

Approved by the Academic Council at 26<sup>th</sup> meeting held on 14 July 2022

Programme Structure & Course Specification of B.Sc. (Hons.) Food Proc. & Technology - 2022-2026



**M.S. Ramaiah University of Applied  
Sciences**

# **Programme Specifications**


**B.Sc. (Hons) Food Processing and  
Technology**

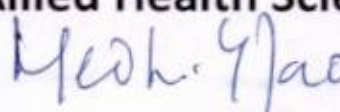
**Programme Code: 019**

**2022 onwards**

  
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**M.S. Ramaiah University of Applied Sciences**  
**Faculty of Life and Allied Health Sciences**

  
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# University's Vision, Mission and Objectives

The M. S. Ramaiah University of Applied Sciences (MSRUAS) will focus on student-centric professional education and motivates its staff and students to contribute significantly to the growth of technology, science, economy and society through their imaginative, creative and innovative pursuits. Hence, the University has articulated the following vision and objectives.

## Vision

MSRUAS aspires to be the premier university of choice in Asia for student centric professional education and services with a strong focus on applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment

## Mission

Our purpose is the creation and dissemination of knowledge. We are committed to creativity, innovation and excellence in our teaching and research. We value integrity, quality and teamwork in all our endeavours. We inspire critical thinking, personal development and a passion for lifelong learning. We serve the technical, scientific and economic needs of our Society.

## Objectives

1. To disseminate knowledge and skills through instructions, teaching, training, seminars, workshops and symposia in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to equip students and scholars to meet the needs of industries, business and society
2. To generate knowledge through research in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to meet the challenges that arise in industry, business and society
3. To promote health, human well-being and provide holistic healthcare
4. To provide technical and scientific solutions to real life problems posed by industry, business and society in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences
5. To instill the spirit of entrepreneurship in our youth to help create more career opportunities in the society by incubating and nurturing technology product ideas and supporting technology backed business
6. To identify and nurture leadership skills in students and help in the development of our future leaders to enrich the society we live in
7. To develop partnership with universities, industries, businesses, research establishments, NGOs, international organizations, governmental organizations in India and abroad to enrich the experiences of faculties and students through research and developmental programmes

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## Programme Specifications: B.Sc. (Hons) Food Processing and Technology

Faculty	Life and Allied Health Sciences
Department	Food Technology
Programme Code	019
Programme Name	B.Sc.(Hons) Food Processing and Technology
Dean of the Faculty	Dr Krishnamurthy J
Head of the Department	Dr. Lokesh A C

1. **Title of the Award:** B.Sc. (Hons) Food Processing and Technology
2. **Mode of Study:** Full Time
3. **Awarding Institution /Body:** M. S. Ramaiah University of Applied Sciences
4. **Joint Award:** Not Applicable
5. **Teaching Institution:** Faculty of Life and Allied Health Sciences, M. S. Ramaiah University of Applied Sciences, Bengaluru
6. **Date of Programme Specifications:** 27<sup>th</sup> June 2022
7. **Date of Programme Approval by the Academic Council of MSRUAS:** 14<sup>th</sup> July 2022
8. **Next Review Date:** June 2024
9. **Programme Approving Regulating Body and Date of Approval:** July 2022
10. **Programme Accredited Body and Date of Accreditation:**
11. **Grade Awarded by the Accreditation Body:**
12. **Programme Accreditation Validity:**
13. **Programme Benchmark:**
14. **Rationale of the Programme**

The purpose of the programme is creation of knowledgeable human resources to work in Government, Semi-Government, Private and Public sector owned Food Technology and Food Processing organisations and also to assume administration positions. With further progression in education, graduates should be able to undertake teaching and research in colleges and universities as well as in scientific organisations.

### 15. Programme Mission

The prime mission of this Programme is to create multiple entry and exit with defined credits and recognition, based on National Education Policy 2021 Guide lines. The purpose of the programme is to create innovative problem solvers in multi-disciplinary settings, entrepreneurs and leaders that apply their knowledge, understanding, cognitive abilities, practical skills and transferable skills gained through systematic, flexible and rigorous learning in the chosen academic domain.

### 16. Graduate Attributes

GA 1. Ability to apply fundamental knowledge of Biology, Biochemistry, Food Chemistry, Food Microbiology for developing food products and preservation.

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- GA 2. Ability to develop technologies for food processing and preservation
- GA 3. Ability to develop processes for food product development
- GA 4. Ability to test food for quality, safety and nutrition
- GA 5. Ability to develop packaging for preservation and distribution
- GA 6. Ability to perform administrative duties in government, semi-government, private and public sector organizations
- GA 7. Ability to teach in schools, colleges and universities with additional qualification and training
- GA 8. Ability to understand and solve scientific problems by conducting experimental investigations
- GA 9. Ability to apply appropriate tools, techniques and understand utilization of resources appropriately in various laboratories
- GA 10. Ability to understand the effect of scientific solutions on legal, cultural, social and public health and safety aspects
- GA 11. Ability to develop sustainable solutions and understand their effect on society and environment
- GA 12. Ability to apply ethical principles to scientific practices and professional responsibilities
- GA 13. Ability to work as a member of a team, to plan and to integrate knowledge of various disciplines and to lead teams in multidisciplinary settings
- GA 14. Ability to make effective oral presentations and communicate technical ideas to a broad audience using written and oral means
- GA 15. Ability to adapt to the changes and advancements in science and engage in independent and life-long learning

#### 17. Programme Outcomes (POs)

- PO 1. **Knowledge:** Apply fundamental knowledge of science and technology to solve real life problems in the chosen domain.
- PO 2. **Design/ Development solution:** Apply disciplinary knowledge and transferable skills in areas related to design and develop new products for solving problems in pharma, healthcare, and agriculture sectors.
- PO 3. **Multidisciplinary approach:** Demonstrate the practical learning skills and integrate knowledge of various disciplines to work effectively in teams with multidisciplinary settings.
- PO 4. **Modern tool usage:** Apply appropriate tools, techniques and understand utilization of resources appropriately in various Laboratories.
- PO 5. **Communication:** Communicate the information effectively in scientific writing and oral presentation.
- PO 6. **Leadership and Ethics:** Apply professional ethics and leadership skills in entrepreneurship.
- PO 7. **Lifelong learning:** Adopt changes and advancements in science and engage in independent and life-long learning

#### 18. Programme Goal

The programme acts as a foundation degree and helps to develop critical, analytical and problem solving skills at first level. The foundation degree makes the graduates employable in food technology and food processing industries and also to assume administrative positions in various types of organisations. With additional qualifications and training help the graduates to pursue a career in academics or scientific organisations as a researcher.

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The goals of the Programme include:

- Promote multilingualism and power of language in learning and teaching
- Multidisciplinary and holistic education to ensure unity and integrity of knowledge
- Ability to choose learning trajectories and programmes
- Eliminate harmful hierarchies among disciplines/fields of study and silos between different areas of learning
- Promote creativity and critical thinking to encourage logical decision-making along with appreciating ethical, human & constitutional values
- Impart life skills such as communication, cooperation, teamwork, and resilience

Facilitate outstanding research as a co-requisite for outstanding education and development

### 19. Programme Educational Objectives (PEOs)

The Bachelor of Science honours degree programme in food technology imparts knowledge and understanding of food processing systems and their behaviour for various inputs/stimuli originating from the surrounding environment. The Programme also provides sufficient understanding and cognitive abilities to design, develop and incorporate scientific methods, and techniques in food processing. In addition, the programme imparts knowledge and training to develop transferable skills and entrepreneurship abilities.

The objectives of the programme are to enable the students to:

**PEO-1.** Understand and apply the concepts of food technology, food quality, safety, packaging and their related aspects for pursuing successful career in industry and pursue higher studies as well.

**PEO-2.** Participate in individual and team oriented, open ended activities aiding constructive thinking to provide opportunity for students to manage and work on multidisciplinary projects.

**PEO-3.** Demonstrate professional and ethical attitude with awareness of current issues and think about the social entailment of their work, especially its impact on safety, health and environment for sustainable development.

**PEO-4.** To promote student awareness of the life-long learning and to introduce them to professional ethics and codes of professional practice

### 20. Programme Specific Outcomes (PSOs)

**PSO 1:** To impart an ability to apply Food technology skills (including microbiology, food process engineering, fermentation, enzymology and nutraceuticals) and its applications in core and allied fields.

**PSO 2:** To provide students with the concepts and research approaches for their higher career in the field of food technology and develop their scientific interest.

**PSO 3:** To impart in-depth practical oriented knowledge to students in various thrust areas of food technology, so as to meet the demands of industry and academia.


**PSO 4:** To provide students interdisciplinary knowledge, research and educational opportunities as lifelong learning through effective communication skills and strong ethical values



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## 21. Programme Structure out line Based on NEP Guide Lines

### Semester-1

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorial (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTC101A	Introduction to Food Technology-I (3+2)	3		4	5	100
2	FTC102A	Food Nutrition and Dietetics (3+2)	3		4	5	100
3	FTC103A	Principles of Food Science (3)	3			3	100
4	FTO101A	Fundamentals of Food Processing (3)	3			3	100
5	TSM101A	English for Communication 1 (3)	3			3	100
6	CSM101A	SEC-1: Digital Fluency/Basic Algorithm and Programming (2) (1+0+2)	1			2	50
<b>Total</b>			<b>16</b>		<b>8</b>	<b>21</b>	<b>550</b>
<b>Total Number of Contact Hours per week</b>			<b>24</b>				

### SEMESTER 2

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTC104A	Introduction to Food Technology-II(3+2)	3		4	5	100
2	FTC105A	Bakery and Confectionery(3+2)	3		4	5	100
3	FTC106A	Fundamentals of Fruits, Vegetables and Plantation Crops(3)	3			3	100
4	FTO102A	Food Hygiene and Sanitation(3)	3			3	100
5	BTN101A	Environmental Studies (2)	2			2	50
6	AHU101A	Health and Wellness/Social and Emotional learning (2) (1+0+2)	1			1	50
<b>Total</b>			<b>15</b>		<b>8</b>	<b>19</b>	<b>500</b>
<b>Total Number of Contact Hours per week</b>			<b>23</b>				



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## SEMESTER 3

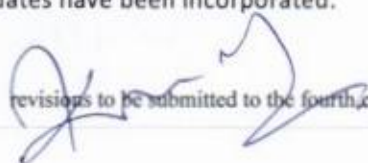
Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTC201A	Food Microbiology(3+2)	3		4	5	100
2	FTC202A	Food Chemistry-1(3+2)	3		4	5	100
3	FTC203A	Technology of Cereals Pulses and Oil Seeds(3)	3			3	100
4	FTO201A	Nutrition in health and fitness OE3(3)	3			3	100
5	TSM102A	English for Communication-2	3			3	100
6	CSM201A	Artificial Intelligence	1		2	2	50
7	BAU201A	Innovation and Entrepreneurship			3	3	100
<b>Total</b>			<b>16</b>		<b>13</b>	<b>24</b>	<b>650</b>
<b>Total Number of Contact Hours per week</b>			<b>29</b>				

## SEMESTER 4

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTC204A	Food Chemistry-II(3+2)	3		4	5	100
2	FTC205A	Food Process Engineering-I(3+2)	3		4	5	100
3	FTC206A	Food Laws and Standards(3)	3			3	100
4	FTO202A	Food industry waste management OE4(3)	3			3	100
5	LAN101A	Constitution of India and Human Rights	2			2	50
6	TSU202A	Professional communication	2			2	50
7	TSU203A	Ethics and Self Awareness	1		2	2	50
<b>Total</b>			<b>17</b>		<b>10</b>	<b>22</b>	<b>550</b>
<b>Total Number of Contact Hours per week</b>			<b>27</b>				

The Program Structure was initially conceptualized, presented, and officially endorsed during the 26th ACM meeting on July 14, 2022. Subsequently, revisions were introduced with the suggestion of BOS Members on 02 August 2023 and these updates have been incorporated.

\*The above said revisions to be submitted to the fourth coming ACM and to get it approved.



