



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Bachelor of Engineering**

**Subject Code: 3151406**

**Technology of Grains**

Semester V

**Type of course:** Professional Course

**Prerequisite:** Nil

**Rationale:** This subject is aimed at imparting knowledge and skills related to the processing techniques, value addition, and handling of processing equipment of cereals, pulses and oil seeds to the students, as the understanding of these aspects is essential for the students to perform efficiently and effectively in the industry.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
1	<b>Properties of Food Grains:</b> Supply chain of food grains, Hydrothermal treatment of Grains, physico-thermal properties, biochemical properties, physico-chemical properties, Effect of different factors on various properties.	4	12
2	<b>Rice:</b> Parboiling and milling of paddy, Aging of rice, Rice enrichment, Processed rice products.	14	22
3	<b>Wheat:</b> Wheat and its quality characteristics for milling into flour and semolina, Flour milling, Turbo grinding and air-classification, Flour grades and their suitability for baking purposes, Assessment of flour quality and characteristics.	10	18
4	<b>Corn and Other cereals:</b> Dry and wet milling of corn, corn starch and its conversion products, Malting of Barley, Milling of millets.	6	14
5	<b>Milling of Pulses:</b> Traditional milling, Commercial milling and Modern methods of milling. Factors affecting milling of pulses, Pulse based extruded products.	8	16
6	<b>Processing of Oil seeds:</b> Pre-treatment, Oil extraction methods, Processing of extracted oil: Refining, Hydrogenation; Processing of deoiled cake: Protein rich products, Soybean processing.	8	18



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## Suggested Specification table with Marks(Theory):

Distribution of Theory Marks					
RLevel	ULevel	A Level	NLevel	E Level	CLevel
18	18	20	22	22	-

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

### Reference Books:

1. Post harvest technology of Cereals, Pulses and Oilseeds by Chakravarti A. Oxford Publishing.
2. Cereal Technology by Potter N.N. AVI Publication.
3. Unit Operations of Agricultural Processing by K.M. Singh and K.K. Sahay
4. Bakery Science & Cereal Technology by Neelam Khatar Paul, Rajbala Grewal & Sudesh Jood (Daya Publishing House).
5. Bakery Technology and Engineering by Matz S.A. CBS Publication.
6. Manual on Rice and its processing by CFTRI Mysore and IIT Kharagpur

### Course Outcome:

After learning the course the students should be able to:

- a. Understand the importance of supply chain of grains, properties of the grains.
- b. Define processes employed in the milling of grains through construction of Process Flow Diagrams.
- c. Understand the milling operations of paddy, wheat, corn, pulses and oilseeds and the utilization of byproducts.
- d. Identify the problems associated with milling of grains and their solution.
- e. Storage of the grains

### List of Experiments:

1. To study the physical properties of rice
2. To study the physical properties of paddy
3. To study the cooking quality of rice using water uptake method.
4. To prepare sprouted or germinated pulses or beans
5. To prepare parboiled paddy by pressure boiling method
6. Determination of Angle of Repose of grains
7. Preparation of quick cooked rice
8. To study the methods of extraction of oil from oilseeds
9. Determination of slipping point of fat
10. Determination of undermilled grains from polished rice

### Major Equipments:

- a. Grain dryer
- b. Specific gravity separator
- c. Cyclone separator



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- d. Sieve shaker
- e. Waterbath
- f. Angle of repose equipment
- g. Minioilexpeller
- h. Minidalmill

## List of Open Source Software/learning website

- a. [www.icpt.edu.in](http://www.icpt.edu.in)
- b. [sch.vscht.cz/materialy/erasmus/CCHT2Engl-Hr-2010.pdf](http://sch.vscht.cz/materialy/erasmus/CCHT2Engl-Hr-2010.pdf)
- c. [www.cftri.com/milling.html](http://www.cftri.com/milling.html)
- d. [www.grains.k-state.edu](http://www.grains.k-state.edu)
- e. [www.grainmilling.org.za/miller.htm](http://www.grainmilling.org.za/miller.htm)