



Re-Accredited 'B++' 2.86 CGPA by NAAC

**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

**વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી**

યુનિવર્સિટી કેમ્પસ, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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ક્રમાંક:ઓથો./પરિપત્ર/૧૩૬૪૩/૨૦૨૬  
તા.૧૮/૦૬/૨૦૨૬

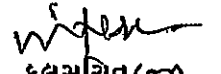
પ્રતિ,  
વડાશ્રી,  
બાયોટેકનોલોજી ડિપાર્ટમેન્ટ,  
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી,  
સુરત.

**વિષય:-** શૈક્ષણિક વર્ષ ૨૦૨૬-૨૭ થી અમલમાં આવનાર B.Sc. Food Technology Program Sem.-3 & 4 (Major) ના અભ્યાસક્રમ બાબત.

સુજાશ્રી,

સવિનય જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૬-૨૭ થી અમલમાં આવનાર B.Sc. Food Technology Program Semester-3 & 4 (Major) નો પેટાસમિતિ દ્વારા તૈયાર કરેલ અભ્યાસક્રમ બાયોટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા.૦૨/૦૪/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૦૪ થી મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૦૪/૬/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૧૬ થી મંજૂર કરવા એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૧૮/૦૬/૨૦૨૬ની સભાના ઠરાવ ક્રમાંક:૧૫ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

  
કુલસચિવ

પ્રતિ,

(૧) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા,

(૨) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....જાણ સારું.





VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT



**Undergraduate Program**

**In**

**Food Technology**

**[3 years (Degree) & 4 years (Honors)]**

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## Undergraduate Program in Biotechnology - Major

### Teaching & Evaluation Scheme Semester - III

[Academic Year of Implementation 2026-2027]

#### **Semester - III**

Course Code	Course Title	Teaching Schedule Hours/Week	Exam Duration & Marks			Total Theory/Practical Marks	Credit
			Duration (Hours)	(CCE) Internal Marks	(SEE) External Marks		
FT-MJ-301	Food Microbiology	2	1:00	25	25	50	2
FTP-MJ-301	Food Microbiology: Practical	4	4:00 to 6:00	25	25	50	2
FT-MJ-302	Molecular Food Composition-II	2	1:00	25	25	50	2
FTP-MJ-302	Molecular Food Composition-II: Practical	4	4:00 to 6:00	25	25	50	2
FT-MJ-303	Food Safety, Quality & Regulatory Standards	4	2:00	50	50	100	4
<b>Total</b>		<b>16</b>	<b>16</b>	<b>150</b>	<b>150</b>	<b>300</b>	<b>12</b>

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## SYLLABUS

<b>Program Name</b>	B. Sc. Food Technology Honors									
<b>Semester</b>	III									
<b>NCrF Credit Level</b>	5									
<b>Course Type</b>	Major									
<b>Course Subtype</b>	Employability and Skill Development									
<b>Subject Type</b>	Discipline Specific									
<b>Course Code</b>	FT-MJ-301									
<b>Course Level</b>	200-299									
<b>Course Title</b>	Food Microbiology									
<b>Credit</b>	2									
<b>Effective From</b>	Academic Year: 2026-2027									
<b>Course Outcomes</b>	<p><b>CO1:</b> Students will gain knowledge of the general characteristics, classification, and identification of molds relevant to food microbiology.</p> <p><b>CO2:</b> Students will develop an understanding of the characteristics, classification, identification, and industrial importance of yeasts and yeast-like fungi, including false yeasts.</p>									
<b>Mapping between Cos and PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
	CO1									
	CO2									
<b>Course Content</b>	<p><b>UNIT – 1: Microorganisms Important in Food Microbiology</b>  Introduction to food microbiology, Intrinsic and Extrinsic factors affecting microbial growth and survival in food, Microflora of food (<b>Bacteria:</b> Morphological Characteristics, Cultural and Physiological Characteristics, Groups of Bacteria Important in Food Bacteriology  <b>Molds:</b> General characteristics of Molds, Classification and Identification;  <b>Yeast and Yeast Like Fungi:</b> General characteristics of Yeast, Classification and Identification, Industrial Importance, False Yeast)</p>									Teaching Hours: 15
	<p><b>UNIT – 2: Food Born Pathogen and Spoilage</b>  Food borne outbreaks- Bacterial, fungal and algal agents for foodborne illnesses, Spoilage, classification of foods by Ease of Spoilage, Factors affecting kinds and numbers of Microorganisms in food, Factors Affecting the growth of microorganisms in food, Chemical changes caused by Microorganisms</p>									Teaching Hours: 15

