



**RAMAIAH
UNIVERSITY**
OF APPLIED SCIENCES

M. S. Ramaiah University of Applied Sciences

Programme Structure of

B.Sc. Food Processing and Technology

B.Sc. (Honours) Food Processing and Technology

B.Sc. (Honours with Research) Food Processing and Technology

Programme Code: 019

Batch 2022 onwards

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

Approved by the Academic Council Meeting at its 26th meeting held on 14th July 2022
Revised and Approved by the 28th, 31st, 36th and 38th ACM held on the 3rd April 2023
22nd March 2024, 27th September 2025 and 10th June 2026, respectively.

HOD FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560054

DEAN
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560054

Ramya K.V.
Dean, Academics
M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

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 instil 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. (Honours) in Food Processing and Technology

Faculty	Life and Allied Health Sciences
Department	Food Technology
Programme Code	019
Programme Name	B.Sc. Food Processing and Technology B.Sc. (Honours) Food Processing and Technology B.Sc. (Honours with Research) Food Processing and Technology
Dean of the Faculty	Dr. Soma Chaki
Head of the Department	Dr. Chennappa Gurikar

- Title of the Award:** B.Sc. in Food Processing and Technology
B.Sc. (Honours) in Food Processing and Technology
B.Sc. (Honours with Research) in Food Processing and Technology
- Mode of Study:** Full Time
- Awarding Institution /Body:** M. S. Ramaiah University of Applied Sciences
- Joint Award:** Not Applicable
- Teaching Institution:** Department of Food Technology, Faculty of Life and Allied Health Sciences,
M. S. Ramaiah University of Applied Sciences, Bengaluru
- Date of Programme Specifications:** 14th June 2021
- Date of Programme Approval by the Academic Council of MSRUAS:** 14th July 2022
- Next Review Date:** June 2028
- Programme Approving Regulating Body and Date of Approval:** Academic Council of MSRUAS on 14th July 2022
- Programme Accredited Body and Date of Accreditation:** Not Applicable
- Grade Awarded by the Accreditation Body:** Not Applicable
- Programme Accreditation Validity:** Not Applicable
- Programme Benchmark:** Not Applicable

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.

With the current trends of National Education Policy (NEP) – 2020 and Self-Employment, there is a tremendous need for a young workforce with skillset that will make the students readily employable, for various roles in academia and industry. The objective is to bridge the gap between the current system of education and what is required in the 21st century. It is to have Holistic and Multidisciplinary

UG Education to produce employable graduates with well-rounded personality. The Government of Karnataka had constituted a Task to suggest an Implementation Framework for NEP-2020. It had also constituted two sub- committees, one on Curriculum Reforms in Higher Education and the other on Governance and Regulations

B.Sc. (Honours) Food Processing and Technology is an undergraduate programme that provides students with a strong foundation in food science, food processing, preservation, quality assurance, food safety, and value addition. The programme equips students with the knowledge and practical skills to develop safe, nutritious, and high-quality food products using modern processing technologies. It also fosters research aptitude, problem-solving abilities, and entrepreneurial skills, preparing graduates for careers in the food processing industry, quality assurance, research, and food entrepreneurship.

The Task Force has suggested NEP-2020 Implementation Framework for Karnataka. The State Government has accepted the action plan and initiated steps to implement NEP-2020, as per the Roadmap suggested by the Task Force. The curriculum is outcome based and it imbibes required theoretical concepts and practical skills in the domain. By undergoing this Programme, students develop critical, analytical thinking and problem-solving abilities for a smooth transition from academic to real-life work environment. Special emphasis shall also be provided to Ability and Skill Enhancement/Vocational Courses as well as Value Added Courses. Opportunities are provided for the students to do internship in Life science and Biotechnology institutes and industry, research & development and also execute a well-defined project independently as well as in a team to enhance practical skills and problem-solving abilities. The students are required to submit a well written project report as partial fulfilment for the award of the degree, which will help develop skills of documenting scientific research methods and outcome. This Undergraduate Programme is meant to highlight systemic change in the higher education system in MSRUAS and align itself with the National Education Policy - 2020.

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.

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.

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 value


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21. Programme Structure

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		4	5	100
2	FTC102A	Food Nutrition and Dietetics	3		4	5	100
3	FTC103A	Principles of Food Science	3			3	100
4	FTO101A	Fundamentals of Food Processing	3			3	100
5	TSM101A	English for Communication 1	3			3	100
6	CSM101A	Digital Fluency	1		2	2	50
Total			16		10	21	550
Total Number of Contact Hours per week			26				

*(h/W/S):

Hours/week/semester

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		4	5	100
2	FTC105A	Bakery and Confectionery	3		4	5	100
3	FTC106A	Fundamentals of Fruits, Vegetables and Plantation Crops	3			3	100
4	FTO102A	Food Hygiene and Sanitation	3			3	100
5	BTN101A	Environmental Studies	2			2	50
6	AHU101A	Health and Wellness	1		2	2	50
Total			15		10	20	500
Total Number of Contact Hours per week			25				

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		4	5	100
2	FTC202A	Food Chemistry-I	3		4	5	100
3	FTC203A	Technology of Cereals Pulses and Oil Seeds	3			3	100
4	FTO201A	Nutrition in Health and Fitness	3			3	100
5	TSM102A	English for Communication-2	3			3	100
6	CSM201A	Artificial Intelligence	1		2	2	50
7	BAU201A	Entrepreneurship Mindset & Action	1	1	2	3	100
Total			17	1	12	24	650
Total Number of Contact Hours per week			30				

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		4	5	100
2	FTC205A	Food Process Engineering-I	3		4	5	100
3	FTC206A	Food Laws and Standards	3			3	100
4	FTO202A	Food Industry Waste Management	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
Total			17		10	22	550
Total Number of Contact Hours per week			27				

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*/ FTE302A*	Introduction to Food Biotechnology/ Beverage Technology	3			3	100
5	TSN301A	Project Management	3			3	50
6	CSM301A	Cyber security	1		2	2	50
7	PTU101A/ BNE101A	Sports/ Yoga	1		2	2	50
		Total	17		12	23	550
Total Number of Contact Hours per week			29				

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*/ FTE304A*	Dairy Technology/ Technology of Meat and Poultry	3			3	100
5	FTC307A	Research Methodology	3			3	100
6	TSN302A	Personality Development andSoft Skills	2			2	50
7	FTI302A	Internship/Group project			4	2	50
Total			17		12	23	600
Total Number of Contact Hours per week			29				
Exit Option after Three Years with a B.Sc. Food Processing and Technology							

For students opting for the fourth year B.Sc. Honours programme, eligibility for the respective degree track shall be determined in accordance with the NEP 2020 guidelines.

1. Students who have completed 132 credits at the end of the first three academic years and secured a minimum CGPA of 7.5/10 shall be eligible for the B.Sc. (Honours with Research) in Food Processing and Technology and shall undertake an individual 21-credit research project in the eighth semester.
2. Students who have completed the required credits but do not meet the CGPA criterion shall be awarded the B.Sc. (Honours) in Food Processing and Technology and shall undertake the prescribed coursework of 13 credits along with a group project of 8 credits in the eighth semester.

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*/ FTE402A*	Emerging Technologies in Food Processing/ Food Analysis and Instrumentation	3			3	100
5	FTI403A	Internship			4	2	100
Total			12		12	18	500
Total Number of Contact Hours per week			24				

Semester -8

B.Sc. (Honours with Research) in Food Processing and Technology

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			42	21	400
Total						21	400
Total Number of Contact Hours per week			42				

*(h/W/S):

Hours/week/semester

B.Sc. (Honours) Food Processing and Technology

Sl. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FTC404A	Novel Food Product Development and IPR	3		4	5	100
2	FTC405A	Spices and flavor technology	3		4	5	100
3	FTC407A	GMP and GLP in food industries	3			3	100
4	FTP402A	Group project			16	8	100
Total			9		24	21	400
Total Number of Contact Hours per week			33				

* **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
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 choose 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

- 3rd year: B.Sc. in Food Processing and Technology
- 4th year: B.Sc. (Honours) in Food Processing and Technology
- 4th year: B.Sc. (Honours with Research) in Food Processing and Technology

26. Assessment and Grading: (Subject to endorsement of revised unified academic regulations for 2022-23- report submitted)

26.1 Components of Grading

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				
Subcomponent Type	Component 1: CE (60% Weightage)			Component 2: SEE (40% Weightage)
	SC1 (Term Tests) 30 %	SC2 (Assignments) 10%	SC3 (Assignments) 20%	SEE Written Exam 40%
	25 + 25 Marks	10 Marks	40 Marks	50 Marks
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			
Subcomponent Type	Component 1: CE (60% Weightage)		Component 2: SEE (40% Weightage)
	Conduct of Experiments	Laboratory Report	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.

26.1.3 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					
Subcomponent Type	CE (Weightage: 60 %) Four components including one Lab component			SEE (40% Weightage)	
	SC1 (Term Tests) 30%	SC2 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
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.

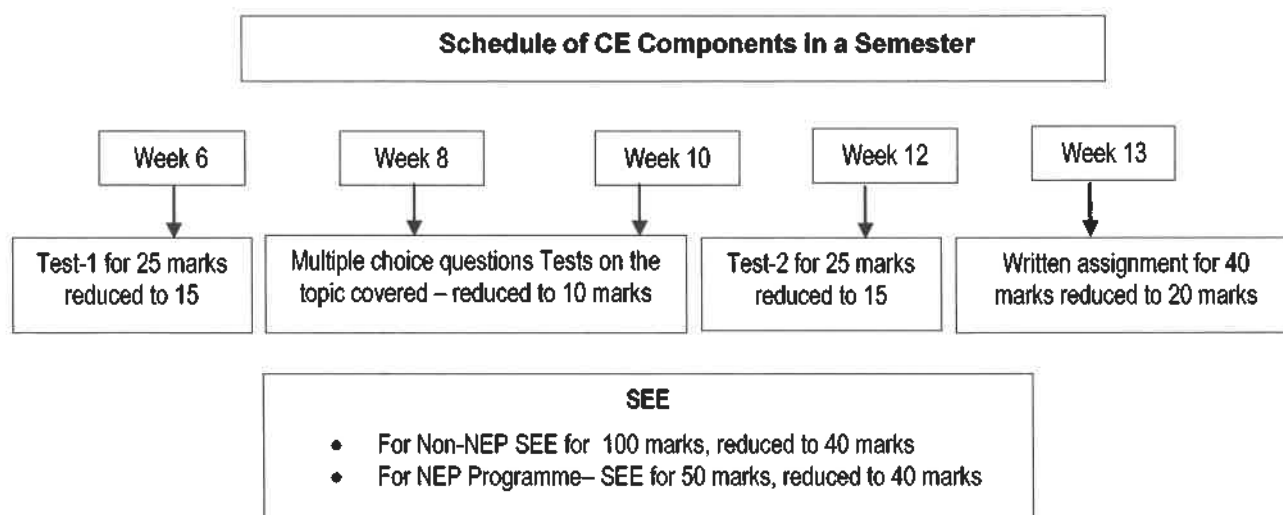
- CE components should have a mix of term tests, quiz and assignments
- Two Tests (15 each), Two Assignments (20 marks). (One written and another to be MCQs)
- In case of courses where laboratory is combined with theory, laboratory components to be assessed in both CE and SEE
- Course leaders to declare the assessment components before the commencement of the session and get approval from HoD and Dean

26.1.4 Ability Enhancement courses

For AECC 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 or Assignments	
HOD-FOOD TECHNOLOGY 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.

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)

29. 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			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	2						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
	Artificial Intelligence	2					3				1	2		
4	Entrepreneurship Mindset & Action								3	1		3		
	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		
	Food industry waste management OE4							3		2			2	2
	Constitution of India and Human Rights	3					3							3
5	Professional communication Ethics and Self Awareness					3								3
	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	
	Beverage Technology	3		2		3		1		1	3		2	3
5	Project Management	2	2			2			2			2	3	
	Cyber Security	2		2		1						2		

HOD, FOOD TECHNOLOGY

DEAN

Dean - Academics

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

M. S. RUAS UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023); 31st ACM (22nd Mar 2024); 36th ACM (27th Sept 2025)

Bangalore-560054

	Sports/ Yoga			3										
Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
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 *	3		2				2		1	3		1	
	Technology of Meat and Poultry*		2		2					3				
	Research Methodology					3								3
	Personality Development and Soft Skills					3							3	1
	Internship/Project Group project		3	3			2					1	3	
Exit Option after Three Years with a B.Sc. Food Processing and Technology														
B.Sc. (Hons. with Res) Food Processing and Technology and B.Sc. (Honours) Food Processing and Technology														
Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
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 FoodProcessing *	3		2		3		1		1	3		2	
	Food analysis and instrumentation *		2		2					3				
	Internship		3	3			2					1	3	
B.Sc. (Hons. by Res) Food Processing and Technology														
Sem	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
8	Research Project/Internship	3	2			2		2	2		1	3	2	
B.Sc. (Hons.) Food Processing and Technology														
8	Novel Food Product Development and IPR	3		2				2		1	2	1	1	
	GMP and GLP in food industries	3		2		2					3	1		
	Spices and flavor technology	3		2				2		1	3		1	3
	Group project		3	3			2					1	3	

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.



M. S. Ramaiah University of Applied Sciences

Course Specifications of

B.Sc. in Food Processing and Technology

B.Sc. (Honours) in Food Processing and Technology

B.Sc. (Honours with Research) in Food Processing and Technology

Programme Code: 019

SEMESTER 1

Department of Food Technology

Faculty of Life and Allied Health Sciences

M.S. Ramaiah University of Applied Sciences

HOD, FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560054

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

DEAN

Dean - Academics

M.S. Ramaiah University of Applied Sciences
Bangalore-560054

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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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 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		2	
CO-3			3					3			
CO-4				3					3		1
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		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	X	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

9. Course Resources

1. Essential Reading

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

2. Recommended Reading

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

3. Magazines and Journals

- FOOD SCIENCE & TECHNOLOGY-Magazine

4. Websites

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

5. Other Electronic Resources

- a. <https://archive.nptel.ac.in/content/storage2/courses/103107088/module1/lecture1/lecture1.pdf>

10. Course Organization:

Course Code	FTC101A	
Course Title	Introduction to Food Technology-I	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2022	
Next Course Specifications Review Date:	June 2028	

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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 labelling for different age groups.

2. Course Size and Credits:

Number of Credits	3+2
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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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.

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 labelling of food products.

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO-1		2	1				3		2		1
CO-2	3	2	2				3	2	1		3
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
Face to Face Lectures		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		02
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		01
Others		
1. Case Study Presentation		
2. Guest Lecture		
3. Industry / Field Visit		04+04
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations	01	
Term Test and Written Examination		105
Total Duration in Hours		

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	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
- Bamji MS, Krishnaswamy K, Brahman 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

- a. <https://ncert.nic.in/textbook/pdf/kehe103.pdf>

10. Course Organization:

Course Code	FTC102A	
Course Title	Food Nutrition and Dietetics	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2022	
Next Course Specifications Review Date:	June 2028	

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 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 Regulations
Attendance Requirement	As per Academic Regulations

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

HOD-FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

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FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560054

Dean - Academics
M.S. Ramaiah University of Applied Sciences
Bangalore-560054

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 colligative 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, Sweeteners, 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	2	3
CO-3	3							3	1	1	2
CO-4				3				3	1		
CO-5	3							3			
CO-6				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		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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
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%	SEE Written Exam 40%
	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
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	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	-----
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, 5th Ed New age international

2. Recommended Reading

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

3. Magazines and Journals

- FOOD SCIENCE & TECHNOLOGY-Magazine

4. Websites

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

5. Other Electronic Resources

- a. <https://www.g-w.com/principles-of-food-science-2022>

10. Course Organization:

Course Code	FTC103A	
Course Title	Principles of Food Science	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2022	
Next Course Specifications Review Date:	June 2028	

Course Specifications: Fundamentals of Food Processing

Course Title	Fundamentals of Food Processing
Course Code	FTO101A
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 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:

Number of Credits	3
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 Regulations
Attendance Requirement	As per Academic Regulations

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

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-VIII:

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		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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		45

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%	SEE Written Exam 40%
	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
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
- B Srilakshmi, 2014. Food Science. New Age International (P) Ltd., Publisher, New Delhi.

2. Recommended Reading

- N. Sakuntala Manay and M. Shadaksharaswamy, 2008 Foods Facts and Principles, 3rd revised Edition. New Age international (P) Limited
- Y.H. Hui. 2007. Handbook of Food Products Manufacturing: Principles, Bakery, Beverages, Cereals, Cheese, Confectionary, Fats, Fruits, and Functional Foods. John Wiley & Sons, Inc., Hoboken, New Jersey, USA.
- Vikas Nanda. 2014. Meat, Egg and Poultry Science & Technology. I.K. International Publishing House Pvt. Ltd., New Delhi

3. Magazines and Journals

- a. Food Science & Technology-Magazine

4. Websites

- a. <https://www.foodprocessing.com/>
- b. <https://www.preparedfoods.com>

5. Other Electronic Resources

- a. https://onlinecourses.nptel.ac.in/noc20_ag01/preview

10. Course Organization:

Course Code	FTO101A	
Course Title	Fundamentals of Food Processing	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2022	
Next Course Specifications Review Date:	June 2028	

Course Specifications: English for Communication 1

Course Title	English for Communication 1
Course Code	TSM101A
Course Type	Ability Enhancement Compulsory Course
Department	Directorate of Transferable Skills and Leadership Development
Faculty	FLAHS/FMC/FMPS/FAD/SSS

1. Course Summary

The course aims at equipping the students with skills essential for effective communication in terms of speaking, writing and comprehension.

The course gives practical exposure to the students by equipping them to use appropriate body language and tone for conversation. It focusses on comprehension of words and building of the word repertoire for meaningful communication. Students are instructed on the ways to construct grammatically correct sentences and compose paragraphs and essays.

