HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

B.Sc. FOOD TECHNOLOGY

(DURATION: 3 YEARS)

CURRICULUM AND SYLLABUS

Under Choice Based Credit System

(In line with NEP 2020)

(Applicable for Students admitted from Academic Year 2023-24)

DEPARTMENT OF FOOD TECHNOLOGY

SCHOOL OF BASIC AND APPLIED SCIENCES

HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE

Motto:

To Make Every Man a Success and No Man a Failure

Vision:

To be an International Institute of Excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society.

Mission:

- To create an ecosystem that promotes learning and world class research.
- To nurture creativity and innovation.
- To instill highest ethical standards and values.
- To pursue activities for the development of the Society.
- To develop national and international collaborations with institutes and industries of eminence.
- To enable graduates to become future leaders and innovators.

Value Statement:

Integrity, Innovation, Internationalization

DEPARTMENT OF FOOD TECHNOLOGY

Vision:

To establish excellence in the field of Food Processing Technology incorporating a value-based holistic education, lucrative innovation, collaborative research, promoting technical and entrepreneurial skills with strong sense of integrity and professionalism

Mission:

- To impart high-quality education to build the students' ability and enhance their skills to make them globally competitive Food Technologist.
- To develop the state-of-the-art research facilities to provide a collaborative environment that stimulates the opportunities to create, analyze, apply, and disseminate knowledge.
- To analyze technical problems, identify and solve using the basic principles of food processing technology and get engaged in lifelong learning and practice independency.
- To provide a holistic environment, equip students with ethics and intellectual integrity, contributing to the development of sustainable community.
- To inculcate entrepreneurial skills to conceptualize innovation in food science and technology to start up their own businesses.

PROGRAM EDUCATIONAL OBJECTIVES (PEO'S):

PEO 1: Graduates will apply fundamental technical knowledge and research skills to find workable solutions to technological challenges and problems in diversified areas of Food Processing.

PEO 2: Graduates will possess professional and ethical responsibilities with effective communication and managerial skills to prove as a responsible leader in government and private sectors.

PEO 3: Graduates will become entrepreneurs and highly competent to professionals of related field, to tackle business challenges and will continue their professional advancement through lifelong learning.

PEO 4: To produce competent graduates with the essential skills who shall pursue careers in the field of food technology, food processing and food regulation to meet the industry needs.

PROGRAMME OUTCOMES (PO'S):

PO1: Food Technology Knowledge: Apply the knowledge of technology and its fundamentals, to the solution of complex scientific problems in food processing technology.

P02: Problem Analysis: Identify, formulate, and analyze scientific issues related to food safety and standards reaching substantiated conclusions using the fundamental principles of food technology.

PO3: Conduct Investigations of Complex Problems: Use research-based knowledge and skill-based methodology to synthesis the information and provide solutions to complex technical problems.

PO4: Development of Solutions: Design solutions for complex scientific problems and acquire practical knowledge to troubleshoot issues with appropriate consideration for public health and safety, and the cultural, societal, and environmental concerns in the field of food technology.

PO5: Communication and Professional Skills: Apply ethical principles, commit to professional responsibilities, and communicate effectively to write technical reports and to make an effective presentation.

PO6: Career and Entrepreneurship: Ability to inculcate entrepreneurial skills and to employ modern technologies to produce new or value-added products to meet consumer and industry demands.

PO7: Ethics and Integrity: Apply ethical principles in developing a new food product, to maintain global food safety standard practices and regulations in areas of food technology.

PROGRAMME SPECIFIC OUTCOMES (PSO'S):

A graduate of the Food Technology programme will be able to:

PSO1: Innovation: Develop new experimental designs, techniques, and tools imparting cost-effective and custom-made solutions to develop a sustainable society.

PSO2: Industry Integration: Demonstrate and conduct independent research in the field of food processing technology.

PSO3: Internationalization: Exhibit competence in holistic development to meet global standards in the areas of food technology

B.Sc. FOOD TECHNOLOGY									
(CREDIT STRUCTURE 126)									
SEMESTER – I									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	CC	AFT11001	Principles of Food Science	3	0	2	**4**	0	5
2	CC	ACT11001	Applied Chemistry	3	0	2	**4**	0	5
3	CC	AMA11001	Applied Mathematics for Food Technology	3	1	0	4	0	4
4	CC	AFT11002	Food and Nutrition	2	0	2	**3**	0	4
5	HS	GLS51001	Communication Skills	2	0	1	**2**	1	3
6	HS	GLS11001	Tamil Art & Culture	1	0	1	**1**	2	2
7	VA	GGE51003	Environmental Science & Sustainable Development	2	0	0	**2**	2	2
8	VA	GBP01400 GPE21401 GPE21402 GPE21403 AVC31401 GGE51401 GGE51402	Health and Wellbeing / Yoga / Sports / Fitness / Fine Arts (Visual / Performing) / NCC / NSS	0	0	2	**1**	2	2
9	NC	ASS21001	Community Development	1	0	1	*	2	2
Total				**17**	**1**	**11**	**21**	**9**	**29**

SEMESTER – II									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	CC	AFT11003	Food Analysis Techniques	2	0	2	**3**	0	4
2	CC	AFT11004	Food Chemistry	2	0	2	**3**	0	4
3	CC	AFT11005	Introduction to Biochemistry	2	0	2	**3**	0	4
4	CC	AFT11006	Unit Operations in Food Technology	3	0	0	**3**	0	3
5	HS	GLS51002	Personality Development and Soft Skills	2	0	1	**2**	1	3
6	AE	ACA31001	Digital Technological Solutions	2	0	2	**3**	2	4
7	HS	GLS51008 GLS51009 GLS51010 GLS11002	Tamil/Hindi/Telugu/Advanced Tamil	2	0	0	**2**	2	2
8	VA	GBP01400 GPE21401 GPE21403 AVC31401 GGE51401 GGE51402	Health and Wellbeing / Yoga / Sports / Fitness / Fine Arts (Visual / Performing) / NCC / NSS	0	0	2	**1**	2	2
			Total	15	0	11	**20**	7	26

SEMESTER – III									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	CC	AFT11007	Food Microbiology	2	0	2	**3**	0	4
2	CC	AFT11008	Processing of Cereals, Pulses &Oil Seeds	2	0	2	**3**	0	4
3	DE	AFT1150*	Food Additives / Food waste management	3	0	0	**3**	0	3
4	NE	********	Non-department Elective	2	0	2	**3**	2	4
5	HS	GLS51011 GLS51012 GLS51013 GLS51014 GLS51015 GLS51016	French/German/Spanish/Korean/Mandarin/Japanese	2	0	0	**2**	2	2
6	HS	GLS51005	Public Speaking	1	0	1	**1**	1	2
7	NC	GLS51015	Indian Knowledge System	3	0	0	*	2	3
8	NC	ABB31001	CSR & SDG (Outreach)	1	0	2	*	2	3
9	SI	AFT11800	Internship evaluation	*	*	*	**4**	*	*
Total				16	**0**	**9**	**19**	**9**	**25**

SEMESTER – IV									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	CC	AFT11009	Technology of Fish Meat Poultry	2	0	2	3	1	4
2	CC	AFT11010	Food Preservation Technology	2	1	0	**3**	0	3
3	DE	AFT115*	Value Addition to Food Industry Refuse/ Introduction to Food Services	3	0	0	**3**	0	3
4	CC	AFT11011	Food Product Development	3	0	2	4	0	5
5	CC	AFT11012	Functional Foods and Nutraceuticals	3	0	0	**3**	0	3
6	SE	AFT11400	Food Preservation Lab	0	0	4	**2**	0	4
7	HS	GLS51006	English for Competitive Examinations	1	0	1	**1**	1	2
7	HS	GLS11003 GLS11004 GLS11005 GLS11006 GLS11007 GLS11008	French Intermediate/ German Intermediate/Spanish Intermediate/Korean Intermediate/Mandarin Intermediate/Japanese Intermediate	2	0	0	**2**	2	2
				16	**1**	**9**	**21**	**4**	**26**

SEMESTER – V									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	CC	AFT11013	Milk and Dairy technology	2	1	0	3	0	3
2	CC	AFT11014	Bakery and Confectionary	2	0	2	3	0	4
3	CC	AFT11015	Food Adulteration and Toxicology	3	0	2	4	0	5
4	CC	AFT11016	Food Safety	3	1	0	4	0	4
5	CC	AGE21001	Fundamentals of Research Methodology	3	0	2	4	2	5
5	DE	AFT1150*	Entrepreneurship /Sensory Evaluation Techniques	3	0	0	3	0	3
6	HS	GLS51007	Verbal Reasoning and Interview Skills	1	0	1	1	1	2
7	NC	AGE31001	Methodology for writing a Professional & Scientific article	1	0	0	*	2	1
Total				18	**2**	**7**	**22**	**5**	**27**

SEMESTER – VI									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	CC	AFT11017	Processing of Oils and Fats	3	1	0	4	0	4
2	CC	AFT11018	Fermented Foods	3	0	0	3	0	3
3	CC	AFT11019	Food packaging technology	3	1	0	**4**	0	4
4	DE	AFT1150*	Quality Control Management / Food Information Regulations	3	0	0	**3**	0	3
5	NC	GGE51011	Introduction to Women and Gender Studies	3	0	0	*	2	3
6	HS	GGE51001	Universal Human Values	2	0	0	2	2	2
7	SI	AFT11801	Project	0	0	14	7	0	14
				17	**2**	**14**	**23**	**4**	**33**

B.Sc Food Technology

2023/R0

LIST OF DEPARTMENTAL ELECTIVES

SL. NO	COURSE CATEGORY	COURSE TYPE	SEMESTER	COURSE CODE	NAME OF THE COURSE	L	T	*P*	*C*	*S*	*TCH*
1	DE 1	TH	III	AFT11500	Food Additives	3	0	*0*	*3*	*0*	*3*
2		TH	III	AFT11501	Food Waste management	3	0	*0*	*3*	*0*	*3*
3	DE 2	TH	IV	AFT11502	Value Addition to Food Industry Refuse	3	0	*0*	*3*	*0*	*3*
4		TH	IV	AFT11503	Introduction to Food services	3	0	*0*	*3*	*0*	*3*
5	DE 3	TH	V	AFT11504	Entrepreneurship	3	0	*0*	*3*	*0*	*3*
6		TH	V	AFT11505	Sensory Evaluation Techniques	3	0	*0*	*3*	0	3
7	DE 4	TH	VI	AFT11506	Quality Control Management	3	0	*0*	*3*	*0*	*3*
8		TH	VI	AFT11507	Food Information Regulations	3	0	*0*	*3*	*0*	*3*

List of Non Departmental electives

SL. NO	COURSE CATEGORY	COURSE TYPE	SEMESTER	COURSE CODE	NAME OF THE COURSE	L	T	P	*C*	*S*	*TCH*
1	NDE	TP	III	AFT11700	Food Preservation Technology	2	0	2	*3*	*2*	*4*
2		TP	III	AFT11701	Principles of Food Science	2	0	2	*3*	*2*	*4*

COURSE TITLE	PRINCIPLES OF FOOD SCIENCE			CREDITS	4
COURSE CODE	AFT11001	COURSE CATEGORY	CC	L-T-P-S	3-0-2-0
Version	2	Approval Details		LEARNING LEVEL	BTL – 3
ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical	End Semester Theory Exam	
15%	15 %	20%	100%	50%	
Course Description	Food Science is the study of the nature of foods, components of various food groups, their nutritional value, effect of processing on the nutrients, the causes of deterioration, the principles underlying food processing, and the improvement of foods for the consuming public.				
Course Objective	To enable the students 1. To enter a career in the food industry as scientists capable of ensuring the production and marketing of safe and quality foods. 2. Provide a broadly based scientific education whose graduates can also enter into employment in other sectors of the food chain or related scientific sectors where they can apply their scientific skills. 3. To allow individuals to develop their capacity to undertake research into the science of foods. 4. To provide undergraduates with opportunities to develop their inter- personal and communication skills. 5. To create a knowledge-based skill towards research-oriented aspiration.				
Course Outcome	Upon completion of this course, the students will be able to 1. Knowledge on different types of nutritional foods 2. Examine on nutritional qualities of different foods 3. Elucidate the properties and processing of the derived products 4. Analyze the features and modifications during the processing of food products 5. Understand the essential and non-essential purposes of food Additives				
Prerequisites: Basic Chemistry					
Pedagogy: Direct Instruction**,** Constructivist, Reflective, Inquiry-based, Case studies, Discussion					

CO, PO AND PSO MAPPING										
CO	**PO -1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**
CO-2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**
CO-3	**2**	**1**	**1**	**1**	**2**	**2**	**3**	**3**	**2**	**3**
CO-4	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**2**
CO-5	**3**	**1**	**1**	**2**	**2**	**2**	**2**	**3**	**2**	**2**
1: Weakly related, 2: Moderately related and 3: Strongly related										

MODULE 1: INTRODUCTION TO FOOD SCIENCE, CEREALS AND MILLETS.	**(9L+3P)**
Introduction to Food Science – Food – Definition, Function and Groups. Introduction to Nutrients - Carbohydrates, Protein, Lipids, Vitamins, Minerals. Cereals: General Outline, Composition & Nutritive value, Structure of Wheat and Rice. Millets – Composition and Nutritive Value, Types. **Activity:** Discussion and Demonstration on importance of Cereal Protein and Starch – Effect of Moist and Dry Heat (Gelatinization and Dextrinization)	**CO – 1** **BTL – 2**
MODULE 2: PULSES & LEGUMES, NUTS & OILSEEDS	**(9L+3P)**
Composition and Nutritive value, Anti-nutritional factors. Changes during cooking, Factors affecting cooking time. Germination - Changes during germination. Nuts & Oilseeds**:** Composition, sources of proteins and oil, Processing of oil seeds - Soya bean, coconut, ground nut and sesame. Protein concentrates and isolates, Texturized vegetable protein. **Activity:** Germination of different kinds of seeds.	**CO – 1** **BTL – 2**
MODULE 3: FRUITS & VEGETABLES, ALGAE AND FUNGI.	**(9L+3P)**
Fruits - Classification, Composition, Nutritive value. Post-Harvest Changes, Ripening, Changes during Ripening, Browning Reactions. Vegetables - Classification, Composition, Nutritive value, Pigments – Types and Effect of Cooking, Microgreens. Algae – Spirulina, Fungi – Mushrooms.	**CO-3** **BTL-3**
MODULE 4: EGGS, MILK AND MEAT, BEVERAGES.	**(9L+3P)**
Eggs: Structure, Composition, Nutritive value, Grading, Quality of Egg. Milk: Composition and Nutritive Value, Milk Cookery – Effect of Heat and Enzymes, Milk Process.	

Fish: Classification, Composition, Nutritive value. Meat: Structure, Classification, Composition, Nutritive value. Post Mortem Changes. Poultry- Classification, Composition and Nutritive Value Beverages - Classification, Function, Coffee, Tea, Cocoa and Chocolate, Carbonated Beverages – Types and Processing Steps. **Practicum:** Quality of Eggs – Candling and Floating Test.	**CO-4** **BTL-3**

MODULE 5: SUGARS, SPICES AND FOOD LAWS.	**(9L+3P)**
Sugar – Properties, Sugar Cookery – Stages of Sugar Cookery, Crystallisation. Spices – History and Benefits - Major and Minor Spices of India. Food laws – FSSAI, Agmark, BIS, Codex Alimentarius, HACCP. **Practicum**: Stages of Sugar Cookery	**CO-5** **BTL-3**
Skill Development Activities: Preparation of Practicum Report Booklet.	
TEXT BOOKS	
1.	B.Srilakshmi (2021) Food Science, New Age publishers
2.	Shakuntala Manay (2019), Foods Facts and principles. New Age publishers
REFERENCE BOOKS	
1.	Janet D. Ward, Larry Ward, Jodi Songer Riedel (2021) Principles of Food Science, 5th Edition, The Goodheart-Willcox Company, Inc.
2.	Vijayalakshmi D., Usha Ravindra, Shahshad Begum S (2019) Principles of Food Science & Nutrition. Satish Serial Pub House.
E-BOOKS / MAGAZINE / ARTICLES	
1.	https://www.pdfdrive.com/food-science-and-technology-d41395460.html
2.	https://www.researchgate.net/publication/362373442_FUNDAMENTALS_OF_FOOD_SCIENCE_AND_NUTRITION_TEXT
ONLINE RESOURCES	
1.	https://courseware.cutm.ac.in/courses/principles-of-Food-Science-and-nutrition/
2.	https://www.youtube.com/watch?v=_kf9yZR4ZnU

COURSE TITLE	APPLIED CHEMISTRY			CREDITS	4
COURSE CODE	ACT11001	COURSE CATEGORY	HS	L-T-P-S	3-0-2-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	End Semester Exam
15%	15%	10%	5%	5%	50%

Course Description	To make the students understand the basic concepts of chemistry and their applications.
Course Objective	1. To make the students understand the basics of chemical bonding and periodic properties of elements. 2. To impart knowledge of organic reactions and basic instrumentation techniques. 3. To impart knowledge of chemical kinetics. 4. To provide a knowledge on polymeric materials and composites. 5. To provide an exposure on the concepts of electro- and photochemistry.
Course Outcome	Upon completion of this course, the students will be able to 1. Identify and demonstrate the different types of chemical bonds. 2. Name the organic compounds, identify the functional groups and analyze the chemicals. 3. Determine the order of a reaction. 4. Select the suitable polymers / composites for industrial applications. 5. Evaluate electrodes and cells and understand the concepts of photochemistry.