<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Frazier, W. C., Westhoff, D. C., &amp; Vanitha, N. M. <i>Food Microbiology</i> (5th ed.). <b>PDF:</b> <a href="https://pa.welib.org/md5/9d53e26411c15689946cd5a1960c703b">https://pa.welib.org/md5/9d53e26411c15689946cd5a1960c703b</a></li> <li>• Modi, H.A. <i>Microbial Spoilage of Foods</i>. <a href="https://epdf.pub/microbial-spoilage-of-foods.html">https://epdf.pub/microbial-spoilage-of-foods.html</a></li> <li>• Blackburn, C. de W. <i>Food Spoilage Microorganisms</i>. <a href="https://epdf.pub/food-spoilage-microorganisms.html">https://epdf.pub/food-spoilage-microorganisms.html</a></li> <li>• Dilbaghi, N. &amp; Sharma, S. <i>Food and Industrial Microbiology</i>. <a href="https://www.saetw.org/ebooks/biomicro/230.pdf">https://www.saetw.org/ebooks/biomicro/230.pdf</a></li> <li>• <i>Food Microbiology: Principles into Practice</i>. <a href="https://www.hchsc.edu.in/img/fsn-e-notes/fmb.pdf">https://www.hchsc.edu.in/img/fsn-e-notes/fmb.pdf</a></li> </ul>
<b>Teaching Methodology</b>	Class work, Discussion, Self-Study, Assignments, Project, seminar
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## SYLLABUS

<b>Program Name</b>	B. Sc. Food Technology Honors									
<b>Semester</b>	III									
<b>NCrF Credit Level</b>	5									
<b>Course Type</b>	Major									
<b>Course Subtype</b>	Employability and Skill Development									
<b>Subject Type</b>	Discipline Specific									
<b>Course Code</b>	FTP-MJ-301									
<b>Course Level</b>	200-299									
<b>Course Title</b>	Food Microbiology: Practical									
<b>Credit</b>	2									
<b>Effective From</b>	Academic Year: 2026-2027									
<b>Course Outcomes</b>	CO: Students will apply safe and ethical laboratory practices, perform isolation, staining, identification, and microbial load assessment of food-related microorganisms, analyze environmental and preservative effects on microbial growth, interpret spoilage changes, and demonstrate professionalism, teamwork, and ethical responsibility in recording and reporting food microbiology experiments.									
<b>Mapping between Cos and PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
	CO									
<b>Course Content</b>	<ol style="list-style-type: none"> <li>1. Isolation and identification of yeasts from food samples.</li> <li>2. Microscopic examination of molds,</li> <li>3. Microscopic examination of microorganisms from different food samples using (Staining method: Simple staining/Gram staining/Spore staining.)</li> <li>4. Effect of preservatives on microbial growth (Sugar, salt, acid)</li> <li>5. Identification of spoilage signs in milk, bread, or fruits.</li> <li>6. Determination of microbial load using the standard plate count method.</li> <li>7. Detection of pathogens from the food samples using selective and differential media</li> </ol>									Teaching Hours: 60

<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Patel, R. J. &amp; Patel, K. R. <i>Experimental Microbiology</i></li> <li>• Roberts, D., &amp; Greenwood, M. (2013). <i>Practical food microbiology</i> (3rd ed.). Vet <a href="https://www.vet-ebooks.com/practical-food-microbiology-3rd-edition/">https://www.vet-ebooks.com/practical-food-microbiology-3rd-edition/</a></li> <li>• Indira Gandhi National Open University (IGNOU). (n.d.). <i>Food safety &amp; food microbiology practical manual</i>. eGyanKosh. <a href="https://egyankosh.ac.in/handle/123456789/93471">https://egyankosh.ac.in/handle/123456789/93471</a></li> <li>• Anonymous. (2013). <i>Microbiological examination methods of food and water— A laboratory manual</i>. KU. <a href="https://kupdf.net/download/ebook-2013-microbiological-examination-methods-of-food-and-water-a-laboratory-manual_5af3f865e2b6f56059d1f4a7_pdf">https://kupdf.net/download/ebook-2013-microbiological-examination-methods-of-food-and-water-a-laboratory-manual_5af3f865e2b6f56059d1f4a7_pdf</a></li> </ul>
<b>Teaching Methodology</b>	Class work, Discussion, Self Study, Assignments, Project, seminar
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## SYLLABUS