2. Course Size and Credits:

Number of Credits	03
Credit Structure (Lecture: Tutorial: Practical)	3:0:0
Total Hours of Interaction	45
Number of Weeks in a Semester	16
Department Responsible	Directorate of Transferable Skills and Leadership Development
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

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

- CO-1. Identify the nuances of communication skills
- CO-2. Apply the concepts of grammar in written communication
- CO-3. Apply professional etiquette as appropriate
- CO-4. Practice extempore and basic conversation skills
- CO-5. Practice comprehension skills
- CO-6. Compose precise paragraphs as per the given topic

4. Course Contents

Unit-I:

Communication Skills: Process of communication, terminologies used in communication process, active listening, communication barriers, types of communication – verbal and non-verbal

Unit-II:

Grammar: Sentence formation, sentence types, different parts of speech, adjectives and articles, verbs and preposition, present and past tense, future tense, use of participles in different tenses, usage of tenses, rules of subject verb agreement

Unit-III:

Essentials of Speaking Skills: Importance of spoken skills, appropriate use of language, appropriate use of tone, pitch and volume

Unit-IV:

Extempore: Preparation for extempore, mind mapping for speaking readiness, Content of extempore – beginning, body and conclusion, Delivery of extempore – body language and paralanguage

Unit-V:

Conversation Skills: Body language in conversation, tones in conversation, conversation manners, stages of conversation. Introduction, feed forward, close, order of introduction, conversation barriers

Unit-VI:

Reading and the Techniques): Skimming, scanning and reading in details

Unit-VII:

Paragraph Writing: Structure of paragraph – topic sentence, supporting sentence, conclusion sentence, functions of paragraph, paragraph patterns, paragraph writing principles – coherence, unity, order, length

Unit-VIII:

Comprehension: Purpose of comprehension, low-level comprehension, high-level comprehension

Unit-IX:

Precis Writing: Paraphrasing techniques, Usage of appropriate words

Unit-X:

Professional Etiquette and Goal Setting): Etiquette and its importance, types of etiquette – workplace, meeting, telephone, dining, norms of etiquette, goals, types of goal, setting SMART goal

5. CO-PO-PSO Mapping

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1									2						2
CO-2									2						2
CO-3									2						2
CO-4									2						2
CO-5									2						2
CO-6									2						2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		15
Demonstrations		02
1.Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems	00	
3. Demonstration on a Computer	00	0
Numeracy		
1. Solving Numerical Problems	00	04
Practical Work		
1. Course Laboratory	00	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	04	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	14
Others		
1. Case Study Presentation	04	
2. Guest Lecture	02	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	04	
5. Group Discussions	04	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		45

7. Method of Assessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the UG Programme (B.Sc./B.Com/BBA). The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of CO's on each Component or Subcomponent of Evaluation:

	Component 1: CE (60%Weightage)		Component 2: SEE (40% Weightage)
Subcomponent▶	SC1	SC2	50 Marks
Subcomponent Type ▶	Practical Assessment	Assignment	
Maximum Marks▶	30	30	
CO-1	X	X	X
CO-2			X

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

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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	Face to face lectures
2.	Understanding	Face to face lectures, group discussions
3.	Critical Skills	--
4.	Analytical Skills	Face to face lectures, activities, , group discussions, assignment
5.	Problem Solving Skills	--
6.	Practical Skills	Face to face lectures, activities, , group discussions, course work
7.	Group Work	Course work, practice, assignment, group discussion
8.	Self-Learning	Course work, practice, assignment, group discussion
9.	Written Communication Skills	Face to face lectures, Course work, practice, assignment, group discussion
10.	Verbal Communication Skills	Face to face lectures, Course work, practice, assignment, group discussion
11.	Presentation Skills	--
12.	Behavioral Skills	Course work, practice, assignment, group discussion, presentation practice, role plays
13.	Information Management	Assignment
14.	Personal Management	--
15.	Leadership Skills	--

9. Course Resources

1. Essential Reading

- Class Notes
- Raman M and Sharma S (2004) Technical Communication: Principles and Practice. New Delhi: Oxford University Press
- Hory Sankar Mukherjee, (2013), Business Communication, Oxford University Press
- Kroehnert, Gary (2004), Basic Presentation Skills, Tata McGraw Hill

2. Recommended Reading

- Sathya Swaroop Debashish and Bhagaban Das, (2014), Business Communication, PHI, New Delhi
- Young, Dona J (2006) Foundations of Business Communications: An Integrated Approach, Tata McGraw Hill
- Kaul, Asha (2007) Effective Business Communication, Prentice Hall India
- Bienvenu, Sherron (2008) The Presentation Skills Workshop, Prentice Hall
- Kavita Tyagi and Padma Misra (2011) Professional Communication, PHI Learning Private Limited, New Delhi

3. Websites

- www.myenglishpages.com
- www.britishcouncil.com
- www.englishmagazine.com
- www.iustenglishmagazine.com

4. Other Electronic Resources

- Electronic resources on the course area are available on RUAS library

10. Course Organization

Course Code	TSM101A
Course Title	English for Communication 1
Course Leader's Name	As per Timetable
Course Leader's Contact Details	Phone: +91-80-453666666
	E-mail: director.tsld@msruas.ac.in
Course Specifications Approval Date	July 2022
Next Course Specifications Review Date	July 2026

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 FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
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Course Specifications: Digital Fluency

Course Title	Digital Fluency
Course Code	CSM101A
Course Type	Skill Development
Department	Electronics and Communication Engineering
Faculty	Engineering and Technology

1. Course Summary

This course exposes different emerging technologies and provides a conceptual understanding of some of the most in-demand technologies like Artificial Intelligence, Big Data Analysis and Internet of Things. This course also focuses on building essential soft skills required for professional success. In this course, students will be introduced to different applications of emerging technologies such as Chat GPT, Chef Watson, and Symphony Retail AI using case studies.

2. Course Size and Credits:

Number of Credits	2
Credit Structure (Lecture: Tutorial: Practical)	1:1:0
Total Hours of Interaction	30
Number of Weeks in a Semester	16
Department Responsible	Electronics and Communication Engineering
Total Course Marks	50
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

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

CO-1. Explain the key concepts and applications of Artificial Intelligence, Big Data Analytics, Internet of Things, Cloud Computing, and Cybersecurity

CO-2. Apply the emerging technologies in the relevant domain

CO-3. Develop holistically by learning essential skills such as effective communication, technology adaptiveness, Problem-solving, design thinking, and teamwork

4. Course Contents

Unit-I:

Emerging Technologies: Overview of Emerging Technologies: Artificial Intelligence, Machine Learning, Deep Learning, Database Management for Data Science, Big Data Analytics, Internet of Things (IoT) and Industrial Internet of Things (IIoT), Cloud Computing and its service models, Cyber Security and Types of Cyber Attack

Unit-II:

Applications of Emerging Technologies: Artificial Intelligence: Autonomous Vehicles, Virtual Reality, Big Data Analytics: Electronic Health Records, Fake drug prevention, Internet of Things: Smart Home, Wearable Journalism, Cloud Computing: Online Data Storage, Anti-Virus Applications

Unit-III:

Case Studies: Case Studies: ChatGPT, Chef Watson, Symphony RetailAI, Generative Design, Stitch Fix, AI in Medical Biotechnology and Bioinformatics

5. CO-PO PSO Mapping:

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1						1	3	1		2	3	3			3
CO-2						1	3	1	1	1	3	3			3
CO-3										2	2	3			3
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		15
Demonstrations		05
1. Demonstration using Videos	00	
2. Demonstration using Physical Models / Systems	00	
3. Demonstration on a Computer	05	
Numeracy		00
1. Solving Numerical Problems	00	
Practical Work		05
1. Course Laboratory	00	
2. Computer Laboratory	05	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
Others		05
1. Case Study Presentation	05	
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	
Mid Terms, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		40

7. Method of Assessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the B.Tech. (Electrical and Electronics Engineering) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document. The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3) COs are assessed as illustrated in the following Table.

MOD-FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

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Focus of COs on each Component or Subcomponent of Evaluation			
	Component 1: CE (60% Weightage)		Component 2: SEE (40% Weightage)
Subcomponent	SC1	SC2	
Subcomponent Type	Assignment	Presentation	50 Marks
Maximum Marks	25	25	
CO-1	X		X
CO-2	X		X
CO-3		X	

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester. Course reassessment policies are presented in the Academic Regulations document.

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
2.	Understanding	Classroom Lectures, Self-study
3.	Critical Skills	--
4.	Analytical Skills	Assignment
5.	Problem Solving Skills	--
6.	Practical Skills	--
7.	Group Work	Assignment
8.	Self-Learning	Self-Learning
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Assignment
12.	Behavioral Skills	Classroom Lectures
13.	Information Management	Assignment

9. Course Resources

1. Essential Reading

a. Course Notes

2. Recommended Reading

a. Digital Fluency: S.P.Sajjan & S.B Ramoshi : Ekalavya E-educate : 2021

b. Digital Fluency: Suresh Palarimath : Siddalingeshwara Book Publications,
Gulbarga

3. Websites

a. <https://futureskillsprime.in>

10. Course Organization

Course Code	CSM101A	
Course Title	Digital Fluency	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	Phone:	+91-804-906-5555
	E-mail:	
Course Specifications Approval Date	July-2022	
Next Course Specifications Review Date	July-2026	


MOD-FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
RAMAIAH UNIVERSITY OF APPLIED SCIENCES

DEAN


Dean - Academics

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)
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SEMESTER 2

Course Specifications: Introduction to Food Technology II

Course Title	Introduction to Food Technology II
Course Code	FTC104A
Department	Food 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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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

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 Dean / Academics

M.S. Ramaiah University of Applied Sciences
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Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023); 31st ACM (22nd Mar 2024); 36th ACM (27th Sept 2025)

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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.

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:

Psychometrics - 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

1. Study of plant layout design
2. Determination of drying characteristics
3. Determination of viscosity of Newtonian and non-Newtonian fluids
4. Study of effect of temperature on viscosity
5. Determination of water holding capacity of meat
6. Estimation of pH of meat
7. Determination of Egg quality
8. Application of Psychometrics in food storage
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		45
Demonstrations		02
1. Demonstration using Videos	2	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		

Numeracy		
1. Solving Numerical Problems		
Practical Work		56
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		02
Total		105

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	20 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	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

9. Course Resources

References

1. Essential Reading

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

2. Recommended Reading

- Singh RP and Heldman DR, 2009, Introduction to food engineering, USA, Academic press
- Fellow P, 1988, Food processing technology, New York, VCH Ellis Horwood
- K.M. Sahay and K.K. singh. 2001. Unit Operations of Agricultural Processing. Vikas Publishing House Pvt. Ltd., Noida, UP.
- George D. Saravacos and Athanasios E. Kostaropoulos. 2002. Handbook of Food Processing Equipment. Springer Science+Business Media, New York, USA.
- B.D. Sharma. 1999. Meat and Meat Products Technology Including Poultry Products Technology. Jaypee Brothers Medical Publishers Pvt. Ltd, New Delhi.
- William J. Stadelman and Owen J. Cotterill. 1995. Egg Science and Technology, 4th Ed. Food Products Press, NY, USA.

3. Magazines and Journals

- Food Science & Technology-Magazine

4. Websites

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

5. Other Electronic Resources

- a. <https://archive.nptel.ac.in/content/storage2/courses/103107088/module1/lecture1/lecture1.pdf>

10. Course Organization:

Course Code	FTC104A	
Course Title	Introduction to Food Technology II	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2022	
Next Course Specifications Review Date:	June 2028	

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Course Specifications: Bakery and Confectionary

Course Title	Bakery and Confectionary
Course Code	FTC105A
Department	Food Technology
Faculty	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:

Number of Credits	3+2
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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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

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)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO-1	3		1				1	3			
CO-2	3	2					1	3	2	2	2
CO-3	1	3					2	3		3	1
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
Face to Face Lectures		45
Demonstrations		
1. Demonstration using Videos	2	

2. Demonstration using Physical Models / Systems		02
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	56
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		02
Total		105

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 (Lab Exercise) 10%	SC3 (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	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

1. Essential Reading

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

2. Recommended Reading

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

3. Magazines and Journals

- FOOD SCIENCE & TECHNOLOGY-Magazine

4 Websites

- <https://bakerpedia.com/>

5. Other Electronic Resources

- Essential Career Skills for Investment Banking and Finance | edX

10. Course Organization:

Course Code	FTC105A	
Course Title	Bakery and Confectionary	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2022	
Next Course Specifications Review Date:	June 2028	

FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

DEAN

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

BANGALORE-560054

Ramapathi K.V.
Dean - Academics

M.S. Ramaiah University of Applied Sciences
Bangalore-560054

Course Specifications: Fundamentals of Fruits, Vegetables and Plantation Crops

Course Title	Fundamentals of Fruits, Vegetables and Plantation Crops
Course Code	FTC106A
Department	Food 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 Regulations
Attendance Requirement	As per Academic Regulations

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.** Analyse 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.

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		3
CO-3	2	3							3		2
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	DEAN	

Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		10
1. Case Study Presentation		
2. Guest Lecture		
3. Industry / Field Visit	5	
4. Brain Storming Sessions		
5. Group Discussions/ Activity	5	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		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%	SEE written Exam 40%
	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
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

References

1. Essential Reading

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

3. Recommended Reading

- P.H. Pandey. 1997. Post-Harvest Technology of Fruits and Vegetables. Saroj Prakashan, Allahabad
- 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.

4. Magazines and Journals

- a. FOOD SCIENCE & TECHNOLOGY-Magazine

5. Websites

- a. <https://bakerpedia.com/>

6. Other Electronic Resources

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

10. Course Organization:

Course Code	FTC106A	
Course Title	Fundamentals of Fruits Vegetables and Plantation Crops	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2022	
Next Course Specifications Review Date:	June 2028	

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 Academic Regulations
Attendance Requirement	As per Academic Regulations

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.

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
Face to Face Lectures		35
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		0
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
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%	SEE Written Exam 40%
	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

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

2. Recommended Reading

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

3. Magazines and Journals

- Journal of Food Safety and Hygiene

4. Websites

- <https://www.virtuallabschool.org/focused-topics/essentials-in-child-care-food-service/lesson-5>

5. Other Electronic Resources

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

10. Course Organization:

Course Code	FTO102A
Course Title	Food Hygiene and Sanitation
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2022
Next Course Specifications Review Date:	June 2028

SEMESTER 3

HFD-FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

DEAN

Ramya R.V.
Dean - Academics

M.S. Ramaiah University of Applied Sciences
Bangalore-560054

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

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 Laboratory Hours	60
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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
- CO 5.** Discuss current trends in food microbiology

4. Course Contents

Unit I:

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 II:

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

Unit III:

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 IV:

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 V:

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

Unit VI:

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 VII:

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
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 moulds 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		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		56
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	X	-	X	X
CO-3	X	-	X	X	X
CO-4	-	-	X	X	X
CO-5	-	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:

Sl.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	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. Frazier William C and Westhoff, Dennis C, 2004, Food Microbiology, New Delhi, TMH
- c. Garbutt, John, 1997, Essentials of Food Microbiology,, London, Arnold

2. Recommended Reading

- a. Pelczar MJ, Chan E.C.S and Krieg, Noel R, 1993, Microbiology, New Delhi, TMH
- b. Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Ed., The Royal Society of Chemistry, Cambridge, UK.
- c. James M. Jay. 2000. Modern Food Microbiology, 6th Ed. Aspen Publishers, Inc., Gaithersburg, Maryland, USA.
- d. George J. Banwart. 1989. Basic Food Microbiology, 2nd Ed. Chapman & Hall, New York, USA.

3. Magazines and Journals

- a. International Journal of Food Microbiology

4. Websites

- a. <https://www.jmbfs.org/>

5. Other Electronic Resources

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

10. Course Organization

Course Code	FTC201A	
Course Title	Food Microbiology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	April 2023	
Next Course Specifications Review Date:	June 2028	

HOD. FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560054

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

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, and their application in food processing. Students will also be taught the function, definition, classification, general reactions, and metabolism of carbohydrates, protein, and lipids. 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+2
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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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.

HEAD-FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023); 31st ACM (22nd Mar 2024); 36th ACM (27th Sept 2025)

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DEAN

Ramya K.V.
Dean Academics

M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560054

Bangalore-560054

4. Course Contents

Unit I

Introduction to food chemistry: Nature and Scope of food chemistry. Role of food chemist.

Unit II:

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 III:

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

Unit IV:

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 V:

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.

Unit VI:

Lipid: Definition, classification and physicochemical aspects of fatty acids in natural foods, hydrolysis, reversion, polymorphism and its application. Chemical aspects of lipolysis, auto-oxidation, antioxidants. Technology of fat and oil processing: Refining, Hydrogenations, Inter etherification, Safety use of oils and fats in food formulation.

Practical

1. Preparation of standard solutions
2. Estimation of moisture content of foods
3. Determination of refractive index and specific gravity of fats and oils
4. Demonstration of Beer's - Lambert law
5. Estimation of total carbohydrates by Phenol sulphuric acid method
6. Estimation of total Proteins by Lowry's method
7. Determination of saponification number of an oil/fat
8. Determination of iodine number of an oil/fat
9. Determination of acid number of an oil/fat
10. Determination of organic acid content by titrimetry

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		3		2
CO-3	3			2			1			3	2
CO-4		2		3			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		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	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

9. Course Resources

1. Essential Reading

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

2. Recommended Reading

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

3. Magazines and Journals

- Journal of Food Chemistry and Nanotechnology

4. Websites

- https://onlinecourses.swayam2.ac.in/cec20_ag10/preview

5. Other Electronic Resources

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

10. Course Organization

Course Code	FTC202A	
Course Title	Food Chemistry-I	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	April 2023	
Next Course Specifications Review Date:	June 2028	

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, barely 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	3+0
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 Regulations
Attendance Requirement	As per Academic Regulations

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 by-products

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**Unit-I:**

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-II:

Rice: Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of by-products.

Unit-III:

Corn: Milling (wet & dry), cornflakes.

Unit-IV:

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

Unit-V:

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

Unit-VI:

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

Unit-VII:

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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		

DEAN

4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
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%	SEE written Exam 40%
	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
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
- N.L. Kent and A.D. Evers. 1994. Kent's Technology of Cereals: An Introduction for Students of Food Science and Agriculture, 4th Ed. Elsevier Science Ltd., Oxford, UK.
- Chakraverty. 2008. Post-Harvest Technology of Cereals, Pulses and Oilseeds, 3rd Ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

2. 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

3. Magazines and Journals

- Food Science & Technology-Magazine

4. Websites

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

5. Other Electronic Resources

- https://books.google.co.in/books/about/Post_Harvest_Technology_of_Cereals_Pulse.html?id=8cC4PAAACAAJ&redir_esc=y

10. Course Organization

Course Code	FTC203A
Course Title	Technology of Cereals Pulses and Oil Seeds
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2023
Next Course Specifications Review Date:	June 2028

Course Specifications: Nutrition in Health and Fitness

Course Title	Nutrition in Health and Fitness
Course Code	FTO201A
Department	Food Technology
Faculty	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:

Number of Credits	3+0
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 Regulations
Attendance Requirement	As per Academic Regulations

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:

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
Face to Face Lectures		34
Demonstrations		02
1. Demonstration using Videos	02	
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 / Kitchen		
4. Clinical Laboratory		

5. Hospital		
6. Model Studio		
Others		04
1. Case Study Presentation	02	
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		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%	SEE Written Exam 40%
	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
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

1. Essential Reading

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

2. Recommended Reading

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

3. Magazines and Journals

- Food and health-Magazine

4. Websites

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

5. Other Electronic Resources

- <https://www.eatright.org>

10. Course Organization

Course Code	FTO201A
Course Title	Nutrition in health and fitness
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	April 2023
Next Course Specifications Review Date:	June 2028

Course Specifications: English for Communication 2

Course Title	English for Communication-2
Course Code	TSM102A
Course Type	Ability Enhancement Compulsory Course
Department	Directorate of Transferable Skills and Leadership Development
Faculty	FLAHS/FMC/FMPS/FAD/SSS

1. Course Summary

This course equips students with professional oral and written communication skills. The course enables the students to draft letters, reports and e-mails for professional communication. The students will be trained to deliver oral presentations and participate in group discussion. The students will be equipped with analyzing and reading the complex documents and given case studies to solve and arrive at a solution using their communication proficiency and analytical skills.