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## SEMESTER 5

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTC301A	Food Process Engineering-II	3		4	5	100
2	FTC302A	Food Quality Testing and Evaluation	3		4	5	100
3	FTC303A	Food business management	3			3	100
4	FTE301A or FTE302A	Introduction to Food Biotechnology Or Beverage Technology	3			3	100
5	FTN301A	Project Management	2			2	50
6	CSM301A	Cyber security	1		2	2	50
7	DSU101A	Sports/ Yoga/ NSS/ R&R(S&G)/ Cultural	1		2	2	50
		<b>Total</b>	<b>16</b>		<b>12</b>	<b>22</b>	<b>550</b>
<b>Total Number of Contact Hours per week</b>			<b>28</b>				

## SEMESTER 6

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTC304A	Industrial Microbiology	3		4	5	100
2	FTC305A	Food-borne diseases	3		4	5	100
3	FTC306A	Food Packaging Technology	3			3	100
4	FTE303A or FTE304A	Dairy Technology * Or Technology of Meat and Poultry*	3			3	100
5	FTE305A	Research Methodology	3			3	100
6	TSN302A	Personality Development and Soft Skills	2			2	50
7	FTI302A	Internship/Training/Project Group project			4	2	50
<b>Total</b>			<b>17</b>		<b>12</b>	<b>23</b>	<b>600</b>
<b>Total Number of Contact Hours per week</b>			<b>29</b>				



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Semester 7

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTC401A	Advanced Processing and packaging technology	3		4	5	100
2	FTC402A	Food storage and preservation technology	3		4	5	100
3	FTC403A	Food toxicology	3			3	100
4	FTE401A or FTE402A	Emerging Technologies in Food Processing * Or Food analysis and instrumentation *	3			3	100
5	FTI403A	Industrial visit/Internship			6	3	100
<b>Total</b>			<b>12</b>		<b>14</b>	<b>19</b>	<b>500</b>
<b>Total Number of Contact Hours per week</b>			<b>26</b>				

Semester -8

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTP401A	Research Project/Internship*			40	21	200
<b>Total</b>						<b>21</b>	<b>200</b>
<b>Total Number of Contact Hours per week</b>							
<b>Total Credits(All Semesters)</b>						<b>171</b>	
<b>Total Marks ( All Semesters)</b>							<b>4100</b>

\* Discipline Specific Electives: Students should choose one course out of the choices given

**22. Ability and Skill Enhancement Courses**


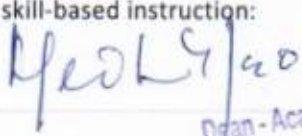
• **Ability Enhancement Compulsory Courses (AECC)**

AECC courses are the courses based upon the content that leads to knowledge enhancement through various areas of study, which will be mandatory for all disciplines:

1. Language and Literature
2. Environmental Science and Sustainable Development/ Environmental Studies
3. Constitution of India and Human Rights, Human rights
4. Project Management

• **Skill Enhancement Courses (SEC)/ Vocational Courses:** These are skill-based courses in all disciplines and are aimed at providing hands-on-training, competencies, skills, etc. SEC courses may be chosen from the pool of courses designed to provide skill-based instruction:

1. Digital Fluency
2. Artificial Intelligence & ML

  
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3. Cyber Security
4. Professional Communication

- **Value Added courses:** These courses are value based courses which are meant to inculcate ethics, culture, soft skills, sports education and such similar values to students which will help in all round development of students.

1. Health & Wellness/ Social & Emotional Learning
2. Sports/ Yoga/NCC/NSS
3. Ethics & Self Aware-ness

- **Open Elective Courses**

A number of Open Elective Courses from various Faculties of RUAS are offered as mentioned in the University's website. Students can choose the Open Electives of their choice. The students are permitted to chose online electives from the list approved by the respective HoD and Dean. Innovation Courses in Lieu of Open Elective Courses

Students can earn 3-credits by participating in innovation activities as per the approved guidelines in lieu of Open Elective Courses. The activities could be related to any of the following:  
Design Thinking and Innovation  
Skill Development  
Industrial Problem Solving and Hackathons

In addition, several Open/General Elective Courses are offered from various Faculties/Schools of MSRUAS. Students can choose from the Open Electives on their own choice.

**23. Course Delivery:** As per the Timetable

**24. Teaching and Learning Methods**

1. Face to Face Lectures using Audio-Visuals
2. Workshops, Group Discussions, Debates, Presentations
3. Demonstrations
4. Guest Lectures
5. Laboratory work/Field work/Workshop
6. Industry Visit
7. Seminars
8. Group Exercises
9. Project Work
10. Project
11. Exhibitions
12. Technical Festivals

**25. Major Features**

4th year option will be offered in all B.Sc. programs for those who qualify (with 7.5 CGPA after completion of 3rd year)

- 1st year: Certificate
- 2nd year: Diploma
- 3rd year: Bachelors or Bachelor (Honors)
- 4th year: Bachelor (Honors with Research)


**26. Assessment and Grading**

**26.1 Components of Grading**

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There shall be **two components** of grading in the assessment of each course:

**Component 1, Continuous Evaluation (CE):** This component involves multiple subcomponents (SC1, SC2, etc.) of learning and experiential assessment. The assessment of the subcomponents of CE is conducted during the semester at regular intervals. This subcomponent represents the formative assessment of students' learning.

**Component 2, Semester-end Examination (SEE):** This component represents the summative assessment carried out in the form an examination conducted at the end of the semester.

Marks obtained CE and SEE components have 60:40 weightage (CE: 60% and SEE: 40%) in determining the final marks obtained by a student in a Course.

The complete details of Grading are given in the Academic Regulations.

**26.2 Continuous Evaluation Policies**

Continuous evaluation depends on the type of the course as discussed below:

**26.1.1 Theory Courses**

For Theory Courses Only			
Focus of COs on each Component or Subcomponent of Evaluation			
	Component 1: CE (60% Weightage)		Component 2: SEE (40% Weightage)
Subcomponent Type ▶	Terms Tests	Assignments	
CO-1			
CO-2			
CO-3			
CO-4			
CO-5			
CO-6			

The details of number of tests and assignments to be conducted are presented in the Academic Regulations and Programme Specifications Document.

- CE components should have a mix of term tests, quiz and assignments
- Two Tests (15 each), Two Assignments (20 marks). (One written and another to be MCQs)
- Course leaders to declare the assessment components before the commencement of the session and get approval from HoD and Dean

**26.1.2 Laboratory Course**

For a laboratory course, the scheme for determining the CE marks is as under:

For Laboratory Courses Only		
Focus of COs on each Component or Subcomponent of Evaluation		
	Component 1: CE (60% Weightage)	Component 2: SEE (40% Weightage)

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Subcomponent Type ▶	Conduct of Experiments	Laboratory Report + Viva	Laboratory SEE
CO-1			
CO-2			
CO-3			
CO-4			
CO-5			
CO-6			
The details of number of tests and assignments to be conducted are presented in the Academic Regulations and Programme Specifications Document			

The subcomponents can be of any of the following types:

- Laboratory / Clinical Work Record
- Experiments
- Computer Simulations
- Creative Submission
- Virtual Labs
- Viva / Oral Exam
- Lab Manual Report
- Any other (e.g. combinations)

Course leaders to declare the assessment components before the commencement of the session and get approval from HoD and Dean

**26.1.1**

**Course Having a Combination of Theory and Laboratory**

For a course that contains the combination of theory and laboratory sessions, the scheme for determining the CE marks is as under:

For Combined Courses (Theory + Laboratory)					
Focus of COs on each Component or Subcomponent of Evaluation					
Course Outcome	CE (Weightage: 60 %) Four components including one Lab component			SEE (Weightage: 25 %)	Lab (Weightage: 15 %)
	Tests (30 %)	Written Assignments+ Lab (20 %)	Assignment +Lab CE (10%)	Written exam	LSEE: SEE
CO-1					
CO-2					
CO-3					
CO-4					
CO-5					
CO-6					
The details of number of tests and assignments to be conducted are presented in the Academic Regulations and Programme Specifications Document.					

- CE components should have a mix of term tests, quiz and assignments
- Two Tests (15 each), Two Assignments (20 marks). (One written and another to be MCQs)

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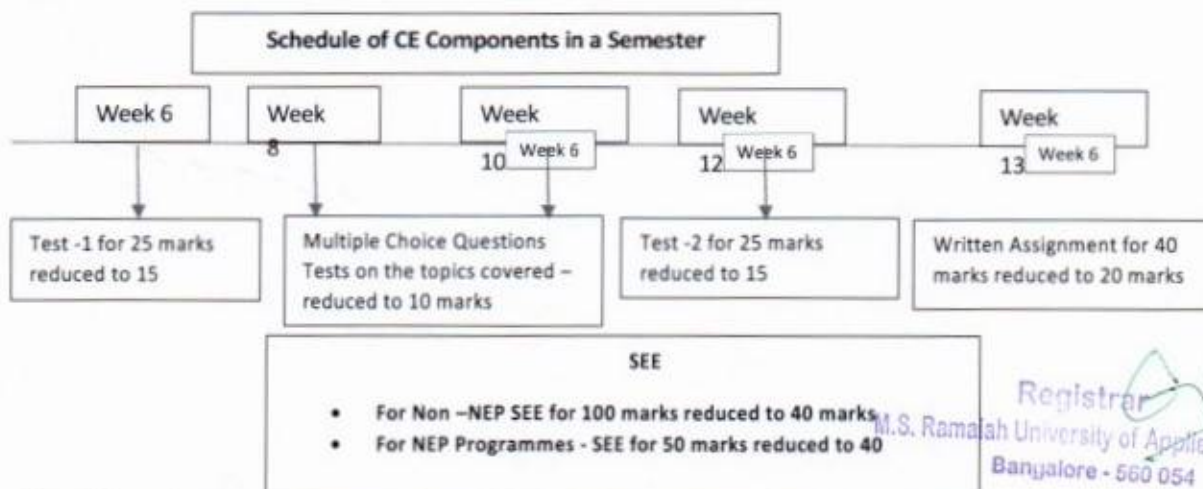
- In case of courses where laboratory is combined with theory, laboratory components to be assessed in both CE and SEE
- Course leaders to declare the assessment components before the commencement of the session and get approval from HoD and Dean

**26.1.3 Ability Enhancement courses**

For AECC Only		
Focus of COs on each Component or Subcomponent of Evaluation		
Subcomponent Type ▶	Component 1: CE (50% Weightage)	Component 2: SEE (50% Weightage)
	Terms Tests or Assignments	
CO-1		
CO-2		
CO-3		
CO-4		
CO-5		
CO-6		

The details of number of tests and assignments to be conducted are presented in the Academic Regulations and Programme Specifications Document.

- Course leaders to declare the assessment components before the commencement of the session and get approval from HoD and Dean



After all the subcomponents are evaluated, the CE component marks are consolidated to attain 60% Weightage. The Semester End Examination shall be a 90 minutes theory paper of 50 marks with a weightage of 40% in case of theory courses. In summary, the ratio of Formative (Continuous Evaluation-CE) Vs Summative (Semester End Examination-SEE) should be 60:40.

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026**

**27. Student Support for Learning**

1. Course Notes
2. Reference Books in the Library
3. Magazines and Journals
4. Internet Facility
5. Computing Facility
6. Laboratory Facility
7. Staff Support

**28. Quality Control Measures**

1. Review of Course Notes
2. Review of Question Papers and Assignment Questions
3. Student Feedback
4. Moderation of Assessed Work
5. Opportunities for students to see their assessed work
6. Review by external examiners and external examiners reports
7. Staff Student Consultative Committee meetings
8. Student exit feedback
9. Subject Assessment Board (SAB)
8. Programme Assessment Board (PAB)

**28. Curricular Map**

Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
1	Introduction to Food Technology-I	3			2			1			3			
	Food Nutrition and Dietetics	3						1	1		3			
	Principles of Food Science			2	3						3		2	
	Fundamentals of Food Processing	3							2		3		2	
	English for Communication 1		3		2							3		
	Digital Fluency/Basic Algorithm and Programming			3								3		
Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
2	Introduction to Food Technology-II	3						1			3			
	Bakery and Confectionery	1		3				2	3	2			3	1
	Fundamentals of Fruits, Vegetables and Plantation Crops	2	3					1	2	1		3	2	
	Food Hygiene and Sanitation		2		2						2	2		3
	Environmental Studies		3		2			3				3		
	Health and Wellness/Social and Emotional learning	2						2						
Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
3	Food Microbiology	3		2				1		1	3		1	
	Food Chemistry-I	3		2				2			3			
	Technology of Cereals Pulses and Oil Seeds	2		2				3		1		3	3	
	Nutrition in health and fitness OE3	3		3		2	1			1	3		1	
	English for Communication-2	1				3								3
	Cyber Security	2					3				1	2		
	Innovation and Entrepreneurship								3	1		3		
Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
	Food Chemistry-2	3		2				1			3		2	
	Food Process Engineering-I	3		1	2			1	1		2		2	1
	Food Laws and Standards	3					3					3		

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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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4	Food industry waste management OE4							3		2			2	2
	Constitution of India and Human Rights	3					3							3
	Professional communication					3								3
	Ethics and Self Awareness							3						3
<b>Sem</b>	<b>Course Title</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>
5	Food Process Engineering-II	3		1	2			1	1		2		2	1
	Food Quality Testing and Evaluation	3		2		2					3	1		
	Food business management	1		2		2			2					3
	Introduction to Food Biotechnology	3	1	2		2			1			2	2	
	Or Beverage Technology													
	Project Management	2	2			2			2			2	3	
	Artificial Intelligence	2		2		1						2		
	Sports/ Yoga/ NSS/ R&R(S&G)/ Cultural			3										
<b>Sem</b>	<b>Course Title</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>
6	Industrial Microbiology	3		2				1		1	3		1	
	Food-borne diseases	3		2		2					3			
	Food Packaging Technology	2		2				2		1	3		1	
	Dairy Technology * Or Technology of Meat and Poultry*	3		2				2		1	3		1	
	Research Methodology					3								3
	Personality Development and Soft Skills					3							3	1
	Internship/Training/Project Group project		3	3			2					1	3	
	<b>Sem</b>	<b>Course Title</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
7	Advanced Processing and packaging technology	3		2				2		1	2	1	1	
	Food storage and preservation technology	3		2				2		1	3		1	
	Food toxicology	3		2		3		1		1	3		2	
	Emerging Technologies in Food Processing * Or Food analysis and instrumentation *	3		2		3		1		1	3		2	
	Industrial visit/Internship													
	<b>Sem</b>	<b>Course Title</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
8	Research Project/Internship*	3	2			2		2	2		1	3	2	

**30. Co-curricular Activities**

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposia, paper writing, attending industry exhibitions, project competitions and related activities for enhancing their knowledge and networking.

**31. Cultural and Literary Activities**

Annual cultural festivals are held to showcase the creative talents in students. They are involved in planning and organizing the activities.

**32. Sports and Athletics**

Students are encouraged to take part in sports and athletic events regularly. Annual sports meet will be held to demonstrate sportsmanship and competitive spirit.