<b>Program Name</b>	B. Sc. Food Technology Honors									
<b>Semester</b>	III									
<b>NCrF Credit Level</b>	5.0									
<b>Course Type</b>	Major									
<b>Course Subtype</b>	Skill Development									
<b>Subject Type</b>	Discipline Specific									
<b>Course Code</b>	FT-MJ-302									
<b>Course Level</b>	200-299									
<b>Course Title</b>	Molecular Food Composition - II									
<b>Credit</b>	2									
<b>Effective From</b>	Academic Year: 2026-27									
<b>Course Outcomes</b>	<p><b>CO1:</b> Analyze the classification, structural organization, and functional properties of food proteins, and evaluate the effects of denaturation and aggregation during food processing and storage.</p> <p><b>CO2:</b> Identify and describe major bioactive compounds in foods, including natural pigments, dietary fibres, vitamins, and minerals, and explain their molecular characteristics and functional roles. Interpret the concept of nutraceuticals and functional foods and evaluate the role of bioactive compounds in promoting health and preventing diet-related disorders.</p>									
<b>Mapping between Cos and PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
	CO1									
	CO2									
<b>Course Content</b>	<p><b>UNIT – 1: Proteins and Enzymes in Food Systems</b> Classification of food proteins (plant, animal, microbial), Amino acid composition and protein quality, Levels of protein structure and food relevance, Functional properties of proteins, Protein denaturation and aggregation</p> <p><b>UNIT – 2: Bioactive Compounds and Functional Food Components</b> Introduction to Bioactive Food Components, Natural Food Pigments: Chlorophylls, Carotenoids and Anthocyanins, Dietary Fibre: Soluble and Insoluble Fibres, Vitamins as Bioactive Molecules, Minerals and Trace Elements in Foods, Nutraceuticals and Functional Foods</p>									Teaching Hours: 15
<b>Reference Books</b>	<ul style="list-style-type: none"> <li>Belitz, H. D., Grosch, W., &amp; Schieberle, P. (2009). <i>Food chemistry</i>. Berlin, Heidelberg: Springer Berlin Heidelberg.</li> </ul>									Teaching Hours: 15

	<ul style="list-style-type: none"> <li>• <i>Socaciu, C. (2007). Food colorants: chemical and functional properties. CRC press.</i></li> <li>• <i>Lehninger, A. L. (2004). Lehninger Principles of Biochemistry: David L. Nelson, Michael M. Cox. New York: Recording for the Blind &amp; Dyslexic.</i></li> </ul>
<b>Teaching Methodology</b>	Class work, Discussion, Self Study, Assignments, Project, seminar
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## SYLLABUS