2. Course Size and Credits:

Number of Credits	03
Credit Structure (Lecture: Tutorial: Practical)	3:0:0
Total Hours of Interaction	45
Number of Weeks in a Semester	15
Department Responsible	Directorate of Transferable Skills and Leadership Development
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

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

- CO-1. Explain the nuances of professional communication
- CO-2. Compose professional written document as appropriate
- CO-3. Discuss the importance of Time and Stress Management
- CO-4. Practice basic presentation skills, group discussion and debating skills
- CO-5. Demonstrate comprehension of complex document

4. Course Contents

Unit-I:

Basics of Communication-Forms and channels for professional communication, directions of professional communication, styles of professional communication

Unit-II:

Essay Writing, Structure of an essay – introduction, body and conclusion, ordering of essay structure, Usage of transitioning words, use of appropriate language and tone

Unit-III

Letter Writing- Purpose of letter writing, Letter format – address, date, salutation, subject line, body of the letter, complementary close, signature, types of letter – Information letter, complaint letter, request letter for projects / internships / industry visits, use of appropriate language and tone while drafting letter, Agenda and Minutes of meeting, Cover letter and CVs

Unit-IV:

E-mail- E-mail as a channel of communication, e-mail format – 'To', 'CC', 'BCC', 'Subject Line', Salutation, Body, and Complementary Close, Situational usage of e-mail

Unit-V:

Time Management and Stress Management- The concept of time and stress management, Time management grid, prioritization, types of stress, ways to handle stress

Unit-VI:

Presentation Skills- The importance of presentation skills, various stages of presentation planning – development of structure and style, interpersonal sensitivity, presentation accessories and equipment, time management during presentation, stages of presentation – introduction, body and conclusion, presentation etiquette

Unit-VII

Debate- Importance of debating skills, various stages of debate planning – development of structure and style, interpersonal sensitivity, time and stress management as a debating skill, stages for debate, debate etiquette

Unit-VIII

Group Discussion- Purpose of group discussion, various stages of group discussion planning – development of structure and style, interpersonal sensitivity, types of group discussion, group discussion delivery, group discussion etiquette

Unit-IX:

Comprehension – Advanced Active listening, listening comprehension and paraphrasing techniques, comprehension of complex documents

Unit-X:

Report Writing- Purpose of report writing, report format, use of language while report writing

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1									2						2
CO-2									2						2
CO-3									2						2
CO-4								2	2						2
CO-5									2						2
CO-6									2						2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		15
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models/Systems		
3. Demonstration on a Computer		
Numeracy		00
1. Solving Numerical Problems		
Practical Work		04
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop/Course Workshop/Kitchen	4	
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		14
1. Case Study Presentation	4	
2. Guest Lecture	2	
3. Industry/Field Visit		
4. Brain Storming Sessions	4	
5. Group Discussions	4	
6. Discussing Possible Innovations		
Term Tests, Written Examination, Presentations		10
Total Duration in Hours		45

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the UG

Programme (B.Sc. / B.Com/ BBA). The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the CO's. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of CO's on each Component or Subcomponent of Evaluation:

	Component 1: CE (60% Weightage)		Component 2: SEE (40% Weightage)
Subcomponent	SC1	SC2	
Subcomponent Type	Practical Assessment	Assignment	
Maximum Marks	30	30	50 Marks
CO-1	X		X
CO-2	X	X	X
CO-3	X	X	X
CO-4		X	X
CO-5		X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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	Face to face lectures
2.	Understanding	Face to face lectures, group discussions
3.	Critical Skills	
4.	Analytical Skills	Face to face lectures, activities, , group discussions, assignment
5.	Problem Solving Skills	
6.	Practical Skills	Face to face lectures, activities, , group discussions, course work
7.	Group Work	Course work, practice, assignment, group discussion

8.	Self-Learning	Course work, practice, assignment, group discussion
9.	Written Communication Skills	Face to face lectures, Course work, practice, assignment, group discussion
10.	Verbal Communication Skills	Face to face lectures, Course work, practice, assignment, group discussion
11.	Presentation Skills	
12.	Behavioral Skills	Course work, practice, assignment, group discussion, presentation practice, role plays
13.	Information Management	Assignment
14.	Personal Management	
15.	Leadership Skills	

9. Course Resources

1. Essential Reading

- a. Class Notes
- b. Raman M and Sharma S (2004) Technical Communication: Principles and Practice. New Delhi: Oxford University Press
- c. Hory Sankar Mukherjee, (2013), Business Communication, Oxford University Press
- d. Kroehnert, Gary (2004), Basic Presentation Skills, Tata McGraw Hill

2. Recommended Reading

- a. Sarvesh Gulati , (2010), Corporate Grooming and Etiquette, New Delhi, Rupa Publications India Pvt. Ltd
- b. Simon Sinek , (2011), Start With Why, United States of America, Penguin Group
- c. Kavita Tyagi and Padma Misra , 2011, Professional Communication, New Delhi, Prentice Hall India

3. Websites

- a. <http://www.businessballs.com/presentation.htm>
- b. <http://www.allyoucanread.com/top-10-business-magazines/>
- c. <https://student-learning.tcd.ie/undergraduate/topics/self-management/>

4. Other Electronic Resources

- a. Electronic resources on the course area are available on RUAS library

10. Course Organization

Course Code	TSM102A	
Course Title	English for Communication-2	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	Phone:	+91-80-453666666
	E-mail:	director.tsld@msruas.ac.in
Course Specifications Approval Date	July-2022	
Next Course Specifications Review Date	July-2027	

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	3+2
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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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.

4. Course Contents**Unit-I:**

Chemistry of food flavour: Flavors: Definition and basic tastes. Description of food flavors and flavor enhancers. Sensory assessment of flavor. Technology for flavor retention.

Unit-II:

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-III:

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-IV:

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-V:

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-VI:

Vitamins and minerals: Allowances, Enrichment, Restorations, and Fortifications. Dietary sources, requirements, functions, losses of vitamins and minerals. Optimization and retention of vitamins and minerals.

Unit-VII:

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	PSO 1	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											

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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

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M. S. RAMIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560034

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Bangalore-560054

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	20 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	X	-	X	X
CO-3	X	-	X	X	X
CO-4	-	-	X	X	X
CO-5	-	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

9.Course Resources

1. Essential Reading

a. Course Notes

b. H.D. Belitz, W. Grosch and P. Schieberle. 2009. Food Chemistry, 4th Ed. Springer-Verlag

Berlin Heidelberg

- c. Fennema, Owen R, 1996, Food Chemistry, 3rd Ed. Marcel Dekker, Inc., New York, USA.
- d. Lillian Hoagland Meyer, 1974, Food Chemistry. The AVI Publishing Co Inc., Connecticut, MA, USA.

2. Recommended Reading

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

3. Magazines and Journals

- a. Journal of Food Chemistry and Nutrition
- b. Journal of Food Chemistry and Nanotechnology

4. Websites

- a. <https://esciencepress.net/journals/index.php/JFCN/index>

5. Other Electronic Resources

- a. <http://discovermagazine.com/tags/?tag=biochemistry>
- b. <https://swayam.gov.in/NPTEL>
- c. <https://www.foodprocessing.com/>

10. Course Organization

Course Code	FTC204A
Course Title	Food Chemistry-II (3+2)
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	April 2023
Next Course Specifications Review Date:	June 2028

Course Specifications: Food Process Engineering-I

Course Title	Food Process Engineering-I (3+2)
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	3+2
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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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 pre-processing 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-I:

Engineering properties of food materials: Introduction to Physical, mechanical, thermal, frictional, Aerodynamic and Rheological properties of food materials.

Unit-II:

Introduction to unit operations: Cleaning, shelling and dehusking, sorting, grading, peeling and separation.

Unit-III:

Size reduction: Principles and equipment used for size reduction. Agitation and mixing: Principles and equipment used. Blending and pulverization equipment.

Unit-IV:

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-V:

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-VI:

Material handling: Material handling machines- Elevators and conveyors.

Practicals

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)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4
CO-1	3							3			2
CO-2	3		2		1		2		3		2
CO-3	3		2				2			3	2
CO-4	3							3			
CO-5			3				1	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		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		02
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		04+04
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		105
Total Duration in Hours		

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	20 Marks	40 Marks	50 Marks	30 Marks

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

9. Course Resources

1. Essential Reading

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

2. Recommended Reading

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

3. Magazines and Journals

- The Journal of Food Process Engineering

4. Websites

- a. <https://egyankosh.ac.in/handle/123456789/1042>

5. Other Electronic Resources

- a. <https://www.foodprocessing.com/>
 b. https://mastermilk.com/uploads/biblio/food_process_engineering_and_technology.pdf

10. Course Organization

Course Code	FTC205A	
Course Title	Food Process Engineering-I (3+2)	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	April 2023	
Next Course Specifications Review Date:	June 2028	

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	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 Regulations
Attendance Requirement	As per Academic Regulations

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

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											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		03

1. Demonstration using Videos	03	
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 / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		07
1. Case Study Presentation	05	
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
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%	SEE 40 % written Exam
	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

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

2. Recommended Reading

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

3. Magazines and Journals

- Food science & technology-Magazine

4. Websites

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

5. Other Electronic Resources

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

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

10. Course Organization

Course Code	FTC206A	
Course Title	Food Laws and Standards	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	April 2023	
Next Course Specifications Review Date:	June 2028	


HOD FOOD TECHNOLOGY
 FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
 M. S. RAJAMAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)


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 Bangalore-560054

Course Specifications: Food Industry Waste Management

Course Title	Food Industry Waste Management
Course Code	FTO202A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The course provides an in-depth understanding of the challenges and opportunities in managing waste generated by the food industry. It covers various aspects of waste management, including regulatory compliance, waste reduction strategies, recycling and reusing techniques, and the role of technology in waste management.

2. Course Size and Credits:

Number of Credits	3+0
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 Regulations
Attendance Requirement	As per Academic Regulations

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

Unit-I:

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

Unit-II:

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-III:

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-IV:

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-V:

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 and areca nut.

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		1	3	2
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
Face to Face Lectures		30
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 / Kitchen		

4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		05
1. Case Study Presentation	03	
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
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%	SEE 40% written Exam
	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

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	-----
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
- A. Chakravarthy & De, "Agricultural Waste and By Product Utilisation".
- Bor S. Luli (ed), "Rice Production and Utilisation"
- E. Beagle, "Rice Husk Conversion to Energy"

2. Recommended Reading

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

3. Magazines and Journals

- Food Industry Wastes

4. Websites

- <https://egyankosh.ac.in/bitstream/123456789/12399/1/Unit-17.pdf>

5. Other Electronic Resources

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

10. Course Organization

Course Code	FTO202A
Course Title	Food Industry Waste Management
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	April 2023
Next Course Specifications Review Date:	June 2028

Course Specifications: Professional Communication

Course Title	Professional Communication
Course Code	TSU202A
Course Type	Skill Development Course
Department	Directorate of Transferable Skills and Leadership Development
Faculty	FLAHS/FMC/FMPS/FAD/SSS

1. Course Summary

This course aims at equipping students with the skills required for effective communication in professional context. The students will be guided through professional practices of written and oral communication. Students will be taught to apply oral and written communication skills in a given situation.

2. Course Size and Credits:

Number of Credits	02
Credit Structure (Lecture: Tutorial: Practical)	2:0:0
Total Hours of Interaction	30
Number of Weeks in a Semester	15
Department Responsible	Directorate of Transferable Skills and Leadership Development
Total Course Marks	50
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

CO-1. Develop vocabulary and language skills relevant to their profession

CO-2. Demonstrate effective writing skills

CO-3. Create Professional Reports and Proposals

CO-4. Demonstrate effective Business Presentation

CO-5. Enhance Debating and Interview Skills

4. Course Contents

Unit-I:

Formal Vocabulary: Few important root word for Vocabulary development, Vocabulary used in Formal writing, sequence words, Emphasis words, Describing a process, Abbreviations, Transition words

Unit-II:

Writing: Job application, CV preparation, Minute preparation, Use of Sequence words, Writing instructions and checklists, Statement of Purpose, Posts, Blogs, Posters

Unit-III:

Report Writing: Benefits of Report writing, Types of Reports- Informational, Analytical, Recommendation, Structure of a Report

Unit-IV:

Proposal Writing: Benefits of Proposal writing, Types of proposal- Solicited and Unsolicited, Structure of a proposal

Unit-V:

Business Presentation: Audience Centric Approach, Planning, Practice, Delivering, Designing flyers or handouts, Nonverbal aspects of a presentation, Question handling, Visual Aids, Other tips for delivering effective presentations

Unit-VI:

Interview Skills: Types of Interviews, Interview etiquette, Nonverbal aspects affecting interviews, Telephone/ Online interviews, One-to-one interviews and panel interview, FAQ's practice

5. CO-PO-PSO Mapping:

Course Outcomes	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1									2						2
CO-2									2						2
CO-3									2						2
CO-4									2						2
CO-5									2						2
CO-6									2						2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Others		10
1. Case Study Presentation	02	
2. Guest Lecture	02	
4. Brain Storming Sessions	03	
5. Group Discussions	03	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		30

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of CO's on each Component or Subcomponent of Evaluation:

	Component 1: CE (100% Weightage)	
Subcomponent	SC1	SC2
Subcomponent Type	Practical Assessment	Assignment
Maximum Marks	25	25
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X
CO-5	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

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	Face to face lectures
2.	Understanding	Face to face lectures, group discussions
3.	Critical Skills	--
4.	Analytical Skills	Face to face lectures, activities, , group discussions, assignment
5.	Problem Solving Skills	--
6.	Practical Skills	Face to face lectures, activities, , group discussions, course work
7.	Group Work	Course work, practice, assignment, group discussion
8.	Self-Learning	Course work, practice, assignment, group discussion
9.	Written Communication Skills	Face to face lectures, Course work, practice, assignment, group discussion
10.	Verbal Communication	Face to face lectures, Course work, practice,

	Skills	assignment, group discussion
11.	Presentation Skills	--
12.	Behavioral Skills	Course work, practice, assignment, group discussion, presentation practice, role plays
13.	Information Management	Assignment
14.	Personal Management	--
15.	Leadership Skills	--

9. Course Resources

1. Essential Reading

- Class Notes
- Raman M and Sharma S (2004) Technical Communication: Principles and Practice. New Delhi: Oxford University Press
- Hory Sankar Mukherjee, (2013), Business Communication, Oxford University Press
- Kroehnert, Gary (2004), Basic Presentation Skills, Tata McGraw Hill

2. Recommended Reading

- Sathya Swaroop Debashish and Bhagaban Das, (2014), Business Communication, PHI, New Delhi
- Young, Dona J (2006) Foundations of Business Communications: An Integrated Approach, Tata McGraw Hill
- Kaul, Asha (2007) Effective Business Communication, Prentice Hall India
- Bienvenu, Sherron (2008) The Presentation Skills Workshop, Prentice Hall
- Kavita Tyagi and Padma Misra (2011) Professional Communication, PHI Learning Private Limited, New Delhi

3. Websites

- www.myenglishpages.com
- www.britishcouncil.com
- www.englishmagazine.com
- www.justenglishmagazine.com

4. Other Electronic Resources

- Electronic resources on the course area are available on RUAS library

10. Course Organization

Course Code	TSU202A
Course Title	Professional Communication
Course Leader's Name	As per Timetable
Course Leader's Contact Details	Phone: +91-80-453666666
	E-mail: director.tsld@msruas.ac.in
Course Specifications Approval Date	Mar-2023
Next Course Specifications Review Date	Mar-2027

Course Specifications: Ethics and Self-Awareness

Course Title	Ethics and Self-Awareness
Course Code	TSU203A
Course Type	Skill Enhancement Course
Department	Directorate of Transferable Skills and Leadership Development
Faculty	FLAHS/FMC/FMPS/FAD/SSS

1. Course Summary

This course aims at helping students with the skills required for Self-development through self-analysis, and self-regulation. The students will be guided through Self-awareness activities and exercises. Students will be sensitized towards professional ethics & etiquette using case studies and related activities.

2. Course Size and Credits:

Number of Credits	02
Credit Structure (Lecture: Tutorial: Practical)	2:0:1
Total Hours of Interaction	30
Number of Weeks in a Semester	15
Department Responsible	Directorate of Transferable Skills and Leadership Development
Total Course Marks	50
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

- CO-1.** Comprehend self & its need for Self-development
- CO-2.** Practise self-awareness by analysis and understanding Emotional Intelligence
- CO-3.** Identify purpose of self and set personal and professional Goals
- CO-4.** Apply professional values and ethics in decision making
- CO-5.** Appreciate the role of Values and Ethics in holistic development

Course Contents

Unit-I:

Self-awareness: definition, need for self-awareness, SWOT analysis, develop self-awareness and self-management skills

Unit-II:

Definition of personality, understanding personality traits and behavior pattern. Relationship between personality and behavior

Unit-III:

Introduction to emotional intelligence. Processing, perceiving, understanding and managing emotions. Ways to develop EI.

Unit-IV:

Identifying life purpose and setting goals. Understanding Importance of goals and setting SMART goals.