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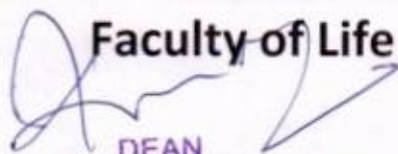
# **Course Specifications**

**B.Sc. (Hons) Food Processing and  
Technology**

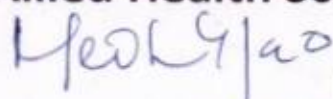
**Programme Code: 019**

**2022 onwards**

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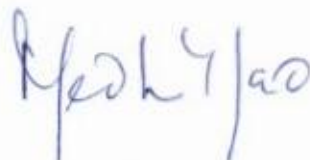


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# SEMESTER 1

  
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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026

Course Specifications: Introduction to Food Technology-I

Course Title	Introduction to Food Technology-I
Course Code	FTC101A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce the students to composition, nutrition and technological aspects of plant foods. Student will be familiarized about evolution of food processing technology, structure and composition of cereals and pulses. They will understand the processing technology adopted in various types of vegetable oil and fatty acids. They will also understand the post-harvest technology adopted for fruits, vegetables and spices.

2. Course Size and Credits:

Number of Credits	03+02
Total Hours of Classroom Interaction	45
Number of laboratory Hours	60
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	A minimum of overall 40% is required for a pass
Attendance Requirement	75% attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Explain evolution of food processing technology

CO-2. Describe the structure and composition of cereals and pulses and the technology employed in processing

CO-3. Distinguish and discuss the processing technology employed in vegetable oils and fatty acids

CO-4. Choose appropriate post-harvest technology for fruits, vegetables and spices processing

4. Course Contents

Unit-I:

Introduction: Historical evolution of food processing technology Compositional, Nutritional and Technological aspects of Plant Foods: Cereals - Structure and composition of cereals, Wheat- structure and

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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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composition, types (hard, soft/ strong, weak). Malting, gelatinization of starch, types of browning- Maillard & Caramelization. Rice- structure and composition, parboiling of rice- advantages and disadvantages.

**Unit-II:**

Pulses- Structure and composition of pulses, toxic constituents in pulses, processing of pulses-soaking, germination, decortications, cooking and fermentation.

**Unit-III:**

Fats and Oils- Classification of lipids, types of fatty acids, Refining of oils, types- steam refining, alkali refining, bleaching, steam deodorization, and hydrogenation. Rancidity –Types- hydrolytic and oxidative rancidity and its prevention.

**Unit-IV:**

Fruits and Vegetables- Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments, Dietary fiber. Post-harvest changes in fruits and vegetables – Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes during the storage of fruits and vegetables and the technology adopted post-harvest Handling.

**Unit-V:**

Spices - Pepper, onion, ginger, cardamom and garlic processing.

**Practicals**

1. To study morphological characteristics of cereals, Millets, Pulses and oil Seeds
2. To study gelatinization behavior of various starches/Swelling and solubility characteristics of starches
3. Estimation of amylose and amylopectin
4. To study the concept of gluten formation of various flours
5. To study malting and germination of cereals and pulses
6. To study dextrinization in foods
7. To study on oil extraction
8. Identification of pigments in fruits and vegetables and influence of pH on them
9. To study the effect of blanching on vegetables

**5. CO-PO PSO Mapping:**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	2							2			
CO-2		2	2					3			
CO-3			3					3			
CO-4				3					3		
CO-5											

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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026**

CO-6									
3: High Influence, 2: Moderate Influence, 1: Low Influence									

**5. Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		36
<b>Demonstrations</b>		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		56
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		02
1. Case Study Presentation		
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations	01	
Term Test and Written Examination		04+04
<b>Total Duration in Hours</b>		<b>105</b>

**7. Method of Assessment**

There are two components for assessment in this course:

	Focus of Course Learning Outcomes in each component assessed				
	CE (60% Weightage)			SEE (40% Weightage)	
	SC1 (Term Tests) 30%	SC2 (Innovative + Lab assignment) 10%	SC3 (Written+ Lab Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X		X	
CO-2	X	X	X	X	
CO-3	X		X		X
CO-4			X		X

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026**

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**9. Course Resources**

**1. Essential Reading**

- a. Course Notes
- b. Lab manual
- c. Bhatia, S.C., 2008, Hand book Of Food Processing Technology, Vol 1, Woodhead publication Ltd
- d. P.H. Pandey. 1997. Post-Harvest Technology of Fruits and Vegetables. Saroj Prakashan, Allahabad

**2. Recommended Reading**

- a. Avantina Sharma, 2010, Textbook of food science and technology, IBDC publisher, 2<sup>nd</sup> Ed
- b. Chakraverty. 2008. Post-Harvest Technology of Cereals, Pulses and Oilseeds, 3<sup>rd</sup> Ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

**3. Magazines and Journals**

- a. FOOD SCIENCE & TECHNOLOGY-Magazine

**4. Websites**

<https://www.foodprocessing.com/>

**5. Other Electronic Resources**

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*Meha G Rao*

Fac  
M.S. RA

Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026

Course Specifications: Food Nutrition and Dietetics

Course Title	Food Nutrition and Dietetics
Course Code	FTC102A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce the students to understand the role of nutrients, their bioavailability from various foods and factors affecting their absorption. Students will be enabled to understand the concepts of balanced diet, recommended dietary allowances, principles of nutritional status assessment and functional foods. They will also be familiarized with diet based disorders, clinical manifestations of deficiency and malnutrition. The practical aspect of this course intends to train the students to estimate BMI and assess nutritional status, perform meal planning, preparation of nutritious snacks and specialty foods and nutritional labeling for different age groups.

2. Course Size and Credits:

Number of Credits	3+2
Total Hours of Classroom Interaction	45
Number of Tutorial Hours	60
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per the Academic Document
Attendance Requirement	80% attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Define key concepts of nutrition and balanced diet.

CO-2. Understand the function, digestion, requirement, deficiency and toxicity of macronutrients and micronutrients in diet and effect on human body.

CO-3. Describe the role of various DRIs in the formulation of dietary guidelines.

CO-4. Understand malnutrition and assess nutritional status of individuals.

CO-5. Determine and translate nutrient needs for individuals and groups across the lifespan in day to day life.

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**4. Course Contents**

**Unit-I:**

Concepts of nutrition: Classification of nutrients. Functions of food-physiological, psychological and social. Tools of Balanced diet: Dietary reference intakes (DRIs). Concept of Balanced Diet. Concept of Functional foods and Nutraceuticals.

**Unit-II:**

Energy balance and basal metabolism.

**Unit-III:**

Macronutrients: Classification, digestion, functions, dietary sources, RDA, clinical manifestations of deficiency and excess and factors affecting absorption.

**Unit-IV:**

Micronutrients: Overview of Fat-soluble vitamins and Water-soluble vitamins – Functions, dietary sources, deficiency and toxicity. Overview of Minerals – Classification of minerals, function of minerals, deficiency and toxicity, factors affecting absorption of minerals.

**Unit-V:**

Malnutrition: Epidemiology of under nutrition and over nutrition, multi-factorial causes of under nutrition and over nutrition. Eating disorders.

**Unit-VI:**

Assessment of nutritional status: Concept and importance of nutritional status, Anthropometry, Biochemical assessment, Clinical examination, Diet surveys.

**Practical**

1. Identification of food sources for various nutrients using food composition table.
2. Nutritional status assessment using anthropometry.
3. Calculation of BMR and energy requirements.
4. Introduction to meal planning, concept of food exchange system for diet planning.
5. Record diet of self-using 24-hour dietary recall and nutritional status assessment.
6. Planning nutritious snacks for different age and income groups.
7. Identification of functional food ingredients using market survey.
8. Preparation of functional foods.
9. Nutritional labeling of food products.

**5. CO-PO PSO Mapping:**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1		2	1				3		2		1
CO-2	3	2	2				3	2	1		3

  
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CO-3	2	1	2				1		1		2
CO-4	3	3	2	3						1	3
CO-5	3	3			2	1	3		3	2	2
3: High Influence, 2: Moderate Influence, 1: Low Influence											

**6. Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		36
<b>Demonstrations</b>		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		56
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		02
1. Case Study Presentation		
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations	01	
Term Test and Written Examination		04+04
<b>Total Duration in Hours</b>		<b>105</b>

**7. Method of Assessment**

The components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

Focus of Course Learning Outcomes in each component assessed	
CE (60% Weightage)	SEE (40% Weightage)

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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026**

	SC1 (Term Tests) 30%	SC2 (Innovative + Labassignment) 10%	SC3 (Written+ Lab Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X		X	
CO-2	X	X		X	
CO-3	X		X	X	X
CO-4			X	X	X
CO-5		X			X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1	Knowledge	Class room lectures, Assignments
2	Understanding	Class room lectures, Assignments
3	Critical Skills	Class room lectures, Assignments
4	Analytical Skills	Class room lectures, Assignments
5	Problem Solving Skills	
6	Practical Skills	
7	Group Work	Assignment/ Class Presentations
8	Self-Learning	Assignment, Examination
9	Written Communication Skills	Assignment
10	Verbal Communication Skills	Class Presentations
11	Presentation Skills	Class Presentations
12	Behavioral Skills	
13	Information Management	Assignment
14	Personal Management	Assignment, Examination
15	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**9. Course Resources**

**1. Essential Reading**

- Course Notes
- Byrd-Bredbenner C, Beshgetoor D, Moe G and Berning J, 2009. *Wardlaw's Perspectives in Nutrition*. 8th Ed. McGraw Hill International Edition.
- Whitney E. and Rolfes SR. 2011. *Understanding Nutrition*. 12th ed. Wadsworth, Cengage Learning, USA.

**2. Recommended Reading**

- Gopalan, C, 1990. *Nutritive Value of Indian Foods*, Delhi, ICMR
- Seth V, Singh K, 2005, *Diet planning through the Life Cycle*, Delhi, Elite Publishing House Pvt Ltd

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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- c. Bamji MS, Krishnaswamy K, Brahmam GNV, 2009, Textbook of Human Nutrition, New Delhi Oxford and IBH Publishing Co. Pvt. Ltd
  - d. Carolyn D. Berdanier, Elaine B. Feldman and Johanna Dwyer. 2008. Handbook of Nutrition and Food, 2nd Ed. CRC Press, Boca Raton, FL, USA.
  - e. Srilakshmi, B. 2012. Nutrition science. 6th Ed. New Age International Ltd. Publishers, New Delhi.
  - f. M.S. Swaminathan, Food and Nutrition, Bangalore printing and publishing Co. Ltd
- 3. Magazines and Journals**
- a. NFI Bulletin. Bulletin of Nutrition Foundation of India.
  - b. The Indian Journal of Nutrition and Dietetics.
- 4. Websites**
- a. <https://www.nin.res.in/NICE.html>
- 5. Other Electronic Resources**

  
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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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Course Specifications: Principles of Food Science

Course Title	Principles of Food Science
Course Code	FTC103A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce students to principles of food science and its applications in food processing. Students will understand properties of water and its role in food processing and spoilage. They will be familiarized with food additives in food preparation / processing. Students will be taught concepts and practices of sensory evaluation. They are also introduced to factors affecting growth of microbes, ohmic heating, high pressure processing of food and food packaging.

2. Course Size and Credits:

Number of Credits	03
Total Hours of Classroom Interaction	45
Number of Tutorial Hours	00
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per academic document
Attendance Requirement	75% attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Explain the properties of water and its role in food processing and spoilage

CO-2. Summarize the properties of flexible packaging material and its significance

CO-3. Describe different types of food additives used in food processing

CO-4. Describe the sensory evaluation method/ process for evaluating food products

CO-5. Discuss the factors affecting growth of microbes in raw food (material) and processed food

CO-6. Discuss the effect of ohmic heating and pressure on food

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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**4. Course Contents**

**Unit-I:**

Water: Physical properties of water and Ice, chemical nature, structure of the water molecule. Absorption phenomena, types of water solutions and collidative properties, Free and bound water, Water activity and Food spoilage, Freezing and Ice structure.

**Unit-II:**

Food: Physical Properties of food- solutions, vapour pressure, boiling point, freezing point, osmotic pressure viscosity, surface tension and specific gravity, acid and bases in food.

**Unit-III:**

Food Additives: Aroma substances, Flavour enhancers, Sweetners, Food colours, Antioxidants, Chelating agents, Humectants, Anticaking agents, emulsions, properties of emulsions, formation of emulsion, emulsifying agent, food foams, formation stability and destruction of foam, application of colloidal chemistry to food Preparation

**Unit-IV:**

Food as a substrate for microorganism: Factors affecting growth of microbes – pH, water activity, organic acids, nutrient contents, RH, Temperature, inhibitory substance and biological structure.

**Unit-V:**

Ohmic heating and High Pressure processing: Principles, equipment and processing, effect on food.

**Unit-VI:**

Sensory evaluation of food: Objectives, type of food panels, characteristics of panel member, layout of sensory evaluation laboratory, sensitivity tests, threshold value, paired comparison test, duo-trio test, triangle test, hedonic scale, chemical dimension of basic tastes, Amoore's classification of odorous compounds. Sherman and Szczniak classification of food texture. Packaging: Objectives of packaging, flexible packaging material properties. Introduction to quality standards.