<b>Program Name</b>	B. Sc. Food Technology Honors								
<b>Semester</b>	III								
<b>NCrF Credit Level</b>	5								
<b>Course Type</b>	Major								
<b>Course Subtype</b>	Employability and Skill Development								
<b>Subject Type</b>	Discipline Specific								
<b>Course Code</b>	FTP-MJ-302								
<b>Course Level</b>	200-299								
<b>Course Title</b>	Molecular Food Composition – II: Practical								
<b>Credit</b>	2								
<b>Effective From</b>	Academic Year: 2026-27								
<b>Course Outcomes</b>	CO: Estimate the protein content in food samples using biochemical methods and interpret the results for nutritional analysis; separate and identify amino acids in food samples using paper chromatography by understanding their Rf values; analyze the effect of acids and alkali on natural food pigments by observing color changes and relating them to pH-dependent pigment stability; conduct sensory evaluation of functional food products by assessing organoleptic properties and interpreting results for food quality and consumer acceptability; study protein denaturation due to heat and pH by observing changes in solubility and coagulation and understanding their relevance to food processing and functionality; and determine the Vitamin C content in food samples by applying appropriate methods, understanding the underlying chemical principles, and interpreting the results for nutritional significance.								
<b>Mapping between Cos and PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
<b>Course Content</b>	<ol style="list-style-type: none"> <li>1. Estimation of proteins by Folin Lowry method.</li> <li>2. Separation of amino acids using paper chromatography.</li> <li>3. Effect of Acids and Alkali on Food Pigments.</li> <li>4. Sensory evaluation of functional food products.</li> <li>5. Study of protein denaturation due to heat and pH.</li> <li>6. Determination of Vitamin C content in food sample by titration.</li> </ol>								Teaching Hours: 60
<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Experimental Microbiology by Rakesh Patel.</li> <li>• Dissanayake, M., Ramchandran, L., Donkor, O. N., &amp; Vasiljevic, T. (2013). Denaturation of whey proteins as a function of heat, pH and protein concentration. <i>International Dairy Journal</i>, 31(2), 93–99. <a href="https://doi.org/https://doi.org/10.1016/j.idairyj.2013.02.002">https://doi.org/https://doi.org/10.1016/j.idairyj.2013.02.002</a></li> <li>• Socaciu, C. (2007). <i>Food colorants: chemical and functional properties</i>. CRC press.</li> </ul>								

	<ul style="list-style-type: none"> <li>• Belitz, H. D., Grosch, W., &amp; Schieberle, P. (2009). <i>Food chemistry</i>. Berlin, Heidelberg: Springer Berlin Heidelberg.</li> </ul>
<b>Teaching Methodology</b>	Class work, Discussion, Self Study, Assignments, Project, seminar
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## SYLLABUS

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<b>Course Type</b>	Major																																																				
<b>Course Subtype</b>	Employability																																																				
<b>Subject Type</b>	Discipline Specific																																																				
<b>Course Code</b>	FT-MJ 303																																																				
<b>Course Level</b>	200-299																																																				
<b>Course Title</b>	Food Safety, Quality & Regulatory Standards																																																				
<b>Credit</b>	4																																																				
<b>Effective From</b>	Academic Year: 2026-27																																																				
<b>Course Outcomes</b>	<p><b>CO1:</b> Students will learn the concept, importance, terminology, historical development, WHO guidelines and basic elements of food safety management systems.</p> <p><b>CO2:</b> Students will learn food contaminants, food additives and their safety, food adulteration, and sanitation practices in food service establishments.</p> <p><b>CO3:</b> To apply principles of quality control and quality assurance to raw materials, in-process operations, and finished food products, and implement GMP, GLP, and HACCP concepts in the context of the Indian food industry.</p> <p><b>CO4:</b> To Interpret and apply Indian food standards and regulations, including the Food Safety &amp; Standards Act, licensing and registration of food businesses, voluntary certification systems and the role of international organizations such as Codex Alimentarius, WTO, and WHO in food standardization.</p>																																																				
<b>Mapping between Cos and PSOs</b>	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> <th>PSO7</th> <th>PSO8</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> </tr> <tr> <td>CO4</td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>									PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	CO1									CO2									CO3									CO4								
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CO2																																																					
CO3																																																					
CO4																																																					
<b>Course Content</b>	<p><b>UNIT -1: Introduction to Food Safety</b>            Concept of Food safety &amp; its definition; Terms related to Food Safety; Importance &amp; Significance of Food Safety; History of Food Safety; WHO's "FIVE KEYS" &amp; "GOLDEN RULES" for safe food preparation; Elements of Food Safety Management.</p>							Teaching Hours: 15																																													