Unit-V:

Understanding values and ethics. Importance of Ethics for professional development. Ethical decision-making process and principles

5. CO-PO-PSO Mapping:

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1									2						2
CO-2									2						2
CO-3									2						2
CO-4									2						2
CO-5									2						2
CO-6									2						2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution															

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Others		10
1. Case Study Presentation	04	
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	04	
5. Group Discussions	02	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		30

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the B.Sc Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of CO's on each Component or Subcomponent of Evaluation:

Subcomponent	Component 1: (60% Weightage)	Component 2: (40% Weightage)
Subcomponent Type	Assignment	Practical Assessment
Maximum Marks	30 Marks	20 Marks
CO-1	X	X
CO-2		
CO-3	X	
CO-4		X
CO-5	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

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	Face to face lectures
2.	Understanding	Face to face lectures, group discussions
3.	Critical Skills	--
4.	Analytical Skills	Face to face lectures, activities, , group discussions, assignment
6.	Practical Skills	Face to face lectures, activities, , group discussions, course work
7.	Group Work	Course work, practice, assignment, group discussion
8.	Self-Learning	Course work, practice, assignment, group discussion

HOD-FOOD TECHNOLOGY

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

9. Course Resources

1. Essential Reading

- Class Notes
- The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change – Stephen R. Covey
- Emotional Intelligence: Why It Can Matter More Than IQ – Daniel Goleman

2. Recommended Reading

- Who Will Cry When You Die? by Robin S. Sharma
- Life's Amazing Secrets by Gaur Gopal Das
- The 5 AM Club by Robin S. Sharma
- The Monk Who Sold His Ferrari by Robin S. Sharma
- <https://gobookmart.com/10-best-self-help-books-by-indian-authors/> Values and ethics in business and profession by Samitha Manna & Suparna Chakraborti
- Value education and professional ethics by Ram Pratap sharma and Madhulika Sharma

3. Websites

- www.mindtools.com
- www.braintracy.com
- www.tonyrobbins.com

4. Other Electronic Resources

- Electronic resources on the course area are available on RUAS library

10. Course Organization

Course Code	TSU203A	
Course Title	Ethics and Self-Awareness	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	Phone:	+91-80-453666666
	E-mail:	director.tsld@msruas.ac.in
Course Specifications Approval Date	March 2023	
Next Course Specifications Review Date	May 2027	

SEMESTER 5

Course Specifications: Food Process Engineering-II

Course Title	Food Process Engineering-II
Course Code	FTC301A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

This course aims at introducing students to advanced operations of food processing and technology.

Students will be taught basic principles of mechanical separations, centrifugation and filtration. Students will understand principles and equipment involved in operations like baking, roasting, frying, filtration and irradiation. Students will also be exposed to current innovation in food process engineering.

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	As per academic regulations
Attendance Requirement	As per academic regulations

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 principles of centrifugation and filtration
- CO-2.** Discuss principles of engineering adopted in equipment used in baking, roasting, frying, filtration and irradiation
- CO-3.** Summarize principles of extraction including super critical fluid extraction and membrane separation process
- CO-4.** Describe concept of heat and mass transfer in food processing
- CO-5.** Appraise current trends and innovation in food processing engineering

HOD-FOOD TECHNOLOGY

DEAN

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

Ranjith K.V.
Dean - Academics

121

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

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4. Course Contents

Unit-I:

Mechanical separations methods: Basic principles of Solid-solid, Solid-liquid and Liquid-liquid separation

Unit-II:

Centrifugation: Liquid-liquid centrifugation, Liquid-solid centrifugation, Basket centrifuge, Bowl centrifuge, clarifiers, de-sludging, Nozzle and decanting centrifuges.

Unit-III:

Filtration: Principles involved in filtration, Pressure, Vacuum and Centrifugal filtration, Expression: batch and continuous types. Extraction/ Leaching Crystallization and Distillation: Basic principles and equipment used, Membrane processes, ultra-filtration, reverse osmosis, electro dialysis.

Unit-IV:

Heat and Mass Transfer: Systems for heating and cooling food products, Thermal Properties of Food, Modes of heat transfer, Application of steady state heat transfer-estimation of conductive heat transfer co-efficient, convective heat transfer coefficient, overall heat transfer coefficient. Fick's Law of Diffusion, Baking, Roasting and Frying operations – Principles and equipment

Unit-V:

Irradiation Principle and its equipment, current trends: Current trends in food processing and Engineering, Innovation and application.

Practicals

1. Study of equilibrium sorption isotherms
2. Study of centrifugal separators
3. Study of ultra-filtration and its application
4. Study of microwave oven and it's evaluation
5. Study of universal and infrared moisture meter and it's evaluation
6. Study of roasting and frying equipment
7. Study of extraction and leaching equipment
8. Study of size reduction machineries
9. Study of principle of reverse osmosis and its application
10. Study of electro dialysis
11. Study of blending equipment

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						3			
CO-2		3						3		
CO-3			3				2			
CO-4	1			2				2		
CO-5						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
Face to Face Lectures		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (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	X
CO-4	-	-	X	X	X
CO-5	-	-	-	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

1. Essential Reading

- Course Notes
- Lab Manual
- Food Process Engineering & Technology by Berk
- Food Processing Handbook by Brennan J G
- Food Processing Technology Principles and Practice 2e by P Fellows
- Handbook_of Food Engineering by Heldmen & Lund

2. Recommended Reading

- Food Processing Handbook by Brennan J G
- Food Processing Technology Principles and Practice 2e by P Fellows

3. Magazines and Journals

- FOOD SCIENCE & TECHNOLOGY-Magazine

4. Websites

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

5. Other Electronic Resources

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

10. Course Organization

Course Code	FTC301A	
Course Title	Food Process Engineering-II	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

Course Specifications: Food Quality Testing and Evaluation

Course Title	Food Quality Testing and Evaluation
Course Code	FTC302A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce students to attributes of quality and their analysis methods. Students are introduced to organoleptic properties such as appearance, flavour, colour, texture and their significance in assessing/measuring quality of food products. Students will also be introduced to modern analytical equipment used for food quality testing.

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	As per academic regulations
Attendance Requirement	As per academic regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

CO 1. Explain sensory evaluation methods used to assess the quality of food products

CO 2. Describe organoleptic properties of food products

CO 3. Describe the factors affecting quality of taste, colour, odour and texture

CO 4. Discuss the significance of quality testing methods and advanced equipment employed

4. Course Contents

Unit-I:

Introduction to organoleptic properties- Appearance, colour, taste, flavor, textural factors and additional quality factors, Introduction to sensory evaluation- Types. Food Adulterants and Food contaminants (Physical, chemical and microbiological).

Unit-II:

Appearance –Size, shape, Texture- gloss, consistency. Colour - Introduction to natural and synthetic colours, functions of colour in foods, Optical aspect of colour, perception of colour, objective evaluation, colour measurement using different systems- Munsell colour system, CIE

colour system, qualitative and quantitative analysis of colour, reflectance spectrophotometry and Colorimetry.

Unit-III:

Texture –Introduction, Definition and classification of texture profile , Subjective evaluation, phases of oral processing, Objective analysis, rheological methods of texture measurement including rheological models , Measurement of texture in various food groups viz. cereals, dairy, fruits and vegetables, meat and meat products.

Unit-IV:

Taste- Introduction ,organs involved in taste perception- tongue, papillae, taste buds, salivary glands, mechanism of taste perception , chemicals responsible for sweet, salt, sour, and bitter taste their structure and chemical dimensions , Factors affecting taste quality, reaction time and factors affecting it , absolute and recognition threshold , taste abnormalities.

Unit-V:

Olfactory – Introduction and definition, anatomy of nose, mechanism of odour perception, Prerequisites for odour perception, odour classification, chemical specificity of odour. Measurement of odour using different techniques – primitive, double tube olfactometer, Elseberg techniques, Wenzel's olfactometer, sniffing, merits and demerits of each methods, olfactory abnormalities.

Unit-VI:

Introduction to modern analytical equipment used for food quality testing: Scanning Electron Microscopy, GasChromatography-Mass Spectrometry, High Performance Liquid Chromatography, Column chromatography, Thin layer Chromatography, spectrophotometer and electrophoresis, Microbiological methods, ELISA.

Practicals

1. Training of sensory panel for flavor perception
2. Quality evaluation of product for physical attributes & Texture analysis using texturometer
3. Extraction of pigments from various fruits and vegetables and influence of heating time and pH
4. Determination of Adulterants in Honey / Jaggery
5. Determination of Adulterants in Maida / Wheat flour
6. Determination of Adulterants in Turmeric / Chilli powder
7. Determination of Adulterants in Coffee / Tea powder
8. Determination of protein from milk / milk products
9. Determination of fat from milk / milk products
10. Analysis of pesticide residues in fruits and vegetable using GCMS and HPLC

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							3			
CO-2		3							3		
CO-3			3					2			
CO-4	1			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
Face to Face Lectures		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (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

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. Manoranjan Kalia, 2010, Food quality management, Agrotech publishing academy Udaipur
- G. Woodman., Food Analysis, Axis book
- b. Inteaz Alli. 2004. Food Quality Assurance: Principles and Practices. CRC Press, Boca Raton, FL, USA.
- c. Lab Manual
- d. Amerine, Pangborn and Roessler, 1965, Principles of sensory evaluation of food, London, Academic Press

2. Recommended Reading

- a. Food Processing Handbook by Brennan J G
- b. Food Processing Technology Principles and Practice 2e by P Fellows

3. Magazines and Journals

- a. FOOD SCIENCE & TECHNOLOGY-Magazine

4. Websites

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

5. Other Electronic Resources

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

10. Course Organization

Course Code	FTC302A	
Course Title	Food Quality Testing and Evaluation	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

Course Specifications: Food Business Management

Course Title	Food Business Management
Course Code	FTC303A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce students the fundamentals of management concepts and entrepreneurship. Students will learn the concept of efficiency and effectiveness in management. The course is intended to introduce the various functions of management and challenges associate with Food Industry.

2. Course Size and Credits:

Number of Credits	03+0
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 regulations
Attendance Requirement	As per academic regulations

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 evolution, key concepts and principles of management
- CO-2.** Describe the importance of planning and organizing
- CO-3.** Explain the concept of staffing, leading and controlling
- CO-4.** Identify appropriate financial management method for given business scenario
- CO-5.** Analyse and discuss challenges of management in food processing industries

HOD FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M.S. RAMAJAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

DEAN
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
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Bangalore-560054

4. Course Contents

Unit-I:

Introduction: Concept of Fundamentals of Management, Evolution of Management Thought, Scope, Functions Principles of Scientific Management and Principles of Modern Management. Maslow's Hierarchy of needs theory

Unit-II:

Planning: Nature and purpose of planning, Planning process, Types of plans, Strategies, Types of strategies, Policies. Decision Making, Types of decision, Decision Making Process.

Unit-III:

Organizing: concept, Importance and Principles, Span of Management, Centralization and Decentralization, Patterns of Organization, Line and Staff Relationships.

Unit-IV:

Finance management: Definition, scope, objective; Time value of money and its accounting, Different systems of accounting: Financial accounting, cost accounting, management accounting

Unit-V:

Human resource management: Definitions, objectives of manpower planning, process, sources of recruitment, process of selection; Corporate social responsibility: Importance, business ethics

Unit-VI:

Case studies on challenges of management in Food processing industries

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	2	
CO-2		2		1					1		
CO-3	2		1				1	1			1
CO-4				3			1			2	
CO-5	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
Face to Face Lectures		25
Demonstrations		08
1. Demonstration using Videos	08	
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 / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		07
1. Case Study Presentation	05	
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)	SEE Written Exam 40%

			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
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	Case Presentations
11	Presentation Skills	Case Presentations
12	Behavioral Skills	Class Presentations
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

- Course Notes
- Koontz Harold and Weihrich Heinz. (2015) Essentials of Management, 6th edition, Tata McGraw-Hill, New Delhi
- Prasad, L. M. (2015). Principles and practice of management. 9th edition, S Chand and sons

2. Recommended Reading

- a. Haberberg, A. and Rieple, A. (2008) Strategic Management: Theory and Application, 1st edition, Oxford University Press

3. Magazines and Journals

- a. FOOD SCIENCE & TECHNOLOGY-Magazine
 b. Business World: ABP Group, Fortnightly business magazine
 c. Prabandhan: Indian Journal of Management: Informatics Publishing Limited, Monthly issue
 d. Journal of Strategic Management, John Wiley & Sons: Emerald Publishing Limited, Quarterly issue
 e. Business Strategy: PwC Strategy& Inc., Quarterly issue

4. Websites

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

5. Other Electronic Resources

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

10. Course Organization

Course Code	FTC303A
Course Title	Food Business Management
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024
Next Course Specifications Review Date:	June 2028

Course Specifications: Introduction to Food Biotechnology

Course Title	Introduction to Food Biotechnology
Course Code	FTE301A
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 Biotechnology and its applications in food industry.

Students will be taught DNA replication, transcription, translation and recombinant DNA technology. They will also be taught applications of biosensors, immobilized enzymes and single - cell proteins in food industry. Students will be introduced to applications of biotechnology in quality improvement of functional foods, fats, flavor compounds and ethical issues concerning genetically modified (GM) crops.

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After undergoing this course students will be able to:

CO-1. Explain DNA replication, transcription, translation and recombinant DNA technology

CO-2. Summarize applications of biosensors, immobilized enzymes, single cell proteins and nanotechnology in food industry

CO-3. Discuss the role and impact of biotechnology in nutritional quality of foods

CO-4. Describe biosafety guidelines and regulations for genetically modified foods

4. Course Contents

Unit-I:

Scope and importance of Biotechnology to food industry.

Unit-II:

Organization of the genetic material in bacteria, eukaryotes and viruses; DNA replication: Replication fork, DNA polymerases, other enzymes and proteins required for DNA replication, origin of replication, replication of circular DNA molecule.

Unit-III:

Transcription and translation: RNA synthesis, types of RNA, genetic code; plasmids, types of plasmids, genetic recombination in bacteria, transformation, transduction, conjugation, regulation of gene expression in prokaryotes.

Unit-IV:

Recombinant DNA technology: Restriction enzymes, cloning vectors, cloning procedure, cloning of specific gene and their identification (colony hybridization, C-DNA, southern blotting, polymerase chain reaction); Biosensors: Classification, application in food industry.

Unit-V:

Application of biotechnology in food: Immobilization of enzymes, applications in industries, economic aspects.

Enzyme Generation of Flavour and Aroma Compounds, Biotechnology Applied to Fats and Oils, Flavour Lipid Modifications

Unit-VI:

Application of biotechnology in quality improvement of functional foods from plant sources– Vitamin, carotene, anthocyanin, proteins, Starch and oil content, Enzymes for food processing such as beta-galactosidase, chymosin, glucose isomerase and α-amylase.

Unit-VII:

Nanotechnology in Food Biotechnology

Unit-VIII:

Ethical issues concerning genetically modified (GM) foods: Testing for GMOs, current guidelines for production, release and movement of GMOs, labelling and traceability, trade related aspects, bio-safety, risk assessment, risk management, public perception of GM foods, IPR, GMO Act 2004.

Unit-IX:

Impact of Biotechnology on Nutritional Quality of Food

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	2	
CO-2		2		1					1		
CO-3	2		1				1	1			1
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		25
Demonstrations		08
1. Demonstration using Videos	08	
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 / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		07
1. Case Study Presentation	05	
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%	SEE Written Exam 40%
	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

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	Case Presentations
11	Presentation Skills	Case Presentations
12	Behavioral Skills	Class Presentations
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. Zeuthen, P., Cheftel, J.C., Eriksson., Gormley, T.R., Linko, P and Paulus, K, Processing and Quality of Foods: Food Biotechnology: Avenues to healthy and nutritious products. Elsevier Applied Science.
- b. Kalidas Shetty, Gopinathan Paliyath, Anthony Parnetto, Robert E. Levin, Food Biotechnology, 2nd edition, Taylor & Francis.

2. Recommended Reading

- a. Introduction to food biotechnology by Perry Johnson-Green (2018)

3. Magazines and Journals

- a. <https://egyankosh.ac.in/bitstream/123456789/99619/1/Unit-1.pdf>

4. Websites

- a. <https://foodinsight.org/>

5. Other Electronic Resources

- a. <https://www.ncbi.nlm.nih.gov/pmc/articles>

10. Course Organization

Course Code	FTE301A	
Course Title	Introduction to Food Biotechnology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

Course Specifications: Beverage Technology

Course Title	Beverage Technology
Course Code	FTE302A
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 types of beverages and their processing technology. Students will be taught the brewing of beverages and associated processing technologies. They will be familiarized about FSSAI Specification of beverages. They will also understand the role of food additives in soft drinks and their permissive level

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment**3. Course Outcomes**

After undergoing this course students will be able to:

CO-1. Explain the types of beverages

CO-2. Describe the processing technology employed in brewing of various types of beverages

CO-3. Discuss the specific equipment and packaging technology used in processing of soft drinks

CO-4. Choose appropriate food additives for soft drinks/beverages

4. Course Contents**Unit-I:**

Introduction: History and status of beverage industry.

Unit-II:

Processing of beverages: Types of beverages, fruit beverages, fruit juice based beverages, dairy

based beverages, and plant extracts, alcoholic beverages, specialty beverages, synthetic beverages, still drinks, carbonated, low-calorie and dry beverages, isotonic and sports drinks.

Unit-III:

Water treatment and quality: Water treatment and quality. Specification for beverage water. Alkalinity reduction, filtration of water, water softening.

Unit-IV:

Colorants and sweeteners: Natural and synthetic colorants used in soft drinks. Sweeteners used in soft drink and their properties, non-nutritive sweeteners. Sweeteners, colorants, acidulants, clouding, clarifying and flavouring agents for beverages; Carbonation; Quality tests and control in beverages

Unit-V:

Quality tests and control in beverages: Quality tests and control in beverages –Chemical and sensory and microbiological quality.

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				3	3	1		2
CO-2	3		1				2	1	3		2
CO-3	2			2			3		1	3	2
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
Face to Face Lectures		31
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 / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		45

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 (Assignments) 10%	SC3 (Assignments) 20%	SEE Written Exam 40%
	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

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

Course Resources

1. Essential Reading

- Course notes
- Bhatia, S.C., 2008, Handbook of Food Processing Technology, Vol 1, Woodhead publication Ltd

2. Recommended Reading

- James G. Brennan, 2011, Food Processing Handbook, Wiley-Blackwell
- Maurice Shachman, 2005, the soft Drinks Companion-Technical Handbook for the Beverage Industry, CRC Press

3. Other Electronic Resources

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

4. Websites

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

5. Other Electronic Resources

- <https://www.ncbi.nlm.nih.gov/pmc/articles>

10. Course Organization

Course Code	FTE302A	
Course Title	Beverage Technology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

MOD FOOD TECHNOLOGY
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Rangarath R.V.
145

Course Specifications: Project Management Fundamentals

Course Title	Project Management Fundamentals
Course Code	TSN301A
Department	Directorate of Transferable Skills and Leadership Development
Faculty / School	All Faculties / Schools of RUAS

1. Course Summary

With the advent of technology, changing business environments, varying economic conditions and prevailing political situations, a varied types of projects are being undertaken. This is seen in different segments such as infrastructure, construction, Information Technology, Manufacturing, Engineering, Health Care, Hospitality, Logistics and Services. Along with these, there is a big need for manpower with competencies in Managing different types and sizes of projects. A Project Management Professional equipped with, appropriate tools and techniques, an ability to apply appropriate methods and processes appropriate project leadership skills and a structured approach to manage a project in its entirety will be in a better position to ensure a project's defined success.