Prerequisites: Basic knowledge in chemistry in the 12th level.

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	2	1	2	1	1	2	1	1	2	1
CO-2	2	1	2	1	1	2	1	1	2	1
CO-3	2	1	2	1	1	2	1	1	2	2
CO-4	2	1	2	1	1	2	1	1	2	2
CO-5	2	1	2	1	1	2	1	1	2	1

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: CHEMICAL BONDING AND PERIODIC TABLE	(9L+3P)
Characteristics of covalent bond – ionic bond – coordinate bond – Van der Waals – hydrogen bond – metallic bond – factors affecting the formation of ionic/covalent compounds – Born Haber cycle – Fajan's rule – shapes of molecules – bond length – bond order – bond angle – concept of resonance – valence bond theory (hybridization) – VSEPR concept – structure of water. Modern periodic table – classification of elements in periodic table – general properties of s, p, d and f-block elements – periodicity in properties of elements – atomic radii – ionic and covalent radii – ionization energy – electronegativity – electron affinity – Lanthanide contraction – inert pair effect. **Demonstration** Demonstration of physiochemical properties of covalent and ionic compounds by audio-visual aids.	**CO-1** **BTL-1,2**
MODULE 2: BASICS OF ORGANIC REACTIONS AND INSTRUMENTAL TECHNIQUES	**(9L+3P)**
Concept of functional group – nomenclature and isomerism – hemolytic and heterolytic fission – types of reactions – addition – elimination – substitution – rearrangement – examples – resonance Vs. tautomerism. Electromagnetic Radiation - Electromagnetic Spectrum – Beers-Lambert Law - UV-Vis spectroscopy - Infrared Spectroscopy - principles and applications - Concept of chromatography and its types. **Practicum:** Applications of UV Visible and FTIR spectroscopy.	**CO-2** **BTL-2,3**
MODULE 3: CHEMICAL KINETICS	**(9L+3P)**
Basic terminology – rate – order – molecularity – determination of rate constants for first and second order reactions – general methods to determine the order of a reaction – problems – effect of temperature, pressure, catalyst, activated complex – collision theory of bimolecular reactions – composite reactions – competitive, parallel and consecutive reactions – definition and examples. **Demonstration** Demonstration on the determination of order of a reaction by the graphical method.	**CO-3** **BTL-2,3**
MODULE4: POLYMERS AND COMPOSITES	**(9L+3P)**
Introduction – Basic definitions – Classification of polymers – Structure and property relationship of polymers – Plastics – Synthesis, properties and applications of PVC and phenol-formaldehyde - Biodegradable Polymers, examples and applications. Composites –constituents and types - applications. **Practicum:** Preparation of phenol-formaldehyde resin.	**CO-4** **BTL-2,3**
MODULE 5: ELECTROCHEMISTRY AND PHOTOCHEMISTRY	**(9L+3P)**
Conductometric Titration – HCl vs NaOH and mixture of acids vs NaOH - Electrochemical Series and its applications - EMF of a cell – galvanic cell – standard electrode potential – types of electrodes – pH & its measurements – buffer solutions. Lambert Beer's law – law of photochemical equivalence – quantum efficiency – high and low quantum yields – reason for high and low quantum yields – phosphorescence and fluorescence. **Quizzes** Quizzes on the electrodes, electrode potential and applications of EMF.	**CO-5** **BTL-2,3**
TEXT BOOKS	

1.	Cotton, F. A., Wilkinson, G. & Gans, P. (2018). Basic Inorganic Chemistry (3rd Edition), John Wiley & Sons.
2.	Morrison, R.T. & Boyd, R. N. (2018). Organic Chemistry (6th Edition), New Delhi, Prentice Hall.
3.	Jain, P.C. & Jain, M. (2018). Engineering Chemistry (17th Edition), New Delhi, Dhanpat Raj Publishing Company (P) Ltd .
REFERENCE BOOKS	
1.	Arun, B., Bahl, B. S. & Tuli, G. D. (2020). Essential of Physical Chemistry, New Delhi , S. Chand & Co. Ltd.
2.	Arun, B. & Bahl, B. S. (2019*).* A Textbook of Organic Chemistry, New Delhi, S. Chand & Co. Ltd.
3.	Palanna, O. G. (2018). Engineering Chemistry (2nd Edition), Mc Graw Hill Education (India) Pvt. Ltd.
E BOOKS/MAGAZINE/ARTICLES	
1.	Applied Chemistry Notes and Study Material PDF Free Download – BTech Geeks
2.	A. K. Haghi, Devrim Balköse, Omari V. Mukbaniani, Andrew G Applied Chemistry and Chemical Engineering, Volume 1: Mathematical and Analytical Techniques Book Free Download – EasyEngineering
3.	List of textbooks for Applied Chemistry 1 - First Year Engineering Semester 1 (MU) | Stupidsid
ONLINE RESOURCES	
1.	Advanced Chemistry | Coursera
2.	Functional Polymeric Materials | edX
3.	Basic Analytical Chemistry | edX

COURSE TITLE	APPLIED MATHEMATICS FOR FOOD TECHNOLOGY			CREDITS	4
COURSE CODE	AMA11001	COURSE CATEGORY	HS	L-T-P-S	3-1-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	End Semester Exam
15%	15%	10%	5%	5%	50%

Course Description	To make the students understand the basic concepts of chemistry and their applications.
Course Objective	To enable the students 1. To develop the student's ability to deal with numerical and quantitative issues in food technology. 2. To enable the use of statistical, graphical and algebraic techniques wherever relevant. 3. To calculate various moments of common random variables including at least means, variances and standard deviations. 4. To be able to answer questions concerning the application of mathematics in food science field. 5. To enable students for analysing different situations in the Industrial/business scenario involving limited resources and finding optimal solution.
Course Outcome	Upon completion of this course, the students will be able to 1. Apply the concept of measure of central tendency. 2. Determine the Correlation and regression coefficients. 3. Classify the testing of hypothesis and interpret its statistical significance. 4. Compute and interpret proportion of variance for ANOVA classification 5. Formulate the linear programming problem and computing the solution using Graphical Method

Prerequisites: Basic knowledge in Mathematics in the 12th level.

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	2	3	1	1	2	2	3	1	-	1
CO-2	2	3	1	1	2	1	1	2	1	1
CO-3	2	3	2	1	2	1	3	2	2	1
CO-4	2	2	3	2	2	-	3	2	1	2
CO-5	2	2	2	1	2	2	2	1	2	2

1: Weakly related, 2: Moderately related and 3: Strongly related	
MODULE 1: Measure of Central Tendency	**(9L+3T=12)**
Introduction to measure of central tendency – mean, median, mode – Dispersion, Range, Quartile, Deviation, Mean Deviation, Standard Deviation.	**CO-1 BTL-2**
MODULE 2: Correlation and Regression	**(9L+3T)**
Correlation- Karl Pearson's coefficient of correlation- Spearman's Rank Correlation- Regression lines and coefficients.	**CO-2 BTL-2**
MODULE 3: Sampling Distributions	**(9L+3T=12)**
Sampling distributions – Testing of Hypothesis for mean, Variance, Proportions and differences using normal, t, Chi-square and F distribution – Tests for Independence of attributes and goodness of fit	**CO-3 BTL-3**
MODULE 4: Analysis of Variance	**(9L+3T=12)**
Introduction to analysis of variance -One-way classification CRD – Two-way classification RBD – Latin Square (LSD)	**CO-4 BTL-2**
MODULE 5: Linear Programming Problem	**(9L+3T=12)**
Introduction to operations research- Objective- Scope of OR- Limitations of OR- Introduction and formulation of linear programming- Solving LPP using Graphical method.	**CO-5 BTL-2**
TEXT BOOKS	
1	S.P. Gupta (2020) Statistical Methods, Suhan publisher.
2	P.R. Vital (2019) Introduction to Operations Research, Margam Publications.
REFERENCE BOOKS	
1	P.R. Vital (2018) Business Statistics and Operations Research, Margham Publications.
2	A. Chandrasekaran, G.Kavitha (2017) Probability, Statistics ,Random Processes and Queuing Theory, Dhanam Publications, Chennai.
3	P.R. Vital (2016) Business Statistics and Operations Research, Margham Publications.
E BOOKS/MAGAZINE/ARTICLES	
1.	https://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/Business-Statistics-by-Gupta.pdf

COURSE TITLE	FOOD & NUTRITION			CREDITS	3
COURSE CODE	AFT11002	COURSE CATEGORY	CC	L-T-P-S	2-0-2-0
Version	2	Approval Details		Learning Level	BTL-3

ASSESSMENT SCHEME				
First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical	End Semester Theory exam
15%	15%	20%	100%	50%

Course Description	The course will provide theoretical knowledge about the correlation between the food and nutrition with the individual nutrient roles and their enhancement functions in a productive manner for the improvement of food stuff products. The mechanisms and pathways have a vital role to be played in body which emphasizes on the role of it in daily routine and metabolisms
Course Objective	To enable the students 1. To elucidate the role of nutrients in food 2. To analyze the nutrients specialization in accordance with the food stuff 3. To discuss the correlation of food and nutrition from diet planning strategy 4. To implement the nutritional skills in clinical and technological food materials 5. To inculcate the ideology in research oriented fashion
Course Outcome	Upon completion of this course, the students will be able to 1. Understand about the main nutrient classification present in the food. 2. Gain knowledge about micronutrient analysis involved in food classifications. 3. Learn about the protein formation and their role with amino acid essentials 4. Detect the analytical energy based roles of macro and micro-nutrients in food 5. Develop study on the mechanism of action of the food metabolism of nutrients.

Prerequisites: Plus 2 science stream

Pedagogy: Direct Instruction**,** Constructivist, Reflective, Inquiry-based, Discussion, Technological platforms like Padlet, Mind map, Case study

CO, PO AND PSO MAPPING										
CO	**PO -1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	**2**	**1**	**1**	**2**	**3**	**2**	**2**	**1**	**0**	**1**
CO-2	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**0**	**1**	**2**
CO-3	**2**	**1**	**1**	**1**	**2**	**3**	**2**	**2**	**0**	**0**
CO-4	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**0**
CO-5	**3**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**1**	**-**
1: Weakly related, 2: Moderately related and 3: Strongly related										

MODULE 1 – FATS AND LIPIDS	**(7L+2P)**
Understanding relationship between food, nutrition and health. Functions of food physiological, psychological and social. Concept of balanced diet. Lipids - Classification, Composition function - essential fatty acids, deficiency, food sources of EFA, Function of TGL, Characteristics of animal and vegetable fats, sterols - cholesterol - function, food sources, phosphor lipids - function, ketone bodies - fat requirements - food sources, dietary lipids and their relation to the causation of Atherosclerosis Activity: To correlate the concepts in the field of Food & Nutrition in relation to food ingredients	**CO – 1** **BTL – 2**
MODULE 2 – NUTRIENTS,VITAMINS AND MINERALS	**(7L+2P)**
Nutrients – Classification, Functions, Dietary sources, RDA. Fat soluble vitamins - A, D, E and K. Water soluble vitamins- thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C. Minerals- Role of Calcium, Phosphorus, Iron, Sodium, Potassium, Iodine, Fluorine, Selenium. **Practicum**: Titrimetric method for estimation of Vitamin C in lemon juice, chillies Estimation of iron in any solution (calorimetry/spectrometer) Determination of inorganic phosphorous	**CO – 2** **BTL – 2**
MODULE 3 – CARBOHYDRATES AND PROTEINS	**(7L+2P)**
Proteins and Carbohydrate - Composition - structure and classification, function of protein, carbohydrates, Amino acids Indispensable and dispensable amino acids - special function of amino acids Protein Energy Malnutrition - Kwashiorkor and Marasmus - etiology, clinical features, treatment and prevention - Evaluation of protein quality - PER, BV, NPU and NPR, chemical score mutual and amino acid supplementation of proteins. **Practicum:** Calculation of chemical score using SAAP, PAAP, reference protein	**CO-3** **BTL-3**
MODULE 4 – BASICS OF ENERGY	**(7L+2P)**
Energy units - Kilocalories, Mega joules, determination of energy value of foods, using Bomb calorimeter, diagram of Bomb Calorimeter - gross calorific values, Physiological energy, value of foods, relation between oxygen used and calorific value **Activity:** Demonstration of Bomb calorie meter	**CO-4** **BTL-2**

MODULE 5 – METABOLISM OF NUTRIENT ACTION	(7L+2P)
Determination of energy requirements, direct calorimetry. Relation between Respiratory quotient and energy output - Specific dynamic action of food .indirect calorimetry - Basal metabolism - definition, determination - factors affecting BMR - determination of energy metabolism, during work - energy requirements for various types of activities, recommended allowances for calories, energy requirements of adults expressed in terms of reference man and reference woman - FAO committee and ICMR committee percent calories supplied by carbohydrates, fats and proteins in average Indian diets - Energy requirements for different age group **Activity:** Calculating BMR using Kymograph Calculating the energy expenditure using Sathyanarayan method Preparing diet plan for different age groups using ICMR RDA .	**CO-5** **BTL-2**

Skill Development Activities:

Deep analysis of nutrients and implement them in food processing and developing a new product

TEXT BOOK	
1.	M. Swaminathan, Principles of Nutrition and Dietetics,2018, Bappco Bangalore
2.	Guthrie H.A. – Introductory Nutrition 2019. C.V. Mosby Co. St. Louis
REFERENCE BOOK	
1.	William, S.R. – Nutrition and Diet Therapy(2016) 5th edition, Mosbey Co. St. Louis.
2.	Wardlaw, G.M. Insel, P.H. – Perspectives in Nutrition (2020) Times Mirror / Mosby College Publishing Co. St. Louis, Toronto, Boston
E-BOOKS / MAGAZINE / ARTICLES	
1.	https://www.vidyawarta.com/01/wp-content/uploads/2019/09/book_A_Text_Book_of_Food_and_Nutrition.pdf
2.	https://pdf.usaid.gov/pdf_docs/PA00TBCT.pdf
ONLINE RESOURCES	
1.	https://books.google.co.in/books/about/Food_and_Nutrition.html?id=N_s6Dn8HC8AC
2.	https://www.routledge.com/go/food-nutrition-textbooks-2020-2021

COURSE TITLE	FOOD ANALYSIS TECHNIQUES			CREDITS	3
COURSE CODE	AFT11003	COURSE CATEGORY	CC	L-T-P-S	2-0-2-0
Version	2	Approval Details		LEARNING LEVEL	BTL – 3

ASSESSMENT SCHEME				
First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical Exam	End Semester Theory Exam
15%	15%	20%	100%	50%

Course Description	Food analysis techniques deal with the development, application and study of analytical procedures for characterizing the properties of foods and their constituents. These analytical procedures are used to provide information about a wide variety of different characteristics of foods, including their composition, structure, physicochemical properties and sensory attributes.
Course Objective	To understand food composition and nutrients. To study of the fundamental and specific aspects of the development, optimization, and practical implementation in routine laboratories. To develop skills for validation of food analytical methods for the monitoring of food safety and quality. To provide information about composition, appearance, texture, flavour, shelf-life, safety, processibility, and microstructure of food. To guarantee food product quality. To safeguard the health, well-being, and safety of the consumers.
Course Outcome	Upon completion of this course, the students will be able to Recognize and describe food composition and nutrients. Comprehend the fundamental and specific aspects of the development, optimization, and practical implementation in routine laboratories. Demonstrate skills for validation of food analytical methods for the monitoring of food safety and quality. Examine and provide information about composition, appearance, texture, flavour, shelf-life, safety, processibility, and microstructure of food. Evaluate and determine quality and safety of food products.
Prerequisites: Chemistry	
Pedagogy: Direct Instruction**,** Constructivist, Reflective, Inquiry-based, Case studies, Discussion	

CO, PO AND PSO MAPPING										
CO	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	**3**	**2**	**1**	**2**	**2**	**3**	**2**	**2**	**1**	**2**
CO-2	**3**	**2**	**1**	**2**	**2**	**2**	**1**	**3**	**2**	**2**
CO-3	**3**	**1**	**1**	**2**	**2**	**1**	**1**	**2**	**3**	**1**
CO-4	**3**	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**3**	**2**
CO-5	**3**	**1**	**2**	**2**	**1**	**1**	**1**	**2**	**3**	**2**

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – SAMPLING AND SAMPLING TECHNIQUES	**(7L+2P)**
Statistical tests and Error Analysis: Accuracy, precision, classification of errors- minimization of errors - Sampling and sample treatment– different methods of sampling – factors involved in effective sampling - representative and homogeneous - pre-concentration and pre-dilutions Activity**:** Discussion on importance of statistical tests. Lab hand on practical on pre-concentration and pre dilution of reagents.	**CO-1** **BTL-1,2**
MODULE 2 – COMPOSITION ANALYSIS OF FOOD	**(7L+2P)**
Principles of Moisture and total solids analysis - Ash analysis - Fat analysis - Protein analysis - Carbohydrate analysis - Vitamin analysis - Traditional method of mineral analysis. **Practicum**: Demonstration of proximate analysis and mineral in the lab.	**CO-2** **BTL-2,3**
MODULE 3 – PHYSICAL ANALYSIS OF FOOD	**(7L+2P)**
Rheological analysis - thermal analysis (TGA, DTA, DSC) – colour analysis. **Practicum:** Demonstration of rheological analysis and colour determination in the lab.	**CO-3** **BTL-3**
MODULE 4 – SPECTROSCOPIC ANALYSIS OF FOOD	**(7L+2P)**
Interaction of radiation with matter – Beer-Lambert's Law – Estimation of iron, nickel by spectrophotometer – Principle and basic applications of – UV-Visible, Infrared, Mass spectroscopy. **Practicum:** Demonstration on use of spectrophotometer in the lab	**CO-4** **BTL-3**
MODULE 5 – SEPARATION TECHNIQUES	**(7L+2P)**
Basic principles of chromatography – TLC – Column chromatography – HPLC - Gas chromatography – Electrophoresis. **Practicum**: Use of chromatography in the lab	**CO-5** **BTL-3**
Skill Development Activities: Laboratory mini-project on paper chromatography.	