	<p><b>UNIT – 2: Food Sanitation &amp; Safety.</b> Food Contaminants -Biological, Chemical, Physical; Food Additives- classification &amp; functional role of different additives (Antioxidants, Preservatives &amp; Food colour); Safety issues; Food Adulteration- Common Adulterants &amp; Classification; Sanitation in Food Service Establishments, Cleaning Agents &amp; Disinfectant</p>	Teaching Hours: 15
	<p><b>Unit – 3: Food Quality &amp; Assurance</b> Basic concept of Quality control &amp; Assurance; Quality Control of raw material- Plant &amp; Animal origin; GMP, GLP; In Process Food Control; Quality Control of Finished Products; HACCP- History, Need, Principle, Application &amp; status in India.</p>	Teaching Hours: 15
	<p><b>UNIT – 4: Food Laws &amp; Regulations</b> Food Standard &amp; Regulation in India (Food Safety &amp; Standard Act 2006, Food Safety &amp; Standards Regulations 2011); Licensing &amp; Registration of Food Business; Voluntary based product Certification (BIS &amp; Agmark); Role of International organization in Food Standardization (CODEX Alimentarius, WTO &amp; WHO)</p>	Teaching Hours: 15
<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Indira Gandhi National Open University. (2019). <i>MFN-003: Food microbiology and safety</i>. New Delhi, India: Author. Retrieved from <a href="http://egyankosh.ac.in/handle/123456789/73112">http://egyankosh.ac.in/handle/123456789/73112</a></li> <li>• Lásztity, R. (2009). <i>Food quality and standards</i> (Vol. 1). Oxford, UK: Eolss Publishers</li> <li>• Motarjemi, Y., &amp; Lelieveld, H. (2014). <i>Food safety management: A practical guide for the food industry</i>. San Diego, CA: Academic Press.</li> <li>• Roberts, C. A. (2001). <i>The food safety information handbook</i>. Westport, CT: Oryx Press.</li> <li>• Roday, S. (2011). <i>Food hygiene and sanitation</i> (2nd ed.). New Delhi, India: Tata McGraw Hill Education.</li> <li>• Sehgal, S. (2024). <i>Unit-11: Introduction to food safety and quality</i> (MVP-002). New Delhi, India: Indira Gandhi National Open University. Retrieved from <a href="http://egyankosh.ac.in/handle/123456789/107504">http://egyankosh.ac.in/handle/123456789/107504</a></li> </ul>	
<b>Teaching Methodology</b>	Classwork, Discussion, Self-Study, Seminars and/or Assignments	
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.	

# VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## Undergraduate Program in Biotechnology - Major

### Teaching & Evaluation Scheme Semester – IV

#### Semester - IV

Course Code	Course Title	Teaching Schedule Hours/Week	Exam Duration & Marks			Total Theory/Practical Marks	Credit
			Duration (Hours)	(CCE) Internal Marks	(SEE) External Marks		
FT-MJ-401	Food Process Engineering	2	1:00	25	25	50	2
FTP-MJ-401	Food Process Engineering: Practical	4	4:00 to 6:00	25	25	50	2
FT-MJ-402	Food Preservation Technology	2	1:00	25	25	50	2
FTP-MJ-402	Food Preservation Technology: Practical	4	4:00 to 6:00	25	25	50	2
FT-MJ-403	Food Certification and Global Compliances	4	2:00	50	50	100	4
<b>Total</b>		<b>16</b>	<b>16</b>	<b>150</b>	<b>150</b>	<b>300</b>	<b>12</b>

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## SYLLABUS

<b>Program Name</b>	B. Sc. Food Technology Honors									
<b>Semester</b>	IV									
<b>NCrF Credit Level</b>	5									
<b>Course Type</b>	Major									
<b>Course Subtype</b>	Employability and Skill Development									
<b>Subject Type</b>	Discipline Specific									
<b>Course Code</b>	FT-MJ-401									
<b>Course Level</b>	200-299									
<b>Course Title</b>	Food Process Engineering									
<b>Credit</b>	2									
<b>Effective From</b>	Academic Year: 2026-2027									
<b>Course Outcomes</b>	<p><b>CO1:</b> Explain the physical properties of foods and fundamental engineering principles applied in food processing, and relate these principles to basic food processing operations. Describe and compare the rheological behavior of processed foods, including fluid foods, suspensions, granular materials, and solid foods, with respect to their flow and deformation characteristics.</p> <p><b>CO2:</b> Explain the principles of thermal processing and microbial death kinetics, and discuss their significance in ensuring food safety and quality during food processing. Explain the working principles and applications of major food engineering unit operations such as evaporation, drying, freezing, size reduction, mixing, separation, extraction, and non-thermal processing techniques</p>									
<b>Mapping between Cos and PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
	CO1									
	CO2									
<b>Course Content</b>	<p><b>UNIT – 1: Fundamentals and Rheology of Processed Foods</b> Physical properties of foods, <b>Engineering principles applied to food processing</b>, Rheology of Processed Foods (Properties of Fluid Foods, Properties of Suspensions and Concentrated Products, Properties of Granular Foods and Powders, Properties of Solid Foods)</p> <p><b>Teaching Hours: 15</b></p>									
	<p><b>UNIT– 2: Thermal Processing and Food Engineering Operations</b> Thermal processing and microbial death kinetics, Evaporation and concentration, Heat exchangers, drying technology, Freezing and freeze drying, Size reduction, Mechanical separation techniques, Mixing and agitation, Leaching and extraction, Non-thermal processing.</p> <p><b>Teaching Hours: 15</b></p>									