The course aims at imparting knowledge and developing competencies on various aspects of Project Management as per International Project Management Association's framework. This course also provides a glimpse of tools, techniques, methods and process for managing a project effectively. This course offers a structured approach which are derived from the experiences of a large number of successful global organizations.

2. Course Size and Credits:

Number of credits	03
Total hours of teaching and learning activities during the semester	45
Number of practical/tutorial hours	15
Number of semester week(s)	15
Department responsible	Directorate of Transferable Skills and Leadership Development
Course evaluation	Total Marks: 100
Pass requirement	40% (min) in Component 1 and 40% (min) in Component 2
Attendance requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (CO)

CO-1. Explain the characteristics of projects, Operations and principles of Project Management

CO-2. Discuss the Project Management Competency Elements as per PMA's Individual Competence Baseline Ver 4.0

CO-3. Discuss the tools for Project Execution, Monitoring and control

CO-4. Apply the tools for project planning and Create a Project Management Plan covering Project Charter, Work Breakdown Structure, Project Organisation, Time Management Plan and Risk Management Plan

4 Course Contents:

Unit-I:

Introduction to Project, Programmes, Portfolio and Operations Project Organization and Permanent Organization, Project Management Success KRAs. Creation of project-Need analysis, Business Case, Project Charter

Unit-II:

Requirements, Objectives & Benefits, Scope-WBS, Scope baseline, Change Management. Time Management-Lifecycle, AOA (ADM), AON (PDM), CPM, Floats, Network Exercises, Gantt Charts, Bar Charts, Resource Calendar

Unit-III:

Controlling, Handling Changes, Phase end and Close out, Earned Value Management System, Variances, SPI & CPI, Numerical Exercises. Quality Management-Quality Planning, Quality Assurance, Quality Control. Quality Tools-Pareto Chart, Control Chart, Inspections, Benchmarking. Risk & Opportunity-Risk categories, Identification, Risk Analysis.

Unit-IV:

Organization and Information, Stakeholder Management, Power and Interest, Culture and Values, Personal integrity and reliability, Personal communication, Communication Planning, Communication methods, Communication barriers, Conflict and crisis, Resourcefulness, Result Orientation

1. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		20
Demonstrations		
1. Demonstration using Videos		
2. Demonstration using Physical		

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3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop/Course		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		
1. Case Study Presentation	05	
2. Guest Lecture		
3. Industry/Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	20	
6. Discussing Possible Innovations		
Written Examination (Term tests and SEE)		05
Total Duration in Hours		50

6. Method of Assessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the respective Undergraduate Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1 or SC2), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
		Component 1: CE (50% Weightage)		Component 2: SEE (50% Weightage)
Subcomponent ►		SC1	SC2	
Subcomponent Type ►		Mid Term Exam	Assignment	50 Marks
Maximum Marks ►		25	25	

CO-1	Explain the characteristics of projects, Operations and principles of Project Management	X		X
CO-2	Discuss the Project Management Competency Elements as per PMA's Individual Competence Baseline Ver 4.0	X		X
CO-3	Discuss the tools for Project Execution, Monitoring and control	X	X	X
CO-4	Apply the tools for project planning and Create a Project Management Plan covering Project Charter, Work Breakdown Structure, Project Organisation, Time Management Plan and Risk Management Plan		X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

7. Achieving 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	How imparted during the course
1.	Knowledge	Class room lectures
2.	Understanding	Class room lectures
3.	Critical Skills	Class room lectures
4.	Analytical Skills	Group discussion
5.	Problem Solving Skills	Case discussions / Group Discussions
6.	Practical Skills	Case discussions
7.	Group Work	case study and group discussions
8.	Self-Learning	Seminars
9.	Written Communication Skills	Examination
10.	Verbal Communication Skills	Group discussions

11.	Presentation Skills	Seminars, Case discussions
12.	Behavioral Skills	Group discussion, Case discussions
13.	Information Management	Case discussions
15.	Leadership Skills	Group discussions

9. Course Resources

1. Essential Readings

- a. Course Notes
- b. Pinto Jeffrey K. (2019) Project Management: Achieving Competitive Advantage, 5th Edition, Pearson

2. Recommended Readings

- a. Meredith, J.R. and Mantel, S.J. (2005) Project Management – a managerial approach, 6th edition, Wiley
- b. Ghattas, R. G. and Sandra L. Mckee (2001) Practical Project Management, New Jersey, Prentice Hall

3. Magazines and Journals

- a. Project Manager Today
- b. PM network
- c. International Journal of Project and Operation Research, Inderscience
- d. Journal of Operation Management, Project and Operation Research, INFORMS

4. Websites

- a. <http://www.providence.edu/mcs/rbg/mba.htm>
- b. <http://library.kent.ac.uk/library/exampapers/deptcourses.php?dept=Business%20Studies>
- c. http://homepages.stmartin.edu/fac_staff/dstout/MBA631/lecture_notes.htm

10. Course Organization

Course Code	TSN301A	
Course Title	Project Management Fundamentals	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	080 – 4536 6666
	E-mail:	
Course Specifications Approval Date		
Next Course Specifications Review Date:		

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SEMESTER 6

Course Specifications: Industrial Microbiology

Course Title	Industrial Microbiology
Course Code	FTC304A
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 relevance of industrial microbiology in food processing industry.

The course intends to develop student ability to apply the techniques, principles, practices and use of microorganisms to the industrial production of food and food products. Students will also be taught maintenance of microbial starter culture, fermentation techniques and use of enzymes for commercial food processing.

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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment**3. Course Outcomes (COs)**

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

- CO-1.** Understand the importance of industrial microbiology in food processing at national and international levels.
- CO-2.** Analyze the effect of fermentation on microbiological quality and nutritive value of food products
- CO-3.** Summarize the process of beer, wine, flavor, colour and vitamins production in industries across regional to global level
- CO-4.** Develop microbial fermentation process for commercial application using locally available substrates.

4. Course Contents

Unit-I:

History and scope of industrial microbiology; Significance of industrial microbiology in the food processing industry. Screening of microorganisms for industrial applications; media, industrial sterilization: Definition, thermal death time, media heat sterilization, advantages of continuous sterilization.

Unit-II:

Types of fermentations – solid state and submerged. Bioreactor: Components of a bioreactor, parts of bioreactors. Design and working of batch, fed-batch and continuous bioreactors, kinetics of microbial growth. Optimized parameters in fermentation process – sterilization of medium, air, aeration, nutrients in medium, temperature and others.

Unit-III:

Industrially important primary and secondary metabolites produced by microorganisms; Acid, alcoholic and mixed fermentations; Beer and Wine production. Mushroom production.

Unit-IV:

Microbial production of food additives such as bacteriocins, vitamins, amino acids, colours & flavours. Probiotics: Importance, role in fermented foods.

Unit-V:

Production of microbial enzymes used in food processing: Types of microbial enzymes and their industrial applications (few selected) in food industry; Downstream processing of enzymes; Extraction; Purification; Concentration; Product recovery using relevant examples.

Practicals

1. Screening of microorganisms capable of producing industrially valuable metabolites (enzymes, antibiotics, etc.)
2. Design and working principles of a bioreactor, Monitoring and control of fermentation.
3. Preparation and sterilization of fermentation media using agricultural/industrial by-products.
4. Microbial production of enzymes used in food processing industry (amylase, protease, etc.).
5. Microbial production of organic acids used in food processing industry (acetic, lactic acid, etc.).
6. Production of wine using locally available fruits.
7. Production of fermented dairy products (curd, yoghurt, cheese, etc.) using suitable starter culture.
8. Biochemical analysis of microbial metabolites produced by fermentation (ethanol estimation, titratable, acidity, etc.)

9. Production of mushroom using locally available agricultural by-products as substrates.
10. Visit to a fermentation industry (Wine, Beer and Whiskey) to understand upstream and downstream processing techniques at large scale.

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			1
CO-2		2	3					3		2	
CO-3			3					3			
CO-4				3					3	2	1
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		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (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	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

9. Course Resources

1. Essential Reading

- a. Course Notes
- b. Principles of Fermentation Technology – Stanbury and Whitaker. Pergamon Press
- c. Industrial Microbiology – Prescott & Dunn.
- d. Laboratory Fundamentals of Microbiology – Alcamo I.E

2. Recommended Reading

- a. Arindam Kuila, Vinay Sharma. 2018. Principles and Applications of Fermentation Technology. Scrivener Publishing LLC
- b. Pelczar M J, Chan E.C.S and Krieg, Noel R, 1993, Microbiology, New Delhi, TMH
- c. James M. Jay. 2000. Modern Food Microbiology, 6th Ed. Aspen Publishers, Inc., Gaithersburg, Maryland, USA.

3. Magazines and Journals

- a. <https://shorturl.at/eyFR1>

4. Websites

- a. <https://www.ncl-india.org/files/ncim/Default.aspx>

5. Other Electronic Resources

- a. <https://shorturl.at/mvM27>
- b. <https://shorturl.at/lpBFV>

10. Course Organization

Course Code	FTC304A	
Course Title	Industrial Microbiology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

Course Specifications: Food-borne diseases

Course Title	Food-borne diseases
Course Code	FTC305A
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 relevance of foodborne diseases in food processing industry. The course intends to develop student ability to apply the techniques, principles, practical skillsets concerned with determination of the qualitative and quantitative values of the pathogenic microorganisms that pose a risk to the safety in food processing industry. Students will also be taught the fundamentals of screening and isolation of important foodborne pathogens that represent the greatest risk to food safety in the industry.

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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

- CO-1.** Understand the significance of foodborne diseases and microbiological sterilization techniques in food safety.
- CO-2.** Analyze foodborne pathogens, their contamination sources, spoilage, and prevention in major food products.
- CO-3.** Summarize foodborne toxins and explain their mechanisms of action.
- CO-4.** Apply and evaluate detection methods for foodborne diseases in compliance with food safety regulations.

4. Course Contents

Unit-I:

History and significance of foodborne diseases; Significance of foodborne diseases in determining the safety and quality of foods in the food processing industry. Screening of foodborne pathogens from various food products.

Unit-II:

Foodborne pathogenic microorganisms in food products: contamination sources, spoilage and prevention, milk & milk products, fruits & vegetables, cereals & cereal products, meat & meat products and poultry & eggs.

Unit-III:

Toxins in Foodborne Diseases - Different types of mycotoxins produced by fungal pathogens in food grains. Enterotoxins, Neurotoxins, Cytotoxins. Mechanism of action of toxins.

Unit-IV:

Methods to detect food borne disease. Biological methods: Microbial culture method, Molecular method (PCR based), Immunological method.

Unit V

Food Safety and Prevention of Food-Borne Diseases: Principles of food hygiene (clean, cook, separate, chill), HACCP and GMP as preventive measures, Role of food handlers in transmission, Case studies of outbreaks and lessons learned.

Practicals

1. Preparation and sterilization of selective media used for isolation of foodborne microorganisms.
2. Screening of foodborne pathogenic bacteria in food samples.
3. Bio-chemical characterization of important foodborne pathogens
4. Isolation of *Salmonella typhi* from poultry products.
5. Isolation of *Staphylococcus aureus* from baked food products.
6. Isolation of coliforms from various food products.
7. Identification and differentiation of coliforms using IMVIC test
8. Direct microscopic observation of foodborne bacterial pathogens using suitable staining techniques
9. Direct microscopic observation of foodborne fungal pathogens using suitable staining techniques
10. Determination of thermal death time and thermal death point of *Staphylococcus aureus*

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			1
CO-2		2	3					3		2	
CO-3			3					3			
CO-4				3					3	2	1
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		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop /Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (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	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

9. Course Resources

1. Essential Reading

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

2. Recommended Reading

- Pelczar M J, Chan E.C.S and Krieg, Noel R, 1993, Microbiology, New Delhi, TMH
- James M. Jay. 2000. Modern Food Microbiology, 6th Ed. Aspen Publishers, Inc., Gaithersburg, Maryland, USA.

3. Magazines and Journals

- <https://www.the-scientist.com/tag/foodborne-illness>

4. Websites

- <https://shorturl.at/EHSVZ>

5. Other Electronic Resources

- <https://www.who.int/health-topics/foodborne-diseases>

10. Course Organization

Course Code	FTC305A
Course Title	Food-borne diseases
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024
Next Course Specifications Review Date:	June 2028

Course Specifications: Food Packaging Technology

Course Title	Food Packaging Technology
Course Code	FTC306A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to train student on measurement of various attributes of packaging material and selection of packaging material and equipment. The students are trained on classification of packaging material and measurement of attributes of paper and paper board. Students will also be trained to determine gas transmission rate, water vapour transmission rate (WVTR) of films, coating on package and equipment for packing solid and liquid food.

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

3. Course Outcomes

After undergoing this course students will be able to:

- CO-1.** Explain current status of packaging, their functions, and impact during transportation and storage
- CO-2.** Categorize food packaging material based on their application
- CO-3.** Discuss aseptic packaging, labelling laws, packaging rules and regulations
- CO-4.** Select appropriate packaging materials and methods for food products

4. Course Contents

Unit-I:

Introduction to packaging: Packaging situations in World, India, need of packaging, plastic consumption/use in World, India etc., requirements of packaging, package functions. Hazards acting on package during transportation, labelling laws.

Unit-II:

Package Materials: Classification, Paper, Glass and Metal manufacturing, advantages and disadvantages, Special problems of packaging food stuffs- packaging of various foods compatibility, toxicity and packaging equipment.

Unit-III:

Polymers: Polypropylene, polystyrene, polycarbonate, PVC, PVDC, Cellulose acetate, Nylon etc. Lamination Coating and Aseptic packaging - Lamination, need of lamination, types, properties, advantages & disadvantages of each type Coating on paper & films, types of coatings. Need of coating, methods of coatings.

Unit-IV:

Aseptic packaging: Importance, advantages, process, comparison of conventional & aseptic packaging, materials and machineries used in packing of food products. Packaging of specific foods with respect to their properties, like bread, biscuits, coffee, milk powder, egg powder, carbonated beverages, snack foods, Fruits, Vegetables, raw meat etc

Unit-V:

Mechanical and functional tests: Shelf life of packaged food stuff. Mechanical and functional tests on Package boxes and package materials. Permeability and migrating tests of packaging material. Labelling laws, packaging rules and regulations. Basic concepts – vacuum, Modified Atmospheric package and controlled atmospheric package, shrink and stretch packaging and retort pouch.

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		1	
CO-2			3					2		2	
CO-3						2	2			3	
CO-4				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
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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
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%	SEE Written Exam 40%
	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:

Sl.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

- a. Gordon L. Robertson. 2014. Food Packaging: Principles and Practice, 3rd Ed. CRC Press, Boca Raton, FL, USA.

- b. Richard Coles, Berek McDowell and Mark J. Kirwan. 2003. Food Packaging Technology. Blackwell Publishing Ltd., Oxford, UK

2. Recommended Reading

- NIIR Board, 2012, Food Packaging Technology Handbook, published by NIIR project Consultancy service
- Frank Albert Paine, Heather Y. Paine., 1992 “Handbook of Food Packaging Technology” Published by Blackie academy and Professional.
- Gordon L. Robertson. 2010. Food Packaging and Shelf Life – A Practical Guide. CRC Press, Boca Raton, FL, USA.
- NIIR Board of Consultant and Engineers, Food Packaging Technology Handbook, NIIR

3. Magazines and Journals

- <https://krishi.icar.gov.in/jspui/bitstream>. Websites

4. Websites

- <https://www.pappcoindia.com/>

5. Other Electronic Resources

- <https://shorturl.at/mvM27>
- <https://shorturl.at/lpBFV>

10. Course Organization

Course Code	FTC306A	
Course Title	Food Packaging Technology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

Course Specifications: Dairy Technology

Course Title	Dairy Technology
Course Code	FTE303A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

Aim of this course is to comprehend various engineering properties of dairy and food materials and to understand the different processing technologies used in dairy plant. The students will be able to understand the engineering properties of milk and milk products. Students will gain knowledge on the thermal process, evaporation, drying and material handling process used in dairy plant.

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

- CO-1.** Various engineering properties of dairy products
- CO-2.** Thermal processing and evaporation process used in dairy plant
- CO-3.** Illustrate the drying and material handling process carried out in dairy plant
- CO-4.** Demonstrate the dairy processing and handling equipment

4. Course Contents

Unit-I:

Engineering properties: Engineering properties of milk and milk products and their significance in equipment design; processing and handling of dairy and food products.

Unit-II:

Homogenization of milk: Principle of homogenization, Effect of homogenization, Technical execution, valves and pumps, single and double stage homogenizers, care and maintenance of homogenizers, Efficiency of homogenization, design principles of homogenizers, operation and maintenance, application of homogenization in dairy industry. Recent advances in homogenization.

Unit-III:

Thermal processing of milk and milk products: Pasteurization; batch, flash and continuous pasteurizer, HTST pasteurizer and design principle and thermal death kinetics, care and maintenance, UHT processing of milk, quality changes during processing of milk and milk products

Unit-IV:

Dairy equipment's: Tanks, pumps, stirrer mixtures and centrifugation: Designs and equipment of tank, types of tanks, pumps in dairy industry, Agitation and mixing, construction of agitators and patterns of flow. Factors in mixing, types, operation, mixing gas, liquid and solid, heat transfer in mixers, power requirement, transmission, scale-up of models. Separation by gravity and centrifugal force, clarifiers and separators, centrifugal separator and efficiency of separation, flow rate and power consumption.

Unit-V:

Evaporation: Classification, design of multiple-effect evaporator, temperature distribution, boiling point elevation, operation, feeding methods, condensate and air removal, scale formation and removal, heat and mass balance, vapor recompression, design of recovery system.

Unit-VI:

Milk powder preparation: Theory of drying, estimation of drying rates and drying time, drying equipment, particle size calculation, design of spray and drum dryer, skim milk and whole milk powders manufacturing methods. Fluidized bed drying, Principles of fluidized bed method, Types of fluidized bed drier, Drying and cooling times in fluidized bed; Freeze drying; Agglomeration, Problems of reconstitution, Methods of Agglomeration, The effect of drying on milk products. Recent advances in drying. Design data performance and selection and design of dryer

Unit-VII:

Material handling: System and devices, design of screw, belt, flight, apron conveyors, bucket elevators, power requirements, and applications, feeders and feeding mechanism. Dairy plant production planning, operation and maintenances

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							3		
CO-2			2							1	
CO-3		2									3
CO-4				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
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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		45

HOD-FOOD TECHNOLOGY

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

BANGALORE-560054

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr. 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

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Bangalore-560054

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 (Lab Exercise) 10%	SC3 (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

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

- Course Notes
- Das H. 2005. Food Processing Operations and Analysis. Asian Books.
- Fellows PJ. 1988. Food Processing Technology, Principle & Practices. Ellis Horwood.
- Toledo RT. 2007. Fundamentals of Food Process Engineering. Springer.
- Ahmed T. 1997. Dairy Plant Engineering and Management. 4th Ed. Kitab Mahal.

