifugation - principle, equipment involved in centrifugation, liquid-liquid centrifugation, liquid- solid centrifugation, clarifiers, desludging machines and its applications.

Filtration: Principles involved in filtration, membrane separation, Pressure and vacuum filtration.

Unit IV Drying and Evaporation**15 hours**

Drying – Theory of drying, Factors influencing drying rate, traditional and modern methods of drying and types of driers.

Evaporation - Basic principle, need for evaporation, design of evaporation system; retention time; types - single effect evaporator, multiple effect evaporators.

Unit V Distillation & Crystallization**15 hours**

Distillation: Theory, working principles and applications in food industry - liquid vapor equilibrium, distillation of binary mixtures, simple distillation, steam distillation, vacuum distillation, and fractional distillation. **Crystallization:** Theory, working principle, nuclei formation- equipment and applications in food industries.

Text Books

S. No	Authors	Title	Publishers	Year and Edition
1	Prabhat K. Nema	Unit Operations In Food Processing	Nipa Books	2023 and 1 st edition
2	Zeki Berk	Food Process Engineering and Technology	Elsevier	2023 and 2 nd edition
3	C.J. Geankoplis	Transport Processes and Unit Operations	Pearson	2023 and 4 th edition
4	Warren L. McCabe, Julian C. Smith, Peter Harriott	Unit Operations of Chemical Engineering	McGraw-Hill Education	2023 and 9 th edition

Reference Books

S. No	Authors	Title	Publishers	Year and Edition
1.	Raul R. Rodriguez and José M. G. Laencina	Principles of Food Engineering	CRC Press	2023 and 5 th edition
2.	Gustavo V. Barbosa-Cánovas, José M. Aguilera, and Carmen A. García	Food Engineering: From Concept to Consumer	Springer	2023 and 1 st edition
3.	Richard W. Hartel, David G. Boulton, and Geoffrey H. H. McMaster	Food Engineering: Principles and Modern Applications	Wiley-Blackwell	2021 and 1 st edition
4.	Dennis R. Heldman and Daryl B. Lund	Food Engineering Handbook	CRC Press	2021 and 3 rd edition

Blended learning links

S. No.	Unit	Topics	Links
1.	I	Introduction to Unit operations	https://youtu.be/C7Vey3qzRqw https://dl.icdst.org/pdfs/files1/0d697ccbbfd1ef3ec6dbf714d56fa24c.pdf
2.	II	Size reduction processes	https://youtu.be/f-tOL83XIQY https://nzifst.org.nz/resources/unitoperations/index.htm
3.	III	Separation processes	https://youtu.be/P4otdiiY6X8 https://archive.org/details/unitoperationsin0000earl
4.	IV	Drying and Evaporation	https://youtu.be/XYkxqrwmrF8 https://www.academia.edu/29604704/UNIT_OPERATION_S_IN_FOOD_PROCESSING
5.	V	Distillation & Crystallization	https://www.scribd.com/document/511144815/Unit-operations-in-food-processing-notes

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, problems, group discussion

Course Designers:

1. **Dr. Sivasankari R**

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24C06	FUNDAMENTALS OF FOOD PROCESSING	THEORY	58	2	-	3

Preamble

- To enable the students to understand about the production, harvesting & importance of different food commodities, gain knowledge on the ideologies of food processing, familiarize with importance of processing in food industries

Prerequisite

- Basic awareness of food commodities

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To gain knowledge on basic trends and production of different food	K1, K2
CLO2	To know about the processing involved in processing of different food	K2
CLO3	To enable students to learn the different methods and techniques in processing	K3
CLO4	To study about the equipment used for processing of foods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	M	M
CLO2	S	S	M	M	M	M
CLO3	S	S	M	M	M	M
CLO4	S	S	M	M	M	M

S - Strong; M-Medium

Syllabus**UNIT I Cereal and Pulse Processing****13 Hours**

Cereals – Properties of paddy, Varieties and quality characteristics. **Paddy** – parboiling, physico- chemical changes during parboiling. Milling of rice - traditional and modern methods. **Wheat & Maize** - Milling –basic concepts, products and by-products. **Millet**s – milling methods of sorghum, finger millet & pearl millet. **Pulses** – pre-treatment and milling – methods (traditional & modern)