TEXT BOOKS	
1.	S.S. Nielsen, Food Analysis, 2020. Aspen Publishers, 2nd Edition.
REFERENCE BOOKS	
1	Y. Pomeranz & C.E. Meloan, Food Analysis: Theory and Practice.2019 Chapman and Hall.
2.	C.S. James. Analytical Chemistry of Foods. 2021.Blackie Academic and Professional
E-BOOKS / MAGAZINE / ARTICLES	
1.	https://fcen.uncuyo.edu.ar/upload/food-analysis.pdf
2.	https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Kinetics/02%3A_Reaction_Rates/2.01%3A_Experimental_Determination_of_Kinetics/2.1.05%3A_Spectrophotometry
ONLINE RESOURCES	
1.	https://www.coursera.org/courses?query=food%20science
2.	https://onlinecourses.swayam2.ac.in/cec20_ag06/preview

COURSE TITLE	FOOD CHEMISTRY			CREDITS	3
COURSE CODE	AFT11004	COURSE CATEGORY	CC	L-T-P-S	2-0-2-0
Version	2	Approval Details		Learning Level	BTL 3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical Exam	End Semester Exam
15%	15%	20%	100%	50%

Course Description	Food chemistry is the study of chemical processes and interactions of all biological and non-biological components of foods. Food chemists mainly focus on how the plant and animal-based foods are prepared, processed and distributed. Food also undergoes changes because of the elements present in it. Food chemistry helps us to find out what causes these changes and what are the primary components that make up our food.
Course Objective	To enable the students 1. To understand the chemical composition of food. 2. To understand the chemical function and properties of major food components. 3. To understand the chemical interactions of food components and their effects on sensory and nutritional quality, functional properties, and safety of foods 4. To allow individuals to develop their capacity to undertake research into the Food Chemistry. 5. To provide undergraduates with opportunities to develop high skills in Food Chemistry.
Course Outcome	Upon completion of this course, the students will be able to 1. Knowledge on chemical composition of food 2. Interpret and be able to control the major chemical and biochemical (enzymatic) reactions that influence food quality with emphasis on food industry applications. 3. Examine the chemical function and properties of major food components. 4. Elucidate the chemical interactions of food components and their effects on sensory and nutritional quality, functional properties, and safety of foods 5. Understand the principles that underlie the biochemical/enzymatic techniques used in food analysis.

Pre-requisites : Chemistry

Pedagogy: Direct Instruction**,** Constructivist, Reflective, Inquiry-based, Case studies, Discussion

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	2	1	1	2	2	2	1	2	3	1
CO-2	1	3	2	1	1	2	3	2	3	1
CO-3	1	1	1	1	1	3	1	1	2	2
CO-4	1	1	1	2	1	1	1	1	2	2
CO-5	1	1	1	3	1	3	2	1	2	1

1: Weakly related 2: Moderately related and 3: Strongly related

MODULE 1: WATER	(7L+2P)
Water as a nutrient, function, sources, requirement, structure, water balance – effect of deficiency. Introduction to chemistry of water and ice. Moisture in food: Hydrogen bonding, Bound water, Free water, Water activity and Food stability. **Activity:** Scope of Food Processing Principles Lab practical works on water	**CO-1** **BTL-1,2**
MODULE 2: ENERGY	**(7L+2P)**
Energy – Unit of energy, food as a source of energy, energy value of food, the body's need for energy, B.M.R. activities. Utilization of food for energy requirements. Acid – base balance. **Activity**: Assignment on energy value of different foods	**CO-2** **BTL-2,3**
MODULE 3: CARBOHYDRATES AND LIPIDS	**(7L+2P)**
Carbohydrates- composition, classification, sources, functions, structure, physical & chemical properties. Other sweetening agents, functions of sugar in food (Browning reaction), changes during cooking and processing. Lipids – composition, nomenclature, saturated, unsaturated fatty acids, classification, food sources, functions of fats. Physical and chemical properties, emulsions, chemistry & technology of fat and oil processing. Role of food lipids in flavor. **Practicum:** Determination of simple reducing sugars and starch in plant foods	**CO-3** **BTL-3**
MODULE 4: PROTEINS	**(7L+2P)**
Proteins – composition, classification sources, functions, denaturation, and protein deficiency, determination of protein quality. Amino acids – classification, Physio-chemical properties, modification of food protein through processing and storage. **Activity:** Presentation by students on amino acids in food	**CO-3** **BTL-3**
MODULE 5: VITAMINS AND MINERALS	**(7L+2P)**
Vitamins – Classification, units of measurement, sources, functions and deficiency diseases caused by following vitamins: a. Fats soluble vitamins – Vitamin A, D, E and K b. Water soluble vitamins – Vitamin C and B-complex. Vitamins and minerals structure general causes of loss in food. Fortifications, Enrichment and Restoration. Mineral functions, sources, Bio-availability, and deficiency of following minerals – calcium, Iron, Iodine, Fluorine, sodium, potassium **Activity**: Mini project on vitamins and minerals in foods	**CO-5** **BTL-3**
Skill Development Activities: Reflecting on personal thoughts during daily activities for one day and observing/ introspecting on the various basic compositions of different foods taught in this course.	

TEXT BOOKS	
1	Damodaran, S., Parkin, K.L and Fennema, D.R. (2019). Fennema's Food Chemistry. 4th edition. CRC Press.
REFERENCE BOOKS	
1	Meyer, L.H. (2018). Food Chemistry. Textbook Publishers. ISBN: 0758149204
2.	Srilakshmi, B. Food science.(2020) 3rd Edition. NewAge International.
3.	Shakuntla, M.N and Shadaksharaswamy, M. (2019). Food Facts and Principles. New Age International
E-BOOKS / MAGAZINE / ARTICLES	
1.	https://www.pdfdrive.com/food-science-and-technology-d41395460.html
	https://books.google.co.in/books?id=xteiARU46SQC&printsec=frontcover&redir_esc=y#v=onepage&q&f=false

COURSE TITLE	INTRODUCTION TO BIOCHEMISTRY			CREDITS	3
COURSE CODE	AFT11005	COURSE CATEGORY	CC	L-T-P-S	2-0-2-0
Version	2	Approval Details		LEARNING LEVEL	BTL – 3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical Exam	End Semester Exam
15%	15%	20%	100%	50%

Course Description	Biochemistry is a discipline of Chemistry that deals with the chemical composition of living organisms. It deals with interactions between living organic cells and their surrounding fluids/matter and is the study of important chemical processes occurring within living organisms. By controlling information flow through biochemical signaling and the flow of chemical energy through metabolism, biochemical processes give rise to the incredible complexity of life.
Course Objective	Students will able to 1. Gain basic concepts of biochemistry. 2. Demonstrate the role of nature of interdisciplinary importance of biochemistry. 3. Get in-depth knowledge use of the physical and chemical properties of molecules. 4. Gain knowledge on the physical and chemical properties of molecules and their status of occurrence in biological system.
Course Outcome	Upon completion of this course, the students will be able to 1. Understand the nature of biochemistry. 2. Understand the physical and chemical properties of molecules as a linkage of biochemistry, quality, texture and other physical and sensory characteristics of foods. 3. Understand the concept and properties of acid-base relationship. 4. Conduct qualitative tests for biomolecules, viz, proteins, carbohydrates, lipids.

Pre-requisites: Nil

Pedagogy: Direct Instruction**,** Constructivist, Reflective, Inquiry-based, Case studies, Discussion

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO1	3	2	1	3	3	2	1	3	2	2
CO2	3	3	3	3	2	2	3	3	3	3
CO3	3	2	2	2	1	1	1	2	3	1
CO4	3	3	3	3	2	3	3	3	3	3

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION TO BIOMOLECULES	(7L+2P)
Overview - Basic principles of Organic Chemistry, Types of Biomolecules, Chemical nature, Biological role, Biological buffers, Water and its importance in Biochemistry **Activity:** Test for proteins	**CO-1** **BTL-1,2**
MODULE 2 – STRUCTURES & PROPERTIES OF CARBOHYDRATES, PROTEINS	**(7L+2P)**
Carbohydrates (Mono, Di, Oligo)- forms of Isomerism, Physiological importance, Polysaccharides - Starch- glycogen- Cellulose and their derivatives- Chitin-Peptidoglycans- Glycoaminoglycans- Glycoconjugates, Test for Carbohydrates. Classification of Amino acids and Proteins, Structure of Proteins- Primary-Secondary- Tertiary and Quaternary - Myoglobin & Hemoglobin, Test for Proteins. **Practicum**: Test for carbohydrates	**CO-2** **BTL-2,3**
MODULE 3 – STRUCTURES & PROPERTIES OF LIPIDS, NUCLEIC ACIDS	**(7L+2P)**
Lipid - Classification (Fatty acids, Glycerolipids, Phospholipids, Glycolipids, Sphingolipids, Steroids) - Physiological importance, Significance of Cholesterol, Nucleic Acids - Structure of Purines - Pyrimidines - Nucleosides - Nucleotides - Ribonucleic acids - Deoxyribonucleic acids - Nucleoprotein complexes, Synthetic Nucleotide analogs, Functions of Nucleotides - Carrier of Chemical energy of cell- Enzyme Cofactor -Regulatory Molecules. **Practicum:** Lab practicals on free fatty acids	**CO-3** **BTL-3**
MODULE 4 – NUTRITION & METABOLISM	**(7L+2P)**
Nutrition, Digestion and absorption of Carbohydrates - Lipids - Proteins - Vitamins - Minerals, Vitamins - Biomedical importance - Classifications - Deficiency diseases, Introduction to Biocatalysis by Enzymes and Pathways, Introduction to Biosynthesis and Breakdown of Carbohydrates- Lipids- Proteins and Nucleic Acids. **Practicum:** Lab practical on food tests	**CO-4** **BTL-3**
MODULE 5 – INTERMEDIARY METABOLISM & BIOENERGETICS	**(7L+2P)**
TCA cycle - Glycolysis - Glyconeogenesis - Pentose phosphate shunt - Urea cycle - Interconnection of Pathways - Metabolic regulations. High energy compounds - Electronegative Potential of compounds, Respiratory Chains- ATP cycle-Calculation of ATP production during Glycolysis and TCA cycle, Regulation of levels of High energy compounds and reducing equivalents inside the cell. **Activity:** Assignment on glycolysis	**CO-5** **BTL-3**
Skill Development Activities: Practical on conversion of carbohydrates to simple reducing sugars	
TEXT BOOKS	
1. David L. Nelson and Michael M. Lehninger's Principles of Biochemistry.2020, Macmillan Worth publisher.	
REFERENCE BOOKS	
1. Lubert Stryer, Biochemistry, 2020. WH. Freeman and Co. 4th Edition.	
2. Murray, R.K., Granner, B.K., Mayes, P.A., Rodwell, V.W., Harper's Biochemistry, 2019.	
E-BOOKS / MAGAZINE / ARTICLES	
1.https://biochem.oregonstate.edu/sites/biochem.oregonstate.edu/files/2022-04/Biochemistry%20Free%20For%20All%201.3_compressed.pdf	
2.https://books.google.co.in/books?id=P3TWDwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false	
ONLINE RESOURCES	

1. https://onlinecourses.nptel.ac.in/noc20_cy10/preview
2. https://onlinecourses.nptel.ac.in/noc22_bt22/preview

COURSE TITLE	UNIT OPERATIONS IN FOOD TECHNOLOGY			CREDITS	3
COURSE CODE	AFT11006	COURSE CATEGORY	CC	L-T-P-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL –3
ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignment/ Project	Surprise Test/ Quiz	Attendance	End Semester Exam
15%	15%	10%	5%	5%	50%
Course Description	The processes used by the food industry can be divided into common operations, called unit operations. Unit operations common to many food products include cleaning, controlling, disintegrating, drying, evaporating, fermentation, heating/cooling (heat exchange), materials handling, mixing, packaging, pumping, separating, and others.				
Course Objective	1. To gain Knowledge on the principles of food process engineering and its significance in food industry. 2. To understand the units, dimensions and formulas related to food processing 3. To familiarize about the existing various food processing unit operations 4. To provide knowledge on emerging novel, various unit operations involved in food industry.				
Course Outcome	Upon completion of this course, the students will be able to 1. List and explain the principles of different types of evaporators and their application. 2. Analyze the different mechanical separation techniques 3. Appraise the significance of size reduction and energy requirements in food processing 4. Illustrate the mechanism of crystallization and distillation 5. Employ different processing techniques to transform the raw materials to quality food product				

Pedagogy: Direct Instruction**,** Constructivist, Reflective study, Inquiry-based Discussion, Technological aspects, Mindmap, Case study

CO, PO AND PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	1	2	2	1	3	2	1	1
CO2	1	2	2	1	2	2	3	2	2	1
CO3	1	1	1	2	1	1	1	2	1	1
CO4	2	2	1	1	1	1	2	2	1	1
CO5	2	1	1	2	2	1	1	2	1	1

Prerequisite	Food science

MODULE 1 - INTRODUCTION TO UNIT OPERATIONS	**(9L+0T)**
Introduction to unit operations in food processing, Units and Dimensions; Basic principles, Total mass balance and energy balance. Activity**:** Discussion on PFD of a primary product from the food industry in technical basis	**CO-1** **BTL-1**
MODULE 2: SIZE REDUCTION PROCESSES	**(9L+0T)**
Size reduction: Principles, Theory, size reduction methods- compression, impact, shearing and cutting, standard sieves, cereal milling, degree of grinding, size reduction machinery-crusher, grinder, attrition mills, hammer mill, ball mills, rietz mill and oil expression and extractions-hydraulic press, screw press. **Practicum**: Exhibit a size reduction process by having a product as an example	**CO -2** **BTL – 2**
MODULE 3: SEPARATION PROCESSES	**(9L+0T)**
Definition and introduction to separation; types of separator – disk, indented cylinder, spiral, specific gravity, destoners, inclined draper, pneumatic and aspirator, Mechanical separation, sedimentation, principle, equipment and applications. Centrifugation: principle, centrifugation equipment and applications in food industries. Filtration: Theory, equipment, types of filters, applications **Practicum:** Find any five food products which utilize any of these unit operation in a separation process with a process flow diagram (PFD), Demonstration of centrifuge in the laboratory	**CO -3** **BTL – 2**
MODULE 4: EVAPORATION	**(9L+0T)**
Basic principle, Importance of evaporation, thermodynamics of evaporation; boiling point elevation, latent heat of evaporation, heat transfer during evaporation, heat transfer coefficients, design of evaporation system; retention time; single effect evaporator, multiple effect evaporator, thermo compression system **Activity:** Field work on the factors affecting evaporation in food industries, evaluate the cause and find the solution	**CO -4** **BTL – 3**
MODULE 5: DISTILLATION (9L+0T)	
Theory and principle, liquid vapor equilibrium, distillation of binary mixtures, simple distillation, steam distillation, vacuum distillation, and fractional distillation. Crystallization: Principle, nuclei formation- equipment and applications in food industries Activity: Activity on various case scenarios of distillation and crystallization in Food Industries, Demonstration of working principle of distillation in laboratory	**CO -5** **BTL-3**

Skill Development Activities: Preparation of Practicum Report Booklet, Art work based on the Practicum	
TEXTBOOKS	
1	Sahay, K. M. and K.K. Singh (2017), Unit operation of Agricultural Processing Vikas Publishing House Pvt. Ltd., New Delhi
2	Dibyakanta Seth (2018), Unit Operations in Food Processing
3	Susanta Kumar Das, Madhusweta Das (2019), Fundamentals and Operations in Food Process Engineering
4	Seid Mahdi Jafari (2021), Engineering Principles of Unit Operations in Food Processing.
REFERENCEBOOKS	
1	A. S. Foust, L. A. Wenzel, C. W. Clump (2018), Principles of Unit Operations , Oxford Press
2	R.L. Earle (2013), Operations in Food Processing , Swan Publishing
E-BOOKS/MAGAZINE/ARTICLES	
1	http://www.uprtou.ac.in/other_pdf/dvapfv_block_4.pdf
2	https://www.sciencedirect.com/book/9780128184738/engineering-principles-of-unit-operations-in-food-processing
ONLINERESOURCES	
1	https://youtu.be/f-tOL83XIQY
2	https://youtu.be/lF0prAt_E3E

COURSE TITLE	FOOD MICROBIOLOGY			CREDITS	3
COURSE CODE	AFT11007	COURSE CATEGORY	CC	L-T-P-S	2-0-2-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical Exam	End Semester Theory Exam
15%	15%	20%	100%	50%

Course Description	The course will provide theoretical knowledge about foods that are into the stage of contamination and the causative organisms preferable microbes and to elucidate on the study of it in the form of Food Microbiology. Furthermore, students will learn the spoilage patterns and the mechanism of action of their functionality.
Course Objective	To enable the students 1. To understand about the physical and chemical properties of food samples. 2. To gain knowledge about microbiology of the spoilage organisms 3. To learn about the various types of contamination organisms. 4. To detect the analytical microbial method for deducing the food spoilage 5. To study on the mechanism of contamination with specified microorganisms.
Course Outcome	Upon completion of this course, the students will be able to 1. Describe the history and study of microbes in food science and technology. 2. Identify different microbial structure and their multiplicative pattern 3. Compose the requirement for the nutrient media for the growth and development such as to study the levels of microbial environment. 4. Classify different types of food poisoning and the control methods 5. Discuss about the various storage and control methods from contamination and spoilage.