<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Heldman, D. R. (Ed.). (2012). <i>Food process engineering</i>. Springer Science &amp; Business Media.</li> <li>• Fellows, P. J. (2022). <i>Food processing technology: principles and practice</i>. Woodhead publishing.</li> </ul>
<b>Teaching Methodology</b>	Classwork, Discussion, Self-Study, Seminars and/or Assignments
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## SYLLABUS

<b>Program Name</b>	B. Sc. Food Technology Honors									
<b>Semester</b>	IV									
<b>NCrF Credit Level</b>	5									
<b>Course Type</b>	Major									
<b>Course Subtype</b>	Employability and Skill Development									
<b>Subject Type</b>	Discipline Specific									
<b>Course Code</b>	FTP-MJ-401									
<b>Course Level</b>	200-299									
<b>Course Title</b>	Food Process Engineering: Practical									
<b>Credit</b>	2									
<b>Effective From</b>	Academic Year: 2026-2027									
<b>Course Outcomes</b>	Estimate and interpret microbial load in diverse food materials using standard microbiological techniques; determine rehydration ratios and evaluate quality changes during dehydration and rehydration; analyze the impact of microwave heating on physical and functional properties of foods; detect common food adulterants using qualitative and analytical methods to ensure safety and authenticity; and assess expansion characteristics and oil absorption capacity of fried snacks in relation to processing conditions and overall product quality.									
<b>Mapping between Cos and PSOs</b>		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	
<b>Course Content</b>	<ol style="list-style-type: none"> <li>1. Study on the estimation of microbial load in food materials.</li> <li>2. Determination of rehydration ratio of dehydrated foods.</li> <li>3. Experiment on properties of food through microwave oven heating.</li> <li>4. Experiment on detection of food adulteration</li> <li>5. Experiment on expansion and oil absorption characteristics of snacks on frying.</li> </ol>									
<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Mrs.P. Dhivya, A. P. (n.d.). <i>Food Process Engineering Laboratory</i>.</li> </ul>									
<b>Teaching Methodology</b>	Classwork, Discussion, Self-Study, Seminars and/or Assignments									
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.									

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT**

**SYLLABUS**

<b>Program Name</b>	B. Sc. Food Technology Honors									
<b>Semester</b>	IV									
<b>NCrF Credit Level</b>	5									
<b>Course Type</b>	Major									
<b>Course Subtype</b>	Employability and Skill Development									
<b>Subject Type</b>	Discipline Specific									
<b>Course Code</b>	FT-MJ-402									
<b>Course Level</b>	200-299									
<b>Course Title</b>	Food Preservation Technology									
<b>Credit</b>	2									
<b>Effective From</b>	Academic Year: 2026-27									
<b>Course Outcomes</b>	<p><b>CO1:</b> Explain the importance of food preservation in industry and society, identify the major causes of food deterioration, and describe various thermal and non- thermal preservation methods along with the use of chemical and natural preservatives, fermentation, and bio-preservation in extending food shelf life.</p> <p><b>CO2:</b> Demonstrate understanding of food packaging as an essential preservation technique, classify various packaging materials used for foods, and apply food safety and quality systems such as FSSAI, HACCP, and GMP while assessing emerging technologies like edible coatings, nanotechnology, and hurdle technology in modern food preservation.</p>									
<b>Mapping between Cos and PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
	CO1									
	CO2									
<b>Course Content</b>	<p><b>UNIT – 1: Principles and methods of Food Preservation</b>                      Importance of food preservation in industry and society, Causes of Food Deterioration, Thermal and Non-Thermal Preservation Methods, Use of chemical preservatives, Natural preservatives, Fermentation and bio-preservation.</p>									Teaching Hours: 15