Grain storage methods - traditional and modern

UNIT II Fruits and Vegetable processing**12 Hours**

Harvesting, Post harvest losses - causes, Processing: canning – principle and steps, problems in canned foods. Drying & dehydration – principles, drying curve, osmotic dehydration. Intermediate moisture foods – characteristics and importance. Minimal processing & Hurdle technology – principle techniques. Fruits and vegetable processing – ketchup/sauce, fruit bar, soup powder, dehydrated fruits and vegetables, fermented vegetables

UNIT III Nuts & Oilseeds processing**10 Hours**

Handling and storage - processing of oil seeds - coconut, groundnut, sesame, sunflower; methods - traditional method - Ghani, expeller, hydraulic presser & modern method - solvent extraction of oil and refining. Processing of cashewnut, arecanut, walnut, hazelnut, almonds, pistachios

UNIT IV Dairy processing**10 Hours**

Physico - chemical properties of milk constituents, quality evaluation of milk – processing of milk, types of special milks and milk products – milk powder, butter, cheese, ghee, yoghurt; Insanitation of milk

UNIT V Flesh food processing**13 Hours**

Meat – Sources of meat, Slaughtering – methods, ante mortem & postmortem changes, shelf life of meat. Processed meat products – cured, smoked, pickled, frozen, salted, canned and dehydrated meat. **Seafood** – Types, cuts of fish, pre-preparation and processing of fish – curing, smoking, drying, chilling, salting, canning. & byproducts – fish oil, fish meal, fish silage, fish ambergris, fish squalene

Poultry – ante and post mortem inspection, Processing of poultry, different cuts of poultry meat

Egg – processing of egg products – frozen egg, egg powder (WEP,EYP,EWP)

Text Books

S.No	Authors	Title	Publisher	Year and Edition
1	Megh R. Goyal, Santosh K. Mishra & Preeti Birwal	Food Processing and Preservation Technology: Advances, Methods and Applications	Apple Academic Press / CRC Press	2022 and 1 st Edn
2	Jagrani Minj, Aparna Sudhakaran V. & Anuradha Kumari	Dairy Processing: Advanced Research to Applications	Springer	2020, and 1 st Edn
3	Adriano Gomes da Cruz, Tatiana Colombo Pimentel & Erick Almeida Esmerino	Dairy Foods Processing	Springer (Humana Press)	2024 and 1 st Edn
4	Megh R. Goyal (Ed.)	Postharvest Management and Preservation of Fruits and Vegetables	Apple Academic Press	2020 and 1 st Edn
5	Adriano Gomes da Cruz & Cristiano V. Cruz	Meat and Poultry Processing: Principles and Applications	CRC Press	2021 and 1 st Edn

Reference books

S. No	Authors	Title	Publishers	Year and Edition
1	Swati Kapoor, Gurkirat Kaur, B. N. Dar & Savita Sharma (Eds.)	<i>Emerging Techniques for Food Processing and Preservation</i>	CRC Press	2024 and 1st Edn.
2	Syed S. H. Rizvi	<i>Food Engineering: Principles and Practices – A One-Semester Course</i>	Springer	2024, and 1st Edn.
3	Junaid Ahmad Malik, Megh R. Goyal & Anu Kumari (Eds.)	<i>Food Process Engineering and Technology: Safety, Packaging, Nanotechnologies and Human Health</i>	Springer	2023 and 1st Edn.

Blended Learning Links

S. No	Unit No	Topic	Link
1	1	Cereal and Pulse Processing	https://www.britannica.com/technology/cereal-processing
2	2	Fruits and Vegetable Processing	https://www.fao.org/3/y4358e/y4358e00.htm
3	3	Nuts & Oilseeds Processing	https://www.sciencedirect.com/topics/food-science/oilseed-processing
4	4	Dairy Processing	https://www.idfa.org/dairy-processing
5	5	Flesh Food Processing	https://www.sciencedirect.com/topics/food-science/meat-processing

Pedagogy

Blended learning, lecture by chalk & talk, power point presentation, e-content, problems, group discussion

Course Designers:

1. Dr.N.Deepa Sathish
2. Ms. Santhiya R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF23CP3	UNIT OPERATIONS PRACTICAL	PRACTICAL	-	-	45	3

Preamble

- To enable the students to gain knowledge on the basic principles of food processing techniques and its applications, apply the skill of material balance and energy balance in unit operation processes.