Prerequisites: AFT01001 Principles of food science

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	1	1	1	2	2	1	2
CO-2	2	1	1	1	1	1	2	1	2	1
CO-3	1	2	2	2	1	2	2	2	1	2
CO-4	1	2	3	2	1	2	1	3	1	1
CO-5	3	2	-	2	1	2	1	1	2	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION (7L+2P=9)	
Basic of microbial existence; history of microbiology, classification and nomenclature of microorganism, microscopic examination of microorganisms, light and electron microscopy; principles of different staining techniques like gram staining, acid fast, capsular staining, flagellar staining. PRACTICUM: Staining techniques – grams' and differential	**CO-1 BTL-2**

MODULE 2 – MICROBIAL STRUCTURE AND METABOLISM (7L+2P=9)	
Structural organization and multiplication of bacteria, viruses, algae and fungi with a special mention of life history of actinomycetes, yeast, mycoplasma and bacteriophage. PRACTICUM: Hanging drop method	**CO-2 BTL-2**
MODULE 3 – MICROBIAL GROWTH ,NUTRITION AND METABOLISM (7L+2P=9)	
Nutritional requirements of bacteria and different media used for bacterial culture; growth curve and different methods to quantitate bacterial growth, aerobic and anaerobic bioenergetics and utilization of energy for biosynthesis of important molecules Practicum: colony counting test	**CO-3 BTL-3**
MODULE 4 – FOOD SPOILAGE AND CONTROL METHODS (7L+2P=9)	
Microbial food poisoning by Staphylococci, Salmonella of food poisoning group and Clostridium botulinum (Botulism). Measures to present microbial food poisoning. Food infections - food borne diseases - Dysentery, Diarrhoea, Typhoid, Cholera. Physical and chemical control of microorganism Practicum: Sterilization techniques	**CO-4 BTL-2**
MODULE 5 – CONTAMINATION AND SPOILAGE OF FOOD (7L+2P=9)	
Principles of food spoilage by micro-biological, Physical and biological factors. Contamination and spoilage of cereals, meat, fish, poultry, eggs, milk and fermented products PRACTICUM: Antibiotic sensitivity assay	**CO-5 BTL-2**

TEXT BOOK	
1	Talaron K, Talaron A, Casita, Pelczar And Reid. (2018) Foundations In Microbiology, W.C.Brown Publishers
2	Neelima Garg, K. L. Garg, K. G. Mukerji, I. K. (2020) Laboratory Manual of Food Microbiology. International Pvt Ltd
REFERENCE BOOK	
1	Pelczar MJ, Chan ECS and Krein NR.(2020) Microbiology Tata McGraw-Hill Edition, New Delhi, India
2	Ahmed E. Yousef, Carolyn Carlstrom. (2020) Food Microbiology: A Laboratory Manual ISBN: 978-0-471-39105-0.
E Books	
1	http://nuristianah.lecture.ub.ac.id/files/2014/09/fundamental-food-microbiology.pdf
2	https://www.yumpu.com/xx/document/view/62503047/extra-food-microbiology-laboratory-ebook-pdf-download
MOOC	
1	https://www.coursera.org/learn/onehealth

COURSE TITLE	PROCESSING OF CEREALS, PULSES AND OILSEEDS			CREDITS	3
COURSE CODE	AFT11008	COURSE CATEGORY	CC	L-T-P-S	2-0-2-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical Exam	End Semester Theory Exam	First Periodical Assessment
15%	15%	20%	100%	50%	15%

Course Description	The course will provide theoretical knowledge about the processing of foods that are falling into the category cereals, fruits and vegetables along with the beverages. The technology concerned has a vital role in these products as they are of daily requirements in food with greater bifurcation of ingredient mixture uses.
Course Objective	To enable the students 1. To develop the knowledge on processing and technologies concerned about Cereals. 2. To learn the internal structure and modifications of the cereals and pulses. 3. To elucidate the nutritional status of the processed substances. 4. To learn about the industrial applications of processing foods 5. To become familiar with various food processing technology.
Course Outcome	Upon completion of this course, the students will be able to 1. Analyze about the byproducts of cereals, pulses and oilseeds 2. Classify different types of food poisoning and the control methods 3. Discuss about the various storage and control methods of contamination 4. In-depth analysis of the composition of cereals, pulses and oilseeds 5. Develop knowledge on the toxic constituents present in pulses.

Prerequisites: AFT01001 Principles of food science

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	2	2	1	1	1	1	1	2	1	1
CO-2	3	1	1	1	1	1	1	1	2	1
CO-3	2	1	2	2	1	1	1	1	2	2
CO-4	1	2	2	1	1	2	1	2	3	1
CO-5	3	1	1	1	2	1	1	3	2	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION	**(7L+2P=9)**
Pulses and Cereals: Composition, Nutritive value, Anti-nutritional factors. Changes during cooking, Factors affecting cooking time. Germination-Changes during germination. Nuts & Oilseeds**:** Composition, sources of proteins and oil - Protein concentrates and isolates, texturised vegetable protein Activity: on changes observed during cooking in pulses, cereals and oilseeds. Flowchart of processing of pulses, cereals, oilseeds.	**CO-1** **BTL-2**
MODULE 2 – PROCESSING WHEAT AND RICE	**(7L+2P=9)**
Wheat -Types, milling, flour grade, flour treatments -bleaching, maturing, types of flour for baking, technology of dough development, Macaroni products. Rice -Physicochemical properties, milling - mechanical & solvent extraction, parboiling, Rice products and utilization of by-products PRACTICUM : Preparation of bread	**CO-2** **BTL-2**
MODULE 3 – PROCESSING OF CEREALS AND PULSES	**(7L+2P=9)**
Corn - Milling (wet and dry), cornflakes. Barley- Milling, Malting, Processing of beer. Oats - Milling (oatmeal, oat flour& oat flakes). Sorghum, Pearl Millet, finger millet – Milling. Red gram, Green gram, Black gram - Milling (Dry & wet), Improved milling method. Anti-nutritional factors in pulses. PRACTICUM : Preparation of Puffed corn, Puffed millets.	**CO-3** **BTL-3**
MODULE 4 – EDIBLE OILS	**(7L+2P=9)**
Sources of edible oils (groundnut, mustard, soyabean, sunflower, safflower, coconut, sesame and oil from other sources); physio-chemical properties; processing of oilseeds: rendering, pressing, solvent extraction, refining, hydrogenation; factors affecting extraction; packing and storage of fats and oils, changes during storage. PRACTICUM : Iodine value of oil Estimation of total fat content in oil	**CO-4** **BTL-2**
MODULE 5 – SPECIALITY OIL PRODUCTS	**(7L+2P=9)**
Margarine, mayonnaise, salad dressing, fat substitutes etc; chemical adjuncts: lecithins and GMS; Nutritional food mixes from oilseeds: processing of oilseeds for food use, protein rich foods, protein enriched cereal food. PRACTICUM: Develop value-added products from oil seed waste Identify different methods of oil extraction for edible purposes	**CO-5** **BTL-2**
TEXT BOOK	
1 2 3	Kent. (2016). Technology of Cereal, 5th Ed. Pergamon Press. Arora, M (2018) Practical Manual Food Processing, 1st Edition, Nirali Prakashan N. Shakuntala Manay. (2019) Food facts and principles. New age publishers. Third revised edition.

REFERENCE BOOK	
1	Chakraborty. (2014) Post-Harvest Technology of Cereals, Pulses and Oilseeds, revised ed., Oxford & IBH Publishing Co. Pvt Ltd
2	Sakunthala manay. (2016) Food facts and principles. New age publishers
3	B.Srilakshmi (2018).Food Science. New age publishers. Seventh edition.
E BOOKS	
1	https://www.pdfdrive.com/food-lipids-chemistry-nutrition-and-biotechnology-e167399800.html
MOOC	
1	https://www.coursera.org/search?query=human%20nutrition&page=2&index

COURSE TITLE	FOOD ADDITIVES			CREDITS	3
COURSE CODE	AFT11500	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	The course will provide the importance of food additives in food acting as a compliment in order to improvise its quality presumption. The formula addition and the desired additive will be based on the food content and nutritive value. The course completely relates to the preservation and additive components pertaining to the food substance.
Course Objective	To enable the students 1. To elucidate the role of additives in food 2. To analyze the nutrient specializations in accordance with the food additive. 3. To discuss the correlation of food and its additive 4. To implement the formulation skills in industrial oriented mechanisms. 5. To inculcate the ideology in research oriented fashion.
Course Outcome	Upon completion of this course, the students will be able to 1. Understand about the main additive classification in varieties of food. 2. Gain knowledge about micronutrient analysis involved in food classifications. 3. Learn about the protein formation and their role with amino acid essentials 4. Detect the analytical energy based roles of macro and micro-nutrients in food 5. Develop study on the mechanism of action of the food metabolism of nutrients.

Prerequisites: Principles of Food Science

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	1	1	1	1	1	3	1
CO-2	2	2	3	2	2	1	1	2	2	2
CO-3	2	2	2	1	1	2	2	2	2	2
CO-4	1	1	2	2	2	1	1	3	2	1
CO-5	2	2	2	2	1	2	1	2	2	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION (9L+0T)

Food additives- definitions, classification and functions, need for food additives, food preservatives, classifications, antimicrobial agents. Safety concerns, regulatory issues in India, international legal issues Nutrient supplements & thickeners, polysaccharides, bulking agents, antifoaming agents, synergists, antagonist Activity: Determination of food additives in foods	**CO-1** **BTL-2**

MODULE 2 – ANTIOXIDANTS (9L+0T)	
Antioxidants (synthetic and natural, mechanism of oxidation inhibition), chelating agents: types, uses and mode of action Activity : Identify the role of additives in food	**CO-2** **BTL-2**
MODULE 3 – COLOURING AGENTS (9L+0T)	
Color retention agents, applications and levels of use, natural colorants, sources of natural color (plant, microbial, animal and insects), misbranded colors, color extraction techniques, color stabilization. PRACTICUM: Isolation of color from any plant/microbe	**CO-3** **BTL-3**
MODULE 4 – FLAVOURING AGENTS (9L+0T)	
Flavoring agents: flavors, flavor enhancers, flavor stabilization, flavor encapsulation Flour improvers: leavening agents, humectants and sequesterants, hydrocolloids, acidulants, pH control agents buffering salts, anticaking agent Activity: Flowchart on the removal of flavor	**CO-4** **BTL-2**
MODULE 5 – SWEETENERS (9L+0T)	
Sweeteners: natural and artificial sweeteners, nutritive and non-nutritive sweeteners, properties and uses of saccharin, acesulfame-K, aspartame, corn sweeteners, invert sugar sucrose and sugar alcohols (polyols) as sweeteners in food products Emulsifiers: Types, selection of emulsifiers, emulsion stability, functions and mechanism of action. Additives, food uses and functions in formulations; permitted dosage	**CO-5** **BTL-2**

TEXT BOOK	
1	Seyed Mohammed Nobavi. (2018). Food Additives and Human Health
2	Shibamato T. and Bjeldanes L. (2022) Introduction to Food Toxicology, Academic Press, Inc. San Diego, CA
REFERENCE BOOK	
1	Morton ID & Macleod AJ. (2018). Food Flavours. Part A, B & C. Elsevier.
2	Tõnu Püssa (2017). Principles of Food Toxicology, Second Edition, CRC Press
3	Joslyn, M.A. Ed. 2018. Methods in Food Analysis. Academic Press, New York.

E BOOK	
1.	https://face-cii.in/sites/default/files/presentation/3dec/Aruna%20ram%20Kumar.pdf
MOOC	
1	https://efsa.onlinelibrary.wiley.com/doi/full/10.2903/j.efsa.2020.e181110

COURSE TITLE	FOOD WASTE MANAGEMENT			CREDITS	3
COURSE CODE	AFT11501	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	This course deals with the classification and characterization of food industrial wastes from fruit and vegetable processing industry, Beverage, Fish, Meat & Poultry industry, Sugar and Dairy industry; Waste disposal methods – Physical, Chemical & Biological.
Course Objective	To enable the students 1 To learn various designing of activated sludge process. 2 To provide scientific knowledge about treatment of waste 3 To develop their capacity to undertake research into the waste management 4. To make effective use of waste. 5. To create knowledge-based skill towards research-oriented aspiration.
Course Outcome	Upon completion of this course, the students will be able to 1. Have Knowledge on treatment methods for liquid food 2. Examine on design of Solid waste management system 3. Characterization of food wastes from Fruit and Vegetable processing industry 4. Analyze the Recovery of useful materials from effluents by different methods. 5. Learn the preparation of Vermicomposting

Prerequisites: AFT01003 Food Analysis Techniques

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	2	1	1	1	1	3	1
CO-2	2	2	2	3	1	2	1	2	2	2
CO-3	1	2	1	1	2	1	2	3	1	2
CO-4	1	-	2	2	1	1	2	2	2	1
CO-5	3	2	2	2	1	2	3	2	2	1

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION	(9L+0T)
Classification and characterization of food industrial wastes from Fruit and Vegetable processing industry, Beverage industry; Fish, Meat & Poultry industry, Sugar industry and Dairy industry; Waste disposal methods – Physical, Chemical & Biological; Economical aspects of waste treatment and disposal. Activity: Making a flowchart of the food industrial waste from any two food industries	**CO-1** **BTL-2**

MODULE 2 – WASTE FROM FOOD INDUSTRIES (9L+0T)	
Treatment methods for liquid wastes from food process industries; Design of Activated Sludge Process, Rotating Biological Contactors, Trickling Filters, UASB, Biogas Plant. PRACTICUM: Designing a process for waste from food industries	**CO-2** **BTL-2**
MODULE 3 – MANAGEMENT OF SOLID WASTES (9L+0T)	
Biological composting, drying and incineration; Design of Solid Waste Management System: Landfill Digester, Vermicomposting Pit. PRACTICUM: Preparation of Vermicomposting	**CO-3** **BTL-3**
MODULE 4 – BIOTREATMENT OF WASTES (9L+0T)	
Biofilters and Bioclarifiers, Ion exchange treatment of waste water, Drinking-Water treatment, Recovery of useful materials from effluents by different methods. PRACTICUM: Model preparation for recovery of useful materials from effluents	**CO-4** **BTL-2**
MODULE 5 – ENVIRONMENT MANAGEMENT (9L+0T)	
Environment management systems (ISO 14000) and its application in food industry; legislation related to waste management; standards for emission or discharge of environmental pollutants from food processing industries. PRACTICUM: A booklet on the regulatory standards and regulations implied on environment management and food waste management	**CO-5** **BTL-3**
TEXT BOOK	
1. Mario Kosava. (2015) Waste management. Oxford Publishing House.	
REFERENCE BOOK	
1	Närvänen, Elina. (2019)Introduction: a framework for managing food waste." Food Waste Management. Palgrave Macmillan
E BOOK	
https://www.pdfdrive.com/food-science-and-technology-d41395460.html	

COURSE TITLE	TECHNOLOGY OF FISH, MEAT & POULTRY			CREDITS	3
COURSE CODE	AFT11009	COURSE CATEGORY	CC	L-T-P-S	2-0-2-1
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	This course deals with the processing of fish, meat and poultry, and as well as quality and hygienic aspects of handling various meat, fish and poultry products during processing.
Course Objective	1. To study about the different processing methods 2. To learn about the preservation techniques without loss of nutrients 3. To study about the various chemical reactions that takes place in meat products 4. To understand about the spoilage of meat. 5. To understand the slaughter process and to learn the HACCP model.
Course Outcome	Upon completion of this course, the students will be able to 1. Advance their knowledge on processing of meat, poultry and fish. 2. Examine on nutritional qualities of different foods 3. Elucidate the properties and processing of the derived products 4. Analyze the features and modifications during the processing of food products 5. Understand the safety aspects of handling meat, fish and poultry product

Prerequisites: Food and Nutrition

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	2	1	1	2	2	3	3	2	2	2
CO-2	3	2	2	2	2	3	3	3	3	3
CO-3	2	3	1	1	1	3	3	2	2	2
CO-4	1	2	1	2	2	2	3	1	2	2
CO-5	3	1	2	2	2	3	3	3	3	3

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – FISH AND PROCESSING	(7L+2P=9)
Classification of fresh water fish and marine fish, commercial handling, storage and transport of raw fish, average composition of fish, freshness criteria and quality assessment of fish, spoilage of fish, methods of preservation of fish, canning, freezing, drying, salting, smoking and curing **Practicum:** Preparation of fish balls	**CO-1** **BTL-2**