	<b>UNIT – 2: Packaging, Storage, and Food Safety</b> Packaging as a Preservation Technique, Types of Packaging Materials Used for Foods, Regulatory standards (FSSAI, HACCP), Good Manufacturing Practice (GMP), Emerging trends: edible coatings, nanotechnology, hurdle technology.	Teaching Hours: 15
<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Rahman, M. S. (Ed.). (2020). <i>Handbook of food preservation</i>. CRC press.</li> <li>• Jay, J. M., Loessner, M. J., &amp; Golden, D. A. (2005). <i>Modern food microbiology</i>. Boston, MA: Springer US.</li> <li>• Coles, R., McDowell, D., &amp; Kirwan, M. J. (Eds.). (2003). <i>Food packaging technology</i> (Vol. 5). CRC press.</li> <li>• Pal, M., Devrani, M., &amp; Hadush, A. (2019). <i>Recent developments in food packaging technologies</i>. 46(1), 21–25.</li> <li>• Majid, I., Nayik, G. A., Dar, S. M., &amp; Nanda, V. (2018). Novel food packaging technologies: Innovations and future prospective. <i>Journal of the Saudi Society of Agricultural Sciences</i>, 17(4), 454–462. <a href="https://doi.org/10.1016/j.jssas.2016.11.003">https://doi.org/10.1016/j.jssas.2016.11.003</a></li> </ul>	
<b>Teaching Methodology</b>	Classwork, Discussion, Self-Study, Seminars and/or Assignments	
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.	

## VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

## SYLLABUS

<b>Program Name</b>	B. Sc. Food Technology Honors									
<b>Semester</b>	IV									
<b>NCrF Credit Level</b>	5									
<b>Course Type</b>	Major									
<b>Course Subtype</b>	Employability and Skill Development									
<b>Subject Type</b>	Discipline Specific									
<b>Course Code</b>	FTP-MJ-402									
<b>Course Level</b>	200-299									
<b>Course Title</b>	Food Preservation Technology: Practical									
<b>Credit</b>	2									
<b>Effective From</b>	Academic Year: 2026-27									
<b>Course Outcomes</b>	Students will apply dehydration, concentration, pasteurization, edible coating, adulterant detection, and hurdle technology techniques, analyze microbial load and food safety, and critically evaluate emerging technologies like nanotechnology in food preservation, packaging, quality retention, and shelf-life extension.									
<b>Mapping between Cos and PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	
	CO1									
<b>Course Content</b>	<ol style="list-style-type: none"> <li>1. Dehydration of food and preparation of concentrate and powder.</li> <li>2. Assessment of microbial load in fresh or preserved food.</li> <li>3. Pasteurization of milk and quality evaluation by MBRT.</li> <li>4. Preparation and evaluation of edible coating.</li> <li>5. Detection of common food adulterants in selected food samples.</li> <li>6. To demonstrate the concept of hurdle technology by applying multiple preservation factors (hurdles) to improve the shelf life and safety of a food product.</li> <li>7. Case study on nanotechnology in food packaging.</li> </ol>									Teaching Hours: 60
<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Experimental Microbiology by Rakesh Patel.</li> <li>• Navya, P., Raju, K., &amp; Sukumaran, M. K. (2017). <i>International Journal of Advances in Scientific Research Analysis of Food Adulterants in Selected Food Items Purchased From Local Grocery Stores</i> * Article History : 03(07), 82–89.</li> <li>• Mahendra Pal, Abiy Shimelis, Wondu Mamo, Amit M. Barot, Suneeta V. Pinto, J. P. P. (n.d.). <i>Hurdle Technology: A Novel Approach for Food Preservation</i>.</li> </ul>									

<b>Teaching Methodology</b>	Classwork, Discussion, Self-Study, Seminars and/or Assignments
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.