**5. CO-PO PSO Mapping:**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3							3			
CO-2		2		1				1	3		
CO-3	3							3	1		
CO-4				3				3	1		
CO-5	3							3			
CO-6				3				3			

3: High Influence, 2: Moderate Influence, 1: Low Influence

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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**6.Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		30
<b>Demonstrations</b>		06
1. Demonstration using Videos	06	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		04
1. Case Study Presentation	02	
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Tests, and Written Examination		05
<b>Total Duration in Hours</b>		<b>45</b>

**7. Method of Assessment**

The components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

	Focus of Course Learning Outcomes in each component assessed			
	CE (60% Weightage)			SEE (40% Weightage)
	SC1 Term Tests 30 %	SC2 Assignments 10%	SC3 Assignments 20%	
	25 + 25 Marks	10 Marks	40 Marks	50 Marks
CO-1	X	X		X
CO-2	X	X		X
CO-3	X		X	X

  
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CO-4	X		X	X
CO-5			X	X
CO-6			X	X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1	Knowledge	Class room lectures, Assignments
2	Understanding	Class room lectures, Assignments
3	Critical Skills	Class room lectures, Assignments
4	Analytical Skills	Class room lectures, Assignments
5	Problem Solving Skills	
6	Practical Skills	
7	Group Work	Assignment/ Class Presentations
8	Self-Learning	Assignment, Examination
9	Written Communication Skills	Assignment
10	Verbal Communication Skills	Class Presentations
11	Presentation Skills	Class Presentations
12	Behavioral Skills	
13	Information Management	Assignment
14	Personal Management	Assignment, Examination
15	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**9. Course Resources**

**1. Essential Reading**

- Course Notes
- Shakuntala Manay M. Shadasharaswamy, Food: Facts and Principles, New age international.
- Srilakshmi, Food science, 5<sup>th</sup> Ed New age international

**2. Recommended Reading**

- Norman N. Potter and Joseph H. Hotchkiss. 1995. Food Science, 5<sup>th</sup> Ed. Chapman & Hall, NY, USA.
- Geoffrey campbellplatt, 2009, Food science and technology, Wuley-Blackwell

**3. Magazines and Journals**


FOOD SCIENCE & TECHNOLOGY-Magazine

**4. Websites**

<https://www.foodprocessing.com/>

  
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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026**

**Course Specifications: Fundamentals of Food Processing**

<b>Course Title</b>	Fundamentals of Food Processing
<b>Course Code</b>	FTO101A
<b>Department</b>	Food Technology
<b>Faculty</b>	Faculty of Life and Allied Health Sciences

**1. Course Summary**

The aim of this course is to introduce students to principles of food preparation and its significance on nutritive value. Students will be taught basic methods of preparation and cooking of cereals, pulses, fruits, vegetables and meat products. They will be familiarized with effect of heat on nutritive values of food products. Students are also introduced to methods of preparation of sugars and candies.

**2. Course Size and Credits:**

<b>Number of Credits</b>	3
<b>Total Hours of Classroom Interaction</b>	45
<b>Number of laboratory Hours</b>	-
<b>Number of Semester Weeks</b>	16
<b>Department Responsible</b>	Food Technology
<b>Course Marks</b>	As described in the program specification
<b>Pass Requirement</b>	As per the Academic Document
<b>Attendance Requirement</b>	80% attendance is mandatory

**Teaching, Learning and Assessment**

**3. Course Outcomes (COs)**

After the successful completion of this course, the student will be able to:

- CO-1. Explain basic methods of pre-processing and cooking
- CO-2. Gain knowledge on the structure, composition and nutritional quality of various plant and animal foods
- CO-3. Provide an overview of processing of plant and animal foods.
- CO-4. Analyze the effect of processing on nutritive value of plant and animal based food products
- CO-5. Develop various plant and animal based food products

**4. Course Contents**


**Unit-I:**

Introduction to cooking - Conduction, convection, radiation, microwave cooking, cooking media: air, water, steam and fat.

**Unit-II:**

Cereals- Structure and composition of cereals; Wheat- structure and composition, types of wheat, processing of wheat, wheat-based food products; Rice- structure and composition, processing of rice and rice-based food products

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**Unit-III:**

Pulses- Structure and composition of pulses, toxic constituents in pulses, pulses processing and pulse-based food products

**Unit-IV:**

Fats and Oils- Classification of lipids, types of fatty; refining of oils, rancidity and its preservation

**Unit-V:**

Vegetables and fruits - Classification of fruits and vegetables, general composition, enzymatic browning, pigments and effect of processing on pigments

**Unit-VI:**

Milk- Chemical composition of milk, milk constituents, processing of milk, milk based products and milk cookery

**Unit-VII:**

Egg- Structure and composition, egg protein, methods of cooking, egg properties, egg foams, and egg based products.

**Unit-IX:**

Meat, fish and poultry- classification, composition, post-mortem changes and processing

**5. CO-PO PSO Mapping:**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3	2						3	2		
CO-2	3							3	1	1	
CO-3	3		2					3	2		
CO-4	3							3	2	1	
CO-5	3						2	3	1	2	

3: High Influence, 2: Moderate Influence, 1: Low Influence

**6. Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		45
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		

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<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		
1. Case Study Presentation	02	
2. Guest Lecture		
3. Industry / Field Visit		02
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		05
Total Duration in Hours		...

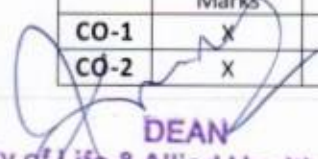
**7. Method of Assessment and Reassessment**

The components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

	Focus of Course Learning Outcomes in each component assessed			
	CE (60% Weightage)			SEE (40% Weightage)
	SC1 Term Tests 30 %	SC2 Assignments 10%	SC3 Assignments 20%	
	25 + 25 Marks	10 Marks	40 Marks	50 Marks
CO-1	X	X		X
CO-2	X	X		X

  
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CO-3	X		X	X
CO-4	X		X	X
CO-5			X	X
CO-6			X	X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1	Knowledge	Class room lectures, Assignments
2	Understanding	Class room lectures, Assignments
3	Critical Skills	Class room lectures, Assignments
4	Analytical Skills	Class room lectures, Assignments
5	Problem Solving Skills	
6	Practical Skills	
7	Group Work	Assignment/ Class Presentations
8	Self-Learning	Assignment, Examination
9	Written Communication Skills	Assignment
10	Verbal Communication Skills	Class Presentations
11	Presentation Skills	Class Presentations
12	Behavioral Skills	
13	Information Management	Assignment
14	Personal Management	Assignment, Examination
15	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**9. Course Resources**

**1. Essential Reading**

1. Course Notes
2. B Sriakshmi, 2014. Food Science. New Age International (P) Ltd., Publisher, New Delhi.

**b. Recommended Reading**

1. N. Sakuntala Manay and M. Shadaksharaswamy, 2008 Foods Facts and Principles, 3rd revised Edition. New Age international (P) Limited
2. Y.H. Hui, 2007, Handbook of Food Products Manufacturing: Principles, Bakery, Beverages, Cereals, Cheese, Confectionary, Fats, Fruits, and Functional Foods. John Wiley & Sons, Inc.,

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2022-2026**

Hoboken, New Jersey, USA.

3. Vikas Nanda. 2014. Meat, Egg and Poultry Science & Technology. I.K. International Publishing House Pvt. Ltd., New Delhi

**c. Magazines and Journals**

1. Food Science & Technology-Magazine

**d. Websites**

1. <https://www.foodprocessing.com/>
2. <https://www.preparedfoods.com>

**e. Other Electronic Resources**

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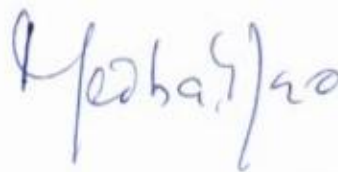
## SEMESTER 2



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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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Course Specifications: Introduction to Food Technology II

Course Title	Introduction to Food Technology II
Course Code	FTC304A
Department	Food Processing and Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to enable students with the fundamentals of food process engineering technology and plant design and technological aspects of animal based food products. Students are taught concepts of unit operations, dimensional analysis, mass and energy balance. Students will be familiarized with design of food plant, principle of grinding, mixing and fluid flow in food processing. Students will understand microbiological, physiological, biochemical preservation and processing of fish and other meat products. They will also be taught chemical composition of food and processing of milk and milk products.

2. Course Size and Credits:

Number of Credits	03+02
Total Hours of Classroom Interaction	45
Number of laboratory Hours	60
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	A minimum of overall 40% is required for a pass
Attendance Requirement	Attending SEE is Mandatory 75% attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After undergoing this course students will be able to:

CO 1. Explain concepts of unit operations, dimensional analysis and Energy Balance

CO 2. Describe important considerations for designing of food plant layouts

CO 3. Explain the structure and composition of flesh foods and the technology employed in processing

CO 4. Explain the significance of processing, pasteurization and homogenization of milk

4. Course Contents

Unit-I:

Introduction - Concept of Unit operation, Units and dimensions, Unit conversions, dimensional analysis, Mass and Energy Balance

Unit-II:

Important considerations for designing of food plants, Construction and design, Types of layout, Grinding and Mixing - Principle and equipment used in food industry.

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**Unit-III:**

Fluid Flow in food Processing-Liquid Transport systems, Properties of Liquids, Newton's Law of Viscosity, rotational viscometer, Properties of Non-Newtonian fluids, Flow characteristics, Reynold Measurement devices.

**Unit-IV:**

Psychrometrics - Properties of Dry Air, Properties of Water Vapour, and Properties of air Vapour mixture, Psychrometric Chart.

**Unit-V:**

(Compositional, Nutritional and Technological aspects of Animal Foods): Milk and Milk Products -Definition, chemical composition of milk, processing of milk

**Unit-VI:**

Egg, Structure, composition and nutritive value, Meat-classification, composition, preservation methods and processing of poultry and animal. Slaughtering, inspection and grading.

**Practical**

**Exercise 1:** Study of plant layout design

**Exercise 2:** Determination of drying characteristics

**Exercise 3:** Determination of viscosity of Newtonian and non-Newtonian fluids

**Exercise 4:** Study of effect of temperature on viscosity

**Exercise 5:** Determination of water holding capacity of meat

**Exercise 6:** Estimation of pH of meat

**Exercise 7:** Determination of Egg quality

**Exercise 8:** Application of Psychrometrics in food storage

**Exercise 9:** Studies on CAP and MAP

**5. CO-PO Mapping**

	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3							2	1		
CO-2		2				2		1		3	1
CO-3		3	2							3	
CO-4		3		1					2		
3: High Influence, 2: Moderate Influence, 1: Low Influence											

**6. Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		36
Demonstrations		
1. Demonstration using Videos	2	

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2. Demonstration using Physical Models / Systems		03
3. Demonstration on a Computer		
<b>Numeracy</b>		56
1. Solving Numerical Problems		
<b>Practical Work</b>		56
1. Course Laboratory	24	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		02
<b>Others</b>		

**7. Method of Assessment**

The components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

	Focus of Course Learning Outcomes in each component assessed				
	CE (60% Weightage)			SEE (40% Weightage)	
	SC1 (Term Tests) 30%	SC2 (Innovative + Labassignment) 10%	SC3 (Written+ Lab Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	20 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X		X	
CO-2	X	X		X	
CO-3	X		X	X	
CO-4			X	X	
CO-5				X	
CO-6		X	X		X
CO-7		X	X		X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

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S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**9. Course Resources  
References**

**1. Essential Reading**

- a. Course notes
- b. Lab manual
- c. Rao DG, 2010, Fundamentals of food engineering, New Delhi, PHI learning private ltd
- d. Akash Pare, B. L. Mandhyan, 2010, Food Process Engineering and Technology,
- e. James G. Brennan, 2006, Food Processing Handbook. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.
- f. Fidel Toldra, 2010, Handbook of Meat Processing, New Jersey, Blackwell Publishing

**2. Recommended Reading**

1. Singh RP and Heldman DR, 2009, Introduction to food engineering, USA, Academic press
2. Fellow P, 1988, Food processing technology, New York, VCH Ellis Horwood
3. K.M. Sahay and K.K. Singh. 2001. Unit Operations of Agricultural Processing. Vikas Publishing House Pvt. Ltd., Noida, UP.
4. George D Saravacos and Athanasios E. Kostaropoulos. 2002. Handbook of Food Processing Equipment. Springer Science+Business Media, New York, USA.
5. B.D. Sharma. 1999. Meat and Meat Products Technology Including Poultry Products Technology. Jaypee Brothers Medical Publishers Pvt. Ltd, New Delhi.

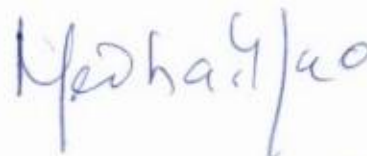
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6. William J. Stadelman and Owen J. Cotterill. 1995. Egg Science and Technology, 4th Ed. Food Products Press, NY, USA.

**2. Other Electronic Resources**

<https://www.foodprocessing.com/>

  
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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**Course Specifications: Bakery and Confectionary**

<b>Course Title</b>	Bakery and Confectionary
<b>Course Code</b>	FTC107A
<b>Department</b>	Food Technology
<b>Faculty</b>	Faculty of Life and Allied Health Sciences

**1. Course Summary**

The aim of this course is to introduce students to the fundamentals of bakery and confectionery product manufacturing technologies. The course emphasises both applied and fundamental aspects of bakery and confectionery technology. The students will get acquainted to the function, significance, and influence of the quality of the raw materials on the finished product. They will gain knowledge of the equipment, faults and remedies related to the development of bakery goods and will understand how to design and create bakery goods with improved nutrition.