MODULE 2 – FISH PRODUCTS	**(7L+2P=9)**
Production of fish meal, fish protein concentrate, fish liver oil and fish sauce and other important by-products, quality control of processed fish, fish processing industries in India **Practicum:** Preparation of fish nuggets	**CO-2** **BTL-2**
MODULE 3 – MEAT PROCESSING	**(7L+2P=9)**
Development of meat and poultry industry in India and its need in nation's economy. Psychological and pathological abnormalities. Pale soft exudate muscle. Dark cutting beef-pH, Water Holding Capacity (WHC) and ERC. Meat freshness. Quality control Activity: Discussion on Techniques used in processing of meat	**CO-3** **BTL-3**
MODULE 4 – POULTRY	**(7L+2P=9)**
Classification of poultry meat, composition and nutritional value of poultry meat & eggs, processing of poultry meat and eggs, spoilage and control, by-product utilization and future prospects, poultry farms in India **Activity:** Preparation of poultry meat and egg recipes	**CO-4** **BTL-2**
MODULE 5 – SLAUGHTER PROCESS AND QUALITY MANAGEMENT	**(7L+2P=9)**
Meat quality -Effects of feed, breed and environment on production of meat animals and their Quality. Meat Quality-color, flavor, texture, Water-Holding Capacity (WHC), Emulsification capacity of meat. Slaughter process: Slaughter, inspection and grading, Anti-mortem examination of meat animals, slaughter of buffalo, sheep/ goat, poultry, pig. A Generic HACCP model, dressing of carcasses, post-mortem examination of meat, different cuts of pork, beef, mutton, chicken. **Activity:** Pictorial representation of HACCP	**CO-5** **BTL-2**
TEXT BOOK	
1. Srilakshmi. (2018) Dietetics. New Age publishers.	
REFERENCE BOOK	
1. Anandharamakrishnan, C (2017). Handbook of drying for dairy products. John Wiley & Sons.	
E BOOK	
1. https://www.pdfdrive.com/food-science-and-technology-d41395460.html	

COURSE TITLE	FOOD PRESERVATION TECHNOLOGY			CREDITS	3
COURSE CODE	AFT11010	COURSE CATEGORY	CC	L-T-P-S	2-1-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	This course deals with the preservation of various food products, which includes canning, pickling, drying, irradiation and the significance of consuming preserved foods.
Course Objective	Enable the students 1. To learn about various food preservation techniques 2. To process food and develop value added products 3. To provide sustainable food to all. 4. To make seasonal foods available at all seasons 5. To reduce the high cost of seasonal foods.
Course Outcome	Upon completion of this course, the students will 1. Have Knowledge on preservation of food products. 2. Examine on nutritional qualities of preserved foods 3. Elucidate the properties and processing of the derived products 4. Understand the safety aspects of consuming preserved food products. 5. Understand to use only seasonal foods in the preparation.

Prerequisites: Food Additives

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	2	2	3	3	3	3	2
CO-2	3	3	3	3	3	2	3	3	2	1
CO-3	3	3	3	3	3	2	3	3	3	2
CO-4	2	2	2	3	2	3	3	2	2	1
CO-5	2	3	3	3	2	2	2	3	2	1

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION TO FOOD PRESERVATION	**(7L+2T=9)**
Objectives and techniques of food preservation, canning, classification of cans, can specification, structure of cans lacquering, canning of food items, thermal process time calculations for canned foods, spoilage in canned food Activity**:** List the food preservatives	**CO-1** **BTL-2**
MODULE 2 – THERMAL PROCESSING AND DRYING	**(7L+2T=9)**
Thermal Processing Principles & application– Blanching, Pasteurization, Sterilization, Ultra high temp sterilization, Aseptic processing Drying- Significance: Natural drying- Solar drying, Artificial drying- Hot air drying, Drum drying, Spray drying, Dehydrofreezing , Freeze drying Pre-treatments, blanching, sulphuring **Practicum:** Blanching of vegetables and fruits	**CO-2** **BTL-2**
MODULE 3 – FREEZING	**(7L+2T=9)**
Effect of low temperature on Fresh Fruits, Vegetables, Meat & Fish products, Chill injury. Freezing, Freezing rate Quick freezing, Slow freezing Air blast freezing, Contact freezing, Immerssion freezing, Cryogenic freezing Quality of frozen foods- Retrogradation, Protein denaturation, Freezer burn.	**CO-3** **BTL-3**
MODULE 4 – MODULE 4 – IRRADIATION AND FERMENTATION	**(7L+2T=9)**
Irradiation - Source of ionization irradiation, Dose & Dosimetry, Mode of action, Scope of irradiation. Fermentation - Principles, Types of fermentation, Advantages **Practicum:** Preparation of Probiotic foods	**CO-4** **BTL-2**
MODULE 5 – CHEMICAL PRESERVATIVES	**(7L+2T=9)**
Natural preservatives-Mode of action, Chemical preservatives- Sulphur dioxide, , Benzoic acid, Sorbic acid , Antioxidants, Recent Trends - Pulsed electric fields, High pressure technology, Ohmic heating, Microwave heating, Hurdle technology Activity: Permissible limits of chemical preservatives in foods.	**CO-5** **BTL-2**
TEXT BOOK	
1. Barba, Francisco J. 2019. Innovative Technologies for Food Preservation. Academic Press.	
REFERENCE BOOK	
1. Augusto, Pedro ED, Beatriz MC Soares, and Nanci Castanha. 2018.Conventional technologies of food preservation. Academic Press.	
E BOOK	
1. https://www.pdfdrive.com/food-science-and-technology-d41395460.html	

COURSE TITLE	VALUE ADDITION TO FOOD INDUSTRY REFUSE			CREDITS	3
COURSE CODE	AFT11502	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	2	Approval Details		Version	2

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	This course deals with the classification of food industry refuse - handling, transportation and storage of industrial refuse – contamination of industrial refuse – effect of contamination and prevention methods
Course Objective	To enable 1. To ensure the production and marketing of safe and quality foods. 2. To Provide a broadly based scientific education whose graduates can work in scientific sectors. 3. To allow individuals to develop capacity to undertake research into the science of foods. 4. To provide undergraduates with opportunities to develop their inter-personal and communication skills. 5. To create a knowledge-based skill towards research-oriented aspiration.
Course Outcome	Upon completion of this course, the students will be able to 1. Have Knowledge on Production of pectin. 2. Examine on Marketable products like chitin, chitosan, fertilizer, nutritional enhancer animal feed from shells. 3. Elucidate the Utilization of tea waste as feed for livestock & poultry. 4. Have Knowledge on texturised fish protein concentrate. Have Knowledge on extraction of prolamin.

Prerequisites: Food Additives

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	3	3	3	3	3	3	3
CO-2	3	3	3	3	3	3	3	3	3	2
CO-3	3	3	3	3	3	3	3	3	3	3
CO-4	3	2	2	3	3	2	3	3	3	2
CO-5	3	3	3	3	3	3	3	3	3	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE I INTRODUCTION (9L+0T)	
Types of food industries, classification of food industry refuse - handling, transportation and storage of industrial refuse – contamination of industrial refuse – effect of contamination and prevention methods – processing methods and processing equipment – their applications. **Practicum:** Food waste handling process	**CO-1** **BTL-2**
MODULE 2 – FRUITS AND VEGETABLES (9L+0T)	
Production of pectin, ethanol, natural gas, citric acid, activated charcoal, fibre extract from apple pomace, vitamins - Production of citrus oil from peels of citrus fruits; Manufacture of candied peel and pectin from albedo of citrus fruits. Production of single cell protein by the use of potato wastes; Recovery of - Protein from potato starch plant waste. **Practicum:** Design a creative method to convert fruits and vegetable waste into a biodegradable component	**CO-2** **BTL-2**
MODULE 3 – FISH, MEAT AND POULTRY (9L+0T)	
Production of fish meal; Fish protein concentrate; Animal feed; Shell product; Glue from seafood processing waste. Texturised fish protein concentrate (marine beef); Utilization of organs and glands of animal as human food. Production of human food from animal blood and blood protein; Marketable products like chitin, chitosan, fertilizer, nutritional enhancer animal feed from shells **Practicum:** Design an innovative method to use non-vegetarian waste	**CO-3** **BTL-3**
MODULE 4 – CEREALS (9L+0T)	
Feed for livestock from wheat and corn bran and germ. Extraction of oil & wax from rice bran, Puffed cereals from broken rice; Starch, modified starch and industrial alcohol from non-usable cereals; Silica from rice husk; Extraction of prolamin (Zein & katirin); Protein from sorghum; Beer spent graining. **Practicum:** Preparation of glue from starch	**CO-4** **BTL-2**
MODULE 5 – DAIRY INDUSTRY AND BEVERAGES (9L+0T)	
Fermentation products from whey. Condensed & dried products from whey; Production of lactose and protein from whey; Utilization of tea waste as feed for livestock & poultry. **Practicum:** Usage of whey in various preparations	**CO-5** **BTL-2**
TEXT BOOK	
1. Anil Kumar (2013) Food Processing By-Products and their Utilization, Wiley-Blackwell. 2. Garg (2019) Processing of food engineering. Jain Brothers Publication.	
REFERENCE BOOK	
1. Lawrence K. (2016) Waste Treatment in the Food Processing Industry., CRC Press. 2. Sahay and Singh (2019). Vikas publishing house.	
E BOOK	
http://download.poultryandmeatprocessing.com/v01/SciPoultryAndMeatProcessing%20-%20Barbut%20-%2018%20Byproducts%20and%20Waste%20-%20v01.pdf	

COURSE TITLE	INTRODUCTION TO FOOD SERVICES			CREDITS	3
COURSE CODE	AFT11503	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments / Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	This course deals with the types of food service establishment, food servicing and planning procedures. Types of menus and types of services in a food service operation.
Course Objective	To enable the students 1. To enter a career in the catering industry as catering scientists capable of ensuring the production of safe and quality foods. 2.Provide a broadly based scientific education whose graduates can also enter into employment in other sectors of the food chain or related scientific sectors where they can apply their scientific skills. 3.To allow individuals to develop their capacity to undertake rese arch into the science of foods. 4.To provide undergraduates with opportunities to develop their inter-personal and communication skills. 5. To create a knowledge based skill towards research oriented aspiration.
Course Outcome	Upon completion of this course, the students will be able to 1. Have Knowledge on food quality and food safety. 2. Examine on preparation of fast foods. 3. Elucidate the Role of maintenance staff and plant operators 4. Have Knowledge on Various types of catering establishments 5. Have Knowledge on Various cleaning procedures in a hotel.

Prerequisites: Introduction to Food Science

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	3	3	3	3	3	3	2
CO-2	3	2	3	3	3	3	3	3	3	2
CO-3	3	3	3	3	3	3	3	3	3	2
CO-4	3	2	3	2	3	3	3	3	3	2
CO-5	3	2	3	3	3	3	3	3	3	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION TO HOSPITALITY INDUSTRY	**(9L+0T)**
Characteristics, Commercial hotels, restaurants, transport catering, Non-commercial and out-door food services Practicum: Industrial visit to a hospitality industry	**CO-1** **BTL-2**
MODULE 2 – MENU PLANNING	**(9L+0T)**
Definition of the menu, Types of menu, Planning procedure, standardization of recipe, characteristics of a menu, factors to be considered while planning menu Practicum: Prepare and display different types of menu	**CO-2** **BTL-2**
MODULE 3 – PRODUCTION AND SERVICE	**(9L+0T)**
Production and service -Different types of production, delivery system, Styles of service **Practicum:** Industrial visit to a hotel (3 star and 5 star)	**CO-3** **BTL-3**
MODULE 4 – EQUIPMENTS	**(9L+0T)**
Production and service -Different types of production, delivery system, Styles of service **Practicum:** Industrial visit to a hotel (with lodging)	**CO-4** **BTL-2**
MODULE 5 – ENVIRONMENTAL MANAGEMENT	**(9L+0T)**
Green Design, Energy Conservation, Water Conservation, Source Reduction, Recycling Incineration and Landfilling • Facility Waste Assessments **Practicum: Design a logo for 3R's.**	**CO-5** **BTL-2**
TEXT BOOK	
June Payne Palacio, Monica. (2019). Introduction to Food Service.11th edition.	
REFERENCE BOOK	
Mohini Sethi (2019) Institutional Food Management. New age publishers.	
E BOOK	
https://watchrovibe.files.wordpress.com/2015/07/hotel-housekeeping-training-manual-sudhir-andrews-pdf.pdf	

COURSE TITLE	FOOD PRODUCT DEVELOPMENT			CREDITS	4
COURSE CODE	AFT11011	COURSE CATEGORY	CC	L-T-P-S	3-0-2-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical Exam	End Semester Theory Exam	First Periodical Assessment
15%	15%	20%	100%	50%	15%

Course Description	The course deals about the nutrition required during various stages of life in order to facilitate optimum growth. The nutrition requirements for reference man and women are dealt with.
Course Objective	1. To Understand the various steps involved in food product development. 2. To evaluate the products by sensory evaluation. 3. To determine the importance of food packaging. 4. To prepare a label for a product with proper prerequisites. 5. To assess the quality control, pricing and marketing of a product.
Course Outcome	Upon completion of this course, the students will be able to 1. Apply a product development process to generate ideas, design, develop and evaluate new products and their markets. 2. Demonstrate skill in the application of standard methods for the measurement and evaluation of sensory differences. 3. Evaluate and analyze the different food packaging material. 4. Review the appropriate labelling to adhere to standards. 5. Gain knowledge on pricing and marketing of food product.

Prerequisites: Principles of Food Science

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	3	2	3	3	3	3	2
CO-2	3	3	3	3	3	3	3	3	3	2
CO-3	3	2	2	2	2	2	3	3	3	2
CO-4	3	2	2	2	2	2	3	3	3	2
CO-5	3	3	3	3	3	3	3	3	3	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION TO NEW FOOD PRODUCT DEVELOPMENT	(9L+3P)
Definition, significance of product development, food needs and consumer preferences, market survey and designing a questionnaire to find consumer needs for a product. Steps involved in product development, formulation of nutritious food products and standardization, Factors that influence new product development success, Intellectual Property Rights and patenting of foods. **Activity:** Generate new ideas on development of food products	**CO-1** **BTL-2**
MODULE 2 – SENSORY EVALUATION OF THE PRODUUCT	**(9L+3P)**
Assessing the sensory characteristics of food - colour, texture, aroma, odor and taste. Sensory evaluation of foods – Laboratory set up, equipment, panel selection and training, judging quality. Subjective evaluation techniques – Difference tests: paired comparison test, duo-trio test, triangle test. Rating tests – Ranking single sample, two samples and multiple samples. **Practicum:** Sensory evaluation of a nutritional bar and cookies	**CO-2** **BTL-2**
MODULE 3 – ESSENTIALS OF FOOD PACKAGING	**(9L+3P)**
Importance, definition, principles design requirement and basic FSSAI laws governing food packaging. Selection criteria and types of packaging material – metal, glass, paper, plastic, edible, wooden. Packages with special features – Boil- in-bag package, plastic-shrink package, cryovac film, microwave oven packaging, aseptic packaging and distribution packaging. **Practicum:** Packaging a nutritional bar and cookies	**CO-3** **BTL-3**
MODULE 4 – PRODUCT LABELLING AND REGULATIONS	**(9L+3P)**
Definition, purpose, importance, Function, Nutritional information and laws governing product labelling. Types of labelling – smart labels, barcode labels, radioactive labels, antimicrobial labels, security labels and other specialized food labels. Standards and regulations for nutrition harming and Nutrition claims in food labels. **Practicum:** Prepare a label for any two food products	**CO-4** **BTL-2**
MODULE 5 – QUALITY CONTROL, PRICING AND MARKETING	**(9L+3P)**
Analyzing the product stability, evaluation of shelf life, determining the changes in sensory attributes due to environmental conditions. Pricing a product, Methods of pricing-cost plus pricing, Demand pricing, Competitive pricing, mark up pricing, Principles of pricing, determining the selling price and profit margin, price bundling, promotional pricing and quantity discounts. Advertising and marketing strategies-Basic techniques, Food advertising regulations, Marketing mix “four P’s” **Practicum:** Design a logo for quality control	**CO-5** **BTL-2**
TEXT BOOK	
Subbulakshmi G and Udipi A Shobha . (2017). Food Processing and Preservation. 1st edition. New Age Publisher.	
REFERENCE BOOK	
Reddy S M. (2018). Basic Food Science and Technology. 3rd edition. New Age Publisher.	
E BOOK	
https://run.edu.ng/directory/oermedia/11934434415399.pdf	

COURSE TITLE	FUNCTIONAL FOODS & NUTRACEUTICALS			CREDITS	3
COURSE CODE	AFT11012	COURSE CATEGORY	CC	L-T-P-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	The course deals with health promoting nutritional factors and bioactive constituents, their potential health implications and mechanisms of action. Also focuses on potential health implications and mechanism of functional foods and discuss the applications of functional foods in the industry.
Course Objective	1. To enable students with an overview of the field of functional foods, nutraceuticals and natural health products. 2. To understand the functional food concept as related to health efficacy and safety. 3. To familiarizes students with: examples of bioactive ingredient-disease relationships and the importance of clinical study support 4. To introduce the regulatory aspects of functional foods; and requirements for standards of evidence of efficacy for health claims; and market determinants of the functional food industry. 5. To promote the consumer acceptance of functional foods.
Course Outcome	Upon completion of this course, the students will be able to 1.Understand the history of functional foods 2. Know the phytochemicals, phytosterols and other bioactive compounds 3. Have sufficient knowledge of safety, and consumer acceptance 4.Understand the significance of functional food in health aspects 5. Realize the legal aspects associated with marketing strategies