Prerequisite

- Fundamental understanding of material properties and process measurements

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the separation, collection and absorption efficiency of separators	K3
CLO2	Gain knowledge on performance evaluation of different types of mills and steam distillation process	K3
CLO3	Calculate the energy requirement and performance characteristics in size reduction process	K4
CLO4	Estimate the thermal efficiency of steam distillation	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	M
CLO2	S	S	S	S	S	M
CLO3	S	S	S	S	S	M
CLO4	S	S	S	S	S	M

S- Strong; M-Medium

UNIT OPERATIONS PRACTICAL (BF23CP3)

Syllabus

45 Hours

1. Determination of density and porosity of food grains
2. Determination of drying characteristics of food materials.
3. Physical Properties of Extruded Foods
4. Determination of Size reduction in Ball Mill
5. Determination of particle size of granular foods by sieve analysis.
6. Estimation of thermal conductivity.
7. Analysis of flow rate through flow through pipes.
8. Estimation of Diffusion Coefficient
9. Estimation of vaporization efficiency and thermal efficiency of Steam Distillation
10. Visit to food processing industries

Text Books

S. No	Authors	Title	Publishers	Year and Edition
1	G.V. Barbosa-Cánovas, J. Benavides, S. Sablani	Food Process Engineering and Technology	Elsevier	2021 and 3 rd edn.
2	P. R. Ashurst, M. D. Haug	Food Processing: Principles and Applications	Wiley-Blackwell	2021 and 2 nd edn.
3	R. Paul Singh, Dennis E. Heiss	Introduction to Food Engineering	Elsevier	2020 and 5 th edn.
4	James R. Whitaker, D. H. Lee	Transport Phenomena in Food Processing	Wiley	2021 and 3 rd edn.
5	David J. McClements, Vassilis A. R. Pappa	Extrusion Cooking: Technologies and Applications	Elsevier	2020 and 2 nd edn.

Pedagogy: Demonstration and hands on practical

Course Designers:

1. Dr. Sivasankari R

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
TH24A23	NUMERICAL AND STATISTICAL TECHNIQUES	THEORY	73	2	-	4

Preamble

- To present students the Basic concepts of Numerical Methods and Statistics
- To enable the students to find the practical applications to the real world problems

Prerequisite

- Students should have a basic understanding of algebra, calculus (differentiation and integration), matrices, and linear equations, along with introductory knowledge of statistics and probability. They should also possess good logical and numerical problem-solving skills.

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall basic Mathematics and Statistical concepts	K1
CLO2	Interpret results from the application of standard statistical and numerical methods.	K2
CLO3	Understand the concepts of Numerical differentiation and Theoretical distributions	K3
CLO4	Applying numerical and statistical methods to solve complex problem.	K3
CLO5	Analyse and evaluate the accuracy of common numerical and statistical methods.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	S
CLO3	S	S	S	M	S
CLO4	S	S	S	S	M
CLO5	S	M	S	S	S

S- Strong; M-Medium; L-Low

NUMERICAL AND STATISTICAL TECHNIQUES (TH24A23)

Syllabus

Unit I

15 Hours

Solution of Linear Simultaneous Equations: Gauss elimination - **Gauss Jordan** - Gauss Jacobi methods - simple problems. **Interpolation: Newton Forward** and Backward Interpolation Formulae.

Unit II

15 Hours

Numerical Differentiation: Newton's Forward Difference - Newton's Backward Difference, **Numerical Integration**: Introduction: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

Unit III

15 Hours

Correlation analysis: Introduction - Significance of the study of correlation - correlation and causation - **Types of correlation** - Methods of studying correlation - Graphic method - Karl Pearson's coefficient of correlation - **Properties of the coefficient of the correlation** - Rank correlation coefficient - Features of Spearman's correlation coefficient, **Regression analysis**.