**2. Course Size and Credits:**

<b>Number of Credits</b>	3+2
<b>Total Hours of Classroom Interaction</b>	45
<b>Number of laboratory Hours</b>	60
<b>Number of Semester Weeks</b>	16
<b>Department Responsible</b>	Food Technology
<b>Course Marks</b>	As described in the program specification
<b>Pass Requirement</b>	As per the Academic Document
<b>Attendance Requirement</b>	75% attendance is mandatory

**Teaching, Learning and Assessment**

**3. Course Outcomes (COs)**

After the successful completion of this course, the student will be able to:

- CO-1. Describe the types of wheat and the fundamental tools used in baking
- CO-2. Discuss the technology used to create baked goods made with hard wheat and soft wheat
- CO-3. Discuss innovative techniques to improve the quality of baked goods.
- CO-4. Explain the fundamental guidelines for creating confectionery products
- CO-5. Develop various baked and confectionary products

**4. Course Contents**

**Unit-I:**

Overview of wheat quality and Equipment used for baking: Wheat Quality-Hardness, Gluten strength, protein content, soundness. Large equipment and small utensils used Dough mixers, Dividers, rounder, proofing, molding, Ovens, Slicers, Packaging materials and equipment



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**Unit-II:**

Bakery products from hard wheat: Bread-Technology of bread manufacturing, role of each ingredient and quality control. Testing of raw material and final product. Bread faults, staleness, ropiness. Other bakery products from very hard wheat-pizza, pastry and its types.

**Unit-III:**

Baked products from soft wheat: Cookies, crackers, biscuits, cakes - types, ingredients, process, faults-causes and remedy

**Unit-IV:**

Nutritional improvement of bakery products- high fiber, low sugar, low calorie, low fat, low sodium baked goods

**Unit-V:**

Confectionery: Classification of confectionary, basic techniques in confection production. Definitions, recipe, composition and manufacturing process. Quality of confectionery, standards and regulations, packaging requirements, economics, and marketing of confectionary goods

**Practical**

1. Identification of bakery utensils and equipment
2. Determination of thousand kernel weight of wheat grain
3. Determination of gluten content of wheat
4. Determination of dough raising capacity of flours
5. Preparation and evaluation of physical properties of bread
6. Preparation and evaluation of physical properties of biscuit
7. Preparation and evaluation of physical properties of cookies
8. Preparation of sponge cake
9. Preparation of fruit jam

**5. CO-PO PSO Mapping:**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3		1				1	3			
CO-2	3	2					1	3			
CO-3	1	3					2	3			
CO-4	3		1					3			
CO-5	2	3					2	3	2		

3: High Influence, 2: Moderate Influence, 1: Low Influence

**5. Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		36
Demonstrations		
1. Demonstration using Videos	2	

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2. Demonstration using Physical Models / Systems		03
3. Demonstration on a Computer		
<b>Numeracy</b>		56
1. Solving Numerical Problems		
<b>Practical Work</b>		56
1. Course Laboratory	24	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		02
<b>Others</b>		

**7. Method of Assessment**

The components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

Focus of Course Learning Outcomes in each component assessed					
	CE (60% Weightage)			SEE (40% Weightage)	
	SC1 (Term Tests) 30%	SC2 (Innovative + Labassignment) 10%	SC3 (Written+ Lab Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	20 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X		X	
CO-2	X	X		X	
CO-3	X		X	X	
CO-4			X	X	
CO-5				X	
CO-6		X	X		X
CO-7		X	X		X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1	Knowledge	Class room lectures, Assignments
2	Understanding	Class room lectures, Assignments
3	Critical Skills	Class room lectures, Assignments
4	Analytical Skills	Class room lectures, Assignments
5	Problem Solving Skills	

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6	Practical Skills	
7	Group Work	Assignment/ Class Presentations
8	Self-Learning	Assignment, Examination
9	Written Communication Skills	Assignment
10	Verbal Communication Skills	Class Presentations
11	Presentation Skills	Class Presentations
12	Behavioral Skills	
13	Information Management	Assignment
14	Personal Management	Assignment, Examination
15	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**9. Course Resources**

**a. Essential Reading**

- a. Course Notes
- b. Lab Manual
- c. NIIR Board of Consultants & Engineers. 2014. The Complete Technology Book on Bakery Products (Baking Science with Formulation & Production), 3rd Ed. NIIR, New Delhi.
- d. Gisslen, Wayne (2018) Professional Baking, 9th Edition. John Wiley & Sons Inc.

**b. Recommended Reading**

- a. Duncan Manley (ed). 2011. Manley's technology of biscuits, crackers and cookies. Fourth edition. Woodhead Publishing Limited.
- b. Stanley Cauvain and Linda Young. 2000. Baking problems solved. CRC Press, Woodhead Publishing Limited.
- c. Hui, YH. 2006. Bakery Products science and technology. Blackwell publishing.

**c. Magazines and Journals**

FOOD SCIENCE & TECHNOLOGY-Magazine

**d. Websites**

<https://bakerpedia.com/>

**e. Other Electronic Resources**

[Essential Career Skills for Investment Banking and Finance | edX](#)

  
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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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Course Specifications: Fundamentals of Fruits Vegetables and Plantation Crops

Course Title	Fundamentals of Fruits Vegetables and Plantation Crops
Course Code	FTC106A
Department	Food Processing and Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to enable the students with various food preservation technology as applied to fruits vegetables and plantation crops. Students will be taught food preservation methods like freeze drying and canning, preparation of beverage, jam, jelly marmalade, pickles, chutneys and sauce. Students will understand dehydration and freeze-drying of fruits, vegetables, spices and plantation products. They will also understand various extraction methods used for extraction of essential oils and oleoresins.

2. Course Size and Credits:

Number of Credits	03
Total Hours of Classroom Interaction	45
Number of laboratory Hours	00
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per academic document
Attendance Requirement	75% attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After undergoing this course students will be able to:

- CO 1. Explain history and evolution of food preservation
- CO 2. Describe method /operations/ technology used for preserving various plant based products
- CO 3. Explain processing of beverages, jam, jelly and marmalade
- CO 4. Analyze types of processing and causes of spoilage of pickles, chutneys and sauce
- CO 5. Propose appropriate food processing methods for the plantation crop products
- CO 6. Choose methods for preservation of fruits, vegetables and plantation crops

4. Course Contents

Unit-I:

Introduction to processing technology of fruits, vegetables and plantation crops.

Unit-II:

Dehydration of fruits, vegetables and spices, methods, process, packing and Storage. Freeze drying method and its application in processing fruits vegetable and plantation products.

Unit-III:

Pickles, chutneys and sauces- processing, Types and causes of spoilage. Tomato products- Selection, pulping& processing of tomato juice, tomato puree, paste, ketchup, sauce and soup.

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**Unit-IV:**

Jam: Constituents, selection of fruits, processing & technology. Jelly: Essential constituents (Role of pectin, ratio), Marmalade: Types, processing & technology, defects.

**Unit-V:**

Beverages- Processing of fruit juices (selection, juice extraction, de-aeration, straining, filtration and clarification), preservation of fruit juices (pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing, carbonation), processing of squashes, cordials, nectors, concentrates and powder.

**Unit-VI:**

Plantation product processing technology of Coffee, tea, cocoa, coconut and arecanut. Essential oils and oleoresins extraction process and technology.

**5. CO-PO Mapping**

	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3							3			
CO-2	2	3						2	3		
CO-3	2	3							3		
CO-4	2	3							3		
CO-5		3	2				1			3	
CO-6		3	2				1			3	
3: High Influence, 2: Moderate Influence, 1: Low Influence											

**6. Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		25
Demonstrations		05
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course / Workshop /		



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Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		
1. Case Study Presentation		
2. Guest Lecture		
3. Industry / Field Visit	5	10
4. Brain Storming Sessions		
5. Group Discussions/ Activity	5	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		05
<b>Total Duration in Hours</b>		<b>45</b>

**7. Method of Assessment**

The components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

	Focus of Course Learning Outcomes in each component assessed			
	CE (60% Weightage)			SEE (40% Weightage)
	SC1 Term Tests 30 %	SC2 Assignments 10%	SC3 Assignments 20%	
	25 + 25 Marks	10 Marks	40 Marks	50 Marks
CO-1	X	X		X
CO-2	X	X		X
CO-3	X	X	X	X
CO-4	X		X	X
CO-5			X	X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Assignments

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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4.	Analytical Skills	Class room lectures, Assignments
5.	Problem Solving Skills	
6.	Practical Skills	
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. C

**Course Resources**

**References**

**1. Essential Reading**

- a. Course Notes
- b. Y.H. Hui. 2006. Handbook of Fruits and Fruit Processing. Blackwell Publishing Ltd., Oxford, UK.
- c. R.P. Srivastava and Sanjeev Kumar. 2002. Fruit & Vegetable Preservation: Principles and Practices, 3rd Ed. International Book Distribution Co., Delhi.

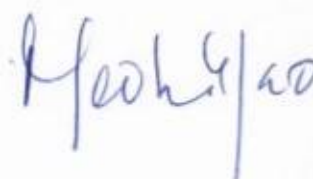
**2. Recommended Reading**

- a. P.H. Pandey. 1997. Post-Harvest Technology of Fruits and Vegetables. Saroj Prakashan, Allahabad
- b. Amalendu Chakraverty, Arun S. Mujumdar, G.S. Vijaya Raghavan and Hosahalli S. Ramaswamy. 2003. Handbook of Post-Harvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices. Marcel Dekker, Inc., NY, USA.

**3. Other Electronic Resources**

<https://www.foodprocessing.com/>

  
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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026

Course Specifications: Food Hygiene and Sanitation

Course Title	Food Hygiene and Sanitation
Course Code	FTO102A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce students to hygiene and sanitation in food processing and its significance in public health. Students will gain an understanding of various food hazards and their role in food contamination and spoilage and the function of food regulatory systems in maintaining sanitary conditions along the supply chain. They will also be familiarized with food plant design and maintenance, and in defining standards for grading water quality to make water acceptable for various applications.

2. Course Size and Credits:

Number of Credits	03
Total Hours of Classroom Interaction	45
Number of laboratory Hours	00
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per the Academic Document
Attendance Requirement	80% attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After undergoing this course students will be able to:

- CO-1. Understand the significance of food hygiene and sanitation in public health
- CO-2. Demonstrate the characteristics and role of microorganisms and other contaminants in food contamination and spoilage.
- CO-3. Outline safety regulatory requirements, food plant design, and management.
- CO-4. Demonstrate the importance of various parameters to determine water quality and analyze water quality assessment standards.

4. Course Contents

Unit-I:

Concept of food hygiene and sanitation in relation to public health. Ways to prevent food contamination during the food supply chain. Importance of personal hygiene.

Unit-II:

Microbial contaminants and toxins. Overview of factors affecting the growth of microorganisms, food spoilage. Food poisoning: metal, microbial and chemical. Other food contaminants: heavy metals and residues of pesticides, sanitizing agents (physical & chemical) and antibiotics.

Unit-III:

Food plant management: Food plant design, external and internal layout of food plant premises  
Maintenance and sanitation of food premises.

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**Unit-IV:**

Food sanitation regulations: National and international food regulatory regime: FSSAI and Codex Alimentarius Commission. Quality systems in food chain establishment: HACCP, ISO 22000, etc.

**Unit-V:**

Water quality: Overview, water quality parameters. Eutrophication and importance of BOD and COD determination. Water quality assessment standards.

**5. CO-PO Mapping**

	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3	1	2						2	2	
CO-2	3	2	1				2	3	2		
CO-3	3			2			2		2	3	
CO-4	3	2	1						2	1	2

3: High Influence, 2: Moderate Influence, 1: Low Influence

**6. Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		35
<b>Demonstrations</b>		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		0
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		05
1. Case Study Presentation	03	
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		03
<b>Total Duration in Hours</b>		<b>45</b>

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**7. Method of Assessment**

The components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

Focus of Course Learning Outcomes in each component assessed				
	CE (60% Weightage)			SEE (40% Weightage)
	SC1 Term Tests 30 %	SC2 Assignments 10%	SC3 Assignments 20%	
	25 + 25 Marks	10 Marks	40 Marks	50 Marks
CO-1	X	X		X
CO-2	X	X		X
CO-3	X	X	X	X
CO-4	X		X	X
CO-5			X	X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods.

S.No.	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Class room lectures, Assignments
4.	Analytical Skills	Class room lectures, Assignments
5.	Problem Solving Skills	
6.	Practical Skills	
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination

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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes
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9. Course Resources

1. Essential Reading

- a. Course notes
- b. Sunetra Roday. 2017. Food Hygiene and Sanitation. Tata McGraw Hill, New Delhi.
- c. Frazier WC and Westhoff DC. 2004. Food Microbiology. New Delhi, TMH Publication.

2. Recommended Reading

- a. Paul L Knechtges, 2012, Food Safety Theory and Practice , Canada, Jones Bartlet Learning.
- b. David Z. McSwane, H S D, 1997, Essentials of Food Safety and Sanitation, USA, Prentice Hall.

b. Other Electronic Resources

1. <https://www.iso.org/iso-22000-food-safety-management.html>
2. <https://www.fao.org/fao-who-codexalimentarius/en/>

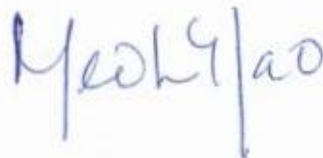


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## SEMESTER 3



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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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Course Specifications: Food Microbiology

Course Title	Food Microbiology
Course Code	FTC201A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to enable students to understand the significance of microbiology and its application in food processing and technology. Students will be taught nature and scope of food microbiology, types of microorganisms, their role in food preservation and spoilage. Students will be taught microbial contamination sources, spoilage & prevention. They will also be taught significance of microbes in fermentation and development of probiotics, prebiotics and synbiotics.