2. Recommended Reading

- Avantina Sharma, 2010, Textbook of food science and technology, IBDC publisher, 2nd Ed
- Gary Krutz, Lester Thompson & Paul Clear. 1984. Design of Agricultural Machinery. John Wiley & Sons.
- Hall CW & Davis DC. 1979. Processing Equipment for Agricultural Products. AVI Publ.
- Higgins L & Morrow LC. 1977. Maintenance Engineering Hand-Book. McGraw Hill.
- Stanier W. 1959. Plant Engineering Hand-Book. McGraw Hill.

3. Magazines and Journals

- FOOD SCIENCE & TECHNOLOGY-Magazine

4. Websites

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

5. Other Electronic Resources

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

10. Course Organization

Course Code	FTE303A
Course Title	Dairy Technology
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024
Next Course Specifications Review Date:	June 2028


HOD, FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560054

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)


DEAN
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560054


Dean - Academics
M. S. Ramaiah University of Applied Sciences
Bangalore-560054

Course Specifications: Technology of Meat and Poultry

Course Title	Technology of Meat and Poultry
Course Code	FTE304A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of the course is to equip students to understand meat production and processing technology. The students will be taught current status of meat and poultry industry in India and its importance. Students will understand Slaughter, inspection and grading of meat followed by Physico-chemical properties, effects of feed, breed and environment on production and quality of meat. Students are also introduced to general Hazard Analysis Critical Control Point (HACCP) model, refrigeration of meat, tenderization of meat, Egg structure, quality and preservation.

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes

After undergoing this course students will be able to:

CO-1. Explain different methods of processing, grading and preservation of meat and eggs

CO-2. Discuss development of meat and poultry industry and its importance in India

CO-3. Discuss the effect of feed, breed and environment on production of quality meat

CO-4. Analyse structure, physicochemical properties and quality of meat and eggs

CO-5. Apply Hazard Analysis Critical Control Point (HACCP) model for meat processing

CO-6. Explain Meat preservation techniques

4. Course Contents

Unit-I:

Livestock and poultry population in India, Development of meat and poultry industry in India and its need in nation's economy, Glossary of live market terms for animals and birds.

Unit-II:

Sources and development of meat and poultry industries and importance in national economy. Muscle structure, chemical composition and flavour-chemical properties of meat muscle

Unit-III:

Effects of feed, breed and environment on production of meat animals and their quality, Meat Quality-color, flavour, texture, Water-Holding Capacity (WHC), Emulsification capacity of meat.

Unit-IV:

Slaughter, inspection and grading, Ante mortem examination of meat animals, slaughter of buffalo, sheep/ goat, poultry, pig.

Unit-V:

A Generic HACCP model, dressing of carcasses, post-mortem examination of meat Processing and preservation of meat- mechanical deboning, aging or chilling, freezing, pickling, curing, cooking and smoking of meat.

Unit-VI:

Refrigeration and freezing, thermal processing- canning of meat, retort pouch, dehydration, irradiation, and RTE meat products, meat curing, Sausages- processing, types and defects.

Unit-VII:

Meat tenderization. Meat emulsions. Technology of manufacture of meat and poultry products. Meat plant sanitation and safety. By-products utilization of abattoir.

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3						1		1	2	
CO-2		2		1					1		
CO-3	2		1				1	1			1

HOD-FOOD TECHNOLOGY

DEAN

Ramya R.V.
Dean - Academics

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

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CO-4				3			1			2	
CO-5	2					1					2
CO-6	2		1	1			1		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		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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		45

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 (Assignments) 10%	SC3 (Assignments) 20%	SEE Written Exam 40%
	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
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

HOD: FOOD TECHNOLOGY

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023); 31st ACM (22nd Mar 2024); 36th ACM (27th Sept 2025)

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FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

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9. Course Resources

1. Essential Reading

- a. Vikas Nanda. 2014. Meat, Egg and Poultry Science & Technology. I.K. International Publishing House Pvt. Ltd., New Delhi.
- b. B.D. Sharma. 1999. Meat and Meat Products Technology Including Poultry Products Technology. Jaypee Brothers Medical Publishers Pvt. Ltd, New Delhi

2. Recommended Reading

- a. Lawrie R A, Lawrie's ,2000, Microbiology of Safe Food, USA, Oxford&Sons,
- b. Parkhurst&Mountney, 1997, Poultry Meat and Egg Production, New Delhi, CBS Publication
- c. Pearson &Gillet, 1997, Processed Meats, New Delhi, CBS Publication.
- d. ShaiBarbut, Poultry Products Processing, 2005, CRC Press
- e. Stadelman WJ, Owen J Cotterill, 2002, Egg Science and Technology, New Delhi, CBS Publication
- f. B.D. Sharma and Kinshuki Sharma. 2011. Outlines of Meat Science and Technology. Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.
- g. William J. Stadelman and Owen J. Cotterill. 1995. Egg Science and Technology, 4th Ed. Food Products Press, NY, USA.

3. Magazines and Journals

- a. Journal of Egg Science and Technology

4. Websites

- a. <https://www.britannica.com/>

5. Other Electronic Resources

- a. <https://www.arc.agric.za/arc-api/>

10. Course Organization

Course Code	FTE304A	
Course Title	Technology of Meat and Poultry	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	


 HOD-FOOD TECHNOLOGY
 FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
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Approved: 26th ACM (14th Oct 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

Course Specifications: Research Methodology

Course Title	Research Methodology
Course Code	FTC307A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The course aims at providing students with an insight into the research methodology and the associated responsibilities of a researcher.

This course deals with the principles of research, research methodology, significant phases of research, significant role of Literature Review, expectations from good literature review as well as procedure for systematic literature review. The essential aspects of technical communication to develop desirable writing skills for the preparation of research document including research paper as well as the skills for an effective presentation are also discussed.

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

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 value, scope, relevance and mandatory steps of research

CO-2. Demonstrate the procedures outlined for a systematic Literature Review

CO-3. Analyze and prepare well-structured research proposal and paper

CO-4. Identify and apply the essential skills desirable for an effective technical presentation

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Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

4. Course Contents

Unit-I:

Basics of Research – Definitions, Mandatory Steps, Types, Relevance of Research for Innovation and Technology Development, Effective Research and Self Discipline, library resources

Unit-II:

Literature Review – Importance, Constituents, sources, Strategies for Literature Search, search engines, overview of citations, Referencing, Paraphrasing, usage of library resources

Unit-III:

Research methodologies - Quantitative and Qualitative, Descriptive, Survey, Experimentation, etc.

Unit-IV:

Research Design- Sample and Sampling Methodology and its estimation. Development of study tools including data collection methods (questionnaire and checklists)

Unit-V:

Statistical Analysis- Descriptive and Inferential Statistics. Formulation and testing of hypothesis, Usage of T, F, Chi-square, Annova, Co-relation, etc.

Unit-VI:

Research Proposal – Identification of research gap, topic, problem statement, identification of variables and their types, Structure of a Good Research Proposal, Getting Started, Tips for compilation of Good Research Proposal.

Unit-VII:

Technical Communication - Research Paper for Publication- Significance of Problem Statement and its scope, Formulation of Hypothesis, Adequacy of Methodology, Significance of Presentation and Discussion of Results, Relevance and Importance of references.

Unit-VIII:

Effective Presentation – Preparation, Templates, Balance between Good Design and Good Content, Planning and Sequencing, 4P's Rule (Plan, Prepare, Practice and Present), Essentials of Effectiveness, Effective Pausing and Inclusive Answering.

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	2	
CO-2		2		1					1		

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CO-3	2		1				1	1			1
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		25
Demonstrations		08
1. Demonstration using Videos	08	
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 / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		07
1. Case Study Presentation	05	
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	
CO-1	X	X		X
CO-2	X	X		X
CO-3	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	Case Presentations
11	Presentation Skills	Case Presentations
12	Behavioral Skills	Class Presentations
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
- Booth W. C, Colomb and G.G Williams. (2005) The Craft of Research, Chicago University Press
- William M.K and Trochim. (2003) Research Methods, 2nd Edition, Biztantra Publications

2. Recommended Reading

- Jonathan Grix. (2004) The Foundation of Research, Palgrave Study Guides
- Wisker Gina. (2001) The Post Graduate Research Handbook, Palgrave
- Rugg G. and Petre M. (2004) The Unwritten Rules of Ph.D research, Open University

3. Other Electronic Resource

10. Course Organization

Course Code	FTC307A	
Course Title	Research Methodology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	August 2024	
Next Course Specifications Review Date:	July 2026	

HOD-FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
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Course Specifications: Internship/Group project

Course Title	Internship/Group project
Course Code	FTI302A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

This module is intended to provide students with an opportunity to apply theoretical knowledge to solving a problem or developing a product. The students will learn skills related to problem identification, planning, management, and execution through working in a team. The group project will focus on the application of appropriate techniques and methodologies and the methodologies and the efficient utilization of resources for the project's execution.

This module will also enable the students to gain practical experience working in a project mode, requiring interactions with the domain specialist to meet the technical challenges of the project undertaken. The significant feature of the project will be the demonstration of its applicability and quantification of benefits.

2. Course Size and Credits:

Number of Credits	0+2
Total Hours of Classroom Interaction	0
Number of laboratory Hours	60
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

CO-1. Work in a team and undertake a project in their area of specialization.

CO-2. Apply appropriate research methodologies while formulating a project.

CO-3. Apply their theoretical knowledge of food science and technology to executing the project.

CO-4. Define specifications, analyze, develop, and evaluate a project.

CO-5. Prepare and present appropriate forms of audio-visual, verbal, and written documentation to describe the project, its execution, and its outcome.

4. Course Contents

- Need for undertaking a project, problem identification, development of the project, evaluation, and presentation.
- Project management
- Costing, finance management, raw material procurement, product development, testing, project evaluation, exhibition, and presentation.
- Team building, teamwork, and leadership skills

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	2					2	2		1	1		2
CO-2		2	3								2	2
CO-3		2	2	1						2	2	
CO-4		3	2	2							2	3
CO-5						1	2	3			2	3
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Topics	Teaching methods	Hours
Critical Review, Problem Formulation and stating Objectives	Reading Journal papers, books and Other relevant materials and problem formulation	20
	Presentation to Reviewers	5

Design	Group work with supervisor's guidance	5
Analysis	Group work with supervisor's guidance	5
Testing and Evaluation	Group work with supervisor's guidance	5
Verification/Validation	Group work with supervisor's guidance	5
Drawing Conclusions	Group work with supervisor's guidance	1
Presentation , Thesis/Report Writing and Viva Voce	Presentation and Viva voce-Group	1
	Thesis/Report writing - Group	10
Tests/Examinations/Presentations		3
Total		60

7. Course 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 (30% weightage)	SEE (20% weightage)
	Presentations (60 Marks)	Project Report (40 Marks)
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X
CO-5	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

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	Group Project work
2.	Understanding	Group Project work
3.	Critical Skills	Group Project work
4.	Analytical Skills	Group Project work
5.	Problem Solving Skills	Group Project work
6.	Practical Skills	Group Project work
7.	Group Work	Group Project work
8.	Self-Learning	Group Project work
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Group Project work
13.	Information Management	Group Project work
14.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

1. References

- a. Assigned reading relevant to the Internship/Training/Project/ Group project.

10. Course Organization

Course Code	FTI302A	
Course Title	Internship/Group project	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	Phone:	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date	June 2028	

HOD-FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
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Approved: 26th ACM (14th Jul 2022), Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025)

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Course Specifications
of
B.Sc. (Honours) Food Processing and Technology
B.Sc. (Honours with Research) Food Processing and Technology

SEMESTER 7


HOD-FOOD TECHNOLOGY
FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Course Specifications: Advanced Processing and packaging Technology

Course Title	Advanced Processing and packaging Technology
Course Code	FTC401A
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 advanced processing and packaging technological aspects for food products. Student will be familiarized about the fundamentals of novel processing of foods and will impart basic knowledge on the advanced methods of food processing and packaging. They will understand the processing technology adopted in various types of food products such as fruits and vegetables, proceed foods in food industry

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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

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 fundamentals of the various food processing methods.

CO-2. Understand the significance of modern packaging and processing technology.

CO-3. Selection of appropriate methods for food systems.

CO-4. Analyse methods of various processing and packaging techniques.

CO-5. Examine various processing and packaging strategies.

CO-6. Design new manufacture techniques to develop process for specific purposes.

HOD-FOOD TECHNOLOGY

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES
M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
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4. Course Contents

Unit-I:

Membrane technology: Pressure activated membrane processes: MF, UF, NF and RO and their industrial application. Membrane distillation Supercritical fluid extraction: Concept, property of super critical fluids SCF, extraction methods, application in food processing

Unit-II:

Microwave and radio frequency processing: Advantages, mechanism of heat generation, application in food processing: microwave blanching, sterilization and finish drying Hurdle technology: Concept and Principle, Preservation techniques as hurdles and their principles, hurdle tech foods.

Unit-III:

High pressure processing: Concept, equipment for HPP treatment, mechanism of microbial and enzyme inactivation and its application in food processing, effect on food constituents. Ultrasonic processing: Properties of ultrasonic, types of equipment, application of ultrasonic as processing technique.

Unit-IV:

Newer techniques in food processing: Principle and application of high intensity light, Pulse electric field, Ohmic heating, IR heating, Inductive heating, Cold plasma, and Pulsed X-rays in food processing and preservation, Cryo-processing of foods. Nanotechnology: Principles and applications in foods.

Unit-V:

Ultrasound processing: Ultrasound processing: fundamentals of ultrasound, ultrasound as a food preservation and processing aid, effects of ultrasound on food properties.

Unit-VI:

Active and Intelligent Packaging: Packaging techniques- Definition, Concept, Types, current use of novel packaging techniques. Novel packaging- oxygen, ethylene and other scavengers: Oxygen scavenging technology, selecting right types of oxygen scavenger, ethylene scavenging technology, carbon dioxide and other scavengers. Antimicrobial food packaging: Antimicrobial agents, constructing/ designing antimicrobial packaging systems, factors affecting the effectiveness of antimicrobial packaging.

Unit-VII:

Filling and Sealing: Types of fillers, seals and sealing equipment. Types of Pouches and Form Fill Seal machines. Labelling - Types of Labels - Nutrition Label - Printing Techniques.

Unit-VIII:

Advanced Packaging Technologies: Vacuum and inert gas packaging. Retort packaging. Aseptic Packaging, Biodegradable Packaging, Modified Atmosphere Packaging, Controlled atmosphere storage and Diffusion channels.

Practicals

1. Preservation and processing of vegetables by drying and dehydration
2. Preservation of foods by Sugar/ chemical preservatives.
3. Study of different oxygen scavengers systems and their analysis
4. Application of anti-microbial packaging for moisture sensitive foods
5. Evaluation of chemical residue migration from package to food
6. Application of MAP packaging in selected foods
7. To study textural characteristics of selected fruit/ vegetable under MAP storage
8. Shelf life evaluation of packaged food product.
9. Determination of shelf life of fresh fruits and vegetables by using edible coating and films.
10. Visit to food processing and packaging industry

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			
CO-2		2	2					3			
CO-3			2					2			
CO-4				3					3		1
CO-5		2								3	
CO-6			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		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		

3. Engineering Workshop / Course/Workshop / Kitchen		56
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	X	-	X	X
CO-3	X	X	-	X	X
CO-4	-	-	X	X	X
CO-5	-	-	X	X	X
CO-6	-	-	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 classes
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
- Lab manual
- Sun, D. Emerging Technologies for Food Processing, (Academic Press, 2005)
- Barbosa-Canovas, G. V., Tapia, M. S. and Cano, M. P. Novel Food Processing Technologies, (CRC Press, 2004)
- Dutta AK & Anantheswaran RC.1999. Hand Book of Microwave Technology for Food Applications.
- Cheryan M. 1998. Ultra-filtration and Micro-filtration Handbook. Technomic Publ.

2. Recommended Reading

- Ohlsson, T. and Bengtsson, N. Minimal Processing technologies in the food industry, (Woodhead Publishing Limited, 2002)
- Gould G W, 2000. New Methods of Food Preservation, CRC Press.
- Sun DW, 2015. Emerging Technologies for Food Processing, Elsevier Ltd.
- Kudra T and Mujumdar AS, 2009. Advanced Drying Technologies, CRC Press.
- Nema PK, Kaur BP and Mujumdar AS, 2018. Drying Technologies for Foods: Fundamentals and Applications, CRC Press

3. Magazines and Journals

- a. FOOD SCIENCE & TECHNOLOGY-Magazine

4. Websites

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

5. Other Electronic Resources

- a. <https://www.intechopen.com/books/11642>

10. Course Organization

Course Code	FTC401A	
Course Title	Advanced Processing and packaging Technology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

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Course Specifications: Food storage and Preservation Technology

Course Title	Food storage and Preservation Technology
Course Code	FTC402A
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 food preservation, Principles and Methods of food preservation, Heat preservations like blanching, pasteurization, sterilization, canning, freezing, Preservation by use of salt and sugar, Direct damage, indirect damage, sources of infestation, Food storage; Definition, Design of storage structure, Types of storage: Traditional, Temperature and moisture change in storage structures, storage of agricultural perishables, controlled and modified atmosphere storage, Permanent storage structures, Shed, vertical silo, squat silo.

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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment**3. Course Outcomes (COs)**

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

- CO-1.** Explain History evaluation and Introduction to food preservation and storage
- CO-2.** Describe the Principles and Methods of food preservation
- CO-3.** Elucidate direct damage, indirect damage and sources of infestation
- CO-4.** Briefly explain about design and types of storage structures

4. Course Contents

UNIT-I:

History evaluation and Introduction to food preservation and storage, importance of food preservation, Need for food preservation, Definition of food preservation, Advantages and scope of food preservation.

UNIT-II:

Principles and Methods of food preservation; Fermentation, Carbonation, Irradiation, Drying and Dehydration, Heat preservations like blanching, pasteurization, sterilization, canning, freezing, Preservation by use of salt and sugar, Chemical preservatives, advantages and disadvantages.

UNIT-III:

Direct damage, indirect damage, sources of infestation, Food storage; Definition, Design of storage structure, Types of storage: Traditional (Morai, Bukhari, kothar, mud, muda, kanaj, kuthla) and Modern storage structures (pusa bin, brick and cement bin, bunker storage, CAP).