Prerequisites: Principles of Food Science

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	2	3	2	3	3	3	2
CO-2	3	3	2	2	3	3	3	3	3	2
CO-3	3	3	2	2	3	3	3	3	3	2
CO-4	2	3	2	2	3	3	3	3	3	2
CO-5	2	3	2	2	3	3	3	3	3	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION	(7L+2T)
History of functional foods, status of nutraceuticals and functional food market, definitions, difference between nutraceuticals and functional foods, types of nutraceutical compounds and their health benefits, Relevant terminologies – Enrichment, value addition, fortification, supplementation **Practicum:** Preparation of few functional foods	**CO-1** **BTL-2**
MODULE 2 – HEALTH BENEFITS OF VARIOUS FOODS	**(7L+2T)**
Cereal and cereal products, Milk and milk products, egg, oils, meat and products, sea foods, nuts and oilseeds, functional fruits and vegetables, herbs and spices, beverages such as tea and wine. Health benefits of functional **Activity:** Health benefits of pulses	**CO-2** **BTL-2**
MODULE 3 – TYPES OF NUTRACEUTICAL COMPOUNDS	**(7L+2T)**
Phytochemicals, phytosterols and other bioactive compounds, peptides and proteins, carbohydrates (dietary fibers, oligosaccharides and resistant starch), prebiotics, probiotics and symbiotic, lipids (Conjugated Linoleic Acid, omega-3 fatty acids, fat replacers), their sources and role in promoting human health Practicum: Discussion on whether anti-nutrients affect the benefits of nutraceutical compounds.	**CO-3** **BTL-3**
MODULE 4 – ROLE OF NUTRACEUTICALS IN DISEASE CONDITIONS	**(7L+2T)**
Role of nutraceutical / functional foods in cardiovascular health, diabetes, obesity, immunity, age related muscular degeneration, stress management; Dosage levels; Adverse effects and toxicity of nutraceuticals Practicum: Discussion on Benefits of nutraceuticals	**CO-4** **BTL-2**
MODULE 5 – STABILITY OF NUTRACEUTICALS	**(7L+2T)**
Safety, Consumer acceptance and assessment of health claims, labeling, marketing and regulatory issues related to nutraceuticals and functional foods Activity**:** Design a slogan to promote the usage of nutraceuticals in day-today life.	**CO-5** **BTL-2**
TEXT BOOK	
Subhadra M, (2020). Functional Foods and Nutrition. Daya publishing house	
REFERENCE BOOK	
Danik M. (2021) Functional foods and viral diseases. New age publishers	
E BOOK	
https://www.pdfdrive.com/food-science-and-technology-d41395460.html	

COURSE TITLE	FOOD PRESERVATION LAB			CREDITS	2
COURSE CODE	AFT11400	COURSE CATEGORY	SE	L-T-P-S	0-0-4-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME	
WEEKLY ASSIGNMENT/ OBSERVATION (INTERNAL PRACTICAL ASSESSMENT)	END SEMESTER PRACTICAL ASSESSMENT
60%	100%

Course Description	Through this practical paper students gets hands on experience in preparing processed milk, cereal, vegetable and fruits products, so that they can start a unit on their own
Course Objective	1. To impart skills in involved in the processing of different foods 2. To provide experience in developing various food products 3. To impart knowledge on assessing the quality parameters of various food products 4. To identify processing and preservation techniques 5. To acquire skills to become an entrepreneur
Course Outcome	Upon completion of this course, the students able to 1. Learn about the processing of dry onion/chilli/garlic paste/potato powder 2. Acquire skill in preparing processed milk products 3. Learn about the preparation of value-added products 4. Become familiar with cultivation of mushrooms 5. Develop skills to become an entrepreneur

Pre-requisites: Food Science

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO1	3	3	2	3	2	3	3	3	3	3
CO2	3	3	2	3	2	3	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3	3
CO4	3	3	3	3	2	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULES

1. Preparation of Jellies – Guava/Banana (CO1) (BTL -2)
2. Preparation of Jams – Mixed fruits/Grapes/Any seasonal fruit (CO2) (BTL -2)
3. Preparation of Marmalades – Oranges/Any seasonal fruit (CO3) (BTL -3)
4. Preparation of pickle – Mango/lime/garlic/tomato/mix vegetable (CO4) (BTL -2)
5. Preparation of vadams – Rice, millet mix and sago (CO5) (BTL -3)
6. Preparation of vathals – mango, brinjal, ladies finger, beans, bitter gourd (CO5) (BTL -2)

TEXT BOOK
1. Anil Kumar Anal (2018) Food Processing By-Products and their Utilization, Wiley-Blackwell Publications
REFERENCE BOOK
1. Xcess board of editors (2020), Opportunities in fruits, vegetables and agro processing industries. Xcess publications
E BOOK
http://download.poultryandmeatprocessing.com/v01/SciPoultryAndMeatProcessing%20-%20Barbut%20-%2018%20Byproducts%20and%20Waste%20-%20v01.pdf

COURSE TITLE	MILK AND DAIRY TECHNOLOGY			CREDITS	3
COURSE CODE	AFT11013	COURSE CATEGORY	CC	L-T-P-S	2-1-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	This course will cover basics of dairy (liquid food) food processing and preservation technologies required in any dairy and food processing industries. The basic knowledge on dairy food processing is intermingled with most of the unit operations at some or other stage of processing. A comprehension of these aspects of processing and preservation will enrich the knowledge base of the students in general.
Course Objective	To enable the students 1. To understand the need and importance of dairy 2. To know the compositional and technological aspects of milk 3. To learn the social and economic impact made by the dairy industry 4. To explore the variety of products and by-products generated from milk. 5. To analyze the quality aspects of dairy products
Course Outcome	Upon completion of this course, the students will be able to 1. Learn the technology of milk and its processing methods 2. Gain knowledge about the various milk processing equipment 3. Improve skills in manufacturing selected dairy products in a pilot plant setting 4. Determine the safety and quality factors that regulate the acceptability of the dairy products by consumers 5. Advance their ability to adapt new technology and develop quality products

Prerequisites: FT1402 Food Preservation Technology

CO, PO AND PSO MAPPING

CO	PO -1	PO -2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	2	1	1	2	1	1	2
CO-2	3	1	3	1	1	2	2	3	2	2
CO-3	2	1	2	2	2	3	2	3	2	2
CO-4	2	2	3	3	2	1	1	1	2	2
CO-5	3	1	1	2	2	3	3	2	2	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – PROPERTIES OF MILK	(7L+2T)
Definition, composition and nutritive value; factors affecting composition of milk. - chemical properties of milk lipids, milk fat structure, fat destabilization; functional properties of milk lipids, milk proteins, their types, precipitation (casein micellar structure and its aggregation); milk enzymes, milk coagulation; lactose; vitamins and minerals in milk Activity: Visit to milk manufacturing unit	**CO-1** **BTL-2**
MODULE 2 – : PROCESSING OF MILK	**(7L+2T)**
Technology of fluid milk: filtration/clarification, standardization, pasteurization (LTLT, HTST), sterilization, homogenization, UHT processing, aseptic packaging, storage and distribution. Activity: Plant visit to various milk manufacturing units around Chennai	**CO-2** **BTL-2**
MODULE 3 – TECHNOLOGY OF RECOMBINED AND RECONSTITUTED MILK	**(7L+2T)**
Technology of milk powders (WMP, SMP): composition, process of manufacture, problems and prevention methods - Technology of Cheese: classification, composition, Nutritive value, process of manufacture of cheddar, mozzarella, cottage and processed cheese, defects (their causes and prevention) Activity: Visit to Cheese manufacturing unit	**CO-3** **BTL-3**
MODULE 4 – MILK PRODUCTS	**(7L+2T)**
Technology of yogurt, Acidophilus milk, bulgaricus milk, kumiss and kefir. Technology of frozen milk products: composition, process of manufacture, defects (their causes and prevention). Technology of indigenous milk products: dahi, butter, ghee, channa, paneer, khoa etc. Newer concepts in dairy products: cream powder, sterilized cream, butter spread, butter powder, cheese spread, whey protein concentrates, Lactose. Practicum: Manufacture of ice cream, whey protein, etc. in the lab	**CO-4** **BTL-2**
MODULE 5 – MILK GRADATION	**(7L+2T)**
Grading of milk and criterion of grading, milk adulteration problem, synthetic milk Dairy plant sanitation: hygiene in dairy Industry, different types of cleansing and sanitizing agents, their applications, cleaning systems Practicum: Demonstration of milk adulteration test in the laboratory Visit to milk manufacturing plant and showing the cleaning and sanitization routine	**CO-5** **BTL-2**

TEXT BOOK	
1.	Walstra P (2018), Dairy Science and Technology. 2nd Ed. Taylor & Francis
REFERENCE BOOK	
1.	Srilakshmi B (2017) Nutrition Science. New age publishers.
2.	Shakunthala Manay (2017) Food Facts and Principles,

COURSE TITLE	BAKERY AND CONFECTIONARY			CREDITS	3
COURSE CODE	AFT11014	COURSE CATEGORY	CC	L-T-P-S	2-0-2-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical Exam	End Semester Theory Exam
15%	15%	20%	100%	50%

Course Description	The course deals about the process and role of bakery ingredients in preparation of breads, cakes, biscuits, chocolates, etc. The course will provide individuals with key knowledge of packaging, labeling, food safety and food laws that can be applied directly in existing products and also in development of new products. The course has been designed for baking professionals, students aspiring to work in the field of bakery and confectionery, entrepreneurs, all involved in implementing and maintaining product quality systems, quality control
Course Objective	To enable the students 1. To learn the formulation and processing of bakery and confectionary products 2. To understand standards and regulations followed in bakery industry 3. To acquire knowledge of bakery unit processing machinery 4. To attain the concepts of confectionery processing machinery 5. To explore the nutritional aspects of bakery and confectionery products
Course Outcome	Upon completion of this course, the students will be able to 1. Adapt the standards and regulations followed in bakery and confectionary industry 2. Grasp basic knowledge about food ingredients and its used in bakery products 3. Utilize bakery unit processing machinery effectively 4. Handle confectionary products and check quality in process line 5. Acclimatize various process flow line in confectionary and bakery products

Prerequisites: AFT0150 Food Additives

CO, PO AND PSO MAPPING

CO	PO -1	PO -2	PO-3	PO-4	PO-5	PO- 6	PO- 7	PSO – 1	PSO-2	PSO - 3
CO-1	1	3	1	1	1	1	3	1	1	1
CO-2	3	1	2	1	1	3	1	2	1	1
CO-3	3	2	1	1	2	3	1	2	1	1
CO-4	3	3	2	1	2	1	1	3	2	2
CO-5	3	1	2	2	3	1	1	2	2	3

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION TO BAKING	(7L+2T)
Bakery ingredients and their functions; Machines & equipment for batch and continuous processing of bakery product **Activity:** Preparation of wheat bread	**CO-1** **BTL-2**
MODULE 2 – BAKING TECHNIQUES	**(7L+2T)**
Testing of flour; Manufacture of bread, cake and biscuits; Analysis of bakery products; Cake icing techniques, wafer manufacture, cookies and crackers **Practicum:** Demonstration and analysis of, cake, biscuit, cake icing, wafer, cookie, crackers	**CO-2** **BTL-2**
MODULE 3 – BAKED PRODUCTS	**(7L+2T)**
Manufacture of bread rolls, sweet yeast dough products, cake specialties, pies and pastries, doughnuts, chocolates and candies; Maintenance, safety and hygiene of bakery plants. **Practicum:** Demonstration of making bread rolls, sweet yeast dough, cake, pies, pastries, doughnuts, chocolates, candies	**CO-3** **BTL-3**
MODULE 4 –EXTRUDING TECHNOLOGY	**(7L+2T)**
Objectives and importance of extrusion in food product development; Components and functions of an extruder; Classification of extruder; Advantages and disadvantages of different types of extruders **Activity:** Preparation of different types of Pasta	**CO-4** **BTL-2**
MODULE 5 – EXTRUDED PRODUCTS	**(7L+2T)**
Change of functional properties of food components during extrusion; Pre and post extrusion treatments; Use of extruder as bioreactor; Manufacturing process of extruded products; Application of extrusion technologies in food industries. **Practicum:** Visit to macaroni and pasta manufacturing unit	**CO-5** **BTL-2**

TEXT BOOK	
1.	Ashok Kumar Y. (2020)Textbook of Bakery and Confectionery PHI Publications
REFERENCE BOOK	
1	Srilakshmi B (2019) Nutrition Science. New age publishers.

COURSE TITLE	FOOD ADULTERATION AND TOXICOLOGY			CREDITS	4
COURSE CODE	AFT11015	COURSE CATEGORY	CC	L-T-P-C-S	3-0-2–0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Practical Assessment	End Semester Practical Exam	End Semester Theory Exam	First Periodical Assessment
15%	15%	20%	100%	50%	15%

Course Description	Food adulteration and toxicology is concerned with assessing the adulteration and injurious effects on living systems of chemicals present in foods. The chemical agents can be man-made (e.g., pesticide residues, food additives, contaminants originating with processing machinery, or packaging materials) or of natural origin (e.g., microbial, animal or plant toxins).
Course Objective	To enable the students 1. To understand interaction between constituents and its effects on food quality 2. To illustrate the importance of food safety, food quality, food laws and regulations in Food industry. 3. To describe the food quality management systems. 4. To explain the nationals and international food laws and regulations. 5. To exemplify different food adulterants.
Course Outcome	Upon completion of this course, the students will be able to 1. Asses nutritional quality of food and composition 2. Evaluate sensory quality test with instruments 3. Setup quality management system in food industry 4. Inspect from raw material to final product in processing line 5. Analyze undesirable constituents in food during processing

Prerequisites: AFT0150 Food Waste Management

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO- 6	PO – 7	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	1	2	1	1	1	2	1
CO-2	1	1	1	1	1	1	1	2	2	1
CO-3	1	1	1	3	1	1	1	3	2	2
CO-4	1	3	2	2	2	1	1	1	1	1
CO-5	3	2	3	1	2	1	1	1	1	1

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – ADULTERATION	(9L+3P)
Introduction to common adulterants and their detection techniques in salts, fats, oil, milk and milk products, spices and condiments, tests for some specific adulterants impact of adulteration and new adulterant. Practicum: Milk adulteration testing demo	CO-1 BTL-2
MODULE 2 – : INTRODUCTION TO FOOD TOXICOLOGY	**(9L+3P)**
Classification, dose, determinants of toxins in foods; naturally occurring toxins from animals, bacterial and fungal and sea food sources. Risk assessment in food toxicology; laws and regulation of safety assessment of foods including food additives, environmental contaminants, pesticides and antibiotic residues Practicum: spices adulteration testing demo Visit to FSSAI, BIS authority to observe the policy of food safety	CO-2 BTL-2
MODULE 3 – TOXIC MATERIALS	**(9L+3P)**
Allergens, toxic constituents and anti-nutritional factors of plant foods (enzyme inhibitors, trypsin and chymotrypsin inhibitor, amylase inhibitor, flatulence causing sugars Activity: Demonstrate the various methods to remove the anti-nutritional factors in pulses	CO-3 BTL-3
MODULE 4 –AGRICULTURAL AND INDUSTRIAL CONTAMINANTS	**(9L+3P)**
Pesticides residues in fruits and vegetables, metal contaminants in foods and their toxicity in human body; animal drug residues in food and water, dioxins and related compounds in food; metals such as lead, arsenic and mercury. Demonstrate the methods to detect metals and other contaminants in food	CO-4 BTL-2
MODULE 5 – FOOD ADDITIVES AS TOXICANTS	**(9L+3P)**
Artificial colors, preservatives, sweeteners; toxicants formed during food processing such as nitrosamines, Maillard reaction products acrylamide, benzene, heterocyclic amines and aromatic hydrocarbons and irradiation; risk of genetically modified food, food supplements, persistent organic pollutants, toxicity implications of nanotechnology in food. Activity: Visit to FSSAI, BIS authority to observe the policy of food safety	CO-5 BTL-2

TEXT BOOK	
1.	Shibamato T. and Bjeldanes L. (2019) Introduction to Food Toxicology, Academic Press, Inc. San Diego, CA
REFERENCE BOOK	
1	Tõnu Püssa (2017). Principles of Food Toxicology, Second Edition, CRC Press.