2. Course Size and Credits:

Number of Credits	3+2
Total Hours of Classroom Interaction	45
Number of Tutorial Hours	25
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per the Academic Document
Attendance Requirement	80% attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes

After undergoing this course students will be able to:

- CO 1. Explain evolution of food microbiology, its nature and scope
- CO 2. Classify microbes based on their role in food spoilage and prevention
- CO 3. Identify microbial contamination sources, spoilage various food products of animal and plant base
- CO 4. Distinguish microbes used in food fermentations, preservation and propagation of probiotics prebiotics and synbiotics



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CO 5. Discuss current trends in food microbiology

**4. Course Contents**

**Unit 1.**

**History and Development of Food Microbiology:** Definition and Scope of food microbiology, Microbial spoilage of foods and chemical changes that occur. Current Trends in Food microbiology.

**Unit 2.**

**Types of microorganisms:** Classification and Nomenclature, Morphology and Structure and their importance in food (bacteria, fungi, viruses and prions, protozoans and others).

**Unit 3.**

**Control of microorganisms:** Control of microorganisms by use of low and high temperature. Significance of spore Asepsis, water activity, drying, preservatives, radiation and pressure for control of microorganisms.

**Unit 4.**

**Microbial contamination sources:** spoilage and prevention-sugar and sugar products and spices and canned foods, milk & milk products, fruits & vegetables, cereals & cereal products, meat & meat products, fish & other sea foods and poultry & eggs.

**Unit 5.**

**Bio-preservation and Detection:** Rapid Methods of Detection, Single cell protein and Single Cell Oil, Recent Advances.

**Unit 6.**

**Fermentation:** Definition and types, Microorganisms used in food fermentations, Dairy Fermentations-starter cultures ,types and methods of preservation and propagation, Lactic acid and aroma compounds production, Health benefits of LAB, probiotics, prebiotics and synbiotics.

**Unit 7.**

**Microbial enzymes:** Types of microbial enzymes and their industrial applications (few selected) including foods. Optimization of process (lab-scale to pilot scale) for better yield and quality characteristics.

**Practical**

1. Study of Microscopy and Micrometry
2. Cleaning and sterilization of glassware

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Approved by the Academic Council on 28th March 2023 and on 3rd April 2023

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3. Preparation of culture media and techniques of inoculation
4. Staining methods (negative staining, capsule-staining, and endospore staining)
5. Isolation of bacteria, yeasts and molds from foods
6. Microbiological analysis of cereal and cereal products
7. Microbiological analysis of vegetable and fruits
8. Microbiological analysis of meat and meat products
9. Microbiological analysis of fish and other Marine foods
10. Microbiological analysis of Eggs and poultry
11. Microbiological analysis of milk and milk products
12. Determination of Thermal Death Time

**5. CO-PO PSO Mapping:**


Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3		1					3			
CO-2	1			2					2		
CO-3		3	1								3
CO-4		2		3						3	
CO-5		1					3			3	

3: High Influence, 2: Moderate Influence, 1: Low Influence

**6. Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		25
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		36
1. Solving Numerical Problems		
Practical Work		

  
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1. Course Laboratory	36	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		
1. Case Study Presentation		
2. Guest Lecture	02	
3. Industry / Field Visit		05
4. Brain Storming Sessions		
5. Group Discussions	03	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		05
Total Duration in Hours		72

**7. Method of Assessment**

The components and subcomponents of course assessment are presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well. The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

Focus of Course Learning Outcomes in each component assessed					
	CE (60% Weightage)			SEE (40% Weightage)	
	SC1 (Term Tests) 30%	SC2 (Innovative + Lab assignment) 10%	SC3 (Written+ Lab Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X		X	
CO-2	X	X		X	
CO-3	X		X	X	
CO-4			X	X	X
CO-5		X			X

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1	Knowledge	Class room lectures, Assignments
2	Understanding	Class room lectures, Assignments
3	Critical Skills	Class room lectures, Assignments
4	Analytical Skills	Class room lectures, Assignments
5	Problem Solving Skills	
6	Practical Skills	
7	Group Work	Assignment/ Class Presentations
8	Self-Learning	Assignment, Examination
9	Written Communication Skills	Assignment
10	Verbal Communication Skills	Class Presentations
11	Presentation Skills	Class Presentations
12	Behavioral Skills	
13	Information Management	Assignment
14	Personal Management	Assignment, Examination
15	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

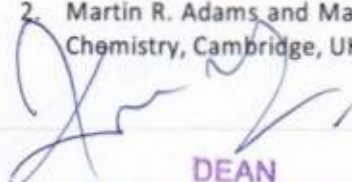
**9. Course Resources**

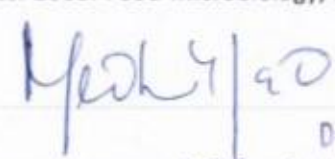
**a. Essential Reading**

1. Course Notes
2. Frazier William C and Westhoff, Dennis C, 2004, Food Microbiology, New Delhi, TMH
3. Garbutt, John, 1997, Essentials of Food Microbiology,, London, Arnold

**b. Recommended Reading**

1. Pelczar MJ, Chan E.C.S and Krieg, Noel R, 1993, Microbiology, New Delhi, TMH
2. Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Ed., The Royal Society of Chemistry, Cambridge, UK.

  
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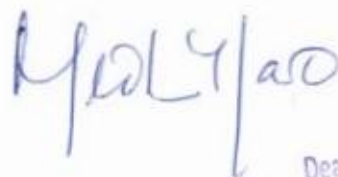
**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026**

3. James M. Jay. 2000. Modern Food Microbiology, 6th Ed. Aspen Publishers, Inc., Gaithersburg, Maryland, USA.
4. George J. Banwart. 1989. Basic Food Microbiology, 2nd Ed. Chapman & Hall, New York, USA.

**c. Other Electronic Resources**

<https://www.foodsafetymagazine.com/magazine>

  
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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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Course Specifications: Food Chemistry-I

Course Title	Food Chemistry-I
Course Code	FTC202A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce students to basic concepts of nature and scope of food chemistry, carbohydrates, proteins, lipids, nucleic acid and their application in food processing.

Students will also be taught the cell structure, function, definition, classification, general reactions, digestion, absorption and metabolism of carbohydrates, protein, lipids and nucleic acid. Students will also understand the various properties of carbohydrates, proteins, lipids their importance in food processing and new food product development.

2. Course Size and Credits:

Number of Credits	03+02
Total Hours of Classroom Interaction	42
Number of laboratory Hours	24
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per Academic Document
Attendance Requirement	80 % attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After undergoing this course students will be able to:

- CO 1. Explain nature and scope of food chemistry in food processing along with role of moisture content and water activity
- CO 2. Evaluate the physicochemical and functional characteristics of lipids, proteins, carbohydrates, and their application in food processing
- CO 3. Discuss about dispersed system of food, the unconventional sources of protein and technology of oil/fat processing
- CO 4. Select the appropriate analytical technique when presented with a practical problem.

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4. Course Contents

Unit 1 (Introduction to food chemistry):

Nature and Scope of food chemistry.

Role of food chemist.

Unit 2 (Water):

Structure of water and ice.

Physicochemical properties, type of water in foods and role of water in food spoilage.

Moisture content and its estimation.

Water activity and sorption isotherm.

Unit 3 (Dispersed systems of foods):

Physicochemical aspects of food dispersion system: a) Sol b) Gel c) Foam d) Emulsions.

Unit 4 (Carbohydrates):

Definition, classification and general reaction of carbohydrates.

Modification of carbohydrates- unmodified and modified starches, modified celluloses.

Functional properties of polysaccharides.

Maillard reaction, Caramelization and methods to control non enzymatic reactions.

Dietary fibers, NDF, ADF, hemicellulose, pectin and natural vegetable gums.

Unit 5 (Protein):

Classification and physicochemical properties (ionic properties, protein denaturation, gelation and hydrolysis).

Protein content and composition in various foods- cereal grains, legumes and oilseed proteins, proteins of meat, milk, egg and fish.

Functional properties of proteins in foods – water and oil binding, foaming, gelation, emulsification. Unconventional sources of proteins- SCP fish protein concentrates, leaf proteins.

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**6. Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		30
<b>Demonstrations</b>		03
1. Demonstration using Videos	03	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		24
1. Course Laboratory	24	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		07
1. Case Study Presentation	01	
2. Guest Lecture	01	
3. Industry / Field Visit	04	
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
<b>Total Duration in Hours</b>		<b>72</b>

**7. Method of Assessment**

The components and subcomponents of course assessment are presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well. The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

Focus of Course Learning Outcomes in each component assessed:					
CE (60% Weightage)				SEE (40% Weightage)	
SC1 (Term Tests) 30%	SC2 (Innovative + Lab assignment) 10%	SC3 (Written+ Lab Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%	
(25 + 25)	10 Marks	40 Marks	50 Marks	30 Marks	

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	Marks)				
CO-1	X	X		X	
CO-2	X	X		X	
CO-3	X		X	X	X
CO-4			X	X	X

**9. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**10. Course Resources**

**a. Essential Reading**

1. Course Notes
2. DeMan, J.M, 1980, Principles of Food Chemistry, NewYork, AVI
3. Fennema, Owen R, 1996, Food Chemistry, New York, Marcell Dekke
4. H.-D. Belitz, W. Grosch and P. Schieberle. 2009. Food Chemisry, 4<sup>th</sup> Ed. Springer-Verlag Berlin Heidelberg
5. David L. Nelson and Michael M. Cox. 2012. Lehninger Principles of Biochemistry, 6th Ed. Macmillan Learning, NY, USA.

Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026

b. Recommended Reading

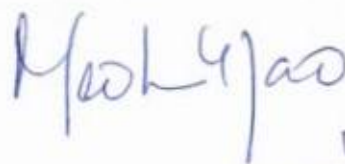
1. Lubert Strayer, 2000, Biochemistry, New York, WH. Freeman and co
2. Donald Voet and Judith G. Voet. 2011. Biochemistry, 4th Ed. John Wiley and Sons, Inc., NY, USA.
3. Reginald H. Garrett and Charles M. Girsham, 2010, 4th Ed, Brooks/Cole Cengage Learning

c. Other Electronic Resources

1. [http:// discovermagazine.com/tags/?tag=biochemistry](http://discovermagazine.com/tags/?tag=biochemistry)
2. <https://swayam.gov.in/NPTEL>
3. <https://www.foodprocessing.com/>



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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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Course Specifications: Technology of Cereals Pulses and Oil Seeds

Course Title	Technology of Cereals Pulses and Oil Seeds
Course Code	FTC203A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this Unit is to introduce students to technology employed in processing of cereals, pulses and oil seeds. Students will be taught technology employed in milling and separation of wheat, rice, barley and sorghum. Student will understand process technology of wheat, parboiling of rice and beer preparation using barley and oats. Students will also be familiarized with technologies used for milling of pulses and oil extraction from oil seeds.

2. Course Size and Credits:

Number of Credits	03
Total Hours of Classroom Interaction	45
Number of Tutorial Hours	00
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per academic document
Attendance Requirement	75% attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- CO 1. Explain methods and technology of milling wheat, rice, barley, oats and millets
- CO 2. Describe physicochemical properties of the flour produced from cereals and their byproducts
- CO 3. Select appropriate method of milling for the given pulses
- CO 4. Compare traditional and modern methods of oil extraction from oil seeds and refinement

4. Course Contents

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**Unit 1 (Technology of cereals):** Introduction to millets and nutri-cereals, Traditional & commercial milling (dry & wet). Wheat- milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, technology of dough development. Rye and triticale milling (flour) and uses.

**Unit 2 (Rice):** Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of byproducts

**Unit 3 (Corn):** Milling (wet & dry), cornflakes.

**Unit 4 (Barley):** Milling (pearl barley, barley flakes & flour), beer preparation.

**Unit 5 (Oats):** Milling (oat-meal, oat-flour & oat-flakes).

**Unit 6 (Technology of Pulses):** Milling of pulses i.e. Dry milling, Wet milling, improved milling method. Sources of protein (defatted flour, protein concentrates and isolates), properties and uses, protein texturization, fiber spinning

**Unit 7 (Technology of Oilseeds):** Introduction, Extraction of oil and refining, principles, traditional and modern methods.