Unit IV

15 Hours

Probability: Introduction - probability defined - **Importance of the concept of probability** - Calculation of probability - Theorems of probability (statements only) – **Mathematical expectation**-Simple problems.

Unit V

13 Hours

Theoretical Distributions: **Binomial distribution** - **Poisson distribution** and **Normal distribution** (without derivations & proof).

Text Books

S.No	Author	Title	Publishers	Year & Edition
1	B.S. Grewal	Numerical Methods in Engineering and Science with Programs in C & C++	Khanna Publishers	2014, XI
				Unit I : Chapter III & VII: 3.3:(3,4), 3.5:(1,2) & 7.1-7.3 Unit II: Chapter VIII : 8.1, 8.2:(1,2), 8.4, 8.5:(I, II, III)
2	S.P. Gupta	Statistical methods	Sultan Chand & Sons Publications	2005, XLXI

Reference Books

S.No	Author	Title	Publishers	Year of Publication
1	P.A.Navanitham	Business Mathematics And Statistics	Jai Publishing Company	2003
2	S.C Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons Publications	2001
3	P.Kandasamy, K.Thilagavathy and K.Gunavathy	Numerical Methods	S.Chand and company LTD Reprint	2007
4	V.K.Kapoor	Fundamentals of Statistics	Applied Statistics Sultan Chand & Sons	2007

MOOC learning

1. <https://nptel.ac.in/courses/111/107/111107105/>
(Lectures by Prof. Ameeya Kumar Nayak and Prof. Sanjeev Kumar, Department of Mathematics, Indian Institution of Technology Roorkee)
2. Lecture 02 Gaussian elimination with partial pivoting Lecture 04 Jacobi and Gauss Seidel methods
3. Lecture 20 Newton's Forward Difference & Newton's Backward Difference
4. Lecture 34 Simpsons 1/3rd rule and 3/8 rule <https://nptel.ac.in/courses/111/106/111106112/>
(6 Lectures by Prof. G.Srinnivasan, Department of Management Studies, Indian Institution of Technology Madras)
5. Lecture 12 Probability
6. Lecture 13 Rules of probability Lecture 19 Binomial distribution Lecture 20 Poisson distribution

Note

Question paper setters to confine to the above text books only

Course Designers:

1. Dr. R. Sasirekha, Assistant Professor
2. Dr. K. Krishnaveni, Assistant Professor

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF25A03	BASICS OF ACCOUNTANCY	THEORY	73	2	-	4

Preamble

- To understand fundamental accounting principles and standards.
- To deepen knowledge of financial transactions and final accounts using double-entry book keeping and Indigenous Accounting Practices.
- To analyse financial data using ratio analysis, cost accounting, and AI-driven automation.
- To effectively communicate financial results using modern tools and sustainability reporting.

Prerequisites

- Basic understanding of business transactions and numerical skills with an interest in financial record keeping and business accounting practices.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the fundamental concepts, principles, and standards of accounting, including IFRS and basic accounting practices	K1
CLO2	Identify and comprehend various financial transactions, book keeping methods, and computerized accounting systems including cloud accounting.	K2
CLO3	Apply accounting techniques to analyze business transactions, prepare final accounts, cost sheets, and cash budgets while integrating AI for automation.	K3
CLO4	Analyze financial statements using ratio analysis and understand the role of digital tools and sustainability reporting in business decision making.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	M	L
CLO2	S	S	M	S	M
CLO3	S	S	S	M	S
CLO4	S	S	S	L	L

S- Strong; M-Medium; L-Low

BASICS OF ACCOUNTANCY - BF25A03 - 73 Hrs

Unit I (14 Hrs)

Accounting: Meaning - Objectives - Types of Accounting - Accounting Concepts and Principles. Overview of Indian and International Accounting Standard - Introduction to IFRS: Concept - objectives - principles (Theory Only) - Kinds of Accounts - Accounting Equation - Journal - Ledger (Preparation of Journal and Ledger).

Unit II (14 Hrs)

Subsidiary Books: Purchase Book, Sales Book, Returns Book, Cash Book. Trial Balance: objectives - methods of preparing Trial Balance. Depreciation: Meaning - need for depreciation – Methods: Straight line and Diminishing balance methods (Simple Problems only).