COURSE TITLE	FOOD SAFETY			CREDITS	4
COURSE CODE	AFT11016	COURSE CATEGORY	CC	L-T-P-C-S	3-1-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	This course deals with the Introduction to concepts of food quality, food safety, food quality assurance and food quality management; objectives, importance and functions of quality control, Current challenges to food safety.
Course Objective	To enable the students 1 To enter a career in the food industry as food safety scientists ensuring the safe production s of foods. 2 To provide a broadly based scientific education whose graduates can also enter into employment in other sectors of the food chain 3 To develop capacity to undertake research into the science of foods. To provide undergraduates with opportunities to develop their inter-personal and communication skills.
Course Outcome	Upon completion of this course, the students will be able to 1. Have Knowledge on food quality and food safety. 2. Examine on desirable safety features of some food processing equipment. 3. Elucidate the Role of maintenance staff and plant operators 4. Have Knowledge on AGMARK 5. Have Knowledge on BIS

Prerequisites: AFT01015 FOOD SAFETY

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO -2	PSO-3
CO-1	3	1	1	1	1	1	1	1	1	1
CO-2	1	2	2	1	1	1	1	2	1	1
CO-3	2	2	1	2	1	1	2	1	2	1
CO-4	3	1	1	2	3	1	3	1	3	1
CO-5	3	1	1	2	3	1	3	1	3	1

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION TO FOOD SAFETY	**(9L+3T)**
Introduction to concepts of food quality, food safety, food quality assurance and food quality management; objectives, importance and functions of quality control, Current challenges to food safety. Activity: Importance of safety at work place and laboratory	**CO-1** **BTL-2**
MODULE 2 – SAFETY ACT **(9L+3T)**	
Role of national and international regulatory agencies, Bureau of Indian Standards (BIS), AGMARK, Food Safety and Standards Authority of India (FSSAI), Introduction to WTO agreements: SPS and TBT agreements, Codex alimentarious commission, USFDA, International organization for standards (ISO) and its standards for food quality and safety (ISO 9000 series, ISO 22000, ISO 15161, ISO 14000) Practicum: Training from FSSAI, AGMARK, BIS	**CO-2** **BTL-2**
MODULE 3 – SAFETY DURING PROCESSING **(9L+3T)**	
HACCP; Desirable safety features of some food processing equipment; Personal protective equipment; Safety from adulteration of food. Activity: HACCP and equipment safety	**CO-3** **BTL-3**
MODULE 4 – PLANT MAINTENANCE **(9L+3T)**	
Role of maintenance staff and plant operators; Preventive maintenance; Guidelines for good maintenance & safety precautions; Lubrication & lubricants; Work place improvement through '5S'. Practicum: Practice 5S at work place	**CO-4** **BTL-2**
MODULE 5 – PERONAL HYGENE(9L+3T)	
Hygiene and sanitation requirement in food processing and fermentation industries; Cleaning, sanitizing & pest control in food processing; storage and service areas Activity: Visit to any food manufacturing industry that practices GMO and sanitation	**CO-5** **BTL-2**
TEXT BOOK	
1	Yasmine Motarjemi. (2022) Food Safety Management, A Practical Guide for the Food Industry. Academic Press.
REFERENCE BOOK	
1	S J Forsythe, P R Hayes. (2018) Food Hygiene, Microbiology & HACCP. Springer. **CO-5 BTL-2**

COURSE TITLE	FUNDAMENTALS OF RESEARCH METHODOLOGY	BTL - 3	CREDITS - 4
COURSE CODE	AGE21001	COURSE CATEGORY - CC	L-T-P-S 3-0-2-2
Course Objective	1. To demonstrate the principles of research and statistics. 2. To explain study designs and data sampling. 3. To examine and analyze the data.		
Course Outcome	Upon completion of this course, the students will be able to 1. Apply principles of research 2. Develop a framework for the study 3. Employ study designs and use sampling methods 4. Interpret results 5. Write reports		

MODULE 1: INTRODUCTION TO RESEARCH AND STATISTICS (12L+0P=12)	
Introduction to Research Methodology: Meaning of research, objectives of research, Types of research & research approaches, Criteria for good research, Problems encountered by researchers in India, Parameters and Estimates, Descriptive and inferential statistics, Variables and their types, Measurement scales.	**CO-1, BTL-3**
MODULE 2: RESEARCH DESIGN AND TABULATING DATA (12L+0P=12)	
Research design: Meaning of research design, Need for research design, Features for good design, Different research designs. Tabulation of Data: histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, Normal probability curve.	**CO-2, BTL-3**
MODULE 3: MEASUREMENT, DATA COLLECTION, CENTRAL TENDENCY (12L+0P=12)	
Measurement & scaling techniques: Measurement in research- Measurement scales. Methods of data collection: collection of primary data and Secondary data. The measure of Central Tendency: Need for measures of central Tendency, Definition, and calculation of mean – ungrouped and grouped, Meaning, interpretation, and calculation of median ungrouped and grouped.	**CO-3, BTL-3**
MODULE 4: PROBABILITY, SAMPLING TECHNIQUES, PROCESSING AND ANALYSIS (9L+3P=12)	
Probability and Standard Distributions, the normal distribution, Divergence from normality – skew ness, kurtosis, Procedures of sampling, and sampling design errors. Sampling fundamentals are needed for sampling & important sampling distributions. Processing & analysis of data: Processing operations, problems in processing, Types of analysis, Measures of central tendency, Dispersion, Asymmetry, and relationship.	**CO-4, BTL-3**
MODULE 5: HYPOTHESIS TESTING, ANALYSIS, AND THESIS WRITING (9L+3P=12)	
Testing of hypothesis: Basic concepts concerning testing of hypothesis, Procedure of hypothesis testing, Tests of hypothesis, limitations of the tests of hypothesis. Analysis of variance (ANOVA), The basic principle of ANOVA, ANOVA technique, Analysis of Covariance (ANCOVA). Thesis writing, Preparation of scientific reports abstracts and research papers.	**CO-5, BTL-3**

TEXTBOOKS

1. Kumar, Ranjit. Research Methodology : A Step-By-Step Guide for Beginners. London, SAGE Publications Ltd, 2019.
2. Research Methodology, 5th ed, C.R. Kothari, New Age International Publishers, 2023.

REFERENCE BOOKS
1. Research Methodology & Biostatistics, Sharma Suresh, Elsevier India, 2016. 2. Mahajan's Methods in Biostatistics for Medical and Research Workers, 9th ed, Bratati Banerjee, Jaypee Brothers Publishers, 2018. **3.** Practice of Social Research, 15th ed, Earl R. Babbie, 2023

COURSE TITLE	ENTREPRENEURSHIP			CREDITS	3
COURSE CODE	AFT11504	COURSE CATEGORY	DE	L-T-P-C-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignment/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	Entrepreneurs require a foundation in several key areas in order to be successful. This course will focus on multiple topics including: opportunities and challenges for new ventures, benefits/drawbacks of entrepreneurship, strategic management and forms of business ownership, marketing strategies, venture finance and human resource Management
Course Objective	To enable the students 1. To systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully. 2. To acquire necessary knowledge and skills required for organizing and carrying out entrepreneurial activities 3. To develop the ability of analyzing and understanding business situations in which entrepreneurs act 4. To master the knowledge necessary to plan entrepreneurial activities. To advance the ability of analyzing various aspects of entrepreneurship activities
Course Outcome	Upon completion of this course, the students will be able to 1. Acquire the ability to discern distinct entrepreneurial traits 2. Know the parameters to assess opportunities and constraints for new business ideas 3. Understand the systematic process to select and screen a business idea 4. Design strategies for successful implementation of ideas 5. Write a business plan

Prerequisites: AFT0150 ENTREPRENEURSHIP DEVELOPMENT

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	1	3	2	1	3	1	1
CO-2	1	1	2	1	2	2	1	2	1	1
CO-3	3	1	2	3	1	3	1	2	1	1
CO-4	1	1	2	3	1	3	1	3	1	1
CO-5	1	2	2	3	1	3	1	3	1	1

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION (9L+0T)	
Entrepreneur & entrepreneurial flair; Classification of small, medium and large scale manufacturing industries; Opportunities of food processing industries in West Bengal	**CO-1** **BTL-2**
MODULE 2 – SCOPE OF ENTREPRENEURSHIP	**(9L+0T)**
Nature, scope and importance of entrepreneurship; business ideas, source of business ideas, feasibility studies, problem solving and decision making. Agricultural sector and food processing industry problems and opportunities; self-employment need and entrepreneurship in foods sector, project sizing, fund management and enterprise management issues in food entrepreneurship, entrepreneurship development policies of government in food business	**CO-2 BTL-2**
MODULE 3 – PROCEDURE	**(9L+0T)**
Trade license and registration marks; Sources of finance; Selection of land and factory sheds.	**CO-3** **BTL-3**
MODULE 4 –EQUIPMENT MANAGEMENT	**(9L+0T)**
Agencies for promotion of food processing industries; Source of machine and equipment.	**CO-4** **BTL-2**
MODULE 5 – WRITING PROJECT PROPOSAL	**(9L+0T)**
Preparation of project report; Market feasibility reports; Techno-economic feasibility report on fruits and vegetable processing, bakery and confectionary, mushroom manufacture and soybean processing.	**CO-5 BTL-2**

TEXT BOOK	
1.	Kanka. (2018) Entrepreneurial Development, Himalaya Publishing House.
REFERENCE BOOK	
2.	Poornima. (2018.)Entrepreneurial Development, S Chand & Co

COURSE TITLE	SENSORY EVALUATION TECHNIQUES			CREDITS	3
COURSE CODE	AFT11505	COURSE CATEGORY	DE	L-T-P-C-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignment /Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	The course deals about the sensory evaluation of food based on which the market of the product id decided. Sensory attributes like smell, taste, vision, texture of a product are taught step by step which will enable the student to understand the importance of sensory evaluation in product development as well as quality control
Course Objective	To enable the students 1. To learn about quality management in food production chain 2. To illustrate the importance of food safety, food quality, food laws and regulations 3. To describe the food quality management systems. 4. To explain the nationals and international food laws and regulations. To exemplify different food adulterants.
Course Outcome	Upon completion of this course, the students will be able to 1. Describe about physical, chemical contaminants in foods 2. Imply food safety system in industry 3. Implement international food laws and standards for food industry 4. Demonstrate national food laws and standards 5. Suggest food labeling regulations to an industry

Pre-requisites: Food Product Development

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	1	2	1	2	1	2	2	1	2	1
CO-2	2	1	1	1	1	1	1	2	1	1
CO-3	1	1	2	3	1	1	3	2	2	1
CO-4	1	1	2	1	1	1	1	2	1	1
CO-5	1	2	3	1	1	1	1	1	1	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION TO QUALITY ATTRIBUTES (9L+0T)	
Appearance, flavour, textural factors and additional quality factors – Concept and Importance of Food Appearance, Sensory Assessment of Appearance- panel selection, screening and training; Physical requirement for food appearance, types of sensory test, Appearance Scales. **Activity:** Making the students to sensory evaluate coffee, tea, bread etc.	**CO-1 BTL-2**
MODULE 2 – TASTE (9L+0T)	
Introduction, Organs involved in taste perception- tongue, papillae, taste buds, salivary glands mechanism of taste perception. Chemicals responsible for sweet, salt, sour, and bitter taste their structure and chemical dimensions. Factors affecting taste quality, reaction time and factors affecting it. Absolute and recognition threshold taste Abnormalities **Activity:** Focus on tongue and its taste buds to experience different taste	**CO-2 BTL-2**
MODULE 3 – OLFACTION (9L+0T)	
Introduction and definition, anatomy of nose, mechanism of odour perception. Prerequisites for odour perception, odour classification, chemical specificity of odour. measurement of odour using different techniques primitive, double tube olfactometer, Elseberg techniques, Wenzel's olfactometer, sniffing, merits and demerits of each methods, olfactory abnormalities. **Practicum:** Use the perception of smell, sniffing to evaluate the food Demonstration of double tube olfactometer, Wenzel's olfactometer	**CO-3 BTL-3**
MODULE 4 –COLOUR (9L+0T)	
Introduction to natural and synthetic colours. Functions of colour in foods. Optical aspect of colour, perception of colour, objective evaluation, colour measurement using different systems- Munsell colour system, CIE colour system, qualitative and quantitative analysis of colour, reflectance spectrophotometry and Colorimetry. **Practicum:** Demonstration to identify misbranded colours Demonstration of reflectance spectrophotometry and colorimetry	**CO-4 BTL-2**
MODULE 5 – TEXTURE (9L+0T)	
Introduction, definition and classification of texture profile. Subjective evaluation, phases of oral processing. Objective analysis, rheological methods of texture measurement including rheological models. Measurement of texture in various food groups viz. cereals, dairy, fruits and vegetables, fish, meat and meat products.	**CO-5 BTL-2**

TEXT BOOK	
1.	Maynard A. Amerine, Rose Marie Pangborn, Edward B. Roessler.(2018) Principles of Sensory Evaluation of Food. Elsevier Publication
2.	Harry T Lawless, Hildegarde Heymann, (2020) sensory Evaluation of Food: Principles and Practices. Springer Publication
REFERENCE BOOK	
1.	DeMan. 2018. Principles of Food Chemistry, 3rd edition, Springer Publication.

COURSE TITLE	PROCESSING OF OILS AND FATS			CREDITS	4
COURSE CODE	AFT11017	COURSE CATEGORY	CC	L-T-P-S	3-1-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/Project	Surprise Test / Quiz	Attendance	End Semester Exam
15%	15 %	10%	5%	5%	50%

Course Description	The course will provide theoretical knowledge about oils and fats, their supply chain, and extraction process of oil. Furthermore, students will learn the difference between oils and fats and their functionality. They will gain a deeper understanding of the chemistry involved in fats and oils, storage, refining, modification, and nutrition.
Course Objective	To enable the students To understand about the physical and chemical properties of fats and oils To gain knowledge about the extraction and refining processes To learn about the various types of packaging available in the market To detect adulteration and know about the standards of identifying oil To develop value added products from oil seed waste
Course Outcome	Upon completion of this course, the students will be able to Describe the physical and chemical property of oils and fats Identify different methods of oil extraction for edible purpose Write down process flow line for oil extraction Classify different types of fat and oil products Discuss about the various storage and packaging materials used

Prerequisites: Principles of food science

Pedagogy: Direct Instruction, Constructivist, Reflective, Inquiry-based, Case studies, Discussion

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	2	3	2	3	2	2	3	3	3	2
CO-2	3	3	3	3	2	3	2	2	3	3
CO-3	2	1	1	1	2	2	3	3	2	3
CO-4	3	2	2	3	2	2	3	3	3	2
CO-5	3	1	1	2	2	2	2	3	2	2

1: Weakly related, 2: Moderately related, and 3: Strongly related

MODULE 1: INTRODUCTION	**(9L+0T)**
Status and prospects of oils & fats processing sector; Issue and challenges facing edible oils & fats producing industry; Sources and availability of edible oils and fats – plant & animal; Composition, nutritional value and health benefits Nuts & Oilseeds: Composition, sources of proteins and oil - Protein concentrates and isolates, texturized vegetable protein Activity**:** Nutrition value of nuts and oils seeds**.**	**CO – 1** **BTL – 2**
MODULE 2 – PROCESSING OF OILS	**(9L+0T)**
Mechanical Expelling of Oils from Plant Sources Pre-treatments of oilseeds - cleaning, dehulling, heat treatment, flaking, milling, etc; enzymatic pre-treatments. Mechanical expression –Hot & cold; Ghani, pressing, screw expelling; Expellers – batch & continuous; Hydraulic & screw presses. s; Refining - filtration, degumming, neutralization, bleaching, deodorization and physical refining. **Practicum:** Expelling oil from plant source	**CO – 1** **BTL – 2**
MODULE 3 – Solvent Extraction of Edible Oils	**(9L+0T)**
principles and mechanism, solvent types & properties, factors affecting solvent extraction process; Pre-press solvent extraction, Extractors – batch & continuous; Miscella distillation; Meal desolventization; Microwave/ Ultrasound/ PEF assisted extraction, Supercritical fluid extraction **Practicum:** Extraction of oil from specific seeds	**CO-3 BTL-3**
MODULE 4 – EDIBLE OILS	**(9L+0T)**
Sources of edible oils (groundnut, mustard, soybean, sunflower, safflower, coconut, sesame and oil from other sources); physio-chemical properties; the processing of oilseeds: rendering, pressing, solvent extraction, refining, hydrogenation; factors affecting extraction; packing and storage of fats and oils, changes during storage. **Activity:** Physico-chemical analysis of edible oils	**CO-4** **BTL-3**
MODULE 5 – SPECIALITY OIL PRODUCTS	**(9L+0T)**
Margarine, mayonnaise, salad dressing, fat substitutes etc; chemical adjuncts: lecithins and GMS; Nutritional food mixes from oilseeds: processing of oilseeds for food use, protein-rich foods, protein-enriched cereal food. **Practicum:** Development of protein rich products from oilseeds	**CO-5 BTL-3**
Skill Development Activities: Extraction of Oil from various Oil seeds	

TEXT BOOKS

1.	M M Chakrabarty ,(2018) Chemistry and Technology of Oils and fats
2.	Frank D Gunstone.(2022).Vegetable Oils in Food Technology: Composition, Properties, and Uses . Technology of Oils and Fats

REFERENCE BOOKS	
1.	Ernesto M , (2022) Processing and Nutrition of Fats and Oils (Institute of Food Technologists Series)"
2.	R J Hamilton .(2020) Recent Advances in Chemistry and Technology of Fats and Oils
E-BOOKS / MAGAZINE / ARTICLES	
1.	https://www.pdfdrive.com/food-science-and-technology-d41395460.html
2.	Processing and Nutrition of Fats and Oils | Wiley Online Books
ONLINE RESOURCES	
1.	FSP: Processing of fats and oils (iasri.res.in)
2.	Fat and oil processing - Extraction, Refining, Fractionation | Britannica

COURSE TITLE	FERMENTED FOODS			CREDITS	3
COURSE CODE	AFT11018	COURSE CATEGORY	CC	L-T-P-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL-3

ASSESSMENT SCHEME					
First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	ESE
15%	15%	10%	5%	5%	50%