**5. CO-PO PSO Mapping:**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1		3						3			
CO-2	1	2						1		3	
CO-3	3							1		2	
CO-4					2				3		
3: High Influence, 2: Moderate influence, 1: Low Influence											

**6. Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		06
1. Demonstration using Videos	06	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		
1. Case Study Presentation	02	04
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Tests, and Written Examination		05
Total Duration in Hours		45

**7. Method of Assessment**

The components and subcomponents of course assessment is presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

	Focus of Course Learning Outcomes in each component assessed			
	CE (60% Weightage)			SEE (40% Weightage)
	SC1 Term Tests 30 %	SC2 Assignments 10%	SC3 Assignments 20%	
	25 + 25 Marks	10 Marks	40 Marks	50 Marks
CO-1	X	X		X
CO-2	X	X		X
CO-3	X		X	X
CO-4	X		X	X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1	Knowledge	Class room lectures, Assignments
2	Understanding	Class room lectures, Assignments
3	Critical Skills	Class room lectures, Assignments
4	Analytical Skills	Class room lectures, Assignments

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5	Problem Solving Skills	
6	Practical Skills	
7	Group Work	Assignment/ Class Presentations
8	Self-Learning	Assignment, Examination
9	Written Communication Skills	Assignment
10	Verbal Communication Skills	Class Presentations
11	Presentation Skills	Class Presentations
12	Behavioral Skills	
13	Information Management	Assignment
14	Personal Management	Assignment, Examination
15	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**9. Course Resources**

**6. Essential Reading**

- d. Course Notes
- e. N.L. Kent and A.D. Evers. 1994. Kent's Technology of Cereals: An Introduction for Students of Food Science and Agriculture, 4<sup>th</sup> Ed. Elsevier Science Ltd., Oxford, UK.
- f. Chakraverty. 2008. Post-Harvest Technology of Cereals, Pulses and Oilseeds, 3<sup>rd</sup> Ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

**7. Recommended Reading**

- Amalendu Chakraverty and R. Paul Singh. 2014. Post-Harvest Technology and Food Process Engineering. CRC Press, Boca Raton, FL, USA.
- Marshall, 1994, Rice Science and Technology, New York, Marcel Dekker

**8. Magazines and Journals**

FOOD SCIENCE & TECHNOLOGY-Magazine

**9. Websites**

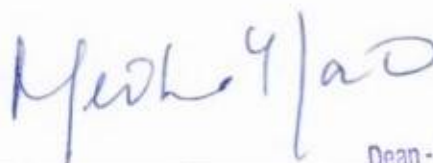
<https://www.foodprocessing.com/>

<http://nptel.ac.in/>

<https://www.foodprocessing.com/>

  
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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**Course Specifications: Nutrition in Health and Fitness**

<b>Course Title</b>	Nutrition in Health and Fitness
<b>Course Code</b>	FTC107A
<b>Department</b>	Food Technology
<b>Faculty</b>	Faculty of Life and Allied Health Sciences

**1. Course Summary**

The aim of this course is to introduce students to the fundamentals of nutritional aspects in relation to health and fitness. The course emphasises on the influence of nutrition for health and fitness. The students will get acquainted to the function, significance, and influence of quality of life with equilibrium on adequate nutrition and fitness. They will gain knowledge of food nutrition, nutrients, health and dimensions, fitness and well-being and management of lifestyle disorders.

**2. Course Size and Credits:**

<b>Number of Credits</b>	3+0
<b>Total Hours of Classroom Interaction</b>	42
<b>Number of laboratory Hours</b>	-
<b>Number of Semester Weeks</b>	16
<b>Department Responsible</b>	Food Technology
<b>Course Marks</b>	As described in the program specification
<b>Pass Requirement</b>	As per the Academic Document
<b>Attendance Requirement</b>	75% attendance is mandatory

**Teaching, Learning and Assessment**

**3. Course Outcomes (COs)**

After the successful completion of this course, the student will be able to:

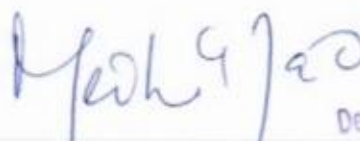
- CO-1. Describe the basic concepts of food and nutrition
- CO-2. Discuss the health, its dimension and implications on growth and development
- CO-3. Discuss management strategies to improve health and quality of life
- CO-4. Develop overall methods of achieving nutritional needs for different age groups
- CO-5. Explain the prevention and management of lifestyle diseases

**4. Course Contents**

**Unit-I:**

Food Nutrition: Basic concepts of food and nutrition, nutrients, functions of food, food groups, food pyramid, my plate, concept of balanced diet, meal planning, nutritional needs of the family for various age groups, food labelling.

**Unit-II:**



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Health and its dimensions: physical, mental, social, emotional, spiritual and environment dimensions, growth and development – factors affecting growth and development, assessment of one’s personal health, achieving and maintaining a healthy weight and stress management.

**Unit-III:**

Fitness: contribution of physical activity for promoting health and well- being, concept of fitness – definition and meaning, improving personal fitness.

**Unit-IV:**

Nutrition status – definition, types and causes of malnutrition, primary anthropometry for assessment of nutritional status, nutritional deficiency – PEM, Vitamin A deficiency, iron deficiency anaemia, iodine deficiency

**Unit-V:**

Lifestyle disease and its management: causes and prevention.

**5. CO-PO PSO Mapping:**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3		1				1	3			
CO-2	3	2					1	3			
CO-3	1	3					2	3			
CO-4	3		1					3			
CO-5	2	3					2	3	2		

3: High Influence, 2: Moderate Influence, 1: Low Influence

**6. Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		35
<b>Demonstrations</b>		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		04
1. Case Study Presentation	02	
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		

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5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		05
Total Duration in Hours		42

**7. Method of Assessment**

There are two components for assessment in this course:

Focus of Course Learning Outcomes in each component assessed				
	CE (60% Weightage)			SEE (40% Weightage)
	SC1 Term Tests 30 %	SC2 Assignments 10%	SC3 Assignments 20%	
	25 + 25 Marks	10 Marks	40 Marks	
CO-1	X	X		X
CO-2	X	X		X
CO-3	X	X	X	X
CO-4	X		X	X
CO-5			X	X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1	Knowledge	Class room lectures, Assignments
2	Understanding	Class room lectures, Assignments
3	Critical Skills	Class room lectures, Assignments
4	Analytical Skills	Class room lectures, Assignments
5	Problem Solving Skills	
6	Practical Skills	
7	Group Work	Assignment/ Class Presentations
8	Self-Learning	Assignment, Examination
9	Written Communication Skills	Assignment
10	Verbal Communication Skills	Class Presentations
11	Presentation Skills	Class Presentations
12	Behavioral Skills	
13	Information Management	Assignment
14	Personal Management	Assignment, Examination
15	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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9. Course Resources

a. Essential Reading

- a. Course Notes
- b. Uppal A.K., Ranganathan P.P., 2018. Fitness, Wellness and Nutrition, 1<sup>st</sup> Ed. Friends Publications, New Delhi
- c. Goyal S., Gupta P., 2012. Food, Nutrition and Health, 1<sup>st</sup> Ed. S. Chand & Company Ltd. New Delhi.

b. Recommended Reading

- d. Mudambi S.R., 2020. Fundamentals of Foods, Nutrition and Diet Therapy, 1<sup>st</sup> Ed. New Age International Publishers.
- e. Swaminathan M., 2012. Handbook of Food and Nutrition, Bangalore Printing and Publishing.

c. Magazines and Journals

Food and health-Magazine

d. Websites

<https://www.nin.res.in>

e. Other Electronic Resources

<https://www.eatright.org>

  
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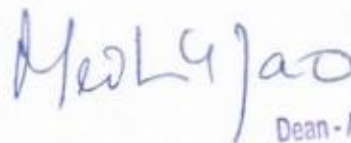
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## SEMESTER 4



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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026

Course Specifications: Food Chemistry-II

Course Title	Food Chemistry-II
Course Code	FTC204A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce students to chemistry of food flavors, additives, colorants, enzymes and anti-nutritional factors. They will also be familiarized with the technology of retention of food flavors, and colorants. Students will be taught about dispersed system of foods, major pigments in animal and plant kingdom. Students will be able to describe the importance of optimization of vitamins and minerals in processed foods.

2. Course Size and Credits:

Number of Credits	03+02
Total Hours of Classroom Interaction	42
Number of laboratory Hours	24
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per Academic Document
Attendance Requirement	80 % attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After undergoing this course students will be able to:

- CO 1. Describe the nature of flavoring compounds and their retention in food
- CO 2. Differentiate food additives and browning reactions in food industry
- CO 3. Summarize enzymes in food industry based on their application, the concept of anti-nutritional factors and food contaminants
- CO 4. Explain the methods for optimization and retention of vitamins, minerals and natural colors in processed foods
- CO 5. Select the appropriate analytical technique when presented with a practical problem.

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4. Course Contents

**Unit 1 (Chemistry of food flavor):**

Flavors: Definition and basic tastes.

Description of food flavors and flavor enhancers.

Sensory assessment of flavor.

Technology for flavor retention.

**Unit 2 (Enzymes):**

Chemical nature, classification, mechanism of action, specificity of enzymes, factor affecting for enzymatic activities.

Role of endogenous enzymes in maturation and ripening.

Enzymes in food industry- carbohydrases (amylases, cellulases, pectinases, invertases), proteases, lipases and oxidases in food processing.

**Unit 3 (Browning Reactions in Food):**

Enzymatic browning and non -enzymatic browning (Maillard reaction, Caramelization reaction and Ascorbic acid oxidation) - mechanism, methods of regulations or control.

**Unit 4 (Food additives):**

General attributes- Buffer systems/ salts / Acids, Chelating agents/ sequestrants, Antioxidants, Antimicrobial agents, Non- nutritive and low calorie sweeteners, Stabilizer and thickeners, Fat replacers, Texturizers and improvers.

Food colorant -Regulatory aspects of Natural and synthetic permitted food colours.

Properties of certified dyes, Use of regulatory dyes

**Unit 5 (Pigments in animal and plants):**

Heme pigments (Hemoglobin and myoglobin), Chlorophyll, Carotenoids, Anthocyanin and Betalains. Effect of processing on pigment behavior and technology for retention of natural colors in food.

**Unit 6 (Vitamins and minerals):**

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Allowances, Enrichment, Restorations, and Fortifications.

Dietary sources, requirements, functions, losses of vitamins and minerals.

Optimization and retention of vitamins and minerals.

**Unit 7 (Anti-nutritional factors):**

Occurrence, effects and methods of elimination or inactivation- protease inhibitors, lectins, lathrogens, phytates and flatulence factors.

Safety evaluation using traditional and modern approach.

Food Contaminants, Pesticidal residues – permitted limits.

**Practical**

1. Determination of ash
2. Estimation of calcium
3. Determination of iron
4. Estimation of starch by Anthrone method
5. Estimation of crude protein by micro Kjeldahl method
6. Estimation of crude fat by Soxhlet method
7. Estimation of tannins
8. Estimation of phenol
9. Determination of smoke point and percent fat absorption for different fat and oils
10. Determination of antioxidants by FRAP method
11. Determination of food colors

**5. CO-PO Mapping**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3	2			1			3	2		
CO-2	3	2	1					2	3		
CO-3	3	2						3			
CO-4	3	2								3	
CO-5	3	2					1			3	

3: High Influence, 2: Moderate Influence, 1: Low Influence

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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**6. Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		30
<b>Demonstrations</b>		03
1. Demonstration using Videos	03	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		24
1. Course Laboratory	24	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		07
1. Case Study Presentation	01	
2. Guest Lecture	01	
3. Industry / Field Visit	04	
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations		
<b>Term Tests, Laboratory Examination/Written Examination, Presentations</b>		08
<b>Total Duration in Hours</b>		<b>72</b>

**7. Method of Assessment**

The components and subcomponents of course assessment are presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well. The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

Focus of Course Learning Outcomes in each component assessed					
CE (60% Weightage)				SEE (40% Weightage)	
SC1 (Term Tests) 30%	SC2 (Innovative + Lab assignment) 10%	SC3 (Written+ Lab Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%	
(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks	

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CO-1	X	X		X	
CO-2	X	X		X	
CO-3	X		X	X	X
CO-4			X	X	X
CO-5		X			X

**9. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**10. Course Resources**

**a. Essential Reading**

1. Course Notes
2. H.D. Belitz, W. Grosch and P. Schieberle. 2009. Food Chemistry, 4<sup>th</sup> Ed. Springer-Verlag Berlin Heidelberg
3. Fennema, Owen R, 1996. Food Chemistry, 3rd Ed. Marcel Dekker, Inc., New York, USA.
4. Lillian Hoagland Meyer, 1974, Food Chemistry. The AVI Publishing Co Inc., Connecticut, MA, USA.

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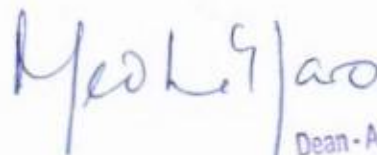
**b. Recommended Reading**

1. Whitehurst and Law, 2002, Enzymes in Food Technology, Canada, CRC Press.
2. Wong, Dominic WS, 1995, Food Enzymes, New York, Chapman and Hall.
3. De Man, J.M, 1980, Principles of Food Chemistry, New York, AVI

**c. Other Electronic Resources**

1. [http:// discovermagazine.com/tags/?tag=biochemistry](http://discovermagazine.com/tags/?tag=biochemistry)
2. <https://swayam.gov.in/NPTEL>
3. <https://www.foodprocessing.com/>

  
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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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**Course Specifications: Food Process Engineering-I**

Course Title	Food Process Engineering-I
Course Code	FTC205A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

**1. Course Summary**

The aim of this course is to introduce the students to various operations of food processing and technology employed in food industry.

Student will be taught significance of material handling, preprocessing of food material (raw material) and associated technology. Student will understand various size reduction technologies used and will be able to apply engineering properties to food material and processing. They will also understand principles of drying, drying rate kinetics, classification, mass and energy balance and their application in food technology.