Unit-IV:

Temperature and moisture change in storage structures, storage of agricultural perishables, controlled and modified atmosphere storage, Permanent storage structures, Shed, vertical silo, squat silo.

Unit-V:

Silo design; Pressure distribution in bin, lateral and vertical pressure, overpass during emptying, construction materials, Durability, Aeration and fumigation, Air tight storage, Dust hazards.

Practicals:

1. Determination of physical properties of grains
2. Market survey of preserved foods
3. Determination of terminal velocity
4. Determination of angle of repose
5. Determination of bulk and true density
6. Determination of particle shape and size
7. Determination of Hopper angle
8. Numerical on lateral and vertical pressure of storage structure
9. Numerical on silo design
10. Visits to food processing and storage unit

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	2							2			
CO-2		2	2					3			
CO-3			3				2	3			
CO-4				3					3		1
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		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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 (Lab Exercise) 10%	SC3 (Assignment) 20%	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	X	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

9. Course Resources

1. Essential Reading

- Course Notes
- Lab manual
- K M Sahay and K K Singh, 2001. Unit operations of agricultural processing.
- D S Warriess. Food processing and preservation vol 2.

2. Recommended Reading

- Rory Anderson, 2010, Textbook of food storage
- Handbook on Fruits, Vegetables & Food Processing with Canning & Preservation 01 Edition (English, Paperback, NPCS Board

3. Magazines and Journals

- Food preservation and storage magazines

4. Websites

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

5. Other Electronic Resources

- <https://www.google.co.in/books/edition/Food Storage for Self Sufficiency and Su/8BljDwAAQBAJ?hl=en&gbpv=1&dq=Food+storage+books+online+link&printsec=frontcover>

10. Course Organization

Course Code	FTC402A	
Course Title	Food storage and Preservation Technology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

Course Specifications: Food Toxicology

Course Title	Food Toxicology
Course Code	FTC403A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The course aims at providing students with an insight into the toxicological aspects of food technology. This course helps student understand the different types of toxins and adulterants such as mutagens, carcinogens, teratogens, and also their natural sources of such contaminations. The course also makes students understand the mechanism of such toxicity are exerted by these toxins. Students will learn how to assess and monitor such toxins from contaminating foods. Finally, the course discusses some of the relevant case studies, highlighting the social impact of such toxins in food.

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

- CO-1.** Understand the basic principles of food toxicology, including the sources and types of foodborne contaminants and toxins.
- CO-2.** Identify and evaluate various risk factors associated with food safety.
- CO-3.** Explain the mechanisms of toxicity of different foodborne agents.
- CO-4.** Apply knowledge of food toxicology to real-world scenarios, including risk assessment and management.

4. Course Contents

Unit-I:

Introduction to Food Toxicology: Definition and scope of Food Toxicology. Definition of Toxins & types of toxins. Chemical, biological, and physical contaminants. Naturally occurring toxins in food. Intentional and unintentional food additives.

Unit-II:

Mechanisms of Food Toxicity: Chemical, microbial, and physical mechanisms. Toxicokinetics and Toxicodynamics. Genotoxicity, Cytotoxicity, Neurotoxicity.

Unit-III:

Mutagens & Carcinogens: Definition. Types of mutagens & carcinogens. Chemical & biological. Mechanism of mutagenicity and carcinogenicity. Food sources for mutagens and carcinogens.

Unit-IV:

Teratogens: Definition. Mechanism of teratogens. Food sources for teratogens. Pesticide Residues. Methylmercury in Seafood.

Unit-V:

Food Allergens: Allergic reactions and sensitization. Common food allergens. Labeling and detection of allergens.

Unit-VI:

Risk Assessment and Management: Hazard identification, exposure assessment, and risk characterization. Regulatory agencies and guidelines. Risk communication and consumer perception.

Unit-VII:

Emerging Issues in Food Safety: Nanotechnology in food. Genetically modified organisms (GMOs). Food fraud and adulteration

Unit-VIII:

Case Studies and Practical Applications: Foodborne disease outbreaks. Food safety in the global supply chain

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

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M. S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

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Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025), 38th ACM (10th June 2026)

CO-1	3							3			
CO-2		2		1				1	3		
CO-3	3							3	1		
CO-4				3				3	1		
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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
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%	SEE Written Exam 40%
	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:

Sl. 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
- Shaw, I.C., 2018. Food safety: the science of keeping food safe. John Wiley & Sons.
- De Vries, J. ed., 2021. Food safety and toxicity. CRC press.

2. Recommended Reading

- a. Deshpande, S.S., 2002. Handbook of food toxicology. CRC Press.
- b. Püssa, T., 2007. Principles of food toxicology. CRC Press.
- c. Deshpande, S.S., 2002. Handbook of food toxicology. CRC Press.

3. Magazines and Journals

- a. Food and Chemical Toxicology

4. Websites

- a. <https://www.sciencedirect.com/journal/food-and-chemical-toxicology>

5. Other Electronic Resources

- a. https://www.wageningenacademic.com/doi/pdf/10.3920/978-90-8686-933-6_13

10. Course Organization

Course Code	FTC403A	
Course Title	Food Toxicology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

Course Specifications: Emerging Technologies in Food Processing

Course Title	Emerging Technologies in Food Processing
Course Code	FTE401A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to introduce students to latest and emerging technologies in food processing. Students are exposed to emerging food processing technologies like high pressure processing, pulsed electric fields processing, osmotic dehydration, ultrasound, and irradiation. Students are also introduced to alternative thermal processing like combined microwave vacuum drying, recent advances in hybrid drying technologies, infrared heating, concepts of minimal processing and innovations in food processing technologies.

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

3. Course Outcomes

After undergoing this course students will be able to:

- CO-1:** Describe non-thermal food processing techniques like osmotic dehydration, high-intensity Pulsed light technology, high pressure processing and pulsed electric fields processing
- CO-2:** Apply alternative thermal food processing like combined microwave vacuum drying, Radio-Frequency Processing and hurdle technology
- CO-3:** Adopt latest innovation in food refrigeration and minimal Processing Technologies in food preservation.

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4. Course Contents

Unit-I:

High Pressure Processing of-Fruits and Fruit Products, Salads and Ready Meals, Meats and Seafood, & Microbiological Aspects of High-Pressure Processing.

Unit-II:

Pulsed Electric Fields, Processing of Liquid and Solid foods, Effect of High-Intensity Electric Field Pulses on Solid Foods, Enzymatic Inactivation by Pulsed Electric Fields.

Unit-III:

Other Non-thermal Processing Techniques-Recent Developments in Osmotic Dehydration, A thermal Membrane Processes for the Concentration of Liquid Foods and Natural Colors, High-intensity Pulsed Light Technology.

Unit-IV:

Non thermal Processing By Radio Frequency Electric Fields- Application of Ultrasound, Irradiation, hurdle technology, Decontamination of Foods by Cold Plasma, Opportunities and Challenges in the Application of Ozone in Food Processing.

Unit-V:

Alternative Thermal Processing- Recent Developments in Microwave Heating, Radio-Frequency Processing, Ohmic Heating, Combined Microwave Vacuum Drying, Recent Advances in Hybrid Drying Technologies, Infrared Heating.

Unit-VI:

Innovations in Food Refrigeration- Vacuum Cooling of Foods, Ultrasonic Assistance for Food Freezing, High-Pressure Freezing, Controlling the Freezing Process with Anti-freeze Proteins, Freezing Combined with Electrical and Magnetic Disturbances.

Unit-VII:

Minimal Processing- Minimal Processing of Fresh Fruit, Vegetables, and Juices, Minimal Processing of Ready Meals, Modified Atmosphere Packaging, for Minimally Processed Foods.

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1			3	3			1	2		3	
CO-2			3					2		3	1
CO-3				3				3			1
3: High Influence, 2: Moderate Influence, 1: Low Influence											

HOD-FOOD TECHNOLOGY

FACULTY OF LIFE AND ALLIED HEALTH SCIENCES

M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (3rd Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025), 38th ACM (10th June 2026)

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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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
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%	SEE Written Exam 40%
	25 + 25 Marks	10 Marks	40 Marks	50 Marks
CO-1	X	X	-	X
CO-2	X	X	-	X
CO-3	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:

Sl.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
- Megha R.Goyal and Mital J. Kaneria, Food Technology: Applied Research and production Apple Academic press

2. Recommended Reading

- Amit K.Jaiswal, Food processing Technologies: Impact on product attributes, CRC press
- Geoffrey campbellplatt, 2009, Food science and technology, Wuley-Blackwell

3. Other Electronic Resources

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

4. Magazines and Journals

- Innovative Food Science & Emerging Technologies

5. Websites

- <https://pubmed.ncbi.nlm.nih.gov/22129381/>

6. Other Electronic Resources

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

10. Course Organization

Course Code	FTE401A
Course Title	Emerging Technologies in Food Processing
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024
Next Course Specifications Review Date:	June 2028

Course Specifications: Food Analysis and Instrumentation

Course Title	Food Analysis and Instrumentation
Course Code	FTE402A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The course aims at providing students with an insight into the different instrumentation facilities that are functional in food analysis. Students will learn the principle and applications of modern instrumentations including microscopy, spectrometry, centrifuge and chromatography, and also their application in food. The students would be provided with in-depth knowledge on correlating multiple instruments to assure the safety and value of food products.

2. Course Size and Credits:

Number of Credits	03+0
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 Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

CO-1. Understand the fundamental principles of food analysis.

CO-2. Familiar with various analytical instruments used in food analysis.

CO-3. Understand the importance of quality control and safety in food analysis.

CO-4. Understand the significance of food safety and traceability of food products.

4. Course Contents

Unit-I:

Microscopy: Properties of light in relation to microscopy - Wavelength, resolution, reflection, transmission, absorption, refraction, diffraction; Types of Microscopes: Principle, construction and uses of bright field microscopy, dark field microscopy, stereomicroscopy, phase contrast

microscopy, Nomarski (DIC) microscopy, inverted microscopy, polarization microscopy, confocal microscopy, fluorescent microscopy, electron microscopy (TEM, SEM), atomic force microscope, Camera lucida, photomicrography (Self-study) and image analysis.

Unit-II:

Centrifugation: Principle of Centrifugation; Types of centrifuges and rotors; Types of techniques in centrifugation.

Unit-III:

Spectroscopy: Visible, UV, FT-IR, NMR, AAS, XRD. Radiobiology: radioisotope techniques (GM counter, scintillation and autoradiography).

Unit-IV:

Chromatography: Types of Chromatography and their applications: Principle and Working of Paper chromatography, TLC, HPTLC, Column chromatography, Gel filtration, affinity, ion exchange, Gas chromatography, HPLC and hydrophobic interaction chromatography. Electrophoresis (agarose and PAGE), isoelectric focusing.

Unit-V:

Food Quality Analysis: Proximate analysis. Nutritional analysis. Analysis of food additives and preservatives. Water activity and moisture analysis. Sensory analysis.

Unit-VI:

Food Safety Analysis & Traceability: Foodborne pathogens detection. Mycotoxin analysis. Pesticide and chemical residue analysis. Traceability and labelling

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		

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		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		04
Others		
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
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%	SEE Written Exam 40%

	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
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. References

a. Nielsen, S.S. ed., 2003. *Food analysis laboratory manual* (p. 557). New York, NY, USA: Kluwer Academic/Plenum Publishers.

b. Pomeranz, Y. ed., 2013. *Food analysis: theory and practice*. Springer Science & Business Media.

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- c. Nollet, L.M. and Toldrá, F. eds., 2012. *Food analysis by HPLC*. CRC press.
- d. Otles, S. ed., 2016. *Handbook of food analysis instruments*. CRC Press.
- e. Sforza, S. ed., 2013. *Food authentication using bioorganic molecules*. DEStech Publications, Inc.

2. Magazines and Journals

- a. FOOD SCIENCE & TECHNOLOGY-Magazine

3. Websites

- a. <https://bakerpedia.com/>

4. Other Electronic Resources

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

10. Course Organization:

Course Code	FTE402A	
Course Title	Food Analysis and Instrumentation	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

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Course Specifications: Internship

Course Title	Internship
Course Code	FTI403A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to enable students to experience a working environment in a Food Processing/Manufacturing Industry.

The students visit various departments of an organization and observe the activities in the units as Research & Development, Manufacturing and Production, clean rooms and other relevant units and relate to underlying theoretical and practical concepts. Students are also required to understand the principles and processes practiced in the downstream and upstream processing involved in the production of food products and its processing operations with advanced technology.

2. Course Size and Credits:

Number of credits	0+2
Total number of hours available per	60
Number of semester weeks	16
Department responsible	Food Technology
Course marks	As described in the program specification
Pass requirement	As per Academic Regulations
Attendance requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After undergoing this course students will be able to:

- CO-1.** Discuss the organizational vision, mission, core values and structure relating to its products
- CO-2.** Discuss the functional areas, and operational activities of various sections of Food manufacturing industries
- CO-3.** Summarize SWOT analysis, GLP and GMP of the organization
- CO-4.** Explain the regulatory measures for new food product production and launching
- CO-5.** Prepare internship report as per prescribed format

4. Course Contents

1. Study the profile, Vision and Mission, Product range of the organisation
2. Study organisational structure of the selected organisation in relation to the product development
3. Conduct a detailed SWOT analysis of the organization
4. Study Functional areas and Operational activities of various sectors of Food manufacturing industries
5. Select a particular function in the department and study the process in detail including the various stakeholders involved
6. Identify good laboratory practices and good manufacturing practices in the sectors
7. Regulatory bodies and regulations involved in production and launching of a food product
8. Prepare and present Industrial visit/internship report in the prescribed format

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	-	-	-	-	-	1	-	1	1
CO-2	2	2	-	-	-	-	-	1	2	-	1
CO-3	-	-	2	-	3	-	-	-	2	-	-
CO-4	-	-	2	-	3	-	-	-	2	-	-
CO-5	-	-	2	-	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
Face to face interaction		04
Industry Internship		56
Field work	40	
Report Writing	10	
Presentation preparations	03	
Evaluation of Report and Presentations	03	
Total Duration in Hours		60

7. Course Assessment and Reassessment

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 (Presentation and Viva- voce, 60% Weightage)	SEE (Internship Report, 40% Weightage)
	30 Marks	20 Marks
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X
CO-5		X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of course outcomes in each component assessed in the above template at the beginning of the semester.

Course reassessment policies are also presented in the Academic Regulations document.

8. Achieving Learning Outcomes

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

Sl.No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Internship
2.	Understanding	Internship
3.	Critical Skills	Internship
4.	Analytical Skills	Internship
5.	Problem Solving Skills	Internship
6.	Practical Skills	Internship
7.	Group Work	Internship
8.	Self-Learning	Internship Report
9.	Written Communication Skills	Internship Diary

10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interaction with employees of the
13.	Information Management	Internship Report
14.	Personal Management	Internship
15.	Leadership Skills	Effective management of learning, time management, achieving the learning

9. Course Resources

1. Essential Reading

- Organization website
- Organisation documents
- Study on the Industry sectors

2. Websites:

- <https://www.cms.ac.in/industrial-visits-cms.php>

10. Course Organization:

Course Code	Internship	
Course Title	FTI403A	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

Course Specifications
of
B.Sc. (Hons. with Research) Food Processing and Technology
SEMESTER 8

Course Specifications: Research Project/Internship

Course Title	Research Project/Internship
Course Code	FTP401A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of this course is to give students an experience of in-plant working in a food processing company.

The students are provided an orientation on research methodology, followed by in-plant project in a food processing company. The students are supposed to work in a team of not more than 4 members. They are required to develop an appropriate solution for an identified problem and submit a project report.

2. Course Size and Credits:

Number of Credits	0+21
Total Hours of Classroom Interaction	00
Number of Laboratory Hours	672
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment**3. Course Outcomes (Cos)**

After undergoing this course student will be able to:

CO-1. Identify and define a real time problem in food processing or food technology

CO-2. Choose appropriate methodology to solve the problem

CO-3. Apply appropriate statistical tools for data analysis

CO-4. Propose solutions for the identified problem

CO-5. Write a project report

4. Course Contents

The Research Project/Internship will cover the following:

1. Identifying a problem for which a better or new solution is required, through literature review or as defined by food technology experts from Industry.
2. Defining the scope of the problem followed by aim and objectives.
3. Identifying the methodology to meet the objectives.
4. Data collection, analysis and interpretation.
5. Propose solution based on data analysis and interpretation (Can be a physical product as well).
6. Preparing/ writing a project report.

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

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours
1. Defining Problem, Aim, Objective & Methodology in concurrence with academic and industrial guide	20
2. Literature Review	40
3. Plan, design and execution of experiments	302
4. Data collection, Analysis and Interpretation	90
5. Discussion with supervisor	20
6. Propose solution / Design / Model etc	90

7. Demonstration, Presentation and Technical	60
8. Report presentation	50
Total Duration in Hours	672

7. Method of Assessment:

There are two components for assessment in this course:

Focus of Course Learning Outcomes in each component assessed			
	Component-I Interim Presentation (60% Weightage)	Component-II Final Presentation (40% Weightage)	
	Presentation	Presentation	Report
	240 Marks	80 Marks	80 Marks
CO-1	X	X	X
CO-2	X	X	X
CO-3	X	X	X
CO-4	-	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:

Sl. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Research Project
2.	Understanding	Research Project
3.	Critical Skills	Research Project
4.	Analytical Skills	Research Project
5.	Problem Solving Skills	Research Project
6.	Practical Skills	Research Project
7.	Group Work	Research Project
8.	Self-Learning	Research Project
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Research Project
13.	Information Management	Research Project
14.	Personal Management	Research Project Report writing, Presentation
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:**1. Essential Reading**

- a. Organization website
- b. Organisation documents
- c. Study on the Industry sectors

2. Websites:

- a. <https://www.cms.ac.in/industrial-visits-cms.php>
- b. Lecture Sessions on Research Project/Internship, Report Preparation delivered by the concerned Head of Department

10. Course Organization:

Course Code	FTP401A	
Course Title	Research Project/Internship	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	March 2024	
Next Course Specifications Review Date:	June 2028	

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Course Specifications
of
B.Sc. (Honours) Food Processing and Technology

SEMESTER 8

Course Specifications: Novel food Product development and IPR

Course Title	Novel food Product development and IPR
Course Code	FTC404A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

This course provides a systematic methodology to the innovation and commercialization of food products. It covers the complete lifecycle of a product—from initial ideation and market research to prototype development, sensory evaluation, and scale-up. Additionally, the course integrates the legal and strategic aspects of Intellectual Property Rights (IPR), teaching students how to protect innovations through patents, trademarks, and copyrights within the Indian and global food industry landscape.

