GUJARAT TECHNOLOGICAL UNIVERSITY

BACHELOR OF ENGINEERING SYLLABUS

Subject Code : 3135103

Subject Name : Food Material Science & Engineering

WEF Academic Year :	2022-23
Semester :	3
Category of the Course :	Engineering Science

Prerequisite : Nil

Rationale :

Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Course Content :

Sr. No.	Course Content	No. of Hours
1	**Food materials science and engineering- An overview** Introduction: Molecular basis of food materials, observation of materials at various size ranges and size-property relationship, amorphous and crystalline structures of materials, gel structures of food materials, interfacial properties of the food materials, application of materials science in food design and development of engineered food materials.	9
2	**Food polymers and colloids** Interactions of Food Biopolymers in molecular and colloidal dispersions, functional properties of polymers and colloids, incompatibility of polymers and colloids, phase diagram of food polymers.	7
3	**Crystalline, glassy, and rubbery state of food** introduction, thermodynamics principles, factors affecting and their application in food systems, water plasticization.	6
4	**Textural and rheological aspect of solid, semi-solid and liquid food** texture measurement of foods, texture measuring instruments, ISO standards of texture measurement, rheological properties of semi-solid and liquid food in connection with the food material science: flow behavior, viscoelastic behavior, extension flow and mechanical models.	9
5	**Micro and macro structures of food materials and their analysis** measurement of microstructures/nanostructures, the relationship between structure and quality, microstructure and emulsions, structure and sensory perception, process to control the structure of food materials, measurement techniques for micro and macro structures.	9

6	**Material Science approaches towards food design** State diagram and its interpretation in food design.	5

Reference Book :

1. Schaum's Outline of Strength of Materials. William Nash McGraw-Hill Education 6th edition 2013
2. Food Materials Science and Engineering. Bhesh Bhandari and Yrjö H. Roos, Wiley-Blackwell 2012.
3. Food Microbiology, W C Frazier, and D C Westhoff, McGraw Hill Book Company, NY

Course Outcome :

After Completion of the Course, Student will able to :

No.	Course Outcomes
01	Describe qualitatively the bonding scheme, structure and general physical properties of a given food, as well as possible applications in food design.
02	Ability to describe the physical origin, as well as the strength of the polymer and colloids based upon type of bond, structure, and other physical properties.
03	Ability to describe a polymer's viscoelastic behavior above and below the glass transition.
04	Ability to correlate the mechanical properties qualitatively in relevance to food engineering.

Suggested Course Practical List :

1) Determination of the physical properties size, shape, sphericity of food products.
2) Determination of average particle size and distribution of powdered material.
3) Determination of moisture content and water activity of food products.
4) Determination of bulk density, true density and porosity of food grains.
5) Determination of color of various food grains, fruits, vegetables, spices and processed foods by hunter color lab.
6) Determination of density and specific gravity of various liquid foods.
7) Determination of rheological properties of food material by viscometer.
8) Determination of frictional properties (angle of repose and coefficient of friction) of food grains.
9) Measurement of firmness of fruits and vegetables by penetrometer
10) Determination of electrical properties of food materials.

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