Unit III (15 Hrs)

Final accounts: Trading account - Profit and loss account - Preparation of Trading, Profit & Loss Account - Balance sheet and its contents - Treatment of adjustments (Simple Problems only) - Computerized accounting: Needs & Importance. Introduction to Accounting Software's - Tally - Features & Benefits. Cloud Accounting: Introduction - Predictive Analytics in Cloud Accounting. (Theory only)

Unit IV (15 Hrs)

Cost accounting: Definition - Types of cost - Elements of Cost - Cost Sheet Formats & Preparation of cost sheet - Cost Volume Profit Analysis (Simple problems only) - Analyzing and managing food & beverage expenses. Management Accounting: Definition - Distinguish between Cost and Management accounting (Theory only).

Flexible Budget - Cash Budget: Meaning - Preparation of cash budget (Simple problems only).

Unit V (15 Hrs)

Ratio Analysis: Nature of Ratio Analysis - Significance - Types. Calculation of Ratios: Liquidity Ratio - Fixed Assets Turnover Ratio - Operating Ratio - Stock Turnover Ratio - Debtors Turnover Ratio - Creditors Turnovers Ratio - Debt Equity Ratio - Techniques of Financial Statement Analysis: Comparative Statements, Common Size Statements (Simple problems only). Introduction to sustainability. (Theory Only).

(Theory and Problems in the ratio of 20% and 80% respectively)

Textbook:

S. No	Authors	Title	Publisher	Year & Edition
1.	P C Tulsian, Bharat Tulsian, Tushar Tulsian	Financial Accounting	S Chand Publications	2025 & 2 nd Edn
2.	Gupta MP, Agarwal BM	Financial Accounting	S Chand Publications	2024 & 1 st Edn
3.	M.P. Gupta, Gupta Ajay	Cost & Management Accounting	Sultan Chand & Sons	2023 & 1 st Edn

Books for Reference:

S. No	Authors	Title	Publisher	Year & Edition
1.	S.N. Maheswari, Suneel K. Maheshwari, Sharad K. Maheshwari	Financial Accounting for BBA	Vikas Publishing House Private Limited	2023 & 7 th Edn
2.	S P Jain and Narang K.L, Simmi Agrawal & Monika Sehgal	Financial Accounting	Kalyani Publishers	2022 & 12 th Edn
3.	Ravi M Kishore	Cost and Management Accounting	Taxmann Publications Private Limited	2021 & 6 th Edn
4.	Shashi K. Gupta, Sharma R.K & Neeti Gupta	Cost & Management Accounting	Kalyani Publishers	2020 & 15 th Edn

Reference Links:

S. No.	Units	Topics	Reference Links
1	I	Introduction to IFRS- Concept and objectives & principles	https://www.youtube.com/watch?v=aL5UFu6Qtes
2		Kinds of Accounts	https://www.youtube.com/watch?v=AQvxKosUBf4&t=221s https://youtu.be/hvUY6i4rUVk
3	II	Meaning, Need for depreciation	https://www.youtube.com/watch?v=N5Wh2NNkqpU&t=1s https://youtu.be/fINkBABbqZU
4	III	Computerized accounting: Needs & Importance	https://youtu.be/BDTZuM7T4Kw

5	IV	Cost accounting: Types of cost	https://youtu.be/_z4-7xr6ur8 https://youtu.be/X3c4XOmP7AE
6		Management Accounting	https://youtu.be/eUMwwp5zDW0
7	V	Nature of Ratio Analysis, Significance	https://youtu.be/y132ILD4Vvg https://youtu.be/KjmGvEJqz3M https://www.youtube.com/watch?v=Wv5ojR1WaA4&t=1200s

Pedagogy

- Chalk& Talk, lecture, Seminar, Power Point Presentation, Group Discussion and Case Study.