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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

- CO-1.** Analyse market trends and consumer needs to identify opportunities for new food product innovation.
- CO-2.** Design and formulate food product prototypes balancing nutritional value, sensory appeal, and cost-effectiveness.
- CO-3.** Evaluate the quality, safety, and shelf-life of developed products using standardized protocols for sensory and physicochemical methods.
- CO-4.** To apply the legal frameworks of Intellectual Property Rights (IPR) to protect food formulations, processes, and branding.

4. Course Contents

Unit I:

Foundations of Novel Food Product Development: Introduction to consumer behavior and food purchasing patterns. Factors influencing consumer acceptance and buying decisions: lifestyle changes, health-focused demands (vegan, organic, clean-label foods), and economic factors.

Consumer preferences, purchasing trends, and changing market dynamics in processed, convenience, and sustainable foods. Identification of current trends and market survey methods to identify opportunities for new food product innovation.

Unit II:

Functional Foods and Nutraceuticals: Introduction to functional foods, nutraceuticals, and dietary supplements. Study of bioactive compounds, phytochemicals, and ingredient functionality. Role of health-focused foods in meeting specific nutritional, therapeutic, and wellness demands. Safety, regulatory aspects, and stability considerations of incorporating functional ingredients into food matrices.

Unit III:

Advanced Prototype Development, Sensory, and Scale-up: Formulation design and recipe standardization for consistency, quality control, and large-scale production. Designing food product prototypes balancing nutritional value, sensory appeal, and cost-effectiveness. Pilot-scale preparation and processing considerations for scale-up production. Shelf-life testing methods, including real-time and accelerated studies. Sensory evaluation methods (affective and descriptive tests) for assessing product quality, acceptability, and consumer preference.

Unit IV:

ICT and AI in the Food Industry: Basics of Information and Communication Technology (ICT) in food processing and supply chain management. Introduction to Artificial Intelligence (AI) and Machine Learning (ML) in the food industry: predictive modeling for shelf-life, quality sorting, and recipe optimization. Digital tracing, IoTs in food industry, smart warehousing, and e-commerce platforms for food products.

Unit -V:

Intellectual Property Rights (IPR) in Food Industry: Introduction to IPR; Patents (process and product); Trademarks and Brand protection; Geographical Indications (GI) for traditional foods; Copyrights and Trade Secrets; Patent searching and filing procedures in India.

Practicals

1. **Market Survey:** Conducting a trend analysis of existing products in a specific category (e.g., plant-based milks).
2. **Ideation:** Generating three distinct product concepts based on market gaps.
3. **Concept Screening:** Using a scoring matrix to select the most viable product for development.
4. **Prototype Formulation (Lab Scale):** Preparing the first version of a selected food product (e.g., a functional beverage).
5. **Sensory Evaluation:** Performing a Hedonic Scale test for the prototype with a semi-trained and consumer panel.
6. **Costing Analysis:** Cost calculating the Raw Material Cost (RMC) and suggested MRP for the developed new food product.

7. Label Designing: Creating a FSSAI-compliant label including nutritional facts and ingredients list.
8. IPR Case Study: Analyzing a famous food industry patent or trademark dispute (e.g., the "Basmati" or "Turmeric" patent cases).
9. Final Product Presentation: "Elevator Pitch" of the developed product including prototype sampling and business plan.

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		2			2	2		
CO-2	3	2		3			2	3	3	3	2
CO-3	3		3		3			2	1		
CO-4	2		2			3	3	3	2	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		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop/course/workshop/Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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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 (Lab Exercise) 10%	SC3 (Assignment) 20 %	SEE (Theory) 25%	SEE (Lab) 15%
	(25 + 25 Marks)	10 Marks	40 Marks	50 Marks	30 Marks
CO-1	X	X	-	X	X
CO-2	X	X	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

9. Course Resources

1. Essential Reading

- Fuller, G. W. (2011).** *New Food Product Development: From Concept to Marketplace* (3rd ed.). CRC Press. (Focus: The definitive guide to the NPD process).
- Siddharth, B. L. (2016).** *Intellectual Property Rights in Food Industry*. Jain Brothers. (Focus: Indian legal perspective on patents and GI tags).
- Moskowitz, H. R., Saguy, I. S., & Straus, T. (2009).** *An Integrated Approach to New Food Product Development*. CRC Press. (Focus: Technical and marketing integration).
- Wani, S. A., & Gul, K. (2022).** *New Product Development in Food Science: Process, Systems and Trends*. Springer.

2. Recommended Reading

- Kemp, S. E., Hollowood, T., & Hort, J. (2009). *Sensory Evaluation: A Practical Handbook*. John Wiley & Sons. (Essential for the "Practical" component).
- Brody, A. L., & Lord, J. B. (2007). *Developing New Food Products for a Changing Marketplace*. Taylor & Francis.
- Bouchoux, D. E. (2017). *Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets*. Cengage Learning.
- Earle, M., Earle, R., & Anderson, A. (2001). *Food Product Development*. Woodhead Publishing.

3. Magazines and Journals

- Journal of Intellectual Property Rights (JIPIR)
- Journal of Food Product Development (JFPD)

4. Websites

- FSSAI (Food Safety and Standards Authority of India): fssai.gov.in — Essential for labeling regulations and "Claims" compliance.
- IP India (Controller General of Patents, Designs and Trademarks): ipindia.gov.in — For searching Indian patent databases and filing procedures.
- WIPO (World Intellectual Property Organization): wipo.int — For international treaties, patent search (PATENTSCOPE), and global IPR news.
- Google Patents: patents.google.com — A user-friendly tool for students to conduct initial prior-art searches during their practical sessions.

10. Course Organization:

Course Code	FTC404A
Course Title	Novel Food Product Development and IPR
Course Leader/s Name	As per time table
Course Leader Contact Details	Phone: (+91)80 45366666
	E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	June 2026
Next Course Specifications Review Date:	June 2028

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Course Specifications: Spices and Flavor Technology

Course Title	Spices and Flavor Technology
Course Code	FTC405A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

This course provides comprehensive knowledge on the science and technology of spices and flavouring materials used in the food industry. Students will learn about the sources, chemical composition, processing methods, extraction techniques, and quality evaluation of spices, essential oils, and flavour compounds. The course also covers flavour recovery, encapsulation technologies, sensory evaluation, and the impact of processing on flavour quality with regulatory standards.

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	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

- CO-1.** Identify the sources, chemical composition, and major flavour compounds present in spices.
- CO-2.** Explain the principles of flavour perception, extraction methods, spice processing technologies, and flavour recovery techniques.
- CO-3.** Apply suitable processing, extraction, encapsulation, and flavour evaluation techniques.
- CO-4.** Analyze the effects of processing on flavour quality using chemical, sensory, instrumental, and FSSAI standards.

4. Course Contents

Unit-I:

Introduction: Status and scope of spice and flavour processing industries in India; Spices, Herbs and seasonings: sources, production, selection criteria; flavours: commercially available materials, classification on the basis of origin, physical characteristic

Unit-II:

Processing technology of Spices commercially: Chemical composition, processing methods, equipment's used; recent developments in processing, cryogenic grinding, retention and recovery of flavour; effect of processing on spice quality: contamination of spices with micro-organisms and insects

Unit-III:

Flavour Technology I: Essential Oils or Oleoresins of Spices: Definition, Methods of essential oils extraction, isolation, and separation. Solvent extraction, Super Critical Fluid Extraction (SCFE), etc. Principles and different techniques of flavour encapsulation.

Unit- IV:

Flavour Technology II: Essence (flavour) recovery techniques from fruits, spices, and herbs; condiments: liquid and Solid flavour production; flavouring, remixing; flavour intensifiers: synthetic flavours; nature-identical flavours; natural flavours. Effect of processing on flavour quality.

Unit-V:

Spices and flavour quality evaluation: Criteria for assessment of flavour quality; identification of natural food flavours; methods of flavour evaluation (subjective and objective: chemical, instrumental, sensory); E-nose and E-tongue; FSSAI standards for flavouring materials and flavours.

Practical:

1. Separation of flavoring compounds and their evaluation.
2. Detection of adulteration in spices.
3. Sensory analysis of flavored foods.
4. Correlation of subjective and objective methods.
5. Separation, purification and identification of some flavoring principles.
6. Formulation of food flavorings.
7. Extraction of essential oils.
8. Extraction and determination of oleoresins.
9. Quality analysis of flavored foods

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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				2			2		
CO-2				3	2						3
CO-3		2		2	2		3		3		
CO-4	2	2				3	2			3	
Average	3	2		3	2	2	3		2	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		36
Demonstrations		03
1. Demonstration using Videos	02	
2. Demonstration using Physical Models	01	
3. Demonstration on a Computer		
Numeracy		56
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory	56	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		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
Total Duration in Hours		105

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.

For Theory Courses Only				
Focus of COs on each Component or Subcomponent of Evaluation				
Subcomponent Type	Component 1: CE (60% Weightage)			Component 2: SEE (40% Weightage)
	SC1 (Term Tests) 30 %	SC2 (Assignments) 10%	SC3 (Assignments) 20%	SEE Written Exam 40%
	25 + 25 Marks	10 Marks	40 Marks	50 Marks
CO-1	x	x		x
CO-2	x	x	x	x
CO-3	x		x	x
CO-4				x
The details of number of tests and assignments to be conducted are presented in the Academic Regulations and Programme Specifications Document.				

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	-----
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

Course Notes

b. Recommended Reading

- Heath, H. B. (1986) Flavour chemistry and technology, Springer.
- Piggott, J. R., Paterson, (1994) A. Understanding Natural Flavors. Springer US
- Morton, I. D., Macleod A. J. (1998) Food Flavor, Elsevier
- Gabelman, A. (1994), Bioprocess Production of Flavor, Wiley
- Ashurst P. R. (1991) Fragrance and Color Ingredients Food Flavorings.

c. Magazines and Journals

FOOD SCIENCE & TECHNOLOGY-Magazine

d. Websites

<https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=iWHzbXYGExXDS52DSnAzdQ==>

e. Other Electronic Resources

[extension://efaidnbmnnnibpcajpcgicfindmkaj/https://epgp.inflibnet.ac.in/epgp_data/uploads/epgp_content/food_technology/food_additives/07.flavourings_for_the_food_industry/et/2682_et_m7.pdf](https://efaidnbmnnnibpcajpcgicfindmkaj/https://epgp.inflibnet.ac.in/epgp_data/uploads/epgp_content/food_technology/food_additives/07.flavourings_for_the_food_industry/et/2682_et_m7.pdf)

10. Course Organization:

Course Code	FTC405A	
Course Title	Spices and flavor technology	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	June 2026	
Next Course Specifications Review Date:	June 2028	

Course Specifications: GMP and GLP in Food Industry

Course Title	GMP and GLP in Food Industry
Course Code	FTC406A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The course aims to provide students with a comprehensive understanding of the principles, regulations, and practices of Good Manufacturing Practices (GMP) and Quality Control (QC). It seeks to develop the knowledge and skills required to ensure the production of safe, effective, and high-quality products in food industries. Students will gain insight into regulatory frameworks, facility and process design, quality testing, documentation systems, and risk management approaches essential for maintaining global quality standards and regulatory compliance.

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	Total Marks: 100
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes

After undergoing this course students will be able to:

- CO 1.** Explain the principles and importance of GMP in ensuring product quality and safety.
- CO 2.** Apply GMP principles to manufacturing workflows
- CO 3.** Implement validation protocols and ensure data integrity
- CO 4.** Integrate QA systems to ensure consistent product quality
- CO 5.** Conduct GMP audits and manage deviations effectively

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4. Course Contents

Unit I:

Fundamentals of GMP and Regulatory Frameworks, Introduction to GMP: history, objectives, and importance, International GMP standards: WHO, US FDA, EU, PIC/S, ICH, Indian GMP regulations in food industries.

Unit II:

GMP Requirements and Facility Design, Facility design and layout for GMP compliance, Equipment qualification, calibration and maintenance, Personnel hygiene, training, and gowning procedures, Raw material handling, storage, and traceability, Process controls and in-process checks, Environmental monitoring and contamination control in food industries.

Unit III:

Good Laboratory Practices (GLP) & Data Integrity: OECD Principles of GLP; Roles of the Study Director and Quality Assurance Unit (QAU). Standard Operating Procedures (SOP) writing and management.

Unit IV:

Quality Control and Quality Assurance Systems: roles and responsibilities, Sampling plans and statistical quality control, testing of raw materials and finished products, Stability studies and shelf-life determination and HACCP

Unit V:

Audits, Deviations, and Continuous Improvement, Internal and external audits: planning, execution, and follow-up, Self-inspection programs, Deviation management, CAPA (Corrective and Preventive Actions), Complaint handling and product recall procedures, Case studies of GMP failures and product recalls, Future perspectives: automation, AI, and digitalization in GMP and QC.

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

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	Total Duration in
Face to Face Lectures		30
Demonstrations		
1. Demonstration using Videos	04	04
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		
1. Case Study Presentation	03	07
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	03	
6. Discussing Possible Innovations	01	
Term Test and Written Examination		04
Total Duration in Hours		45

7. Course Assessment and Reassessment

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 Assignments 15%	SC3 Assignments 15%	
	25 + 25 Marks	25 Marks	25 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

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of course outcomes in each component assessed in the above template at the beginning of the semester.

Course reassessment policies are also presented in the Academic Regulations document.

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
2.	Understanding	Classroom lectures, self-study
3.	Critical Skills	Assignment
4.	Analytical Skills	Assignment
5.	Problem Solving Skills	Assignment, Examination
6.	Practical Skills	Assignment
7.	Group Work	--
8.	Self-Learning	Self-study
9.	Written Communication Skills	Assignment, examination
10.	Verbal Communication Skills	--
11.	Presentation Skills	--
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	--
15.	Leadership Skills	--

9. Course Resources

a. Essential Reading

- Willig, S.H., Stoker, J.R. & Tuckerman, M.M., 2017. Good Manufacturing Practices for Pharmaceuticals. 7th ed. New York: CRC Press.
- Sharp, J., 2005. Good Pharmaceutical Manufacturing Practice: Rationale and Compliance. 2nd ed. London: CRC Press.
- Vasconcellos, J. & Saraiva, J., 2018. Good Manufacturing Practices for the Food Industry. Boca Raton: CRC Press.

b. Recommended Reading

- Mortimore, S. & Wallace, C., 2013. HACCP: A Practical Approach. 3rd ed. New York: Springer.
- Hui, Y.H. & Evranuz, E.Ö., 2015. Handbook of Food Safety Engineering. Chichester: Wiley-Blackwell.

3. Agalloco, J. & Carleton, F.J., 2008. Validation of Pharmaceutical Processes. 3rd ed. New York: Informa Healthcare.

4. Liu, D., 2019. Biopharmaceutical Manufacturing: Technology and Process Development. New York: Wiley.

c. Magazines and Journals

1. <https://link.springer.com/journal/12247>

2. <https://www.sciencedirect.com/journal/journal-of-food-protection>

3. <https://www.sciencedirect.com/journal/regulatory-toxicology-and-pharmacology>

d. Websites

1. <https://www.who.int/teams/health-product-and-policy-standards/quality-assurance/gmp>

2. <https://www.fda.gov/drugs/pharmaceutical-quality-resources/current-good-manufacturing-practices-cgmps>

e. Other Electronic Resources

1. <https://www.ijpsjournal.com/assetsbackoffice/uploads/article/A+Review+on+Quality+Assurance+and+Quality+Management+System+in+Pharmaceutical+Industry.pdf>

10. Course Organization:

Course Code	FTC406A	
Course Title	GMP and GLP in Food Industry	
Course Leader/s Name	As per time table	
Course Leader Contact Details	Phone:	(+91)80 45366666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	June 2026	
Next Course Specifications Review Date:	June 2028	

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Approved: 26th ACM (14th Jul 2022); Revised: 28th ACM (31st Apr 2023), 31st ACM (22nd Mar 2024), 36th ACM (27th Sept 2025), 38th ACM (10th June 2026)

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Course Specifications: Group project

Course Title	Group project
Course Code	FTP402A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

This module is intended to provide students with an opportunity to apply theoretical knowledge to solving a problem or developing a product. The students will learn skills related to problem identification, planning, management, and execution through working in a team. The group project will focus on the application of appropriate techniques and methodologies and the methodologies and the efficient utilization of resources for the project's execution.

This module will also enable the students to gain practical experience working in a project mode, requiring interactions with the domain specialist to meet the technical challenges of the project undertaken. The significant feature of the project will be the demonstration of its applicability and quantification of benefits.

2. Course Size and Credits:

Number of Credits	0+8
Total Hours of Classroom Interaction	0
Number of laboratory Hours	60
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per Academic Regulations
Attendance Requirement	As per Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

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

CO-1. Work in a team and undertake a project in their area of specialization.

CO-2. Apply appropriate research methodologies while formulating a project.

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CO-3. Apply their theoretical knowledge of food science and technology to executing the project.

CO-4. Define specifications, analyze, develop, and evaluate a project.

CO-5. Prepare and present appropriate forms of audio-visual, verbal, and written documentation to describe the project, its execution, and its outcome.

4. Course Contents

- Need for undertaking a project, problem identification, development of the project, evaluation, and presentation.
- Project management
- Costing, finance management, raw material procurement, product development, testing, project evaluation, exhibition, and presentation.
- Team building, teamwork, and leadership skills

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	2					2	2		1	1		2
CO-2		2	3								2	2
CO-3		2	2	1						2	2	
CO-4		3	2	2							2	3
CO-5						1	2	3			2	3
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Topics	Teaching methods	Hours
Critical Review, Problem Formulation and stating Objectives	Reading Journal papers, books and Other relevant materials and problem formulation	20
	Presentation to Reviewers	5
	Group work with supervisor's guidance	5

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Analysis	Group work with supervisor's guidance	5
Testing and Evaluation	Group work with supervisor's guidance	5
Verification/Validation	Group work with supervisor's guidance	5
Drawing Conclusions	Group work with supervisor's guidance	1
Presentation , Thesis/Report Writing and Viva Voce	Presentation and Viva voce-Group	1
	Thesis/Report writing - Group	10
Tests/Examinations/Presentations		3
Total		60

7. Course 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 (30% weightage)	SEE (20% weightage)
	Presentations (60 Marks)	Project Report (40 Marks)
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X
CO-5	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

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	Group Project work
2.	Understanding	Group Project work
3.	Critical Skills	Group Project work
4.	Analytical Skills	Group Project work
5.	Problem Solving Skills	Group Project work
6.	Practical Skills	Group Project work
7.	Group Work	Group Project work
8.	Self-Learning	Group Project work
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Group Project work
13.	Information Management	Group Project work
14.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

1. References

- Assigned reading relevant to the Internship/Training/Project/ Group project.

10. Course Organization

Course Code	FTP402A	
Course Title	Group project	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	Phone:	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	June 2026	
Next Course Specifications Review Date	June 2028	

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