**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT**

**SYLLABUS**

<b>Program Name</b>	B. Sc. Food Technology Honors								
<b>Semester</b>	IV								
<b>NCrF Credit Level</b>	5								
<b>Course Type</b>	Major								
<b>Course Subtype</b>	Employability / Skill Development								
<b>Subject Type</b>	Discipline Specific / Intra-disciplinary								
<b>Course Code</b>	FT-MJ-403								
<b>Course Level</b>	200-299								
<b>Course Title</b>	Food Certification and Global Compliance								
<b>Credit</b>	4								
<b>Effective From</b>	Academic Year: 2026-2027								
<b>Course Outcomes</b>	<p><b>CO1:</b> Students will be able to explain food safety principles and identify different types of food hazards and control measures.</p> <p><b>CO2:</b> Students will be able to describe national and international food regulations and their role in ensuring food quality and safety.</p> <p><b>CO3:</b> Students will be able to interpret food safety management systems and understand the process of food certification and auditing.</p> <p><b>CO4:</b> Students will be able to apply concepts of food labelling, traceability and global compliance in food industry practices.</p>								
<b>Mapping between Cos and PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
<b>Course Content</b>	<p><b>UNIT - 1: Fundamentals of Food Safety and Hazards</b>  Basics of food safety and its importance, Identification of physical, chemical and biological food hazards, Introduction to food allergens, contaminants, and adulterants, Basic principles of Good Manufacturing Practices (GMP) and Good Hygienic Practices (GHP), Introduction to HACCP and its 7 basic principles.</p>							Teaching Hours: 15	

	<p><b>UNIT - 2: Overview of National and International Food Regulations</b> Need for food regulations; mandatory vs. voluntary compliance. Food Safety and Standards Act (2006), FSSAI: Basic functions, licensing, and registration overview, Overview of Indian agencies: AGMARK and BIS, Introduction to global bodies: CODEX Alimentarius Commission (CAC) and FAO.</p>	Teaching Hours: 15
	<p><b>UNIT - 3: Introduction to Food Safety Management Systems</b> Concept of Food Safety Management Systems (FSMS), Introduction to ISO 9000 (Quality) and ISO 22000 (Food Safety) principles, Importance of food certification for businesses, Basic steps in food safety auditing, certifying bodies, and the certification process.</p>	Teaching Hours: 20
	<p><b>UNIT - 4: Basics of Food Labeling and Global Compliance</b> Fundamentals of food labeling based on FSSAI and Codex guidelines, Introduction to traceability concepts and product recall systems, Basic case studies on export compliance failure and rejections.</p>	Teaching Hours: 10
<b>Reference Books</b>	<ul style="list-style-type: none"> <li>• Alli, I. (2004) Food Quality Assurance: Principles and Practices. CRC Press, Boca Raton, FL, USA.</li> <li>• Andersen, V., Lelieveld, H. L. M., &amp; Motarjemi, Y. (Eds.). (2023) <i>Food Safety Management: A Practical Guide for the Food Industry</i> (2nd ed.). Academic Press (Elsevier).</li> <li>• Cramer, M. M. (2013) Food Plant Sanitation: Design, Maintenance, and Good Manufacturing Practices. CRC Press, Boca Raton, FL, USA.</li> <li>• Early, R. (1995). <i>Guide to Quality Management Systems for the Food Industry</i>. Blackie Academic &amp; Professional (Springer Science &amp; Business Media).</li> <li>• Food and Agriculture Organization (FAO) &amp; World Health Organization (WHO) (Ongoing). <i>Codex Alimentarius Commission Publications and Standards</i>. Rome: FAO/WHO. Available from: <a href="https://www.fao.org/fao-who-codexalimentarius">https://www.fao.org/fao-who-codexalimentarius</a></li> <li>• Food Safety and Standards Authority of India (FSSAI). (2011). <i>Food Safety and Standards Regulations Manuals</i> (and subsequent amendments). Ministry of Health and Family Welfare, Government of India, New Delhi. Available from: <a href="https://www.fssai.gov.in">https://www.fssai.gov.in</a></li> <li>• Hester, R. E. and Harrison, R. M. (2001) Food Safety and Food Quality. Royal Society of Chemistry, Cambridge, UK.</li> <li>• Schmidt, R. H. and Rodrick, G. E. (2003) Food Safety Handbook. John Wiley and Sons, Inc., Hoboken, New Jersey, USA.</li> </ul>	
<b>Teaching Methodology</b>	Classwork, Discussion, Self-Study, Projects, Seminars and/or Assignment	
<b>Evaluation Method</b>	50% CCE: Internal assessment based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% SEE: External assessment based on semester end University examination.	