**2. Course Size and Credits:**

Number of Credits	03+02
Total Hours of Classroom Interaction	42
Number of laboratory Hours	24
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per Academic Document
Attendance Requirement	80 % attendance is mandatory

**Teaching, Learning and Assessment**

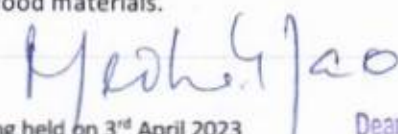
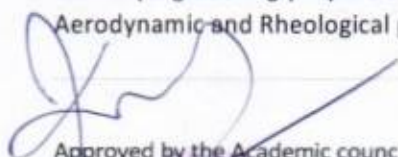
**3. Course Outcomes (COs)**

After undergoing this course students will be able to:

- CO 1. Explain significance of material handling and preprocessing operation
- CO 2. Describe size reduction, separation, agitation and mixing technology
- CO 3. Explain the principles of evaporation and drying in food processing
- CO 4. Analyze engineering properties of food material
- CO 5. Discuss principles of evaporation in food processing

**4. Course Contents**

**Unit 1 (Engineering properties of food materials):** Introduction to Physical, mechanical, thermal, frictional, Aerodynamic and Rheological properties of food materials.



  
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**Unit 2 (Introduction to unit operations):** cleaning, shelling and dehusking, sorting, grading, peeling and separation.

**Unit 3 (Size reduction):** Principles and equipment used for size reduction. Agitation and mixing: Principles and equipment used. Blending and pulverization equipment.

**Unit 4 (Drying):** Principles of drying, drying rate kinetics, classification, mass and energy balance. Different types of dryers and components – solar, roller, spray, tray, fluidized bed, freeze drying.


**Unit 5 (Evaporation):** Principles of evaporation, types and selection of evaporators, mass and energy balance. Functioning of single and multiple effect evaporators, recompression heat and mass recovery and vacuum creating devices.

**Unit 6 (Material handling):** Material handling machines- Elevators and conveyors.

**Practical**

1. Study of mass and energy balance equations
  2. Study on cleaning, dehulling and dehusking of food material
  3. Study on sorting and grading of food materials
  4. Study of rheology and texture of food materials
  5. Determination of flow parameters of Newtonian, non- Newtonian food products by Capillary tube viscometer, Haake's viscometer, Rotational viscometer and Falling Ball viscometer
  6. Demonstration on working of single effect evaporator
  7. Evaporators Design problems
  8. Study of different types of conveyors
  9. Automation in processing
5. CO-PO Mapping

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3							3			2
CO-2	3		2		1		2		3		2
CO-3	3		2				2				2
CO-4	3							3			
CO-5			3				1	2	3		

  
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3: High Influence, 2: Moderate Influence, 1: Low Influence

**6. Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		30
<b>Demonstrations</b>		03
1. Demonstration using Videos	03	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		24
1. Course Laboratory	24	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		07
1. Case Study Presentation	01	
2. Guest Lecture	01	
3. Industry / Field Visit	04	
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
<b>Total Duration in Hours</b>		<b>72</b>

**7. Method of Assessment**

The components and subcomponents of course assessment are presented in the Academic Regulations document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Academic Regulations document as well. The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following Table.

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SC1 (Term Tests) 30%	SC2 (Innovative + Lab assignment) 10%	SC3 (Written+ Lab Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%	
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CO-1	X	X		X	
CO-2	X	X		X	
CO-3	X		X	X	X
CO-4			X	X	X
CO-5		X			X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

**9. Course Resources**

**a. Essential Reading**

1. Course Notes
2. Ramaswamy H and Marcott M, 2006, Food Processing Principles and Applications, USA, CRC Press
3. Akash Pare, B. L. Mandhyan, 2010, Food Process Engineering and Technology

**b. Recommended Reading**

  
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1. K.M. Sahay and K.K. Singh. 2001. Unit Operations of Agricultural Processing. Vikas Publishing House Pvt. Ltd., Noida, UP.
2. R.L. Earle. 1983. Unit operations in Food Processing. Pergamon Press, New York, USA.
3. Amalendu Chakraverty and R. Paul Singh. 2014. Post-Harvest Technology and Food Process Engineering. CRC Press, Boca Raton, FL, USA

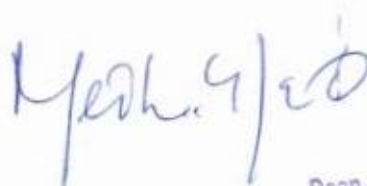
**c. Other Electronic Resources**

1. <https://www.foodprocessing.com/>



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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026

Course Specifications: Food Laws and Standards

Course Title	Food Laws and Standards
Course Code	FTC206A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The course aims to familiarize students with the food laws, regulations, and policies that govern food regulation in India. The course provides students with the knowledge they need to understand the laws of safety and the standards that apply to the food processing industry. The course is divided into four major sections: Indian Food Regulatory Regime; Global food regulation scenario; Export and Import Laws and Regulations and other relevant Laws and Standards Related to Foods.

2. Course Size and Credits:

Number of Credits	3+0
Total Hours of Classroom Interaction	42
Number of laboratory Hours	00
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per the Academic Document
Attendance Requirement	As per the Academic Document

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

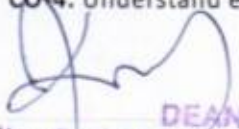
CO-1. Describe the history and development of Indian food regulatory regime

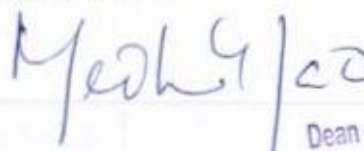
CO-2. Acquire knowledge on the salient feature of Food Safety and regulation Act

CO-3. Discuss global food regulation scenario

CO-4. Understand export and import laws and regulations

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**4. Course Contents**

**Unit-I:**

Introduction: Introduction to subject, need of enforcing the laws and various types of laws, history of Food Regulation in India and overview of repealed acts and orders.

**Unit-II:**

Indian Food Regulatory Regime: Food safety and standards act, 2006-Provisions, definition and different section of the Act and implementation. Food Safety and standards rules and regulations.

Food safety and standard authority of India-Genesis and evolution, structure and function of food authority, enforcement, laboratory ecosystem, registration and licensing, food recall procedures, tribunal, offences and penalties, initiatives of FSSAI.

**Unit-III:**

Global food regulation scenario: Scope of codex standards, overview of Codex Alimentarius Commission (History, Members, Standard setting and Advisory mechanism, implications, harmonization of National Standard with Codex), WTO Implications (SPS and TBT agreement) and other International Standard Setting Bodies.

**Unit-IV:**

Other Laws and Standards Related to Foods: The Bureau of Indian Standards Act, The Agricultural Produce (Grading and Marketing) Act, The Infant Milk Substitutes, Feeding Bottles, and Infant Foods (Regulation of Production, Supply and Distribution) Act, Legal Metrology Act, Consumer Protection Act.

**Unit-V**

Export and Import Laws and Regulations: Foreign Trade Policy, Export (Quality Control and Inspection) Act, 1963, Export Inspection Council export promotional bodies like APEDA, MPEDA and CEPC, Customs Act and Import Control Regulations

**5. CO-PO PSO Mapping:**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3		1					3			
CO-2	3	1	2					3	2	1	
CO-3	3	1						3	1		
CO-4	3		1					3	1		

3: High Influence, 2: Moderate Influence, 1: Low Influence



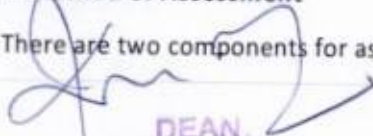
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**6. Course Teaching and Learning Methods:**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		30
<b>Demonstrations</b>		
1. Demonstration using Videos		
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		
1. Case Study Presentation	05	
2. Guest Lecture	02	
3. Industry / Field Visit		07
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		05
<b>Total Duration in Hours</b>		<b>42</b>

**7. Method of Assessment**

There are two components for assessment in this course:



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Focus of Course Learning Outcomes in each component assessed				
	CE (60% Weightage)			SEE (40% Weightage)
	SC1 Term Tests 30 %	SC2 Assignments 10%	SC3 Assignments 20%	
	25 + 25 Marks	10 Marks	40 Marks	
CO-1	X	X		X
CO-2	X	X		X
CO-3	X	X	X	X
CO-4	X		X	X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S.No	Curriculum and Capabilities Skills	How imparted during the course
1	Knowledge	Class room lectures, Assignments
2	Understanding	Class room lectures, Assignments
3	Critical Skills	Class room lectures, Assignments
4	Analytical Skills	Class room lectures, Assignments
5	Problem Solving Skills	
6	Practical Skills	
7	Group Work	Assignment/ Class Presentations
8	Self-Learning	Assignment, Examination
9	Written Communication Skills	Assignment
10	Verbal Communication Skills	Class Presentations
11	Presentation Skills	Class Presentations
12	Behavioral Skills	
13	Information Management	Assignment
14	Personal Management	Assignment, Examination
15	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

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**9. Course Resources**

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**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026**

**a. Essential Reading**

1. Course notes
2. The Food Safety and Standards act, 2006 along with Rules & Regulations 2011, Commercial Law Publishers (India) Pvt. Ltd.

**b. Recommended Reading**

1. Kiron Prabhakar, 2017, Practical Guide to Food Laws and Regulations, Bloomsbury India Publication
2. Gabriela Steier and Kiran K. Patel, 2016, International Food Law and Policy, Springer Cham, <https://doi.org/10.1007/978-3-319-07542-6>

**c. Magazines and Journals**

1. Food science & technology-Magazine

**d. Websites**

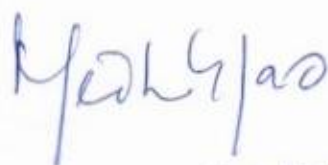
1. <https://www.fssai.gov.in>

**e. Other Electronic Resources**

1. <http://nptel.ac.in/>
2. <https://www.foodprocessing.com/>



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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
2022-2026

Course Specifications: Food Industry Waste Management

Course Title	Food Industry Waste Management (Open Elective-4)
Course Code	FTO202A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce students to basic concepts of nature and scope of food chemistry, carbohydrates, proteins, lipids, nucleic acid and their application in food processing.

Students will also be taught the cell structure, function, definition, classification, general reactions, digestion, absorption and metabolism of carbohydrates, protein, lipids and nucleic acid. Students will also understand the various properties of carbohydrates, proteins, lipids their importance in food processing and new food product development.

2. Course Size and Credits:

Number of Credits	3+0
Total Hours of Classroom Interaction	42
Number of laboratory Hours	00
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per Academic Document
Attendance Requirement	80 % attendance is mandatory

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After undergoing this course students will be able to:

CO 1. Identify sources of wastes and its nature in food industry

CO 2. Evaluate the Thermal and biotechnological uses of waste generated by food industry

CO 3. Discuss about waste generation and effluent management in fruit, vegetable and Meat based food industries

CO 4. Assess and select appropriate technique/ method for by product utilisation

4. Course Contents

Approved by the Academic Council at 28<sup>th</sup> meeting held on 3<sup>rd</sup> April, 2023

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**Unit 1 (Sources of wastes):**

Different sources of wastes from food industries and their availability in India-nature of different waste

**Unit-2 (Waste from rice mill)**

Waste utilisation from rice mill - Thermal and biotechnological uses of rice husk - pyrolysis and gasification of rice husk - cement preparation and different thermal applications - utilisation of rice bran - stabilization-defatted bran utilization

**Unit-3 (Waste from fruit and vegetable industries)**

Processes for Waste utilization from fruit and vegetable industries- Distillation for production of alcohol - oil extraction from waste - waste management in sugar mills - citric acid production from fruit waste. Waste from tuber crops - effluent safe disposal- effluent treatment plant- waste recycling plant - feasibility report for food industries using food waste and by products.

**Unit-4 (Waste from Fish, Meat and Poultry)**

Fish industry by products and waste utilisation - meat and poultry waste recycling Waste effluent safe disposal- effluent treatment plant- waste recycling plant -

**Unit-5 (By products Management)**

By products of wheat milling – germs and bran

By products of pulse milling – husk, germs and broken.

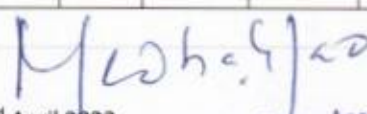
By products of plantation crops like Coconut, coffee arecanut.



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**5. CO-PO Mapping**

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3		1				2	3	1		2
CO-2	3		1				2	1	3		2
CO-3	3			2			2			3	2

**Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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									1		
CO-4		2		3			1		3	2	
3: High Influence, 2: Moderate Influence, 1: Low Influence											

**6. Course Teaching and Learning Methods**

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
<b>Face to Face Lectures</b>		28
<b>Demonstrations</b>		05
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
<b>Numeracy</b>		
1. Solving Numerical Problems		
<b>Practical Work</b>		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
<b>Others</b>		04
1. Case Study Presentation	02	
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		05
<b>Total Duration in Hours</b>		<b>42</b>

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*Meha G Rao*

**7. Method of Assessment**

There are two components for assessment in this course:

*[Handwritten Signature]*

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Focus of Course Learning Outcomes in each component assessed				
	CE (60% Weightage)			SEE (40% Weightage)
	SC1 Term Tests 30 %	SC2 Assignments 10%	SC3 Assignments 20%	
	25 + 25 Marks	10 Marks	40 Marks	
CO-1	X	X		X
CO-2	X	X		X
CO-3	X	X	X	X
CO-4	X		X	X

**8. Achieving Course Learning Outcomes**

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

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Programme Structure and Course Details of B.Sc. (Hons) in Food Processing and Technology  
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9. Course Resources

a. Essential Reading

6. Course Notes
7. A. Chakravarthy & De, "Agricultural Waste and By Product Utilisation".
8. Bor S. Luli (ed), "Rice Production and Utilisation"
9. E. Beagle, "Rice Husk Conversion to Energy"

b. Recommended Reading

1. P. N. Chereminnoff & A.C Morresi, 1976, "Energy from Solid Wastes"

c. Other Electronic Resources

1. <https://www.foodprocessing.com/>

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