GUJARAT TECHNOLOGICAL UNIVERSITY

FOOD PROCESSING TECHNOLOGY

FOOD CHEMISTRY

SUBJECT CODE: 2131407

B.E. 3RD SEMESTER

Type of Course: Food Processing Technology

Prerequisite: Nil

Rationale: Food chemistry is one of the major aspects of food science which deals with the composition and properties of food and the chemical changes it undergoes during handling, processing, and storage. The course will cover topics like Water, Carbohydrates, Protein, Lipids, Minerals, Pigments and Food Additives. This course provides students with knowledge on the chemical constituents of food and their functional significance in food systems; it will also be beneficial to evaluate how the conditions of storage and handling of food substances affect food qualities .

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage (%)
1.	**Moisture in foods** Structure, Properties, Types of water in food and their specific function, Water activity and stability.	6	15
2.	**Lipids** Classification, Structures, Physical and chemical properties, Rancidity and its types.	8	15
3	**Carbohydrates** Definition, Classification, Functions, Properties of simple and complex carbohydrates.	8	15
4.	**Proteins** Introduction, Classification and structures, Physicochemical properties, Nutritive and supplementary value of food proteins, Denaturation and its implications, Gel formation and its theories.	10	20
5.	**Pigments** Introduction and significance of natural pigments in food - Chlorophylls, Carotenoids, Haemoglobin and Myoglobin, Anthocyanins, Flavonoids, Betalains Tannins.	06	15
6.	**Food additives** Definitions, uses and functions of: Acids, Bases, Buffer system,	08	20

	Chelating / sequestering agents, Low calorie and non-nutritive sweeteners, Antioxidants, Emulsifying and Stabilizing agents, Anti-caking agents, Thickeners, Firming agents. Flour bleaching agents and Bread improvers. Anti-microbial agents/class-I and Class –II preservatives		

Reference Books:

1. Food Chemistry by L H Meyor (CBS Publisher, Delhi)
2. Food Facts and Principal by N. ShakuntalaManay& M. Shadaksharaswamy (New International (P) Ltd. Publishers, New Delhi)
3. Food Chemistry by O.R. Fennema, 2nd edn. (Marcel Dekkar Inc.)
4. Food Chemistry by H D Belitz and W. Groech (Springer Publ.)
5. Food Additives by S.N. Mahindru
6. Food Processing and Preservation by B.Siavsankar (Prentice Hall India)

Course Outcomes:

At the end of this course students will be able to:

1. Name and describe the general chemical structures of the major components of foods (water, proteins, carbohydrates, and lipids) and selected minor components (e.g. minerals pigments and additives).
2. Know the functional behavior of these food components with respect to food quality, nutrition and safety.
3. Predict how processing conditions are likely to change the reactivity of food components.
4. Control the major chemical and biochemical (enzymatic) reactions that influence food quality with emphasis on food industry applications.
5. Describe the physicochemical properties of water and the significance of water activity to the stability of foods.
6. Describe the chemistry of carbohydrates and the mechanisms of non-enzymatic and enzymatic browning.
7. Understand the chemistry and significance of lipids in foods.

List of Practical:

1. Introduction to laboratory instruments and equipments
2. Determination of moisture content in food by hot air oven method.
3. Determination of acidity of given food sample
4. Determination of moisture content in food sample by Infra Red Moisture Balance/Meter
5. Determination of specific gravity of given oil sample
6. Determination of ash content in given food sample
7. Determination of crude fat by Soxhlet method
8. Determination of acid value of given oil sample.
9. Determination of Saponification value of given oil sample.
10. Determination of protein content by Micro-Kjeldhal method

Open Ended Problem:

- Effect of temperature on gelation of various food proteins.
- Factors affecting on chlorophyll retention in green leafy vegetables.

List of Open Source Software/learning website

- www.ift.org/knowledge-center/core-sciences/food-chemistry.aspx
- www.rsc.org/foodfunction
- www.wiziq.com/tutorials/food-chemistry
- www.fao.org/food/food-safety-quality/scientific-advice/jecfa/en/

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.