



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Vocation

Level: Under Graduate

Branch: Food Processing and Quality Control

Course / Subject Code: BV03009021

Course / Subject Name: Food Drying and Dehydration

w. e. f. Academic Year:	2024-25
Semester:	3
Category of the Course:	Core Courses

**Prerequisite:** Basic knowledge of Food drying and dehydration processes and products

<b>Rationale:</b>	The course explores the principles and techniques of food drying and dehydration to extend shelf life, preserve quality, and enhance economic value. It emphasizes innovative drying methods, their applications in the food industry, and quality assessment, preparing students for careers in food processing and technology.
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## Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand the fundamentals and applications of drying and dehydration processes in food preservation.
02	Analyze different drying techniques and their suitability for various food products.
03	Design efficient drying systems based on energy and quality considerations.
04	Evaluate the quality attributes and shelf life of dried and dehydrated foods.

## Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	0	3	50	0	0	0	50

## Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	<b>Introduction to Drying and Dehydration</b> Importance, principles, and methods of drying. Overview of dehydration processes in the food industry.	08	15
	<b>Fundamentals of Moisture Movement</b>	10	20



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	Moisture content measurement, sorption isotherms, psychrometric principles. Heat and mass transfer during drying.		
3.	<b>Drying Equipment and Technologies</b> Tray dryers, spray dryers, freeze dryers, and microwave drying. Comparison of traditional and modern techniques. Energy considerations and optimization.	10	25
4.	<b>Quality and Shelf Life of Dried Foods</b> Quality changes during drying (color, texture, flavor, nutrients). Shelf-life determination and packaging of dehydrated foods.	09	20
5.	<b>Innovations and Future Trends</b> Emerging techniques (infrared, ultrasound-assisted drying). Sustainability in drying processes.	08	20
	<b>Total</b>	<b>45</b>	<b>100</b>

## Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
18	20	20	18	12	12

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

## References/Suggested Learning Resources:

### (a) Books:

1. Food Drying Science and Technology: Microbiology, Chemistry, Applications" by Yiu H. Hui, Wiley-Blackwell.
2. Dehydration of Foods" by N. R. Desrosier, CBS Publishers.
3. Postharvest Technology of Fruits and Vegetables" by Verma and Joshi, Indus Publishing.

### (b) Open-source software and website:

1. DRYMOSIM: Open-source software for modeling drying systems.
2. Simulink for drying process simulation (part of MATLAB).

### Websites

1. [NPTEL](http://www.nptel.ac.in/)
2. [Food and Agriculture Organization \(FAO\)](http://www.fao.org/)



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## **Suggested Course Practical List:**

1. Moisture content determination using oven drying and Karl Fischer methods.
2. Preparation of dried fruits/vegetables using a tray dryer.
3. Comparative study of drying methods: tray drying vs. microwave drying.
4. Determination of sorption isotherms for dehydrated foods.
5. Study of the rehydration characteristics of dried food products.

## **List of Laboratory/Learning Resources Required:**

1. Tray dryer, freeze dryer, and spray dryer.
2. Moisture meters and psychrometric charts.
3. Open-source simulation tools for drying process modeling.

## **Suggested Project List:**

1. Development of energy-efficient drying systems for agricultural products.
2. Assessment of nutrient retention in different drying techniques.
3. Sustainability analysis of drying processes in the food industry.
4. Quality analysis of dehydrated foods from traditional and innovative drying methods.

## **Suggested Activities for Students:**

1. Case studies on successful drying and dehydration industries in India.
2. Group discussions on the environmental impact of dehydration processes.
3. Simulation-based assignments on optimizing drying conditions.
4. Visits to local food processing units specializing in dehydration.

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