Course Designers:

1. Dr.K.Nithya Kala
2. Dr.S.P.Depikaa

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
BF24SB01	GENERATIVE AI FOR FOOD INDUSTRY	THEORY	41	4	-	3

Preamble

- The objective of this course is to understand the breadth and depth of Generative Artificial intelligence(Gen AI)

Prerequisite

- Basic understanding of artificial intelligence concepts

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the fundamental concepts and ethical considerations of Generative AI	K1
CLO2	Apply AI principles in practical settings using basic AI tools and platforms	K3
CLO3	Develop advanced skills in specialized AI applications	K3
CLO4	Explore emerging trends in AI, integrating advanced AI tools into diverse food industry practices	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	S	S	M
CLO2	S	S	S	S	S	S
CLO3	S	S	M	S	S	S
CLO4	S	M	S	S	M	S

S- Strong; M-Medium

Syllabus**Unit 1: Introduction to Gen AI****9 Hours**

Understanding Gen AI: Definition and scope of Gen AI - Overview of its applications in various fields - Introduction to essential skills needed for Gen AI. Ethical Considerations: Discussion on ethical guidelines and responsible use of AI - Understanding the impact of AI on society and individuals. AI's role in the food industry

Hands-on Activity: Exploring AI Tools

- Working with appropriate content creation Gen-AI tools to engage with ChatGPT to explore various subjects, simulate interviews, or create imaginative written content.
- Working with appropriate writing and rephrasing Gen-AI tools to drafting essays on designated topics and refining the content with improved clarity, coherence, and correctness.

Unit 2: Basic AI Concepts**8 Hours**

Introduction to AI: Basic concepts and terminology of artificial intelligence - Examples of AI in everyday life - Real-world examples of AI applications in different domains. Machine Learning Basics: Understanding the principles of machine learning - Overview of supervised and unsupervised learning. Supervised learning for quality prediction, Unsupervised learning for clustering food types or conditions, Applications of ML in food production and processing Convolutional Neural Networks (CNNs) for image recognition in food inspection, Use cases in food

processing and quality control

Hands-on Activity: Simple AI Projects

- Working with appropriate educational content creation Gen-AI tools to generate quizzes and flashcards based on classroom material.
- Working with appropriate language learning Gen-AI tools to practice and enhance language skills through interactive exercises and games across multiple languages.

Unit 3: AI in Practice**8 Hours**

Text Analysis and Natural Language Processing (NLP): Introduction to NLP concepts and techniques - Hands-on exercises analyzing text data and extracting insights. Image Recognition and Processing: Basics of image recognition algorithms and techniques - AI Tools for Text and Image Processing, Data collection for AI applications

with appropriate **Hands-on Activity:** Text and Image Projects

- Working with appropriate image processing Gen-AI tools to experiment with AI-generated images.

- Working object recognition Gen-AI tools to identify various objects such as text, images, products, plants, animals, artworks, barcodes, and QR codes.

Unit 4 : AI Applications in Food Processing

10 Hours

Automation in Food Production: Robotics for food sorting, packaging, and processing

Automated systems for improving efficiency in food factories; **Computer Vision for Food**

Quality Control: Basics of computer vision and image processing, Using AI for defect detection, grading, and classification of food (e.g., fruits, vegetables, packaged goods); **AI in Process**

Optimization: Process control in food production using AI (e.g., temperature control in pasteurization); AI-based real-time optimization of food manufacturing; **Sensory Analysis Using**

AI: AI for predicting taste, aroma, and texture of food products, Machine learning models for sensory data analysis

Hands-on Activity: Exploring AI Tools and Applications in Food Processing

Unit 5: AI in Food Supply Chain and Logistics

10 Hours

AI for Supply Chain Optimization: AI in inventory management, production scheduling, and demand forecasting, AI for optimizing food delivery routes and logistics; **Food Traceability with**

AI: Using AI for tracking food from farm to table, Block chain integration for food traceability;

Reducing Waste in Food Supply Chain; AI for reducing food waste through better forecasting, AI applications in optimizing food storage and handling

AI and Jobs: Exploring how AI impacts jobs and industries - Discussion on opportunities and challenges - Exploration of AI-powered creative tools and applications

Societal Impact of Gen AI - Future Directions and Challenges

Hands-on Activity:

- Exploring with Case Studies in Generative AI and final project
- Working with appropriate data analysis Gen-AI tools to perform data analysis, visualization, and predictive modeling tasks.
- Working with appropriate website builder Gen-AI tools to develop professional websites with AI assistance
- Working with appropriate resume generation Gen-AI tools to create professional resumes efficiently

Pedagogy

Demonstration of AI Tools, Lectures and Case studies.