Course Description	The course deals with the history of fermented foods and beverages and the impact of fermentation on flavor, aroma, and taste from chemistry to the microbiology of fermented foods, the role of different types of microbes in the production, preservation, and enhancement of diverse foods
Course Objective	To enable the students 1. To understand various principles and procedures involved in fermentation of foods 2.To examine the different biochemical and microbial systems involved in various food and beverage fermentations 3.To study common biochemical pathways involved in different fermentation systems 4. To discuss on the methods for starter culture preparation, protection and use. 5. To learn about the impact of fermentation on nutritive value, flavour, aroma.
Course Outcome	Upon completion of this course, the students will be able to 1. Identify the principles of food fermentation technology 2. Evaluate the types of starters used in Food Industry 3. Discuss about the production of various fermented foods, and alcoholic and non-alcoholic beverages. 4. Apply the benefits of traditional foods and their existence at present to explore 5. Compile the Impact of fermented products and its benefits

Prerequisites: Food Microbiology

Pedagogy: Direct Instruction, Constructivist, Reflective, Inquiry-based, Case studies, Discussion

CO, PO AND PSO MAPPING

CO	PO -1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	3	2	2	3	3	3	3
CO-2	3	3	3	3	2	3	2	2	3	3
CO-3	2	1	1	1	2	2	3	3	2	3
CO-4	3	2	2	3	2	2	3	3	3	2
CO-5	3	1	1	2	2	2	2	3	2	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: – IMPORTANCE OF FERMENTED FOODS	(9L+0T)
Fermentation - Principles, Types of fermentation, Types of fermented foods, Advantages of fermentation. Organisms used to produce fermented food products; Environmental parameters for fermentation process; safety criteria of fermented foods	**CO-1 BTL-2**
Practicum: Developing a Food product using Fermentation Technique	
Microorganisms involved in Fermentation, Microbial activities with specific role in Fermentation, Significance of Fermentation food in the Indian diet, Factors influence growth & Metabolic activities of microbes in food Fermentation. **Practicum:** Assessing the microbial activities of various microbes involved in fermentation	**CO-2 BTL-2**
MODULE 3: CEREAL BASED FERMENTED PRODUCTS (9L+0T)	
Fruits - Classification, Composition, Nutritive value. Post-Harvest Changes, Ripening, Changes during Ripening, Browning Reactions. Vegetables - Classification, Composition, Nutritive value, Pigments – Types and Effect of Cooking, Microgreens. Algae – Spirulina, Fungi – Mushrooms. **Practicum:** Development of cereal-based fermented products	**CO-3 BTL-3**
MODULE 4: EGGS, MILK AND MEAT, BEVERAGES.	**(9L+0T)**
Different types of pickles like olive cucumber, salt stock and dill pickles, Fish sauce, sausages, and Surimi. **Practicum:** Classification and Demonstration of Different type of Pickles	**CO-4 BTL-2**
MODULE 5: DAIRY-BASED FERMENTED PRODUCTS	**(9L+0T)**
Cheese, Butter, Yoghurt, Kefir, Koumiss, Srikhand, Cultured butter milk; Whey based fermented products. **Practicum:** Preparation of Dairy-based fermented foods.	**CO-5 BTL-3**
Skill Development Activities: Preparation of Practicum Report Booklet.	

TEXT BOOK	
1	Joshi VK (2017). Indigenous fermented foods. CRC press I edition
2	Shakuntala Manay (2016), Foods Facts and principles. New Age publishers
REFERENCE BOOK	
1.	Joshi VK (2019). Indigenous fermented foods. CRC press I edition
2.	Fermented Food Products Edited ByA. Sankaranarayanan, N. Amaresan, D. DhanasekaranEdition1st Edition (2020).
E-BOOKS / MAGAZINE / ARTICLES	
1	Joshi VK (2017). Indigenous fermented foods. CRC press I edition
2	Microbiology and Technology of Fermented Foods | Wiley Online Books

COURSE TITLE	FOOD PACKAGING TECHNOLOGY			CREDITS	4
COURSE CODE	AFT11019	COURSE CATEGORY	CC	L-T-P-S	3-1-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL –3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/Project	Surprise Test / Quiz	Attendance	End Semester Exam
15%	15 %	10%	5%	5%	50%

Course Description	The course provides knowledge and skills in the handling and packaging of foods and develops values about the safety and environmental impact of packaging. Also, this course imparts the knowledge on application of fundamentals of engineering in packaging design for developing optimal packaging systems for a range of products in food systems.
Course Objective	To enable the students 1. To study the functions of packaging along with the influence of various factors on food. 2. To explain various recent techniques of food packaging and applications 3. To understand the principles and requirements of packaging techniques. 4. To identify the purpose, principle and advance knowledge related to the various packaging technology systems. 5. To demonstrate suitable recycling methods of packaging materials, biodegradable packaging materials and safety and legislative aspects.
Course Outcome	Upon completion of this course, the students will be able to 1. Understand packaging materials and its importance in food industry 2. Adapt and utilize packaging materials for right application in Food Industry 3. Check barrier properties of packaging materials to avoid cross contamination with air, water and printing ink 4. Standardize testing methods for packaging material to assure quality 5. Demonstrate packaging laws and regulations meeting standards

Prerequisites: Food science

Pedagogy: Direct Instruction, Constructivist, Reflective, Inquiry-based, Case studies, Discussion

CO, PO, AND PSO MAPPING

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO1	3	2	2	3	2	2	3	3	3	3
CO2	3	3	3	3	2	3	2	2	3	3
CO3	2	1	1	1	2	2	3	3	2	3
CO4	3	2	2	3	2	2	2	3	2	2
CO5	3	1	1	2	2	2	2	3	2	2

1: Weakly related, 2: Moderately related, and 3: Strongly related

MODULE 1: INTRODUCTION TO FOOD PACKAGING	**(9L+3T)**
Definition, factors involved in the evolution and selection of a food package, and functions of food packaging (containment, protection, convenience and communication). Paper and paper-based packaging materials: types of paper (Kraft, bleached, greaseproof, glassine), paper products (paper bags, cartons, drums and molded paper containers), functional properties of paper; testing of paper packaging materials. **Practicum:** Developing of Paper and paper-based packaging	**CO – 1** **BTL – 2**
MODULE 2: PLASTIC PACKAGING MATERIALS	**(9L+3T)**
Classification of polymers, functional and mechanical properties of thermoplastic polymers; processing and converting of thermoplastic polymers (extrusion, blow molding, injection molding, compression molding, lamination, and heat sealing); testing of plastic packages. Packaging requirements of selected foods- cereal and snack food, beverages, milk and dairy products, poultry & eggs, red meat, frozen foods, horticultural products, and microwavable foods. **Activity:** Evaluation of functional and mechanical properties of thermoplastic polymers	**CO – 2** **BTL–2**
MODULE 3: METAL PACKAGING MATERIALS	**(9L+3T)**
Container-making processes (end manufacture, three-piece can manufacture and protective and decorative coatings); functional properties of metal containers; Tin plate containers- quality control tests. **Activity:** Quality control of metal containers	**CO-3** **BTL-3**
MODULE 4: GLASS PACKAGING MATERIAL	**(9L+3T)**
Composition and manufacture of glass containers; glass container nomenclature; glass containers-closure functions, closure terminology and construction; properties of glass containers – mechanical, thermal and optical properties; testing of glass containers. **ACTIVITY:** Discussion on mechanical, thermal, and optical properties of glass containers	**CO-4** **BTL3**
MODULE 5: ASEPTIC PACKAGING OF FOODS	**(9L+3T)**
Sterilization of packaging material food contact surfaces & aseptic packaging systems; active food packaging – definition, scope, physical and chemical principles involved. Edible films and coatings– use of edible active layers to control water vapor transfer, gas exchange, and modification of surface conditions with edible active layers. Oxygen absorbents – classification, factors influencing the choice of oxygen absorbents, Ethanol vapor: ethanol vapour generator, uses of ethical for shelf-life extension of food, effect of ethanol vapor on food spoilage/food poisoning bacteria, and advantages and disadvantages of ethanol/vapor generators. **Practicum:** Development of active packaging material and analyzing its physical and chemical properties.	**CO-5** **BTL-3**
Skill Development Activities: Preparation of Practicum Report Booklet**.**	

TEXT BOOKS	
1.	Robertson, G.L. (2016). Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis
2.	Shakuntala Manay (2021), Foods Facts and Principles. New Age publishers
REFERENCE BOOKS	
1.	Ahvenainen, R. (2018) Novel Food Packaging Techniques, CRC Press.
2.	Food and Beverage Packaging Technology Editor(s): Richard Coles, Mark Kirwan First published: (2021)
E-BOOKS / MAGAZINE / ARTICLES	
1.	Food Packaging (egyankosh.ac.in)
2.	Food Packaging Technology (researchgate.net)
ONLINE RESOURCES	
1.	Advances in food packaging technology-A review (researchgate.net)
2.	https://www.youtube.com/watch?v=_kf9yZR4ZnU

COURSE TITLE	QUALITY CONTROL MANAGEMENT			CREDITS	3
COURSE CODE	AFT11506	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL – 3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/ Project	Surprise Test / Quiz	Attendance	End Semester Exam
15%	15 %	10%	5%	5%	50%

Course Description	The course deals about providing safe and wholesome food to consumers through quality control methods. Sensory evaluation the most important feature in product development is discussed in detail.
Course Objective	To enable the students 1. To understand basic sensory quality attributes of raw and processed foods. 2. To provide an insight of basic tastes and derived tastes in food. 3.To understand the methods of detecting food adulterants 4.To provide fundamental knowledge on food safety aspects 5.To provide in-depth knowledge on food laws and regulations
Course Outcome	Upon completion of this course, the students will be able to 1. Apply the principles of sensory science in product development 2. Identify the various chemical, physical contaminants during processing, packaging and storage 3. Detect food adulteration by various techniques 4. Analyze quality of the processed food products 5. Compile various methods of sensory evaluation

Prerequisites: Food safety

Pedagogy: Direct Instruction, Constructivist, Reflective, Inquiry-based, Case studies, Discussion

CO, PO AND PSO MAPPING

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	3	2	2	3	3	3	3
CO-2	3	3	3	3	2	3	2	2	3	3
CO-3	2	1	1	1	2	2	3	3	2	3
CO-4	3	2	2	3	2	2	3	3	3	2
CO-5	3	1	1	2	2	2	2	3	2	2

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1: FOOD QUALITY	(9L+0T)
Introduction to food quality management – Definition, quality concepts, quality, quality perception, quality attributes, safety, health, sensory, shelf life, convenience, extrinsic attributes, and factors affecting food quality. Total food quality management functions Activity**:** Evaluating the factors affecting Quality attributes	**CO – 1** **BTL – 2**
MODULE 2: FOOD CONTAMINATION	**(9L+0T)**
Contamination in Food-: Physical, Natural toxins, chemicals, heavy metals, antibiotics, dioxins, environmental pollutants. Contaminants formed during processing nitrosamines, acrylamide, and contaminants from packaging materials. **Practicum:** Experimentation on different major food contaminants during food processing	**CO – 2** **BTL – 2**
MODULE 3 – FOOD ADDITIVES	**(9L+0T)**
Meaning, Need, Classification, Characteristics, and classification of food additives. Antimicrobial agents – Nitrites, sulfides, sulfur dioxide, sodium chloride, hydrogen peroxide. Colors- Importance, classification- natural, artificial colors. **Practicum:** Development of various combinations of natural food additives	**CO-3** **BTL-3**
MODULE 4 –FOOD SAFETY	**(9L+0T)**
GRAS (Generally Recognized as Safe). Permissible limit for Food additives. ADI, LD50. Food labeling **Activity:** Comparison of different types Food Labelling (Perishable/non-perishable and shelf stable).	**CO-4** **BTL-3**
MODULE 5 – FOOD LAWS, STANDARDS AND REGULATIONS	**(9L+0T)**
National and International Food laws & and regulations: FSSAI, FPO, PFA, AGMARK, BIS, ISI, HACCP, USFDA, EU, Codex Alimentarius. World Trade Organization- Sanitary and Phyto Sanitary agreement, Technical Barriers in Trade, Tinned foods -Standards of Identity, Standards of Quality. **Activity:** FSSAI standard requirements are analyzed and compared with international food laws	**CO-5** **BTL-3**
Skill Development Activities: HACCP/ISO/FDA/EU/USFDA requirements are assessed.	

TEXT BOOKS	
1.	Srilakshmi, Food Science (2019) New Age publishers
2.	Shakuntala Manay (2016), Foods Facts and Principles. New Age publishers
REFERENCE BOOKS	
1.	Operations Research and Management Science Handbook (The Operations Research Series) by A. Ravi Ravindran – PDF Drive
2.	Quality management systems for the food industry : a guide to ISO 9001/2 ; [companion volume to practical approaches to food control and food quality series] XA-DE by Andrew Bolton – PDF Drive
E-BOOKS / MAGAZINE / ARTICLES	
1.	Quality Management for Organizational Excellence Introduction to Total Quality by David L. Goetsch (Kindle Edition)
2.	Total Quality Management (researchgate.net)

ONLINE RESOURCES	
1.	Quality Control Training & QC Courses | ASQ
2.	Quality Control (QC) explained – Toolshero

COURSE TITLE	FOOD INFORMATION AND REGULATIONS			CREDITS	3
COURSE CODE	AFT11507	COURSE CATEGORY	DE	L-T-P-S	3-0-0-0
Version	2	Approval Details		LEARNING LEVEL	BTL – 3

ASSESSMENT SCHEME

First Periodical Assessment	Second Periodical Assessment	Seminar/ Assignments/Project	Surprise Test/ Quiz	Attendance	End Semester Exam
15%	15 %	10%	5%	5%	50%

Course Description	This course deals with the specifications and standards for various food products. Various food laws as well as authorizing bodies were discussed in detail to maintain the safety and quality of foods.
Course Objective	To enable the students 1. To become food scientists capable of ensuring the production and marketing of safe and quality foods. 2. Provide a broadly based scientific education that can also enter employment in other sectors of the food chain 3. To allow individuals to develop their capacity to undertake research into the science of foods. 4. To provide undergraduates with opportunities to develop their interpersonal and communication skills. 5. To create a knowledge-based skill towards research-oriented aspiration
Course Outcome	Upon completion of this course, the students will be able to Have Knowledge of FSSAI. Examine on Material used for packing and laws related to packaging. Elucidate the Methods to detect adulterants of various foods Have Knowledge of PFA Have Knowledge of FDA

Prerequisites: Food Safety

Pedagogy: Direct Instruction, Constructivist, Reflective, Inquiry-based, Case studies, Discussion

CO, PO AND PSO MAPPING										
CO	**PO -1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**3**
CO-2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**
CO-3	**2**	**1**	**1**	**1**	**2**	**2**	**3**	**3**	**2**	**3**
CO-4	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**2**
CO-5	**3**	**1**	**1**	**2**	**2**	**2**	**2**	**3**	**2**	**2**

1: Weakly related, 2: Moderately related and 3: Strongly related

MODULE 1 – INTRODUCTION TO LAWS AND REGULATIONS	**(9L+0T)**
The objective of Food Laws, Major Food Laws and Regulations of India and Regulation of Food Sanitation. **Activity:** Listing the major Food Laws related to Hygiene and sanitation.	**CO – 1** **BTL – 2**
MODULE 2 – NATIONAL LAWS	**(9L+0T)**
Prevention of food Adulteration Act (PFA), Fruit Product Order (FPO), Meat Product Order (MPO), AGMARK, Bureau of Indian Standards (BIS), Food Safety and Standards Authority of India (FSSAI). **Practicum:** Preparing the List of possible Food adulteration and Testing.	**CO – 1** **BTL – 2**
MODULE 3 – INTERNATIONAL LAWS	**(9L+0T)**
Certification of HACCP, ISO, Codex Alimentarius, FDA, USDA, CARE. **Activity:** Creating SOPS for safe food related to national and international standard's Requirements	**CO-3** **BTL-3**
MODULE 4 – LABELING AND PACKAGING	**(9L+0T)**
Packaging – Functions, Classifications, Material used for packing and laws related to packaging. Labeling – Nutrition Labeling, Labeling provisions in existing food laws. **Practicum:** Building Nutrition Labeling for new products in align with packaging laws	**CO-4** **BTL-3**
MODULE 5 -SPECIALIZED FOOD REGULATION	**(9L+0T)**
Regulations of dietary supplements. Regulations of biotechnology and genetically modified foods. Food defense Importation and exportation.	**CO-5** **BTL-3**
Skill Development Activities: Preparation of Practicum Report Booklet.	
TEXT BOOKS	
1	Food Safety and Standards Act, 2016 Commercial Law Publishers (India) Pvt. Ltd; 2021st edition (1 November 2020); Commercial Law Publishers (India) Pvt. Ltd

2	Organizational Behavior, 18e (updated) Paperback – 31 May 2022 by Neharika Vohra Stephen P. Robbins, Timothy A. Judge (Author)
REFERENCE BOOKS	
1	Gail Vance (2014) Sensory evaluation practices. Fifth edition. CRC press
2	Lawman, Food Safety and Standards Act, 2017
E-BOOKS / MAGAZINE / ARTICLES	
1	FSSAI
2	13 ChapterAN2018-19.pdf (mohfw.gov.in)
ONLINE RESOURCES	
1	FOOD SAFETY & QUALITY (ihmnotes.in)