Course Designers

1. Mrs. S. Ponmalar
2. Dr.N.Deepa Sathish

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
NM23DTG	DESIGN THINKING	THEORY	30	-	-	2

Preamble:

1. To expose the students to the concept of design thinking as a tool for innovation
2. To facilitate them to analyze the design process in decision making
3. To impart the design thinking skills

Course Learning Outcome

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO 1	Understand the concepts of Design thinking and its application in varied business settings	K1
CLO 2	Describe the principles, basis of design thinking and its stages	K2
CLO 3	Apply design thinking process in problem solving	K3
CLO 4	Analyze the best practices of design thinking and impart them in business and individual day to day operations.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5
CLO 1	S	M	M	S	S
CLO 2	M	S	S	M	M
CLO 3	S	S	S	M	S
CLO 4	S	S	S	S	S

S-Strong; M-Medium

NM23DTG - DESIGN THINKING

Syllabus

(30 Hrs)

UNIT – 1

6 Hours

Design Thinking Overview: Introduction to Design Thinking and Design Research Strategies - Design Thinking Skills

UNIT – II

6 Hours

Design Thinking Mindset: Principles of Design Thinking - Basis for design thinking -Design Thinking Hats - Design thinking team

UNIT – III

6 Hours

Empathize: Definition - Listen & Empathize with the Customers and / or Users - Tools and Techniques

UNIT – IV

6 Hours

Define : Definition - Defining the Problem - Tools and Techniques - Journey mapping and Ideate - definition - Ideation techniques

UNIT – V

6 Hours

Prototype: Definition - Prototype Alternate Solutions - Test the Solutions - Visualization - Story Telling - Cautions and Pitfalls - Best Practices

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year and Edition
1.	Christian Mueller-Roterberg	Handbook of Design Thinking Tips& Tools for how to design thinking	Amazon Kindle Version	2018
2	Gavin Ambrose Paul Harris	Design Thinking	AVA Publishing Switzerland	2010
3	Sambhrant Srivastava and Vijay Kumar	A Text Book of DESIGN THINKING	Vayu Education of India	2022

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year and Edition
1	Maurício Vianna Ysmar Vianna Isabel K. Adler Brenda Lucena Beatriz Russo	Design Thinking - Business Innovation	MJV Press	2011
2	Moritz Gekeler	A practical guide to design thinking	Friedrich-Ebert-Stiftung	2019
3	J. Berengueres	The Brown Book of DesignThinking	UAE University College, Al Ain	2014

Blended Learning Links

UNIT	TOPICS	LINK
UNIT I	Introduction to Design Thinking	https://www.digimat.in/nptel/courses/video/109104109/L01.html
	Design Thinking skills	https://www.youtube.com/watch?v=b-9Id-Jt_PI
UNIT II	Principles & Basis of Design Thinking	https://youtu.be/6-NRiom8K9Y
	Design Thinking hats	https://www.youtube.com/watch?v=bc-BvFQDmmk
UNIT III	Empathize	http://acl.digimat.in/nptel/courses/video/109104109/L02.html http://acl.digimat.in/nptel/courses/video/109104109/L03.html https://youtu.be/ls2mqHs02B0
UNIT IV	Define	http://acl.digimat.in/nptel/courses/video/109104109/L04.html https://youtu.be/veixQsRnZZU https://youtu.be/6-bDSKZJEAM
	Ideate	http://acl.digimat.in/nptel/courses/video/109104109/L11.html http://acl.digimat.in/nptel/courses/video/109104109/L12.html http://acl.digimat.in/nptel/courses/video/109104109/L13.html
UNIT V	Prototype	http://acl.digimat.in/nptel/courses/video/109104109/L15.html
	Testing	http://acl.digimat.in/nptel/courses/video/109104109/L16.html http://acl.digimat.in/nptel/courses/video/109104109/L17.html http://acl.digimat.in/nptel/courses/video/109104109/L18.html http://acl.digimat.in/nptel/courses/video/109104109/L19.html